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ABSTRACTS

4th World Congress on ADHD
From Childhood to Adult Disease

06–09 June 2013 · Milan · Italy

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Introduction

In the name of the World Federation of ADHD, it is our pleasure to welcome you here in Milan to the 4th World Congress on ADHD: from Childhood to Adult Disease.

After the incredible success of the Berlin meeting in 2011—almost 2,100 participants from 79 countries attended—Milan is the ideal setting to elucidate and discuss the current advances in basic science and clinical research, contributing to our understanding of ADHD as a lifespan disorder.

In this volume, abstracts for the plenary sessions (PL) come first, then the hot topic symposia (HT), and finally the poster (P) abstracts. Submitted abstracts have not been modified in any way. The PL have been organised in five topics: Costs and benefits of ADHD; Approaches to the subtyping of ADHD; What is next in ADHD? Update on treatment of ADHD across the lifespan; Reward and motivation in ADHD. The 16 HT cover the latest clinical and research developments in the broader field of ADHD and related disorders.

We are pleased to have received more than 400 poster abstracts, which is a large number compared to our initial steps marked by the congress in 2007. We have organised altogether 37 Guided Poster Tours so that presentations of the different topic categories can be represented uniformly. The topics are: Aetiology, autism spectrum disorders, co-morbidity, diagnosis, electrophysiology, genetics, imaging studies, life quality, non-pharmacological treatment, pathophysiology, pharmacological treatment, substance abuse and miscellaneous. We would like to encourage you to not only view these selected posters, but to also engage in active discussions and to exchange ideas with our young colleagues.

Of all abstracts submitted by young scientists, the eight most meritorious have been selected by the Scientific Programme Committee. The authors have been invited to give a presentation during one of the two young scientist award sessions (YS). With this approach, we intended to highlight the importance of original scientific contributions of young colleagues at the congress.

We thank all the speakers, contributors, and sponsors of the 4th World Congress on ADHD: from Childhood to Adult Disease and welcome you to—what we are sure—will be a very enjoyable and highly informative event.

Luis Rohde
Congress President
President World Federation of ADHD

Manfred Gerlach
Chairmen Scientific
Programme Committee

Friday, 7 June 2013, 08.30–10.30

PL-01 Costs and benefits of ADHD

PL-01-001 Costs and benefits of ADHD

M. Schlander*

* Wiesbaden, Germany

Objective: Economists generally prefer a societal perspective when assessing the opportunity cost (i.e., the value foregone by alternative use) of all resources utilized for diagnostic and therapeutic interventions ("direct" costs) and loss of productivity ("indirect" costs) attributable to a defined condition. In practice, however, many analysts adopt the narrow perspective of a health care payer, i.e., that of a national health scheme (NHS) or that of insurance companies, be it public or private ones. Accordingly, most studies of the cost of attention-deficit/hyperactivity disorder (ADHD) have reported direct medical costs only. A further limitation of most studies published to date has been the limited time horizon evaluated. In particular, almost all studies using administrative claims data to determine the direct cost from a payer's perspective have been cross-sectional in nature. Children and adolescents with ADHD have been found to receive significantly more therapy, and have more physician and emergency department visits and more hospitalizations compared to their siblings without ADHD. Consequently, the health care costs for children and adolescents with ADHD are, across studies, consistently higher than those of control patients without mental health problems. Further to this, additional costs in the education system associated with ADHD may result from extra lessons, special classes and additional staff. Increased rates of criminal behavior, delinquency, and substance use add to the excess costs associated with ADHD in adolescents; and ADHD in children and adolescents can also result in indirect costs for their parents due to loss of productivity. Any interpretation of these findings needs to take into account the prevalent coexistence of other mental health problems in patients with ADHD. For example, following observations from the Nordbaden Project in Germany, the additional presence of conduct and personality disorder, mood and affective disorders, specific development disorders, and adjustment disorders resulted in substantially increased direct medical costs. Even in the absence of ADHD, these conditions had a profound impact on the costs of health care, in many cases exceeding the cost associated with pure ADHD. To date, the overall economic impact of coexisting conditions has not yet been systematically evaluated. Studies of adult patients with ADHD found significantly increased absenteeism from work. According to the WHO World Mental Health Survey (2008), ADHD was associated with a statistically significant 22.1 annual days of lost excess role performance compared to control persons without ADHD. Furthermore, adult ADHD was associated with increased numbers of workplace injuries and accidents, reductions in work performance, and decreased annual household incomes for affected families. Data also show increased direct medical costs in adults with ADHD, but again these data should be interpreted with some caution given the likely selection of severe cases related to often relatively low diagnosis rates of adult ADHD. The potential bias introduced by naïve extrapolation from small studies is illustrated by some recent reviews suggesting social costs of ADHD higher than the total cost of all cancers. More reliable estimates are cumbersome and should address the impact severity, coexistent conditions, and explicitly take into account international and regional differences. It will be argued that exaggerated estimates of social costs may do more harm than good, especially from the perspective of patients. Future studies are needed to estimate the true cost of ADHD, applying more complex longitudinal models of the natural history of the disorder. Furthermore, it should be noted that cost of illness studies by definition cannot provide insights into the value of interventions.

PL-01-002 ADHD in academic and professional life

K. W. Lange*

* Regensburg, Germany

Objective: Children and adolescents with attention deficit hyperactivity disorder (ADHD) have been shown to commonly present with academic underachievement and learning disabilities.
Method: This review summarizes and discusses the problems of patients with ADHD related to academic and professional life.
Results: The adverse effects of ADHD on children change from primary school and adolescence, with varying aspects of the disorder being more prominent at different stages. ADHD persisting into adulthood may cause disruptions to professional life. However, childhood ADHD does not preclude high educational and vocational achievements.

PL-01-003 Entrepreneurship and ADHD

M. Adamou*

* Wakefield, United Kingdom

Abstract not received

PL-01-004 ADHD and driving

O. Tucha*

* Groningen, The Netherlands

Objective: Driving is a complex and important activity of daily living which requires the integrity of a variety of cognitive functions including executive functioning, focussed and sustained attention as well as spatial attention. Furthermore, personality factors and emotional processing have been shown to affect driving abilities. For example, impulsiveness, emotional instability and thrill-seeking behaviour have been related to an increased crash risk. Attention Deficit Hyperactivity disorder (ADHD) in adults is a condition which is characterised by impairments in just these cognitive functions as well as by these behavioural and emotional disturbances. Therefore, adults with ADHD appear to be particularly susceptible to poor, unsafe and crash-prone driving. This presentation summarizes the growing literature on ADHD and driving. The findings of observational studies and studies examining driving behaviour of adults with ADHD (i.e., driving in a simulator, on-road driving), studies investigating the effects of interventions (i.e., pharmacologic and non-pharmacologic treatment strategies) as well as studies assessing cognitive abilities related to poor driving performance of adults with ADHD will be presented.

Friday, 7 June 2013, 11.00–12.30

PL-02 Approaches to the subtyping of ADHD

PL-02-001 Is there validity in sub-typing ADHD

E. Willcut*

* Boulder, USA

Objective: Despite over 30 years of research, the validity of diagnostic subtypes of attention deficit/hyperactivity disorder (ADHD) remains unclear. This presentation will describe a series of analyses that were conducted to test the internal and external validity of the DSM-IV subtypes of ADHD to inform the development of diagnostic criteria for ADHD in DSM-5.
Method: To test the validity of the DSM-IV subtype model, 546 studies of DSM-IV ADHD were included in a comprehensive meta-analysis. In addition, a series of new analyses were conducted in three large population-based samples in the United States.
Results: Converging results from all of these sources of information overwhelmingly support the internal and external validity of the distinction between the inattention and hyperactivity-impulsivity symptom dimensions. However, studies of longitudinal stability, academic and cognitive functioning, etiological influences, and treatment response provide unexpectedly weak support for the distinction between the categorical DSM-IV combined and predominantly inattentive subtypes.
Conclusion: The DSM-IV subtype structure may not provide the optimal approach to describe heterogeneity among individuals with ADHD. Several alternative approaches and subtype models will be described to facilitate future research.

PL-02-002 ADD: an ADHD type or a different disorder?

R. A. Barkley*

* Syracuse, NY, USA

Objective: ADD is the older term for ADHD but has returned in use by clinicians to indicate individuals with ADHD Predominantly Inattentive Type and specifically that subset whom researchers have termed Sluggish Cognitive Tempo (SCT). This presentation will review the history of SCT and present new findings that suggest it is a distinct condition from but may sometimes overlap or be comorbid with ADHD.
Method: Present a brief history of ADD/SCT, then review findings concerning the nature of SCT, its associated demographics, comorbidities and impairments and how these are distinct from those associated with ADHD.
Results: The findings of various studies will be discussed indicating that SCT forms a distinct set of symptom dimensions from ADHD, has unique demographic correlates, shows a different pattern of comorbidity with other psychiatric and learning disorders, and is associated with different impairments than is ADHD.
Conclusion: SCT, or what has been called ADD, is a distinct attention disorder from ADHD but may coexist with it in up to a third to a half of all cases of each.

PL-02-003 Families unhappy in their own right: towards neurobiological subtyping of ADHD

K.-P. Lesch*, M. Romanos, A. Reif, B. Franke

* Würzburg, Germany

Objective: Genome-wide screening methods identify a rapidly increasing number of rare mutations, both inherited and de novo, such as single nucleotide (SNV) and copy-number variants (CNV) associated with ADHD. We performed whole-exome sequencing (WES) of several affected members 8 extended pedigrees with a high density of ADHD followed by segregation analysis of candidate variants. Preliminary results indicate no clear segregation patterns of individual variants suggesting more complex, oligogenic disease etiology. The diversity of ADHD-related phenotypes supports the hypothesis of extensive genetic heterogeneity, which excludes the interfamilial combining of sequencing data and suggests that every family has to be considered individually. With the implementation of high-throughput sequencing technologies it is to be expected that the number of putatively pathogenic mutations causing ADHD will further increase in the next years. This is likely to lead to the identification of multiple functional relationships between gene products and the emergence of common molecular and cellular pathways towards disease. Potential candidates are genes involved in synaptogenesis and synaptic plasticity. These common pathways will allow refined subtyping of ADHD into population- or even family-specific syndromes and will provide attractive opportunities for knowledge-based personalised therapeutic interventions.

Saturday, 8 June 2013, 08.30–10.30

PL-03 What is next in ADHD?

PL-03-001 Advances in phenotypic definitions of ADHD

L. A. Rohde*

* Porto Alegre, Brazil

Conflict of interest: In this presentation, the rationale for the DSM-5 diagnostic criteria for ADHD will be critically reviewed including main modifications like those in the age-of-onset criteria, developmental adaptations for the diagnosis in adults and the removal of the exclusion of the diagnosis in the presence of Autistic Spectrum Disorders. Relevant areas of uncertainty on how phenotypic definition of the disorder should be delimited will be discussed. Limitations of the polythetic approach for ADHD diagnosis in advancing the current neurobiological knowledge about the disorder will be presented. Other approaches like the use of clinical prototypes and those originated from a dimensional perspective will also be reviewed.

PL-03-002 New ways of conceptualizing ADHD neurobiology

F. X. Castellanos*

* New York, USA

Objective: A variety of neuroimaging approaches have been used with the goal of understanding the neurobiology of ADHD over the past two decades. Recent brain imaging investigations have focused on large-scale neural networks which are proving to be heuristically useful and which seem to correspond to functionally important systems in brain. The most frequently implicated in ADHD (and in many other psychiatric disorders) is the default network, which appears to interact with the frontoparietal executive control network and with the dorsal and ventral attention networks. The interplay among these systems is increasingly being examined through both task-based and resting state fMRI studies. Minimizing head motion is particularly important for resting state fMRI studies, but when this is done, resting state fMRI data are amenable to aggregation across multiple sites, thus making data sharing possible to attain sufficiently large samples. This process is now underway and is beginning to reveal mechanistic insights into aspects of ADHD.

PL-03-003 The case for autistic traits in ADHD

J. Biederman*

* Boston, USA

Objective: This study sought to address the implications of autistic traits (ATs) in ADHD youth without a diagnosis of autism by providing a comprehensive comparison of clinical and neuropsychological correlates of children with and without ATs across multiple non-overlapping domains of functioning.
Method: Participants were 242 youth with ADHD and 227 controls without ADHD of both sexes. Participants completed a large battery of measures designed to assess psychiatric comorbidity, psychosocial, educational, and cognitive parameters. A diagnosis of autism was exclusionary. ATs were operationalized using a unique profile from the CBCL consisting of 3 subscales (Withdrawn + Social + Thought Problems T-scores), which had been previously linked with autism spectrum disorders.
Results: A positive AT profile was significantly overrepresented among ADHD children (18 vs. 0.87 %, $p < 0.01$) when compared with Controls. While ADHD children with and without a positive AT profile did not differ in the core symptoms of ADHD, ADHD children with a positive AT profile were significantly more impaired as indexed by additional psychopathology and functioning in the interpersonal, school, family and cognitive domains.
Conclusion: A substantial minority of ADHD children manifests autistic traits. ADHD children with the autistic trait profile exhibit greater severity of illness and dysfunction in a wide range of non-overlapping domains of functioning. Findings call for further research in this sparingly studied area.

PL-03-004 What we need to turn the page of me-too treatments? Can we foresee innovative pharmacological interventions for ADHD?

J. Buitelaar*

* Nijmegen, The Netherlands

Objective: Current effect treatments for ADHD all target the dopaminergic (DA) and/or noradrenergic (NA) neurotransmission. Psychostimulants enhance DA and NA mainly by reuptake inhibition, atomoxetine is a selective NA reuptake inhibitor. Pre-synaptic alpha-2 agonists modulate also the NA neurotransmission. In fact, after the serendipitous discovery by Bradley in 1937 of benzedrine (a racemic mixture of amphetamines) and the FDA approval for methylphenidate in 1955, the introduction of extended release forms of stimulants has been the major innovation. Despite preclinical data showing that nicotinic cholinergic systems are involved with several important aspects of cognitive function including attention, learning and memory, clinical studies with these agents were not terribly successful. Thus, is there a strategy for developing real innovative pharmacological interventions for ADHD?
Method: I will review current molecular-genetic work in ADHD as well draw upon recent work in autism. I will further discuss progress in developing animal models of ADHD (such as Drosophila) and developing cellular models of ADHD.
Results: Integrated bioinformatic and pathway analyses of molecular-genetic findings suggest that the causal genetic variants converge into a limited number of gene-protein networks. Targeted interventions in preclinical models of autism has shown to be able to rescue the phenotype even at adult age. Neuroscience findings suggest that ADHD is disorder of neural communication.
Conclusion: Such a strategy should take account of the following issues: the concept of ADHD as a disorder of neuronal connectivity; the concept of ADHD, based on recent genetic studies and meta-analyses, as a disorder of synapse formation and the micro architecture of the brain; and the concept of personalized medicine which require segmentation of ADHD into biologically more homogenous subtypes. New techniques as induced neuronal stem cells will allow us to build cellular models of ADHD that can be used as an efficient way of drug screening.

Sunday, 9 June 2013, 08.30–10.30

PL-04 Update on the treatment of ADHD across the lifespan

PL-04-001 New pharmacological treatment options

A. Zuddas*

* Cagliari, Italy

Objective: To review efficacy and safety of the current medications, and their different preparation and derivatives, for ADHD in children, adolescent and adults To review the available data on experimental medications with innovative mechanisms for the disorder and their clinical and ethical implications.
Method: Review of literature data on efficacy, safety and impact on quality of life of stimulants (methylphenidate and amphetamines) and non stimulants (atomoxetine and guanfacine) medications; search and analysis of published data on innovative medication identified by clinical trial registries.
Results: Several derivative of existing drugs, such as liquid preparation of methylphenidate, pro-drug of amphetamine (lysdexamphetamine), alpha 2 agonists (guanfacine), a specific NE-uptake inhibitor (LY 2216684) and Triple mono-amine re-uptake inhibitors, have been recently investigated: may of them have been registered for ADHD and are effectively used in many countries. Innovative medication such as nicotinic agents, AMPA modulator, H3 agents 5HT7 modulators and essential fatty acids are still under intense scrutiny and investigation: their development consider brain function (attention, memory) rather than disorders and they are under investigation also for other psychiatric disorder (i.e., depression, dementia, cognitive impairment in schizophrenia).

Conclusion Current ADHD medication in their different preparation are among the more effective drugs in psychiatry; they are relatively safe and easy to use. New medications with innovative mechanisms of action are under development considering brain function rather than disorders. Identification of biomarkers will be crucial (also considering the cost of new medications).

PL-04-002 Cardiovascular safety of psychostimulants

A. G. Winterstein*

* Gainesville, USA

Objective: Two large population-based cohort studies of stimulant cardiac risk were published recently. This presentation will focus on one study in youth eligible for Medicaid benefit in 28 US states and discuss results in context of the second study.
Method: 1,219,847 youth age 3–18 eligible for state Medicaid programs from 1999 to 2006 entered the cohort at the first diagnosis of a mental health condition commonly treated with stimulants after a minimum period of 6 months' eligibility. They were followed until loss of eligibility, their 19th birthday, admission to hospital for longer than 30 days, or death. Exclusion criteria included transplant recipients, receipt of dialysis, or claims indicating substance misuse. We retained high-risk groups with similar use of stimulants as low risk children. We used discrete survival analysis to estimate the relative risk for a composite endpoint of stroke, acute myocardial infarction, or sudden cardiac death for periods of stimulant use and non-use, adjusted for exposure propensity score and antipsychotic use for the full cohort and the high risk and low risk groups.
Results: A total of 66 events occurred during 2,321,311 years of follow-up. The adjusted odds ratio for current versus no stimulant use was 0.62 (95 % confidence interval 0.27–1.44), with a corresponding adjusted incidence rate of 2.2 and 3.5 per 100,000 patient years for current stimulant and non-use, respectively. 26 events occurred in high-risk patients (incidence rate 63 per 100,000 patient years) with an odds ratio of 1.02 (0.28–3.69).
Conclusion: Treatment of children with central nervous stimulants is not significantly associated with an increase in the short-term risk of severe cardiac events. Analyses cannot be generalized to children with long-term use of stimulants. Furthermore, long-term effects of slight increases in heart rate or blood pressure are unknown.

PL-04-003 Non-pharmacological treatment

S. Young*

* London, United Kingdom

Objective: NICE guidelines recommend that drug treatment for children, young people and adults with ADHD should always form part of a comprehensive treatment plan that includes psychological, behavioural and educational advice and interventions. Group parent training and/or individual psychological treatments are recommended as a first-line treatment for children with 'moderate' ADHD. At the time of publication, there were very few studies evaluating non-pharmacological treatments in adolescents and adults with ADHD and there has since been a substantial increase in published research investigating psychological therapies for the treatment of ADHD in adults. This presentation will consider the need for non-pharmacological treatment in young people and adults and review the evidence for this treatment. Many of the studies are limited by methodological problems, including open label design, small sample size, exclusion of samples with severe comorbidities, inadequate description of interventions given to control groups, lack of blinding and follow-up. Despite these pitfalls, some commonalities emerge supporting a structured cognitive behavioural therapy (CBT) paradigm that follows a skill based program. Both group and individual treatments seem to be helpful and many studies reported large effects that were (when measured) sustained over time. Group treatments were recommended by NICE due to their resource and cost efficiency; some interventions integrate both group treatment and individual coaching sessions in order to support the patient to transfer skills acquired into daily routines. This approach may be particularly helpful when treating individuals with complex needs and severe comorbidities.

PL-04-004 Cost effectiveness of treatment

M. Weiss*

* Vancouver, Canada

Abstract not received.

Sunday, 9 June 2013, 11.00–12.30

PL-05 Reward and motivation in ADHD

PL-05-001 Substance addiction in relation to ADHD; motivation and reward

G. van de Glind*

* VS. Utrecht, The Netherlands

Objective: Neurobiological features, like motivation and reward and impaired ability to inhibit intentional actions, are highly relevant in vulnerability for development of Substance Use Disorders (SUD). They are also known to be part of ADHD's etiology. This presentation will zoom into 'motivation and reward' in SUD and ADHD. This presentation will discuss research findings in both the domain of SUD and of ADHD.
Method: Findings in the literature on 'motivation and reward' in SUD and ADHD will be presented. Also relations with genetic and environmental factors will be discussed. Two cases of young adults with ADHD and comorbid SUD will be presented. The literature also suggests an association between anhedonia and stimulant dependence. The dopamine system is involved in conditioning via motivation and reward. Impairment in the motivation and reward system, has mayor implications for social functioning, adding to the vulnerability for SUD development. Recent neuroimaging studies show altered brain structure and altered function in specific brain circuits related to motivation and reward. Moreover children with attention-deficit/hyperactivity disorder show prominent abnormalities in the inferior PFC and its connections to striatal, cerebellar, and parietal regions.
Results: The literature also suggests an association between one of the symptoms of depression, anhedonia (i.e., diminished interest or pleasure in rewarding activities), and stimulant dependence The dopamine system is involved in experiencing pleasure, feeling good. Hence it is involved in conditioning via motivation and reward. Impairment in the motivation and reward system, has mayor implications for social functioning, adding to the vulnerability for SUD development. Recent neuroimaging studies show altered brain structure and altered function in specific brain circuits related to motivation and reward. Moreover children with attention-deficit/

hyperactivity disorder show prominent abnormalities in the inferior PFC and its connections to striatal, cerebellar, and parietal regions.
Conclusion: Implications for treatment and for prevention of development of SUD in ADHD adolescents, related to motivation and reward, will be discussed.

PL-05-002 Neurophysiology of reward processing in ADHD

A. Fallgatter*

* Tübingen, Germany

The reward system is considered a relevant part of the brain network disturbed in ADHD. Delay discounting is a particular form of reward processing related to impulsivity and is operationalized as the preference for smaller-but-sooner over later-but-larger rewards. Delay discounting can be measured with intertemporal choice paradigms. Moreover, neural structures involved in delay discounting (e.g. the ventral-striatum and the orbitofrontal cortex) are highly innervated by dopaminergic neurons.

We employed the functional imaging methods Near-Infrared Spectroscopy (NIRS) and functional Magnetic Resonance Imaging (fMRI) in order to measure brain function during intertemporal choice paradigms in groups of healthy subjects and patients with ADHD. Behavioral measures of impulsivity were employed. Dopaminergic neurotransmission was assessed by a genetic polymorphism (Val158Met) in the gene of the catechol-O-methyltransferase, which has been shown to alter the dopamine bioavailability.

NIRS measurements in healthy subjects indicated a dopamine-related increase of function from low (low DA level) to partial (intermediate DA level) and full (high DA level) reward delay sensitivity within the orbitofrontal cortex. Furthermore, DA-bioavailability was shown to moderate the association of neural reward delay sensitivity and impulsivity: reward delay sensitivity in the orbitofrontal cortex was strongly correlated with impulsivity at intermediate dopamine levels, but not at low or high dopamine levels where impulsivity was related to delay-independent activation of the orbitofrontal cortex. Functional MRI investigations suggested a hyporesponsiveness of the ventral striatal reward system in patients with ADHD as compared to healthy controls for both immediate and delayed rewards. In contrast, delayed rewards evoked hyperactivation in the dorsal caudate nucleus and the amygdala of ADHD patients.

These data support the conception of a close link between delay discounting, brain activation and dopaminergic neurotransmission. In particular, the results implicate that studies on neural correlates of delay discounting should account for the dopamine bioavailability.

PL-05-003 Obesity

S. Kooij*

* Den Haag, The Netherlands

Objective: ADHD is associated with increased rates of obesity in both children and adults, in both clinical and epidemiological studies.
Method: Literature review regarding the possible pathways that contribute to obesity in ADHD. The consequences of obesity for health in general, like diabetes, cardiovascular disease and cancer, will be discussed. The relationship between obesity in ADHD patients and the obesity epidemic in the Western world, might be explained by short sleep duration in both ADHD patients and in our 24 h society.
Results: Several factors are involved in the development of obesity in ADHD: genetics, lifestyle, impulsivity, addiction, mood and sleep problems all have impact on appetite and weight in ADHD patients.
Conclusion: Based on the data, new, comprehensive treatment perspectives are proposed to prevent and treat obesity in ADHD patients. The relatedness of weight and sleep duration may also offer perspectives for the reduction of obesity rates in the Western world.

Thursday, 6 June 2013, 15.00–16.30

HT-01 Research consortia present new findings

HT-01-001 An overview of the genetics of adult ADHD: the IMPACT consortium

A. Reif*

* Würzburg, Germany

Objective: The persisting form of attention deficit/hyperactivity disorder (adult ADHD, aADHD) has a prevalence of up to 5 % and presumably represents a more severe form of ADHD. This condition goes along with a plethora of comorbid disorders, e.g., depression, bipolar disorder, anxiety disorders, and substance abuse disorders, causing considerable burden of disease. Despite its importance and its high heritability, only little is known about the genetics and the developmental pathways leading to persistence of ADHD.
Method: To address this issue, the International Multicenter persistent ADHD CollaboraTion (IMpACT) was established in 2008 and comprises research centers from Brazil, Germany, the Netherlands, Norway, UK, USA, and Spain, that all have expertise in both clinical aspects of ADHD as well as it molecular genetics.
Results: A number of candidate gene studies as well as meta-analyses performed within the IMpACT consortium implicate some of the same genes involved in ADHD in children, although in some cases different alleles may be responsible for adult versus childhood ADHD. Up to now, no specific linkage or individual genome-wide association studies were performed, however, exome and whole genome sequencing studies are under way. In addition, studies of rare genetic variants have identified probable causative mutations for aADHD, comprising e.g., the genes encoding DIRAS2 or NPY. Use of endophenotypes based on neuropsychology and neuroimaging, as well as hold the promise of identifying additional genetic variants involved in disease etiology.
Conclusion: Ultimately, these studies might identify disease mechanisms that might enable prevention of persistence of ADHD into adulthood.

HT-01-002 Overlap and differences between ADHD and ASD: analyses of data from Neuroimage and BOA

N. Lambregts-Rommelse*

* EZ Mijmengen, The Netherlands

Objective: Why are attention-deficit/hyperactivity disorder (ADHD) and Autism Spectrum Disorder (ASD) together so frequently present in the same individual and/or family? Can shared endophenotypes (underlying, heritable vulnerability traits) play a role here? How does development influences this complex picture?
Method: These questions will be discussed in the light of new findings from two large longitudinal family-genetic projects primarily based on ADHD (the IMAGE project) and ASD (the BOA project)

with substantial overlap in measurements, facilitating pooling of data of both cohorts.
Results: Results indicate that heritable vulnerabilities in social cognition and executive functioning may increase the risk for ADHD and ASD alike. However, the phenotypic co-occurrence of ADHD and ASD and also of the underlying cognitive endophenotypes are strongly moderated by age.
Conclusion: Implications for treatment and future research are discussed.

HT-01-003 Abnormal reward anticipation in ADHD: A subtyping strategy

J. Buitelaar*, D. von Rhein, R. Cools

* Nijmegen, The Netherlands

Objective: Intermediate phenotypes are neurocognitive measures of psychiatric disorders that are heritable vulnerability traits, which mediate between genes and phenotype. As biological siblings of patients share on average 50 % of their genes, some of the risk genes should also be present in unaffected siblings. Consequently, intermediate phenotypes should also be evident in unaffected siblings. Deficits in the processing of reward have been described as one of the main cognitive impairments in ADHD. For example, patients with ADHD show a stronger preference than matched controls for immediate rewards compared with delayed rewards even if the delayed reward is much higher than the immediate one, a phenomenon referred to as delay aversion (DEL) (Sonuga-Barke 1992). The aim of this study is to examine whether reward processing is an intermediate phenotype of ADHD.
Method: The monetary incentive delay (MID) task has been well validated to investigate different phases of reward processing (Knutson et al. 2001). We administered the MID task in the MRI scanner to 137 patients with ADHD, 83 unaffected siblings and 86 age-matched controls, all participants of the NeuroIMAGE study.
Results: Analysis of the cue-related neural responses revealed a main effect in the ventral striatum, with greater activation after reward. This effect however was similar for all groups. Analysis of the outcome related neural responses demonstrated larger signal changes for ADHD patients compared to controls with the unaffected siblings being intermediate.
Conclusion: I will discuss these findings in the context of the existing literature. Our results show that in this large cohort cue-related (i.e., anticipatory) neural responses are not abnormal in ADHD. Rather, the neural responses to received reward are abnormal, and could be useful as an intermediate phenotype. Our further analyses will be directed at identifying whether specific subgroups of ADHD exists with more dominant reward-related pathology.

HT-01-004 Large-Scale multicenter genetic studies in ADHD

B. Franke*

* Nijmegen, The Netherlands

Objective: ADHD is a highly heritable disorder, but finding the genes contributing to ADHD has proven difficult. This is caused by the strong genetic heterogeneity of ADHD, where many different common and rare genetic variants contribute to disease risk. Common genetic risk factors are all of small individual effect, which means that large sample sizes are required to identify them. Equally, large samples are also needed to confirm the role of rare genetic defects in ADHD.
Method: The large samples needed to do meaningful gene-finding studies in ADHD can only be collected in large international collaborations, like the ADHD Molecular Genetics Network, the International Multi-center ADHD Genetics (IMAGE) study, the International Multi-center persistent ADHD CollaboraTion (IMpACT) and the Psychiatric Genomics Consortium (PGC).
Results: As part of the PGC, many research groups have shared their genetics data on ADHD. This information has been used in two meta-analyses of genome-wide association studies of common genetic variants. The most recent, ongoing one includes more than 5,000 patients and even more controls. The findings from this study will be presented during the meeting. In addition to the studies of common variants, such collaborative studies have also enabled the analysis of rare variants increasing ADHD risk. These collaborative studies have, among others, lead to the identification of CHRNA7 (encoding a nicotinic acetylcholine receptor) as an ADHD gene (Williams et al. Am. J. Psychiatry 2012). A new project, which involves many of the members of the ADHD Molecular Genetics Network, currently analyses the results of the 'exome chip', an array of rare genetic variants positioned in the coding regions of genes all over the genome.
Conclusion: The recent results in genetics research of ADHD as well as other psychiatric disorders has shown that collaboration in large, international consortia is the only way towards understanding the genetic contribution to ADHD.

Thursday, 6 June 2013, 15.00–16.30

HT-02 Symposium on the results of the international ADHD in substance use disorders prevalence (IASP) study: the first collaborative project of the ICASA foundation

HT-02-001 ADHD and Substance abuse: A general perspective

G. van de Glind*

* VS. Utrecht, The Netherlands

Objective: This presentation has three goals: (1) Introduction on the topic of the linkage between ADHD and Substance Use Disorders (SUD); (2) Introduction on the International Collaboration on ADHD and Substance Abuse (ICASA foundation) (3) Outlines of the International ADHD in Substance use disorders Prevalence (IASP) study.
Method: In introducing the topic, first the concept of 'comorbidity' will be discussed. Then explanatory models for the linkage between ADHD and SUD will be presented:—comorbid development of Conduct Disorder/Anti Social Personality Disorder;—genetic predisposition;—neurobiological concepts, such as motivation and reward, inhibition, dopaminergic system, anhedonia;—self medication theory;—self esteem;—environmental factors.
Results: n.a.
Conclusion: An international research network, the International Collaboration on ADHD and Substance Abuse (ICASA foundation www.adhdandsubstanceabuse.org), collaborates in order to achieve two goals: 1) Prevention of development of SUD in patients with ADHD; 2) Improved diagnostic and treatment procedures for patients with both disorders. Vision and activities of the ICASA-foundation will be presented briefly. The first collaborative research project of the ICASA-foundation is the IASP-study. In this study 3.575 treatment seeking SUD patients, from eight European countries, Australia

and the USA were included, and screened for ADHD, using the WHO Adult ADHD Self-report Scale V 1.1 (ASRS). 1.276 of these treatment seeking SUD patients were thoroughly assessed for ADHD, Major Depression, Bipolar Disorder, Anti Social Personality Disorder and Borderline Personality Disorder. The research methods and results will be described, thus introducing the other presentations in this symposium.

HT-02-002 The prevalence of ADHD in treatment seeking SUD patients

M. Konstenius*, G. van de Glind, W. van den Brink

* Stockholm, Sweden

Objective: Substance use disorders (SUD) and attention deficit hyperactivity disorder (ADHD) overlap but estimates of ADHD in SUD vary widely, ranging from 2 to 83 %. The objectives of the present study were to get reliable estimates of ADHD in SUD and to understand how the planned DSM-5 criteria will influence the prevalence rates.
Method: The present study is an international multi-center cross-sectional study. 3,558 patients seeking treatment for SUD were screened for adult ADHD using the World Health Organization Adult ADHD Self-Report Scale v 1.1 (ASRS). Of these, 1,276 patients took part in a diagnostic assessment using Conner's Adult ADHD Diagnostic Interview (CAADID). Ten countries participated in the study. Seven countries participated in both screening and assessment: France, Hungary, the Netherlands, Norway, Spain, Sweden, and Switzerland. Additional three countries participated in the screening stage: Australia, Belgium, and the United States.
Results: The overall rate of adult ADHD according to DSM-IV, excluding ADHD-NOS, was 13.8 % (95 % CI 12.1–15.9 %). Including ADHD-NOS, the overall prevalence of DSM-IV adult ADHD was 16.7 % (95 % CI 14.7–18.8). There were considerable differences between countries ranging from 5.4 % for Hungary to 31.3 % for Norway. The proposed DSM-5 criteria for adult ADHD resulted in the overall prevalence rate of 16.0 % (95 % CI 14.0–18.0).
Conclusion: ADHD is a highly prevalent disorder in patients seeking treatment for SUD, and the proposed DSM-5 criteria do not significantly influence the prevalence rates. Patients seeking treatment for SUD should be screened for adult ADHD as poor prognoses of SUD in patients with comorbid ADHD has been indicated by literature.

HT-02-003 Screening and diagnosis of ADHD in SUD patients

J. A. Ramos-Quiroga*

* Barcelona, Spain

Objective: Diagnosis of adult ADHD is based on a careful and systematic assessment of lifetime history of symptoms and impairment. Central to this process is the assessment of childhood onset, current symptoms and the presence of impairment in at least two domains, according to the DSM-IV. For screening purposes in adult populations the WHO endorsed the 6-item Adult ADHD Self-Report Scale (ASRS) that has been translated into more than 13 languages. ASRS has good psychometrics properties in SUD population. The Diagnostic Interview for ADHD in Adults (DIVA) is based on the DSM-IV criteria and is a semi-structured interview for ADHD in adults. DIVA provides a list of concrete and realistic examples, for both current and retrospective (childhood) behaviour. Examples are also provided of the types of impairments that are commonly associated with the symptoms. Conners Adult ADHD Diagnostic Interview for DSM-IV-TR (CAADID) is a semi-structured diagnostic interview for the assessment of adult ADHD. The CAADID provides categorical information helpful for defining research groups and offers a variety of content information that can be used for qualitative analyses. Nevertheless DIVA and CAADID don't systematically evaluate SUD. The adult ADHD section of the Psychiatric Research Interview for Substance and Mental Disorders IV (PRISM-IV) can serve as a valid alternative. PRISM-IV is a structured interview based on DSM-IV-TR diagnostic criteria and specifically designed to study comorbidity in substance use subjects. In the current version assesses 21 Axis I and 2 Axis II disorders. PRISM showed high test–retest reliability for the majority of dependence, depressive, anxiety, and psychotic disorders, as well as for ADHD and antisocial and borderline personality disorders. As conclusion, ADHD can be systematically assessed in patients with SUD.

HT-02-004 Comorbidity and trauma in SUD patients with and without ADHD

L. Meijvis*

* Utrecht, The Netherlands

Objective: Attention deficit hyperactivity disorder (ADHD) is highly prevalent in substance use disorders (SUD) patients, as approximately 23 % of those with SUD have comorbid ADHD. Other comorbid disorders, including conduct disorder (CD) and oppositional defiant disorder (ODD) are frequently found in SUD patients. To understand the trajectories in developing SUD, it is important to understand the comorbidities that are often related to SUD, which can aggravate the symptoms in those patients and requires adjusted treatment.
Method: The present study is an international multi-center cross-sectional study. 3,558 patients (ranging in age from 18 to 65) seeking treatment for SUD were screened for adult ADHD using the World Health Organization Adult ADHD Self-Report Scale v 1.1 (ASRS). Of these, 1,276 patients took part in a diagnostic assessment using Conner's Adult ADHD Diagnostic Interview (CAADID). Ten countries: Australia, Belgium, France, Hungary, the Netherlands, Norway, Spain, Sweden, Switzerland and the United States participated in the screening stage. France, Hungary, the Netherlands, Norway, Spain, Sweden, and Switzerland also participated in the full assessment stage. Latent class analysis (LAC) was used to distinguish 3 subgroups:—SUD patients without comorbid disorders (uncomplicated group)—SUD patients with ADHD (without comorbidities)—SUD patients with ADHD and trauma and an accumulation of comorbidities.
Results: High rates of comorbidities were found in the study population, including ADHD (14 %), borderline personality disorder (BPD) (14 %), depression (20 %), and antisocial personality disorder (ASP) (22 %). A smaller percentage was found for bipolar disorder (BP) (5.6 %). Preliminary findings on trauma showed that all traumata were significantly related to ADHD, as these traumatic experiences were more prevalent in those with ADHD compared to SUD patients without ADHD. However, rates of experienced trauma were high among all participants.
Conclusion: Preliminary conclusions: Both trauma and comorbidities including BPD, ASP and depression are prevalent in SUD patients.

Thursday, 6 June 2013, 17.00–18.30

HT-03 Effects and mechanisms of psychotherapy in the treatment of ADHD in children and adults

HT-03-001 Results of a randomized controlled multicenter trial on the multimodal treatment of mothers and children both affected by ADHD (AIMAC)

T. Jans*, C. Jacob, K. Hennighausen, M. Roesler, S. Hänig, E. Sobanski, L. Poustka, M. Colla, V. Kappel, A. Philipsen, f. t. AIMAC study group

* Würzburg, Germany‘

Objective: To evaluate whether the treatment of maternal ADHD improves the efficacy of a parent–child training for children's ADHD.
Method: 144 mother–child-pairs—both affected by ADHD according to DSM-IV—were treated at five study sites in Germany. Mothers were randomized to cognitive-behavioral group psychotherapy plus open methylphenidate treatment or to control treatment (supportive counseling). After 13 weeks of treatment a parent–child training was added for all mother–child-pairs on a weekly basis for 12 weeks. Primary outcome criterion was the change in the children's externalizing symptoms from baseline to week 26 (after parent training). Amongst others, secondary outcome measures referred to maternal psychopathology including ADHD symptoms. Intention-to-treat analysis was performed within a linear regression model.
Results: After pre-screening out of 444 mother–child pairs 206 were evaluated for trial participation and 144 were randomized (children: mean age 9.4 years, 73.5 % males; mothers: mean age: 38.3 years). 52.8 % of the children and 65.3 % of the mothers had combined ADHD subtype. Current axis-I co-morbidity rates were 47.2 % in children (Kiddie-SADS) and 31.3 % in mothers (maternal axis-II co-morbidity was 20.1 %; SCID-I/-II). There was a substantial decline in the child's externalizing symptoms with no significant differences between groups. Improvement of maternal ADHD symptoms and associated psychopathology was significantly higher in mothers of the treatment group.
Conclusion: Our combined treatment effectively reduced ADHD symptoms in mothers. A comprehensive treatment should always be offered to mothers affected by ADHD. However, against our hypothesis parent training seems to be beneficial for the treatment of childhood ADHD even if mothers do not receive an extended treatment for maternal ADHD. Limitation: our results should not be generalized to multi-problem families with high social disadvantages and major parental psychopathology (CCT-ISRCTN73911400, funding: BMBF01GV0605.

AIMAC study group

Members of the AIMAC study group (ADHD in Mothers and Children; coordinating investigators: A. Warnke, T. Jans, Wuerzburg University Hospital) are our colleagues at the study sites at Freiburg (University Medical Center Freiburg: Department of Psychiatry and Psychotherapy, Director: M. Berger, PI: A. Philipsen; Department of Child and Adolescent Psychiatry and Psychotherapy, Director and PI: E. Schulz), Homburg (Saarland University Hospital and Saarland University Faculty of Medicine: Institute for Forensic Psychology and Psychiatry, Director and PI: M. Roesler; Department of Child and Adolescent Psychiatry and Psychotherapy, Director and PI: A. v. Gontard), Mannheim (Central Institute for Mental Health: Clinic for Psychiatry and Psychotherapy, Director: A. Meyer-Lindenberg, PI: E. Sobanski; Clinic for Child and Adolescent Psychiatry and Psychotherapy, Director: T. Banaschewski, PIs: K. Becker, M. Holtmann, L. Poustka), Berlin (Charité - University Medicine, Campus Benjamin Franklin, Department of Psychiatry and Psychotherapy, Director: I. Heuser, PI: M. Colla; Campus Virchow-Klinikum, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, Director: U. Lehmkuhl, PI: R. Burghardt), Wuerzburg (Wuerzburg University Hospital: Department of Psychiatry, Psychosomatics and Psychotherapy, Director: J. Deckert, PI: C. Jacob; Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, Director: M. Romanos, former Director and PI: A. Warnke), members of the Clinical Trials Unit at University Medical Center Freiburg (Director: R. Bredenkamp, principal trial statistician: E. Graf) as well as members of the Data Monitoring and Safety Committee (H. Remschmidt, G. Wassmer, N. Wodarz). Independent supervision was carried out by S. Schürmann and T. Wolff Metternich-Kaizman chaired by M. Döpfner at the Department of Child and Adolescent Psychiatry and Psychotherapy at the Cologne University Hospital (parent training) and at the Institute for Psychology of Freiburg University chaired by U. Frank in in cooperation with F. Mayer-Bruns and K. Schehr (DBT for mothers). We thank R. Fischer (MEDICE Arzneimittel Puetter GmbH & Co. KG) for his advice in preparing the study protocol and case report forms as well as his assistance in SAE management. F. Mattejat gave helpful expert advice in planning the study. We are also grateful that HOGREFE and BELTZ publishers provided treatment manuals for free. We gratefully thank all participating families and all our partners for their cooperation.

HT-03-002 Results of the randomised controlled multicentre trial on the multimodal treatment of adult ADHD (COMPAS)

A. Philipsen*

* Freiburg, Germany

Objective: Attention Deficit Hyperactivity Disorder (ADHD) is a serious risk factor for co-occurring psychiatric disorders and negative psychosocial consequences in adulthood. Given this background, there is great need for an effective treatment of adult ADHD patients.
Method: Therefore, our research group has conducted a first controlled randomized multicenter study on the evaluation of disorder-tailored DBT-based group program in adult ADHD compared to a psychophar–macological treatment. Between 2007 and 2010, in a four-arm-design 433 patients were randomized to a manualized dialectical behavioural therapy (DBT) based group program plus methylphenidate or placebo or clinical management plus methylphenidate or placebo with weekly sessions in the first 12 weeks and monthly sessions thereafter. Therapists are graduated psychologists or physicians. Treatment integrity is established by independent supervision. Primary endpoint (ADHD symptoms measured by the Conners Adult ADHD Rating Scale) is rated by interviewers blind to the treatment allocation (Current Controlled Trials ISRCTN54096201).
Results: The trial is funded by the German Federal Ministry of Research and Education (01GV0606) and is part of the German network for the treatment of ADHD in children and adults (ADHD-NET). In the lecture the first data of our interim analysis (baseline data, results of treatment compliance and adherence) as well as outcome data are presented.

HT-03-003 Genes and psychotherapy in adult ADHD

T. Renner*

* Würzburg, Germany

Objective: Persistence of ADHD into adulthood is found in about half of the affected patients. Thus, gaining insight into neurobiological aspects of treatment in adults is an interesting topic. In a German multicenter network on adult ADHD genetic approaches are combined with structural MRI to assess potential influence of genetic variants on therapeutic response.
Method: Gene variants of potential risk genes are genotyped in a sample of German adult ADHD patients and analysed regarding with structural MRI data and treatment.
Results: Data still are processed and first results will be presented.
Conclusion: Interaction in between genetic predisposition and response to treatment is an important field of current research on neuropsychiatric disorders and may contribute to the better understanding of differing responses in individual patients.

HT-03-004 Differential effects of psychotherapy and pharmacotherapy with methylpenidate on cerebral structure and neurochemistry in adults with ADHD

L. Tebartz van Elst*

* Freiburg, Germany

Objective: There is an intensive debate as to whether pharmacotherapy with ADHD might alter brain structure in patients with

ADHD. To answer this question we acquired structural MRI data in adult ADHD patients receiving methylphenidate, placebo, structured group psychotherapy or counselling in a four-armed randomized study.
Method: In this large prospective study we investigated brain volumes in 157 adult patients with ADHD and 120 control subjects. Half of the patients received methylphenidate treatment and half received placebo. MRI data were acquired at basedline and 3 and 12 months after onset of study.
Results: In line with earlier findings there were no overall differences in brain volumes between patients and controls. Comparing inattentive with combined ADHD subgroups we found significant volume loss in the left dorsolateral prefrontal and the ventromedial prefrontal cortex. Prospective imaging revealed no significant change in brain volumes in patients treated with methylphenidate compared to placebo. There was a trend towards slight increase in bilateral cerebellar hemisphere volumes.
Conclusion: We could not find any evidence for cerebral volume loss in patients treated with methylphenidate compared to controls. There might be a discrete trend towards increased volumes bilaterally in the cerebellar cortex in patients treated with methylphenidate.

Thursday, 6 June 2013, 17.00–18.30

HT-04 Research on ADHD in Asia and Australia

HT-04-001 The concept of consilience in ADHD research in Korea: a developmental approach

S.-C. Cho*

* Republic of Korea

Objective: The objective of this presentation is to provide a comprehensive model in ADHD research to understand the psychopathology and to provide a new treatment modality.
Method: Methods: In this paper, the author tried to apply the concept of 'Consilience' to the field of ADHD research. Recently, the term 'Consilience' has been very popular and has been used very frequently across the various academic fields. The original meaning of 'Consilience' is 'to jump (consilience) together (con). Actually, "Consilience' was first used by William Whewell and Edward Wilson borrowed it to describe the unity of knowledge. In one word, "Consilience' can be defined as 'to unify every field of knowledge and science to understand the human being and to improve the life of human being'.
Results: The review on ADHD research in Korea has shown 4 definitive developmental phases. Firstly, the reliability and validity studies for objective assessment for ADHD have been conducted. And the research on pharmacotherapy for ADHD and related disorders has been conducted. Biochemical studies, neurophysiological studies, brain imaging studies, genetic studies, and integrative studies have been conducted. Secondary, the research on secondary emotional and psychological problems such as depression, anxiety or conduct problems has been conducted. Thirdly, cognitive-behavior therapy, group therapy, social skill training programs and the programs to treat the parent–child relational problems have been developed. In addition, educational programs for teachers to understand and to help the ADHD children in school have been developed. Lastly, music therapy, art therapy, drama therapy, developmental bibliotherapy therapy have been applied in ADHD treatment.
Conclusion: Conclusions: Based on these findings, 'Bio-Psycho-Socio-Spiritual Model' is suggested to apply the concept of 'Consilience' to the field of ADHD research in Korea.

HT-04-002 Recent ADHD research in Japan

T. Saito*

* Tokyo, Japan

Objective: The objective of this presentation is to present different research approaches to identifying, selecting, and validating biomarkers of Attention Deficit Hyperactivity Disorder (ADHD) and to enhancing clinical interventions, particularly in early detection of ADHD and early interventions.
Method: In this presentation, I will present diversities of research activities in Japan regarding to identifying biomarkers of ADHD. Electrophysiological measures such EEG and event-related potentials (ERP) have strong support as candidate biomarkers for ADHD. Imaging studies are increasingly important tool to identifying biomarkers of ADHD and I present the results of functional MRI, Positron Emission Topography in Japanese population and also present the results of functional near infrared spectroscopy (fNIRS). FNIRS has been established as a noninvasive optical tool for studying changes in the concentration of oxygen in the cerebral cortex, which may be alternative to functional neuroimaging tools. In addition to basic researches in Japan Japanese clinicians have tries to find better way to identify patients in the early stage and establish comprehensive early support system. I will present pros and cons of this program. Another recent focus of ADHD research in Japan is with adult ADHD. Concept of Adult ADHD is rather confusing and controversy both in academia and lay person. I will also present the result of recent epidemiological study of adult ADHD in Japan.
Results: There are a diversity of studies of ADHD conducted in Japan but researches on ADHD in Japan is still in its early stage. Conclusion; Academia and public interests in ADHD is rapidly increasing in Japan. This is the best time for Japanese researchers to focus more on identifying biomarkers of ADHD and systematically establishing early intervention programs.

HT-04-003 Developing causal pathways and treatment outcomes for ADHD using multiple data sources: WA population linkage study

D. Silva*, L. Colvin, C. Bower

* West Perth Wa, Australia

Objective: To provide an overview of the data linkage opportunities in Western Australia (WA) relating to ADHD and to investigate the early risk factors and health, education and justice outcomes for children prescribed stimulant medication (SM) for ADHD.
Method: Using de-identified population linked data from the stimulant notification register, midwives notification, hospital morbidity, justice records and education data, 16,883 children and adolescents (cases) aged 4–25 years diagnosed and prescribed stimulant medication were identified and 32,728 matched controls.
Results: Mothers of children who were subsequently diagnosed with ADHD and treated with SM were significantly more likely to be single, younger and smoked during pregnancy. Prematurity was associated with ADHD. Post term deliveries and low Apgar scores

showed no increased risk of being subsequently diagnosed with ADHD. Post natal pathways were examined using hospital morbidity data where children under 4 years subsequently diagnosed with ADHD were significantly more likely to be admitted with diseases of middle ear and tonsils, epilepsy, asthma, infections, gastro-oesophageal reflux disease, head injuries, other injuries, burns and poisonings. Children with ADHD were 2.5 times more likely to have community correction encounter in the justice system and only 10 % of these children were taking regular SM at the time. ADHD children had significantly lower education scores for both numeracy and literacy and these scores became progressively worse with increasing age of the child.
Conclusion: This is the largest population study on ADHD children. Data linkage at a population level can provide important information on early causal pathways and specific education and justice outcomes of ADHD children in relation to medication use which will assist policy makers and clinical practitioners better understand this common mental health condition at multiple levels.

Thursday, 6 June 2013, 17.00–18.30

HT-05 Risk pathways and ADHD prodomes

HT-05-001 "At risk" for ADHD: A developmental psychopathology perspective

E. J. S. Sonuga-Barke*

* Southampton, United Kingdom

Objective: The argument for early intervention in ADHD is now frequently made. However, the effectiveness, and equally importantly, cost effectiveness, of such strategies depend on; (i) the early identification of individuals most "at risk" for long term ADHD; (ii) the availability of efficacious early years therapies for those children and (iii) knowledge of which "at risk" children are likely to respond to which types of therapy. In this talk we present a model of the developmental psychopathology of ADHD to address points (i) and (iii). Starting from a bio-psycho-social perspective we will examine the way that multiple early genetic and environmental factors can create a spectrum of neurobiological risk affecting a range of different brain networks. Over developmental time, this risk is moderated by later genetic and environmental risk and protective features leading to the emergence of multiple distinctive developmental phenotypes characterised by different trajectories of disorder onset, remission or exacerbation (both ADHD and co-occurring conditions). Building on this I will discuss the potential value of developing an ADHD developmental taxonomy and associated risk index that may help; (i) identify young children at most risk of long term ADHD-related burden and (ii) target and tailor early years therapies in the most effective ways to help these children and their families.

HT-05-002 Who is at risk for ADHD?

G. Polanczyk*

* Sao Paulo, Brazil

Objective: The identification of individuals who are at increased risk for ADHD is a fundamental step towards developing early intervention programs. In preschool years, hyperactivity is a strong predictor of school age ADHD, and therefore a promising clinical marker of risk. However, a large number of preschoolers with hyperactivity do not go on to develop the disorder as they age, challenging the cost-effectiveness of interventions based solely on this symptom. Additionally, not all school age children with ADHD present with hyperactivity as preschoolers. It is likely that identifiable environmental risk and protective factors, as well as clinical and cognitive features associated with hyperactivity, may contribute to the identification of "at-risk" children. It is also likely that in the absence of preschool hyperactivity other patterns of risk precede the disorder.
Results: Results from longitudinal studies may inform the existence and utility of a consistent set of early risk markers that predict later ADHD.

HT-05-003 How genetics can inform the concept of at-risk in ADHD?

B. Franke*

* Nijmegen, The Netherlands

Objective: ADHD is frequent in children, but also in adults. It is one of the most highly heritable psychiatric disorders, with the adult disorder potentially carrying an even higher genetic load than ADHD in children. Finding genes for ADHD has been challenging, as the genetic component is highly complex.
Method: For most patients, our current models presume a multifactorial ADHD etiology, with multiple genetic risk factors of individually small effect contributing to disease risk simultaneously. For a still unknown percentage of patients, we suspect an oligogenic etiology, in which very few strong genetic risk factors cause ADHD.
Results: In all cases, a single genetic variants is unlikely to be sufficient to determine that a person has ADHD, all variants serve only to increase disease risk. In many cases, this occurs in interaction with unfavourable environmental factors or other genetic factors. This means that knowing the genes contributing to ADHD might help to prevent the full manifestation of the disorder, or at least its persistence into adulthood. This latter hypothesis is also driven by models from twin research showing that the genetic factors for childhood and older-age symptoms of ADHD overlap only partly (Greven et al. J. Abnorm. Child Psychol. 2011).
Conclusion: In comparison to other psychiatric disorders we still know relatively little about ADHD's genetic component. Sample sizes of ADHD patients available for genetic research (<10,000) still lack behind that of others—especially schizophrenia (>25,000). Findings from this disorder suggest that we will eventually be able to construct individual risk profiles for ADHD patients that may be useful for diagnosis, prognosis prediction and individualized treatment.

HT-05-004 Thinking about ADHD before the development of the full syndrome: The concept of at-risk

J. Halperin*

* New York, USA

Objective: The majority of children with ADHD evidence early symptoms, behavioral problems and psychosocial difficulties prior to the manifestation of the full syndrome. Subsequently, these difficulties escalate into more severe impairment, oftentimes further complicated by emotional dysregulation, comorbid psychiatric disorders, learning difficulties and social problems, all of which are characteristic of many youth with ADHD. While several evidence-based treatments provide symptomatic relief, longer-term outcomes

are often far from optimal. This presentation will examine the potential utility of early identification of children "at-risk" for ADHD and the perils and promises for the development of early interventions which target the long-term trajectory of the disorder.
Method: The risks (false positives, labeling children) and potential benefits (prevention of the full syndrome) of early identification of at-risk children will be discussed in relation to the development of early intervention programs.
Results: Despite considerable promise, due to the likelihood of false positive identifications, it is essential that early interventions targeting at-risk children be relatively risk-free, of low cost, readily accessible in the community, and easy to implement. Widespread use of early, potentially preventive, interventions targeting at-risk children should ideally not only be safe, but to the extent possible, should be helpful to all children irrespective of risk status.
Conclusion: In the words of Desiderius Erasmus (1466–1536) "Prevention is better than cure." That is certainly true for ADHD. If the concept of ADHD prodromes helps lead us down that road—it is one worth taking.

Friday, 7 June 2013, 16.30–18.00

HT-06 Is psychostimulant treatment of ADHD harmful for the patient?

HT-06-001 The pharmacology of medical used psychostimulants

M. Gerlach*

* Würzburg, Germany

Objective: The psychostimulants amphetamine and methylphenidate are amphetamine-like drugs (amphetamines) that were used for more than 50 years in the treatment of attention-deficit/hyperactivity disorder (ADHD). In addition to these medical used agents, amphetamines include natural products such as phenylethylamine and cathinone, and synthetic derivatives such as methamphetamine and methylene-dioxy-methamphetamine (MDMA) commonly known as "ecstasy". Although their effects are inconsistent, amphetamines mimic the action of the sympathetic nervous system (hence, they are also known as sympathomimetic amines) acting as powerful stimulants on the central nervous system.
Results: Amphetamine and methylphenidate, in contrast to cocaine, are substrates for both the dopamine (DAT) and noradrenaline (NA) transporters (NET), and are competitive inhibitors of dopamine and noradrenaline uptake in in vitro studies. In addition, amphetamine promotes dopamine efflux by reverse transport through monoamine uptake transporters.
Conclusion: This paper shortly discusses the pharmacology of the medical used amphetamines in comparison to the amphetamine-like psychostimulants that were misused.

HT-06-002 Adverse events of medication in association with ADHD and co-morbid mental disorders in a nationwide Danish sample over sixteen years

H.-C. Steinhausen*

* Aalborg, Denmark

Objective: The study of the association of four adverse events, namely, cancer, tic disorders, suicidal attempts, and substance use disorders (SUD), with attention-deficit disorder (ADHD), co-morbid mental disorders, and various medications in a large representative nationwide sample.
Method: Data were linked from four Danish national registers on a total of 21,187 patients with ADHD, their dispensed drug prescriptions, and associated adverse events between 1994 and 2010. The cohort was divided into subgroups treated with methylphenidate (MPH) only, antidepressants only, antipsychotics only, and mixed medication. A control group of patients with ADHD never had any medication. The risks of various co-morbid disorders, duration of medication, age at onset of medication, and year of birth for developing adverse events stratified for sex were analyzed.
Results: For developing cancer, none of the drugs represented risk factors whereas higher dose and older age were risk factors. Regarding tic disorders, MPH was protective, age at onset of medication was not significant, and earlier year of birth was protective. For suicidal attempts, longer duration of medication and younger age had a protective function whereas antidepressants, antipsychotics, mixed drugs, mood disorders, conduct/dissocial personality disorders, and substance use disorders acted as risk factors. Substance abuse disorders were predicted by antidepressants, antipsychotics, and mixed drugs in combination with co-morbid anxiety disorders, personality disorders, and conduct disorders, older age at onset of medication, and later birth whereas longer duration of medication was protective.
Conclusion: This large and representative study provides solid evidence on the associations of various medications and co-morbidities in the development of cancer, tic disorders, suicidal attempts, and substance use disorders in patients with ADHD. For all four adverse events MPH is not a risk factor. The risk potential of other medications is strongly related to specific co-morbid disorders.

HT-06-003 Is the treatment of ADHD with psychostimulants harmful for the dopaminergic system?

K. W. Lange*

* Regensburg, Germany

Objective: A major concern regarding psychostimulant medication in the pharmacotherapy of children and adolescents with attention deficit hyperactivity disorder (ADHD) are the potential side effects to the developing brain including central dopaminergic systems.
Method: The review will summarize and discuss the potential neurotoxic effects of psychostimulants to the developing brain in animals.
Results: At present, the findings in rodents do not indicate that the "therapeutic" administration of amphetamine and methylphenidate lead to long-term adverse effects to the dopamine system in regard to development, neurobiology or behaviour.
Conclusion: Although conceivable harmful effects of psychostimulant treatment in humans should be borne in mind, no sufficient information is available as for the potential damage to the dopamine system following psychostimulants in patients with ADHD.

HT-06-004 Sudden death and use of stimulant medication in youths

L. Greenhill*

* New York, USA

Objective: To review the most recent literature that estimates the risk of cardiovascular adverse events occurring during treatment with

stimulant medication for the treatment of ADHD. One estimate (Gould et al. 2009, AJP) put the estimate in the very rare range, with a significantly greater (but very small) risk of sudden death of youth treated with stimulants than those who died suddenly in car accidents and were being treated with psychoactive medication.
Method: A review of the literature since 2010 was undertaken in Pub Medication database using the key words "ADHD," "youth," "stimulant treatment," "adverse events," "cardiovascular," "stroke," "myocaridal infarction," "sudden death," "pharmacoepidemoligal methods," or "risk."
Results: The result of the search identified 6 evidence based articles suitable to address this question and that met basic criteria used by the American Academy of Child and Adolescent Psychiatry for indicating the strength of evidence for risks during treatment of children and adolescents for psychiatric disorder. The number needed to harm (NNH) appears to be far lower than previous estimates.
Conclusion: The results of this literature search suggest that clinicians can be guardedly optimistic that their patients can be treated with psychostimulants if they have been previously screened using clinical history to eliminate those who have a family history of sudden cardiac death, do not have cardiac physical anomolies, or have a history of severe cardiac disease, such as cardiac failure, syncope, or cardiac-induced exercise intolerance.

Friday, 7 June 2013, 16.30–18.00

HT-07 ADHD: The subjective burden of disease

HT-07-001 Quality of life in ADHD

M. Danckaerts*

* Leuven, Belgium

Objective: A systematic review is provided of Quality of Life (QoL) studies in children with ADHD, addressing 4 main questions: (1) What is the impact of ADHD on QoL? (2) What is the relationship between the children's own perspective on their QoL and the perception of their parents? (3) How does the impact of ADHD on QoL compare to other somatic health problems or other mental health problems? (4) Does treatment of ADHD impact on QoL?
Method: A systematic review is performed to complement a former review (Danckaerts et al. 2010, The quality of life of children with attention deficit/hyperactivity disorder: a systematic review. Eur Child Adolesc Psychiatry, 19:83–105) of studies focusing on QoL in children or adolescents with ADHD, containing empirical data on QoL measurement.
Results: Most studies only used parent ratings of QoL. ADHD is associated with a significant impact on QoL, especially in psychosocial domains, as rated by parents. This relationship is less clear when children's ratings are used. The impact is comparable to that of several physical health conditions and other mental disorders, but the specific domains of impact may be different. Treatment may have a positive impact on QoL. However effect sizes are smaller than for the effect on symptom improvement and studies are restricted to pharmacological treatment.
Conclusion: ADHD seriously compromises QoL, especially from a parental perspective. However, methodological problems in QoL research need to be resolved in order to make robust conclusions.

HT-07-002 Stigmatization in ADHD

A. B. M. Fuermaier*

* Groningen, The Netherlands

Objective: Stigmatization can be defined as discrediting stereotypes towards a group of people which derive from often falsely assumed associations with unfavorable characteristics. Negative consequences and disadvantages of stigmatization are described which affect various facets of the individuals, such as the individual self-perception, interpersonal relationships, chances for career development, access to treatment options or judgments towards people close to the stigmatized person.
Method: In this presentation, current approaches in the assessment of stigmatization are introduced, such as measuring peoples' reactions towards vignettes depicting characters with certain characteristics and questionnaires measuring the quantity of stigmatizing beliefs. The usefulness and limitations of the various methodologies are discussed by presenting the findings obtained by studies applying those methodologies to measure stigmatization in ADHD.
Results: ADHD is a disorder which is highly associated with stigmatization and the mere label ADHD was shown to be likely to trigger stigmatizing beliefs. Despite this strong association between ADHD and stigmatization, there has been only limited research carried out on stigmatization in ADHD. This shortage of empirical research can largely be explained by a lack of disease specific assessment tools to measure stigmatization in ADHD.
Conclusion: It will be concluded how empirical research contributed to our current understanding of stigmatization in ADHD and relevant issues of stigmatization in ADHD will be emphasized.

HT-07-003 Self-esteem, self-efficacy and resources in adults with ADHD

R.-D. Stieglitz*

* Basel, Switzerland

Objective: The aim of the study was the analysis of therapy-relevant factors like self-esteem, self-efficacy, and resources in adults with ADHD in comparison with a group of healthy controls.
Method: A sample of 43 adults with a ADHD diagnosis according to DSM-IV were matched with a nonclinical sample in terms of age and gender. All participants ($N = 86$) were assessed with the following instruments: Symptom Checklist-90–Revised (SCL-90-R), Rosenberg Self-Esteem Scale, General Perceived Self-Efficacy Scale, and Dick's Resources Checklist.
Results: Adults with ADHD showed lower levels of self-esteem and self-efficacy when compared with the control group. Some, but not all, of the resources of adults with ADHD were reduced. Otherwise people with ADHD seem to possess specific resources.

Conclusion: The results have important implications for the treatment of adult ADHD and suggest that specific therapy programs should include resources-oriented modules for enhancing self-esteem, self-efficacy, and fostering strengths.

HT-07-004 Self-awareness/complaints of patients with ADHD

I. Manor*

* Tel Aviv, Israel

Objective: ADHD is estimated as 5–7 % of children and 4–6 % of the adult population. Its diagnosis is based, at least partially, on the patients' reports.
Method: This presentation deals with these estimates and the perceptions according to two studies.
Results: The first study used 103 students who were evaluated for ADHD using the ASRS and the WURS. They were also asked to complete a self-rating questionnaire, measuring their symptoms as well as their awareness level of their own symptoms. Factor analysis yielded two factors explaining 41 % of the variance, with a significant difference between both ADHD subgroups and CG in Part-1 score ($p < 0.0001$) and a significant difference between ADHD-C-G and both ADHD-I-G, CG in Part-2 score ($p < 0.0001$). The self-reported average number of symptoms per student was significantly lower than objectively diagnosed in both clusters and in both ADHD-groups, especially in the specific subtypes. The second study assessed the accuracy of children's reports of medication (MPH) response, as shown by the TOVA. It compared their subjective reports before and after the MPH challenge using the CGI-C to the TOVA results themselves. 165 children and adolescents, aged 11.09 + 3.43 years. Diagnosed as ADHD went through the TOVA before and after MPH challenge (0.3 mg/Kg). All patients filled the CGI-C without knowing the results. A significant correlation was found between CGI-C and the TOVA C score ($r = -0.32$, $p < 0.01$), but not in any of the other scores. There was a significant negative correlation between the age and the tendency to assess improvement ($r = -.210$, $p < 0.01$).
Conclusion: As can be seen from these studies, patients with ADHD tend to under-estimate the severity of their impairment, and their assessment of their medication response.

Friday, 7 June 2013, 16.30–18.00

HT-08 The role of sleep problems and circadian clock genes in ADHD:

HT-08-001 Circadian rhythms in ADHD: The role of clock genes

A. Coogan*

* Ireland

Objective: Circadian rhythms are recurring patterns in physiological, behavioural and cognitive parameters that recur approximately every twenty-four hours. The molecular basis for such rhythms is the interaction of a number of clock genes and their products. There is increasing evidence that implicates alterations in circadian rhythms and the underpinning clock mechanism in ADHD. We will examine this evidence and ask what the next steps in understanding the significance of such circadian effects might be in ADHD.
Method: A number of lines of evidence will be assessed, including genetic studies linking polymorphisms in clock genes to ADHD, functional assays of circadian function in ADHD and also we will enquire as to the extent to which impulsivity and attention are under circadian regulation.
Results: These data indicate that there are changes in circadian function in ADHD, and that such changes may be of import in the psychopathology of the condition. Further, such changes may represent novel targets for therapeutic intervention.
Conclusion: Therefore, understanding circadian rhythm changes in ADHD may be viewed as not a side curiosity, but a key issue in understanding and more effectively addressing this condition.

HT-08-002 What is chronotherapy?

J. Thome*

* Rostock, Germany

Objective: The crucial role of the circadian rhythm and its underlying environmental (e.g., zeitgeber such as light) and molecular mechanisms (e.g., CLOCK genes) in the pathogenesis of neuropsychiatric disorders including ADHD is today widely recognised. However, the use of chronobiological approaches in daily clinical practice is much less well accepted and established, although the beneficial effects of interventions such as light therapy and sleep deprivations have been known for a long time. With a better understanding of chronobiological processes from the cellular to the behavioural level, it is increasingly possible to investigate innovative chronotherapeutic strategies including the use of psychopharmacological compounds which directly influence neuronal systems involved in circadian rhythmicity (e.g., the melatonin-receptor system, CLOCK-gene expression). Accordingly, a new field of psychiatric chronotherapy is emerging which needs to be defined and whose chances and limitations need to be clarified.

HT-08-003 Sleep disturbance, circadian preference and symptoms of adult ADHD

L. Mateescu*

* Romania

Objective: In the clinical practice, sleep disorders and circadian rhythm disturbances are frequently described by parents of children diagnosed with ADHD as problems associated with the present time, but having its onset in the postnatal period. Half of children with ADHD have a parent experiencing the same problem. Integrating the information from both children and their parents into one combined, prospective and retrospective analysis of sleep disorders and circadian rhythm disturbances, we should be able to understand the evolutive nature of sleep disorders in ADHD.
Method: After the initial screening of 20 children with ADHD, the following data were documented for each member of the triad child-both parents: bedtime details using a sleep log for over 14 nights, questionnaires regarding the sleep pattern and a full history of their sleep disturbances. Each parent was evaluate for the Adult ADHD disorder.
Results: An evening circadian tendency has been recorded in both child and parental evaluations.
Conclusion: Sleep disturbances and circadian preferences have a significant impact on ADHD symptoms in children and adults, requiring to be included in assessment and intervention.

HT-08-004 Circadian rhythm problems and delayed sleep phase in ADHD: From research to clinical practice

L. Imeraj*, I. Antrop, D. Deboutte, H. Roeyers, E. Sonuga-Barke

* Gent, Belgium

Objective: Disruptions in the sleep-wake cycle and the circadian system have been found in a wide range of psychiatric disorders, especially affective disorders, and are generally correlated with severity and diminished quality of life. Recently, researchers have become increasingly interested whether such effects are implicated in ADHD pathophysiology. Knowledge on diurnal variations in ADHD may improve diagnostic and therapeutic options.
Method: We first review the literature on across-the-day fluctuations in ADHD in terms of (i) time-of-day effects on behavior and activity; (ii) morningness-eveningness chronotypology; (iii) sleep/wake rhythms; and (iv) rhythmicity in neuroendocrine and neurophysiological responsiveness. We here add our recent data on longer-term evaluations of heart rate/activity and cortisol in non-medicated children with ADHD and normal controls. Second, we provide a framework that addresses possible underlying neurobiological mechanisms and review the current implications for diagnosis and treatment.
Results: The literature supports altered diurnal arousal patterns in ADHD. Evidence for a circadian phase delay was suggested by an association of ADHD with eveningness and with later sleep times, difficulties with morning awakenings, and excessive daytime sleepiness. Moreover, we found time-specific alterations in diurnal heart rate/activity and cortisol profiles in children with ADHD (hypo versus hyperarousal at different times-of-day). Based on these findings, we hypothesize that a locus coeruleus/arousal dysregulation may be reflected in circadian fluctuations in task-related performance next to alterations in sleep-wake cycles. Time-specific arousal disruptions encourage further adjustment of dosing and timing of ADHD medication (e.g., different times of administration for different drug-release preparations), but also point to the value of circadian-based therapies in ADHD such as melatonin treatment and light therapy.
Conclusion: There is mounting evidence to support the notion that circadian rhythms are altered in at least a subgroup of patients with ADHD which provides additional options for clinical practice.

Friday, 7 June 2013, 16.30–18.00

HT-09 Personality disorder in adult ADHD

HT-09-001 Personality profile of adult ADHD: the alternative five-factor model

J. A. Ramos-Quiroga*

* Barcelona, Spain

Attention-deficit/hyperactivity disorder (ADHD) is one of the most frequently diagnosed disorders in childhood affecting around 3% to 5% of adults worldwide. Most of the studies have been carried out using the Five Factor Model (FFM). Given the value and importance of describing adult ADHD in terms of general personality structure for a better conceptualization of this disorder, this study contributes adding new data on an Alternative Five Factor Model (AFFM) of personality. The aim of the present study is twofold: To assess the personality rofile of adults with ADHD under the AFFM perspective, and to test the discriminant validity of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) in differentiating ADHD subjects vs. Normal range controls. A sample of 217 adults (64% male) meeting ADHD diagnosis (DSM-IV) was paired by age and sex with 434 normal-range controls. Logistic regression analysis showed that high scores on Neuroticism-Anxiety, Impulsivity and General Activity, and low on Work Activity were the most powerful predictors of being endorsed with an ADHD diagnosis. Results may suggest refinements in the personality assessment of ADHD as it seems that the ZKPQ provides more specific subscales for the description and conceptualization of this disorder.

HT-09-002 Childhood ADHD and borderline personality disorder: developmental issues and controversial aspects

A. Fossati*

* Milano, Italy

Objective: Retrospective studies have consistently shown an association between childhood ADHD and adult BPD. Few longitudinal data are currently available; they also suggest a link between ADHD in childhood and BPD in adulthood. Questions remain open as to the developmental pathways and risk factors leading to BPD from childhood ADHD
Method: Literature review based on PsychInfo and SCOPUS electronic databases, and data based on 447 consecutively admitted in- and outpatients (any PD = 335, 74.9 %; BPD = 65, 14.5 %).
Results: Clinical models of BPD emphasize childhood impulsivity as a potential risk factor for BPD development, when interacting with psychosocial risk factors (e.g., invalidating environment, attachment disturbances, traumatic events, etc.). BPD has been consistently associated with general personality traits (e.g., high N, low A and C). Our findings show a mediation role of impulsive-aggression, sensation seeking and conduct problems on the relation between childhood ADHD ad BPD.
Conclusion: Models of BPD should take into account childhood ADHD as a risk factor for BPD development, and clarify the developmental pathways leading to extreme temperament and personality configurations leading to BPD. Longitudinal studies on this topic are particularly needed.

HT-09-003 Are temperament profiles different in early and late onset adult ADHD

C. B. Surman*

* USA

Objective: To review evidence that adult temperament profiles are different in early and late onset manifestations of ADHD.
Method: Studies of temperament in adults with ADHD which utilized the Cloninger Temperament and Character Inventory (TCI) will be reviewed. Two studies which evaluated TCI temperament profiles in adults with early versus later onset ADHD will be described in detail, conducted by our research group (Faraone et al. 2009) and Guimarães-da-Silva et al. (2012).
Results: Studies have replicated findings of TCI profiles of elevated Novelty Seeking (NS) and/or Harm Avoidance (HA) in ADHD. The two studies to date evaluating TCI profiles in early versus late onset adults found similar profiles, except the Brazilian study found a higher rate of novelty seeking in the early onset group.
Conclusion: Further study is necessary to clarify how often temperamental differences correlate with onset of ADHD. If early and late onset ADHD correlate with different personality profiles, it offers evidence that these are clinically divergent conditions, either in

etiology or in their impact on adaptive function. It is relevant to note that the new DSM V definition of ADHD will allow later onset of ADHD than prior criteria.

HT-09-004 Genetics correlations and personality in adults with ADHD

A. Merwood*

* London, United Kingdom

Objective: There is now substantial evidence of phenotypic associations between adult ADHD and measures of personality, in particular with high novelty seeking and harm avoidance in accordance with Cloninger's psychobiological model. These dimensions may be important predictors of ADHD symptomatology, including psychiatric comorbidity, and may be considered as putative endophenotypes for ADHD. However, in order to evaluate these theories it is important to first establish the extent to which the etiology of ADHD and temperament is shared. This talk presents findings from a large, adult twin study examining genetic correlations between symptoms of hyperactivity-impulsivity, inattention and Cloninger's dimensions of temperament. Results are interpreted in the context of findings from recent candidate gene studies.
Method: Participants were 886 twin pairs aged 19–20 years, recruited from the Swedish general population. ADHD symptoms of hyperactivity-impulsivity and inattention were measured using an 18-item DSM-IV rating scale. Temperament was measured for the dimensions novelty seeking, harm avoidance, reward dependence and persistence, using Cloninger's Temperament and Character Inventory. The twin method was used to decompose phenotypic variance and covariance into genetic and environmental components.
Results: All ADHD and temperament dimensions were moderately heritable, with heritability estimates of 34–45 %. There were significant genetic correlations of inattention symptoms with novelty seeking ($rG = 0.55$), harm avoidance ($rG = 0.34$) and persistence ($rG = -0.29$), and of hyperactivity-impulsivity symptoms with novelty seeking ($rG = 0.45$). Follow-up analyses indicated that a single genetic factor accounted for the association of both hyperactivity-impulsivity and inattention with novelty seeking.
Conclusion: These findings indicate genetic associations between ADHD and temperament, but suggest that unique profiles of temperament may characterise different domains of adult ADHD. These results are consistent with the findings of some candidate gene studies and have implications regarding the clinical assessment of adult ADHD and our understanding of the heterogeneity of symptoms.

Friday, 7 June 2013, 16.30–18.00

HT-10 Vigilance regulation model of ADHD and affective disorders

HT-10-001 Dysregulation of vigilance as a pathogenetic factor in affective disorders and ADHD

U. Hegerl*

* Leipzig, Germany

Objective: The regulation of vigilance ("brain arousal") is a state modulated trait with fundamental importance for all higher organisms. Hyperactivity, sensation seeking and attention deficits observed in overtired children but also in patients with ADHD and mania appear to be a dysfunctional autoregulatory reaction aiming at stabilizing vigilance by creating a stimulating environment (Hegerl U, Hensch T (2012): The vigilance regulation model of affective disorders and ADHD. Neuroscience & Biobehavioral Reviews). In contrast, the sensation avoidance and withdrawal in Major Depressive Disorder (MDD) is seen as an autoregulatory reaction to tonically increased vigilance.
Method: An EEG-based algorithm has been developed and validated (VIGALL, Vigilance Algorithm Leipzig) which allows to assess the stability of the individual vigilance regulation and to test this vigilance model.
Results: In two independent populations of unmedicated patients with major depression indeed a hyperstable vigilance regulation with less declines to low vigilance stages (drowsiness patterns) was found, whereas an unstable vigilance regulation is found in patients with mania and ADHD.
Conclusion: Further data concerning the relationship between vigilance regulation on the one hand and effects of therapeutic sleep deprivation or abnormalities in ADHD and cancer related fatigue will be reported.

HT-10-002 Vigilance regulation in ADHD

M. Romanos*

* München, Germany

Objective: There have been various pathophysiological models and anetiological considerations during the last decades that involve disturbed vigilance in attention-deficit/hyperactivity disorder.
Method: We here give a concise overview on existing vigilance models of ADHD with emphasis on recent electrophysiological approaches.
Results: There is increasing evidence for dysregulated vigilance to be related to ADHD symptoms and further neuropsychiatric symptoms. The beneficial effects of psychostimulant medication may in part be contributed to the normalising effects on vigilance. Conclusions. Vigilance dysregulation may constitute a specific subtype of ADHD and may elucidate the heterogeneity aetiology of ADHD. Possible neurobiological mechanisms will be discussed.

HT-10-003 Geographic variation in the prevalence of ADHD: Circadian and sleep aspects of ADHD

M. Arns*, K. van der Heijden, L. E. Arnold, J. L. Kenemans

* Nijmegen, The Netherlands

Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) is the most common psychiatric disorder of childhood with average worldwide prevalence of 5.3 %, varying by region.
Method: We assessed the relationship between the prevalence of ADHD and solar intensity (SI: kWh/m^2/day) based on multinational and cross-state studies. Prevalence data for the US were based on self-report of professional diagnoses, for the other countries, on diagnostic assessment. SI data were obtained from national institutes.
Results: In three datasets (across 49 US States for 2003 and 2007 and across 9 non-US countries) a relationship between SI and the prevalence of ADHD was found, explaining 34–57 % of the variance in ADHD prevalence, with high SI having an apparent preventative effect. Controlling for low birth weight, infant mortality, average income (SES), latitude, and other relevant factors did not change these findings.

Furthermore, these findings were specific to ADHD, not found for the prevalence of autism spectrum disorders nor major depressive disorder.
Conclusion: In this study we found a lower prevalence of ADHD in areas with high SI for both US and non-US data. This association has not been reported before in the literature. The preventative effect of high SI may be related to an improvement of circadian clock disturbances, which have recently been associated with ADHD. These findings likely apply to a substantial sub-group of ADHD patients and have major implications in our understanding of the etiology and possibly prevention of ADHD by medical professionals, schools, parents, and manufacturers of mobile devices.

HT-10-004 The sleep phenotypes and therapeutic options for ADHD

S. Miano*

* Rome, Italy

Objective: An appropriate assessment and treatment of sleep problems in children with attention-deficit hyperactivity disorder (ADHD) might improve their quality of life and the severity of ADHD. The identification of specific sleep phenotypes of ADHD might be helpful.
Method: According to literature data, five sleep phenotypes may be identified in ADHD: a sleep phenotype characterized by a hypo-arousal state, resembling narcolepsy, which may be considered a "primary" form of ADHD,. without interference of other sleep major disorders; a phenotype associated with delayed sleep onset latency; a phenotype associated with sleep disordered breathing (SDB); another phenotype associated to restless legs syndrome (RLS) and/or periodic limb movements (PLMDs); lastly, a phenotype associated to epilepsy/or EEG interictal discharges. Each sleep phenotype will be described mainly in terms of increased or decreased level of arousal during sleep, and the implications of these sleep alterations for appropriate treatment of ADHD.
Results: All the sleep phenotypes, except the primary form of ADHD and those related to focal benign epilepsy or focal EEG discharges, are associated with an increased level of arousal during sleep. Treatment with stimulants is recommended above all in the primary form of ADHD, whereas treatment of the main sleep disorders or of co-morbidities (such as delayed sleep onset latency or epilepsy) is preferred in the other sleep phenotypes.
Conclusion: The arousal system may be hyperactivated or hypoactivated depending on the form of ADHD/sleep phenotype. Recent studies have explained this association demonstrating that both an increase and a decrease in arousal are imputable to executive dysfunctions controlled by prefrontal cortical regions which are strongly implicated in the pathogenesis of ADHD.

Saturday, 8 June 2013, 16.30–18.00

HT-11 Approaches to ADHD treatment

HT-11-001 Complementary and alternative treatments for ADHD: State of the evidence and practical implications

L. E. Arnold*

* Columbus, USA

Objective: To draw clinically practical conclusions from published evidence for complementary and alternative treatments (CATs) for attention-deficit/.hyeractivity disorder (ADHD).

Method: Reviews and meta-analyses when available, other data as necessary, are summarized and interpreted in light of the SECS versus RUDE criterion: Treatments that are Safe, Easy, Cheap, and Sensible do not need as much evidence to justify individual patient trials as those that are Risky, Unrealistic, Difficult, or Expensive.
Results: Several dozen CATs have been reported. None have the compelling level of double-blind randomized clinical trial (RCT) evidence required for drug approval, but a few come close. Two meta-analyses, but not a Cochrane review, of omega-3 fatty acid RCTs concluded a small but significant effect. Two meta-analyses of dietary eliminations, especially artificial colorings, concluded a significant small to medium effect. Two meta-analyses of unblinded neuro feedback RCTs concluded a strong medium effect that decreased to nonsignificance when only blinded studies were considered. Cognitive training had a medium effect, reduced to nonsignificance for blinded studies. Micronutrient supplementation is standard treatment when insufficiency is demonstrated. Zinc and magnesium have conflicting evidence varying by geography, Iron is a common insufficiency during rapid growth, as in preschoolers and adolescents. Vitamin Recommended Daily Allowance/Intake (RDA/RDI) has not been tested in ADHD, but a therapeutic multivitamin/mineral RCT showed benefit. Massage and rotary vestibular stimulation have some promising unblinded randomized data. Quality of breakfast appears to affect attention in normal children. Nonblind data for meditation, yoga, relaxation, and EMG biofeedback appear promising. Data for exercise, homeopathy, green spaces are not compelling. Herbs are crude drugs without good quality control; only Pycnogenol has RCT support.
Conclusion: Omega-3 fatty acids, RDA/RDI multivitamins/minerals (especially with stimulant anorexia), and food-dye restriction are reasonable adjuncts to treatment. With general health benefits, exercise, massage, meditation, vitamin D in winter, sleep hygiene, and low-sugar breakfast pass the SECS criterion.

HT-11-002 The efficacy of psychological treatments for ADHD: Current evidence and future potential

E. J. S. Sonuga-Barke*

* Southampton, United Kingdom

Objective: Stimulant medication is currently the first line and most efficacious treatment for ADHD. Although it is strikingly effective for many patients in terms of short term symptom control it is limited in a number of other ways. Normalisation of symptoms is rare; long term efficacy remains unclear; some areas of functioning are not improved; side effects are common though rarely severe; translation from RCTs to normal care can be problematic; and many patients and parents do not see medication as being right for them and their family. For these reasons there is an urgent need to develop effective non-pharmacological treatments to complement medication approaches. In this talk, building on the findings of a recent meta-analyses, I will highlight the strengths and limitations of currently available psychological treatments in the behavioural, cognitive and biofeedback domains. This will lead to a discussion of the importance of translational neuroscience as a guide for therapeutic innovation. In conclusion I will argue for the value of integrated treatment approaches that combine behavioural and cognitive approaches aimed at exploiting brain plasticity though early intervention in naturalistic settings.

HT-11-003 Meta-analyses of pharmacological treatment

T. Banaschewski*

* Mannheim, Germany

Objective: European and North American guidelines recommend multimodal treatment for ADHD, incorporating psychological, behavioral and educational interventions. Approved medications include short- and long-acting methylphenidate (MPH)- and amphetamine (AMP)-based stimulants, as well as the non-stimulants atomoxetine, guanfacine and clonidine. In Europe, pharmacological treatment is generally reserved for those with more severe symptoms, or those with less severe ADHD for whom non-drug interventions are either unavailable, have been refused or are inadequate. MPH is the first-line option; atomoxetine and dexamphetamine are also available. Comparisons between different medications are hindered by the absence of direct comparative trials, but various meta-analyses of randomized placebo-controlled trials have reviewed the effectiveness and safety of stimulant and non-stimulant treatment for children, adolescents and adults with ADHD and also investigated if features of study design influence estimates of efficacy. Their results and recent findings from clinical trials will be compared and methodological issues in meta-analyses will be critically discussed.

Saturday, 8 June 2013, 16.30–18.00

HT-12 The role of ADHD in forensic psychiatry

HT-12-001 Prevalence of ADHD in prison and forensic psychiatric populations

M. Rösler*

* Homburg, Germany

Objective: The prevalence of ADHD and comorbid conditions in prison populations and forensic psychiatric hospitals will be determined.
Method: A literature synopsis is given. Furthermore we report on 4 studies which we performed in 2 prisons and 2 forensic psychiatric hospitals.
Results: The prevalence of ADHD is increased in prison populations. Particularly in male adolescent and young adult prisoners the disorder can be found frequently with prevalence rates which can reach 50 %. Female incarcerated individuals also display elevated frequencies of ADHD but they are not as high as in males. The prevalence of ADHD declines with growing age. Beyond the age of 60 years a significant increase as compared with the general population can no more be found. Regarding the subtype of ADHD the combined type predominates followed by the hyperactive-impulsive subtype. ADHD predominantly inattentive can be seen only rarely. In almost all cases ADHD occurs with conduct disorder or antisocial personality disorder. During incarceration ADHD may cause problems in social coexistence. The prevalence of critical events is increased in persons with ADHD. In forensic psychiatric hospitals ADHD is increased. In two German facilities the prevalence was 10 and 25 % respectively.
Conclusion: ADHD plays an important role in different populations of perpetrators. Despite the fact that the risk of criminal behavior is mainly mediated by comorbid conduct or antisocial disorder ADHD has a modulating effect on the type of offences and the response to psychosocial interventions during incarceration.

HT-12-002 Impact of ADHD on different types of criminal behaviour

W. Retz*

* Homburg, Germany

Objective: The adult attention deficit-/hyperactivity disorder (ADHD) is associated with problems regarding activities of daily living and social adaptation. The prevalence of ADHD in offender populations is increased. In prison and forensic populations ADHD is almost always associated with the development of conduct disorder (CD) in early life. Exclusively patients with ADHD and CD and not those with pure ADHD are at risk to develop later antisocial personality disorder (ASP) and/or criminality.
Method: The presentation will give an overview about studies regarding the relation of ADHD with criminal behavior.
Results: When comparing offenders with and without ADHD it is apparent that individuals with ADHD start their crimes in earlier age. The risk for recidivistic crimes is increased. Moreover it has been shown that the prevalence of ADHD is not associated with all types of criminal behavior. The prevalence of ADHD is low in cheating and some types of property crime and relatively high in sexual offences, drug crimes and reactive violence but not in proactive violence. Importantly, there is no common psychopathologic structure between ADHD and psychopathy (Hare).
Conclusion: The antisociality of individuals with ADHD seems to be a distinct subgroup of the comprehensive field of ASP as defined according to DSM-IV. Specific care programs might be useful to reduce the risk of criminal recidivism in this offender population.

HT-12-003 Critical incidents during imprisonment: Impact of ADHD

G. Gudjonsson*

* London, United Kingdom

Objective: To test the hypothesis that ADHD symptoms are related to critical incidents and disruptive (demanding) behaviour within institutional settings.
Method: Three groups of participants in different institutional environments were investigated: (1) suspects in police custody (n = 200), (2) adolescents detained in a secure unit (n = 54), and (3) adult prisoners (n = 198). All participants were interviewed and assessed for ADHD symptoms. Critical incidents and disruptive (demanding) behaviour within each institution was obtained from official records or from staff ratings.
Results: The police custody study showed that ADHD contributed significantly to increased use of resources in custody in terms of demands made on staff after controlling for conduct disorder and length of time in custody. The secure unit study showed that ADHD symptoms predicted the extent of institutional behavioural problems and critical incidents beyond conduct disorder and substance misuse. The adult prison study showed that participants who were symptomatic for ADHD, either fully symptomatic or in partial remission, were significantly more likely to be involved in a range of critical incidents within the prison during the previous three months (i.e., verbal and physical aggression, total number of incidents regardless of type, and the severity of the aggressive incidents). These findings remained highly significant after controlling for antisocial personality disorder traits.
Conclusion: The findings from the three studies suggest that one of the factors driving behavioural problems within the custodial environment is the current level of ADHD symptoms. The findings also show that the more severe the current level of ADHD symptoms, the more common and severe are the behavioural problems in this population.

HT-12-004 Medication for ADHD and criminality

H. Larsson*

* Stockholm, Sweden

Objective: ADHD is a common disorder that has been associated with criminal behavior in some studies. Pharmacologic treatment is available for ADHD and may reduce the risk of criminality.
Method: Using Swedish national registers, we gathered information on 25,656 patients with a diagnosis of ADHD, their pharmacologic treatment, and subsequent criminal convictions in Sweden from 2006 through 2009. We used stratified Cox regression analyses to compare the rate of criminality while the patients were receiving ADHD medication, as compared with the rate for the same patients while not receiving medication.
Results: As compared with nonmedication periods, among patients receiving ADHD medication, there was a significant reduction of 32 % in the criminality rate for men (adjusted hazard ratio, 0.68; 95 % confidence interval [CI], 0.63–0.73) and 41 % for women (hazard ratio, 0.59; 95 % CI 0.50–0.70). The rate reduction remained between 17 and 46 % in sensitivity analyses among men, with factors that included different types of drugs (e.g., stimulant vs. nonstimulant) and outcomes (e.g., type of crime).
Conclusion: Among patients with ADHD, rates of criminality were lower during periods when they were receiving ADHD medication. These findings raise the possibility that the use of medication reduces the risk of criminality among patients with ADHD.

Saturday, 8 June 2013, 16.30–18.00

HT-13 ADHD research in Italy

HT-13-001 Biomarkers identification in ADHD

C. Scassellati*, C. Bonvicini, S. V. Faraone, M. Gennarelli

* Brescia, Italy

Objective: To determine whether peripheral biochemical markers (biomarkers) might differentiate patients with attention-deficit/hyperactivity disorder (ADHD) from non-ADHD individuals.
Method: We conducted a systematic search and a series of meta-analyses of case–control studies comprising studies from 1969 to 2011.
Results: We identified 210 studies in the following categories: 71 studies of the main metabolites and metabolism enzymes of monoaminergic neurotransmission pathway; 87 studies of environmental risk factors divided into heavy metals (18 studies), substance/chemical exposures (16 studies), and nutritional factors (trace elements: 29 studies; essential fatty acids: 24 studies); 22 studies of the hypothalamic–pituitary–adrenal axis (HPA) pathway; 31 studies indicated with "other". After screening for the availability for meta-analyses of drug naïve/free case–control studies and Bonferroni correction, five comparisons were statistically significant (Norepinephrine [NE], 3-Methoxy-4-hydroxyphenylethylene glycol [MHPG], monoamine oxidase [MAO], Zinc [Zn], cortisol), five of the significant findings found support in studies of response to ADHD medications (NE, MHPG, MAO, b-phenylethylamine [PEA], cortisol), six in studies of symptoms severity (NE, MHPG, MAO, ferritin, Zn, cortisol) and three in studies of neurophysiological or cognitive functioning (lead-ferritin-Zn). No evidence of publication bias was found, whereas significant heterogeneity of effect sizes across studies was found for three of the five biomarkers that differentiated ADHD from control subjects. Suggestive associations were evidenced for neuropeptide Y (NPY), manganese, and dehydroepiandrosterone (DHEA).
Conclusion: This study provides evidence for several peripheral biomarkers as being associated with ADHD both in diagnosis and in treatment efficacy. Further studies are warranted to replicate these findings, to assess their specificity for ADHD, and to quantify the degree to which they are sufficiently precise to be useful in clinical settings.

HT-13-002 Social responsiveness and deficits in facial emotion identification in ADHD

S. Carucci*, C. Peddis, L. Anchisi, A. Zuddas

* Cagliari, Italy

Objective: (1) To explore, by the Social Responsiveness Scale (SRS), the social functioning of ADHD compared to ASD and healthy controls (TDC) and investigate the effects of methylphenidate (MPH) on social impairment in the ADHD. (2) To compare the three samples while processing facial emotions and matching emotions by the Amsterdam Neuropsychological Test battery (ANT).
Method: Data were collected from 234 children aged 4–13 and IQ > 70 (110 ADHD, 30 ASD and 103 TCD). SRS were re-administered to a group of ADHD (n = 38) that underwent on MPH at least for 9–12 months. Facial Recognition (FR), Identification Facial Emotion (IFE) and Matching Facial Emotion (MFE) were assessed in 35 ADHD, 32 ASD and 36 TDC aged 6–14 using reaction time (RT) correct (RTC), RT to errors (RTE) and Errors.
Results: SRS Total and each subscale score in ADHD and ASD were significantly higher than TDC ($p < 0.001$) with a significant relationship between Hyperactivity and Autistic Mannerism ($p < .001$). MPH treatment showed a significant improvement on SRS scores in the ADHD. ADHD were significantly slower and less accurate than TDCs in both the FR and IFE. A significant main effect for group and task (respectively $p = .005$ and $p < .0001$) and a significant interaction between task and group ($p = .039$) were found for the FR versus IFE task for both RT and number of errors. Both ASD and ADHD groups compared with the TDC group were slower.
Conclusion: This study highlights a significant social impairment in ADHD. Specific information processing deficits are present in both ADHD and ASD (slower RT and larger error rates) especially during FR and IFE stimuli. ADHD also showed a SRS profile similar to ASD. Significant benefits from MPH on social impairment confirm its utility in treating ADHD as a complex disorder. Recognition of specific social deficit in ADHD may help to consider specific targets for a comprehensive intervention.

HT-13-003 Impusivity, attentional saliency and decision making in adult with ADHD compared to pathological gamblers and obsessive compulsive patients

S. Pallanti*, G. Grassi, A. Cantisani, A. Grippo

* Firenze, Italy

Objective: ADHD is frequently diagnosed during infancy or adolescence, but its impact on adult population is underestimated and relatively poorly studied. Recent evidence shows that circa 2/3 of the children with a diagnosis of ADHD still meet the criteria for the diagnosis in adulthood. One of the most important aspects that have to be considered during the assessment of the adult ADHD patient is the primary role played by impulsivity in the clinical presentation and in the pathophysiology of the disorder. Evoked potentials are of interest in attention deficit hyperactivity disorder (ADHD) research because of their putative relationship with impulsivity and the executive dysfunctions observed in ADHD. The aims of this study are to explore the relationship between impulsivity and attentive salience in a group of ADHD patients with a neurophysiological assessment protocol compare to other putative impulsive populations: namely Obsessive Compulsive Disorder and Pathological Gamblers.
Method: We studied a group of 20 ADHD patients (DSM IV TR) (still in progress, age 17–38, 17 M, 3 F), compare to matched Health

controls and 20 OCD and 20 Pathological Gambler (PG) with neurocognitive, psychometric and neurophysiological assessment (Continuous Performance Test, Conners' Adult ADHD Rating Scale (CAARS), Barratt Impulsity Scale (BIS). Decision making processes also has been assessed with Iowa Gambling test (IGT). The neurophysiological assessment consisted of cognitive event-related potentials (P300 elicited by using the auditory oddball task) and a particular protocol of auditory and tactile event-related potentials (ERP), involving habituation/dishabituation phenomena to salient stimuli. We then correlated the neurocognitive estimates of vigilance, attention and impulsivity with neurophysiological patterns.
Results: Preliminary results shown higher levels of Impulsivity in the ADHD sample compared to both the OCD and PG sample.
Conclusion: The investigation of the correlation between ERP results and clinical assessment in ADHD has proved useful in identifying a relatively peculiar pattern and it will be discussed in the final part of the presentation.

HT-13-004 Dopamine transporter antibodies and ADHD

P. Curatolo*

* Roma, Italy

Objective: ADHD research has recently converged on the brain dopamine transporter (DAT) abnormalities. Immunization with DAT fragments has been associated with long-term striatal impairment, hyperactivity, and reduced cognitive flexibility in mice.
Method: The presence of autoantibodies directed against dopamine transporter (DAT aAbs) was evaluated in ADHD children using a new ELISA assay. 63 children which met DSM-IV-TR criteria for ADHD were assigned to pharmacological treatment with methylphenidate (MPH) or non pharmacological therapy according to clinical severity. We also characterized the DAT genotype (9-repeat or 10-repeat polymorphic alleles).
Results: The DAT aAbs levels were measurable in serum of ADHD patients and were undetectable in control children. Basal titers were higher in ADHD patients under MPH treatment and specifically for those carrying a DAT 10/10 genotype. The DAT aAbs levels of the group with no pharmacological treatment correlated with distinct subscales of Conners' Parents and Teachers Scales, specifically for children with a DAT 10/10 genotype.
Conclusion: These findings indicate that measurable levels of DAT directed aAbs are present in ADHD children and interestingly higher basal anti DAT titers were observed in subjects suffering from a more severe type of ADHD, suggesting that the evaluation of serum anti DAT titers could be a possible molecular marker for ADHD.

Saturday, 8 June 2013, 16.30–18.00

HT-14 The relevance of iron in the pathogenesis of ADHD

HT-14-001 Iron in brain function

HT-14-002 ADHD, Tourette′s syndrome and restless legs syndrome: The iron hypothesis

S. Cortese*

* Verona, Italy

Objective: To present and discuss the hypothesis that iron deficiency may underlie the comorbidity among ADHD, Restless Legs Syndrome (RLS) and Tourette′s syndrome.
Method: Systematic review of the literature on clinical and neuroimaging studies on iron deficiency in ADHD, RLS, and Tourette's syndrome.
Results: Clinical and neuroimaging studies assessing, respectively, peripheral and brain iron deficiency in the three disorders separately are available. No study has addressed how iron deficiency may underlie the comorbidity among the three disorders.
Conclusion: So far, the iron hypothesis of ADHD-RLS-Tourette's syndrome has not been systematically assessed. Further exploration of this hypothesis may lead to useful clinical applications in terms of clinical management of the three disorders.

HT-14-003 The relevance of iron in the pathogenesis of ADHD

M. Romanos*

* München, Germany

Objective: Iron metabolism has been discussed to play a pathophysiological role in ADHD. Several studies in clinical samples have been published to elucidate the potential contribution returning inconclusive results.
Method: We here review the evidence on the role of iron in ADHD pathophysiology and present recent studies both in clinical as well as large population-based samples.
Results: While most clinical studies support the notion of disturbed iron metabolism to be related to ADHD, a recent population-based found no significant association between peripheral ferritin and ADHD symptom scores.
Conclusion: In summary there is some evidence for iron mechanism to be a relevant factor in ADHD, however, the inhomogeneous results suggest that this may only be relevant for a specific subgroup of patients. Future lines of research are discussed.

Saturday, 8 June 2013, 16.30–18.00

HT-15 Brain mechanisms of ADHD interventions

HT-15-001 How ADHD pharmacological treatments impact in brain development?

P. Shaw*

* Bethesda, USA

Abstract not received.

HT-15-002 Differential response and mechanisms of action of stimulants and non-stimulants: findings from the USA

J. Newcorn*

* New York, USA

Objective: Little is known about the mechanisms by which stimulant and nonstimulant medications for ADHD exert their therapeutic effects, and there are not yet biomarker data to guide treatment selection. Unique effects of ADHD medications in frontostriatal circuits as well as inter-individual variations in catecholamine genes provide possible bases for differential response.
Method: We used functional magnetic resonance imaging to test the predictive value of baseline neural activation in 36 youth with ADHD (mean age 11.0 ± 2.4 years; 30 males) recruited from a larger comparator trial. Youth were scanned with fMRI using a go/nogo task while off-medication, and treated with both medications in randomized order in a double-blind cross-over design. Clinical response was measured using the ADHD Rating Scale-IV-Parent Version. Analyses examined baseline fMRI predictors of response using separate regressors for symptomatic improvement to the two medications, and the interaction of the two terms. We additionally examined response in context of polymorphisms of the dopamine transporter gene (SLC6A3).
Results: Elevated baseline activation in right caudate nucleus was associated with superior response to methylphenidate over atomoxetine. This difference in response was primarily accounted for by greater improvement in inattention symptoms with methylphenidate. In addition, the relationship between methylphenidate response and caudate activation was moderated by polymorphic variation in the dopamine transporter locus (SLC6A3).
Conclusion: These findings offer a window into the neurobiological basis of differential response to stimulant and nonstimulant medications for ADHD, and represent an important step in the development of personalized, biomarker-informed treatment strategies for youth with ADHD.

HT-15-003 Differential mechanisms of action of stimulants and non-stimulants on ADHD brain function: Findings from the UK studies

K. Rubia*, A. Cubillo, A. Smith, K. Chantiluke, H. Hart

* London, United Kingdom

Objective: ADHD is effectively treated with the catecholamine-reuptake inhibitors Methylphenidate and Atomoxetine. Serotonin, however, has also been implicated in the disorder with the serotonin-agonist Fluoxetine having some behavioural effects. We conducted placebo-controlled comparisons between the acute mechanisms of action of Methylphenidate and Atomoxetine as well as the effects of Fluoxetine on ADHD brain (dys)function. Meta-regression analyses on long-term stimulant effects on brain function are also presented.
Method: Twenty medication-naïve children with ADHD performed 3 tasks in fMRI (Stop, working memory (WM) and time discrimination (TD)), after single doses of Methylphenidate, Atomoxetine and placebo, in a double-blind, randomized crossover design. For the Stop and WM tasks, we also assessed the acute effects of Fluoxetine on a different sample of 20 ADHD children relative to placebo. We assessed within patient upregulation effects as well as normalisation effects of each drug on deficits observed under placebo relative to 20 controls. Meta-regression analyses assessed associations between long-term stimulant treatment and brain function in a meta-analysis of fMRI studies of inhibition, attention and timing.
Results: Both Methylphenidate and Atomoxetine upregulated and normalised bilateral inferior frontal underactivation during the Stop task and left ventrolateral underactivation during TD. During working memory, only Atomoxetine upregulated and normalised right dorsolateral prefrontal underactivation, while Methylphenidate enhanced left inferior frontal activation, suggesting frontal laterality effects. Fluoxetine normalised fronto-striatal deficits in ADHD children relative to controls during Stop and WM tasks. Meta-regression analyses show associations between long-term stimulants and more normal frontal and striatal brain activation.
Conclusion: Atomoxetine and Methylphenidate have task-dependent shared as well as drug-specific effects on prefrontal brain activation. Fluoxetine, however, also normalises fronto-striatal dysfunctions. The findings suggest that catecholamine as well as indoleamine agonists can normalise key ADHD brain dysfunctions. The meta-regression analyses on long-term stimulant effects further suggest that brain function changes with Methylphenidate may be long-term.

HT-15-004 Brain mechanism of EEG neurofeedback

D. Brandeis*

* Mannheim, Germany

Objective: The clinical effects of controlled EEG-neurofeedback treatment of ADHD are sizeable and partly specific, but also include contributions of expectancy (Sonuga-Barke et al. in press, Am. J. Psychiat.) and other unspecific factors. NF-related improvement mediated by specific brain mechanisms of learned cortical control, and mediated by nonspecific factors such as parental support each appear to characterize about half of the ADHD patients (Drechsler et al. 2007, Beh. Brain Res. 3 (1): 35). Feedback and training of activity from specific dysfunctional regions represents a new approach to increase specificity. We targeted regulation in the anterior cingulate (ACC) brain region affected in ADHD.
Method: Topographic EEG and source localization was used for tomographic neurofeedback (tNF; Liechti et al. 2012, Clin. Neurophysiol. 123: 1989–2005) in 13 ADHD children training bidirectional regulation of their ACC brain activity during 36 lessons. Frequency (theta and beta bands), and slow cortical potentials (SCP) protocols were alternated. The ACC activity and its change over the course of training and rest phases were computed using sLORETA (low-resolution electromagnetic tomography) of the 30-channel EEG.
Results: Reduction of ADHD symptoms and EEG-artefacts related to movement were obtained after tNF. Movement reduction mediated symptom reduction indirectly through EEG changes. Control over ACC activity was learned only in one SCP condition providing simple feedback. ACC frequency distribution at rest normalized over the course of the training.
Conclusion: Clinical improvement and artefact reduction can follow ACC-tNF without substantial learning of control despite some stabilisation of ACC activity. The results indicate that brain mechanisms underlying nonspecific contribution to NF require further study. The assumption that targeting impaired brain regions in clinical groups for neurofeedback induces specific control, and improves learning and

outcomes also motivates NIRS- or fMRI-neurofeedback and requires critical evaluation.

Saturday, 8 June 2013, 16.30–18.00

HT-16 Is something lacking in the current definitions of adult ADHD

HT-16-001 Emotional Symptoms as a Defining Symptom Dimension in Adult ADHD

F. Reimherr*

* Salt Lake City (UT), USA

Objective: Previous studies have documented that many patients with attention-deficit/hyperactivity disorder (ADHD) have significant emotional symptoms that cannot be explained by the presence of other DSM primary diagnoses. Such symptoms are part of the Utah Criteria for the diagnosis of ADHD in adults and are assessed by the Wender-Reimherr Adult Attention Deficit Disorder Scale (WRAADDS).
Methods: Design & Methods: A recent factor analysis of this scale was done using data from 5 studies of over 700 patients. The selection of factors was supported by a scree plot and the Kaiser criterion. Factors were extracted using principal components method and rotation was done using the Varimax method. Baseline dependent variables associated with these factors and change in these factors was examined in 2 clinical trials with both a short and long term phases.
Results: The factor analysis resulted in a 2-factor solution: attention/disorganization and emotional symptoms. Hyperactivity/restlessness was contained within the emotional factor and impulsivity loaded equally on the two factors. Impairment in a number of areas including oppositional defiant symptoms, ADHD ratings, social adjustment, personality disorder ratings, and substance abuse are more strongly associated with this second factor. During the short term portion of the studies, the attention/organization factor was 38 % lower in the medication arm than the placebo arm ($p < .001$, $d = .97$); the emotional factor was 39 % lower in the active medication arm than in the placebo arm ($p < .001$, $d = .89$). In the long term portion of the same studies, the attention/organization factor improved 60 % ($p < .001$, $d = 3.3$) over baseline values; the emotional factor improved 65 % ($p < .001$, $d = 2.4$).
Conclusions: While the attention/organization factor is critical for diagnosis, impairment was associated with the emotional factor. Both in short term and long term studies, these factors were highly responsive to methylphenidate. These two factors were informative in conceptualizing adult patients with ADHD.

HT-16-002 Deficits of emotional and self regulation

P. Asherson*

* London, United Kingdom

Objective: To investigate the relationship of emotional regulation (affective lability, AL) to ADHD in children and adults. To what extent can we view emotional dysregulation as a third symptom dimension of ADHD?
Method: Literature review and reporting of own data for treatment response, case–control differences and family and twin studies of ADHD and symptoms of emotional dysregulation. I will report findings from a unique sample of non-comorbid male adult ADHD cases and controls, and several twin samples.
Results: Symptoms of AL show high sensitivity and specificity for ADHD, particularly in adult samples. Family and twin samples indicate shared genetic effects between AL, inattention and hyperactivity-impulsivity. Treatment studies show that AL responds to stimulants and atomoexetine in the same time-scale as core ADHD symptoms. Cognitive-experimental studies do not however indicate a shared neurobiological basis.
Conclusion: Affective lability is seen to accompany ADHD in around 80 % of adult cases. Evidence for shared genetic influences, and shared treatment response, and the additional impact of affective lability on the impairments seen in ADHD, suggests that affective lability can be viewed as a third symptom dimension of the disorder. However since AL is commonly seen in other disorders we agree that AL should be viewed as an associated feature of the disorder and not part of the diagnostic algorithm.

HT-16-003 The contribution of informantion's to the diagnosis of Attention-Deficit/Hyperactivity Disorder in adult patients

R. G. Klein*

* New York, USA

Objective: The objective is to summarize the state of knowledge about the importance of obtaining diagnostic information from others, in addition to self reports, for diagnosing Attention-Deficit/Hyperactivity Disorder (ADHD) in adults.
Method: The rationale for recommending input from significant others will be presented, and the literature on the topic will be summarized. In addition, we will present results from a longitudinal study of 135 boys with ADHD (probands) and 136 controls, (mean age 41 years). In addition to self-reports, we obtained clinical information about ADHD from 98 relatives of probands (72.6 %), and from 96 relatives of controls (70.6 %) (mostly spouses). Interviews were conducted by clinicians, blind to group membership.
Results: Many investigators, and the DSM-5, recommend that informants should be included in the evaluation of ADHD in adults. In our study, there was poor agreement between self and informants for a diagnosis of ADHD (kappas = .22–.34). We report on the incremental validity of adding information from relatives to self reports for predicting outcomes other than ADHD, such as educational attainment, quality of overall function, and of social, and occupational, adjustment.
Conclusion: When the informant and subject disagree, whom do you believe? It is difficult to select an area of function that enables determination of the validity of a diagnosis of ADHD in adults when there is no agreement. It is difficult for research to integrate subtle aspects of subjects' or informants' motivation that may minimize or emphasize symptoms and impairment. Clinicians would be wise to obtain informant reports, but take into account that many personality factors may influence their perception. The same considerations complicate diagnosis when relying on subjects' reports about themselves.

HT-16-004 Differences and similarities between ADHD and bipolar disorders in adults

A. Reif*

* Würzburg, Germany

Objective: There is considerable evidence that ADHD and BPD can be co-morbid conditions. Coming from primary bipolar samples, the co-morbidity between BPD and ADHD has been estimated to be between 9 and 18 %. Coming from primary ADHD samples, comorbidity rates varied a lot with values between 5 and 47 %, although the mean seems to be ranging from 9 to 19 % as well. A mutual co-morbidity rate around 20 % is also supported by the population-based National Comorbidity Survey study. Overlap of clinical symptoms of both disorders is a challenge in differential diagnosis, and also treatment can be difficult especially in co-morbid patients, so that research addressing the pathomechanisms underlying this co-morbidity is highly relevant. Neural systems that seem to be affected in both disorders include frontocortical-striatal networks, although there is only little research specifically dedicated to address this. One possible explanation for the increased co-morbidity, and alterations in cortico-striatal pathways, might be that both disorders share at least some risk genes. Only a few studies have addressed this systematically; nevertheless, there a few genes that were proposed to be implicated in both disorders, such as TPH2, DIRAS2 and DGKH. At present, analysis of the PGC datasets is under way which will come up with novel loci that play a role in the ADHD—bipolar disorder comorbidity. Beyond this groundwork, controlled treatment studies are urgently needed to specify the best pharmacological treatment for co-morbid patients.

Thursday, 6 June 2013, 17.00–18.30

YS-62 Young Scientist Award Session

YS-62-001 Extremely preterm children + mild neurodevelopmental disability + ADHD-symptoms = true?

S. Elgen*, K. Sommerfelt, T. Markestad

* Bergen, Norway

Objective: To investigate if extremely preterm (EP) children with mild neurodevelopmental disability (NDD), such as mild vision or hearing impairment, mild motor deficit, mild cerebral palsy (CP), or mild cognitive impairment, are at increased risk of having ADHD symptoms compared to EP children without NDD.
Method: In a national population based Norwegian cohort with gestational age (GA) 22–27 weeks or birth weight 500–999 g, ADHD symptoms were assessed with the Yale Children's Inventory (YCI), cognitive function with the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R), motor function with the Movement Assessment Battery for children (ABC-test and severity of CP with the Gross Motor Function Classification for CP (GMFCS). EP children with more severe NDD than mild were excluded from the study as YCI is not validated among those.
Results: Of 258 eligible EP children with no or mild NDD, parents completed YCI for 213 (83 %). Children with mild NDD versus no NDD had a significantly increased risk ($p < 0.05$) of ADHD symptoms on 4 of 7 YCI scales, including the core scale Attention.
Conclusion: Extremely Preterm children with minor NDD are at a moderately increased risk of ADHD symptoms compared to equally preterm children with no NDD.

YS-62-002 Why an apparent distraction would help ADHD children?

S. Baijot*, C. Colin, H. Slama, G. Soderlund, B. Dan, N. Deconinck

* Brussels, Belgium

Objective: It has been proposed recently that adapted noise can be beneficial for the nervous system (Moss et al. 2004). In ADHD, an adapted level of noise has been suggested to compensate for the hypofunction of dopamine transmission (Solanto 2002). For instance, it has been found that noise improved ADHD children's performance in episodic memory (Sikström and Söderlund 2007). The objective of this ongoing study is to assess the potential benefits of noise, in ADHD compared to typically developing children (TDC), during a task tapping on inhibitory and attentional processes.
Method: Nine ADHD children (mean age = 9; SD = 1) and 16 TDC (mean age = 9.1; SD = 1.3) performed a visual Cued Go/Nogo task while exposed to white noise (a random signal containing equal power within any frequency band with a fixed width) or not. ADHD children stopped medication 24 h before testing.
Results: ADHD children exhibited less hits than TDC ($p = .004$). A marginal Group x Noise interaction ($p = .08$) indicated that ADHD children made less hits than TDC in the no-noise condition ($p = .005$), whereas they made as many hits as TDC in the noise condition ($p = .18$). Moreover, ADHD children committed more false alarms (FA) than TDC ($p = .05$). A significant Group x Noise ($p = .009$) interaction indicated that ADHD children made more FA than TDC in the no-noise condition ($p = .01$) whereas they were as efficient as TDC in the noise condition ($p = .96$).
Conclusion: Those first preliminary results suggest fairly strongly that ADHD children benefit from noise exposure during an executive task, which is an important finding with respect to theories focusing on the importance of adapting the environment of ADHD children. We are currently analysing neurophysiological measures collected during the Cued Go/Nogo in order to shed more light on the temporal course of this beneficial effect of noise.

YS-62-003 Global and regional grey matter volumes in treatment-naïve versus chronically treated children with Attention-Deficit/Hyperactivity Disorder: A voxel-based morphometry study

S. De Brito*, H. Slama, A. Mary, D. Baleriaux, M. Kavec, T. Metens, P. Peigneux, I. Massat, T. Villemonteix

* Birmingham, United Kingdom

Objective: to examine grey matter volumes differences between children with attention-deficit/hyperactivity disorder (ADHD) and

typically developing (TD) children, and to determine if such differences are related to the subjects' history of stimulant treatment.
Method: voxel-based morphometry (VBM) was used to compare grey matter volumes in 32 treatment-naïve children with ADHD, 23 children with ADHD treated with methylphenidate for a minimum of one year (all of them without comorbid psychiatric and medical conditions, with combined-type), and 27 TD children. Groups were comparable for age, IQ and socio-economic status. Between-group differences in grey matter volumes were assessed using an ANOVA model, with age and gender as covariates of no interest. Based on previous findings, five regions of interest (ROIs) were identified: the basal ganglia, the cingulate cortex, the cerebellum, the temporal lobe and the inferior frontal cortex. Inferences in our ROIs and at the whole brain level were made using a statistical threshold of $p < 0.05$ after family-wise error correction. As a second step, group differences were assessed considering male participants only ($n = 51$).
Results: in comparison to the TD children and to the medicated ADHD group, the never medicated group showed reduced grey matter volumes in the right inferior frontal cortex (rIFC). In the analyses restricted to male participants, the never medicated ADHD group, as compared to the TD group, displayed reduced grey matter volume in the right inferior frontal gyrus, in the right inferior temporal gyrus and in the anterior cingulate gyrus (ACC) bilaterally.
Conclusion: our study, the first VBM study of ADHD including a treatment-naïve group, first confirms previous findings of structural deficits in ADHD in regions associated with motor inhibition (rIFC) and affective processing (ventral part of the ACC). It also suggests that methylphenidate might exert a normalizing effect on grey matter volumes deficits found in ADHD.

YS-62-004 Predictive classification of adolescents with Attention Deficit Hyperactivity Disorder using structural magnetic resonance imaging

L. Lim*, A. Cubillo, A. Smith, K. Chantiluke, A. Simmons, M. Mehta, A. Marquand, K. Rubia

* London, United Kingdom

Objective: Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder diagnosed based on subjective clinical measures. This study applied Gaussian process classification (GPC) to structural grey matter (GM) data, to assess whether individual ADHD adolescents can be accurately differentiated from controls based on objective, brain structure measures and whether this is disorder-specific relative to autism spectrum disorder (ASD).
Method: Twentynine mostly medication-naïve ADHD boys, and 29 age-matched healthy and 19 boys with autism spectrum disorder (ASD) were scanned. GPC was applied to make disorder-specific predictions of ADHD diagnostic status based on individual GM patterns. In addition, voxel-based morphometry (VBM) analysis tested for univariate group level differences in GM.
Results: The pattern of GM correctly classified up to 75.9 % of ADHD and 82.8 % of healthy controls, achieving an overall classification accuracy of 79.3 %. The discriminating GM patterns showed higher weights for classification of ADHD patients in earlier developing ventrolateral/premotor fronto-temporo-limbic-brain stem and stronger classification weights for controls in later developing dorsolateral fronto-striato-parieto-cerebellar networks. The probabilistic predictions furthermore correlated with ADHD severity were disorder-specific relative to autism. Some frontal, parietal and cerebellar regions classifying controls in the multivariate analysis were also decreased in GM in ADHD relative to controls in the univariate analysis, suggesting they are deficit areas.
Conclusion: The study provides evidence that pattern recognition analysis can provide significant individual diagnostic classification of ADHD patients and controls based on distributed structural GM patterns with 79.3 % accuracy and that this is disorder-specific relative to ASD. The classification patterns show that earlier developing ventrolateral/premotor fronto-limbic–brain stem regions discriminate ADHD; while later developing dorsolateral fronto-striato-parieto-cerebellar networks discriminate controls, in line with the maturational delay hypothesis of ADHD. Findings are a promising first step towards finding an objective diagnostic tool based on brain imaging measures to aid with the subjective clinical diagnosis of ADHD.

Friday, 7 June 2013, 16.30–18.00

YS-63 Young Scientist Award Session

YS-63-001 Methylphenidate-regulated genes in lymphoblastoid cell lines of adult ADHD patients

S. Kittel-Schneider*, R. Schwarz, S. Reichert, C. Jacob, A. Reif

* Würzburg, Germany

Objective: Methylphenidate (MPH) is the most common used substance in childhood and adult Attention-deficit-/hyperactivity disorder (ADHD). Besides inhibiting noradrenaline and dopamine transport and thus increasing the availability of those neurotransmitters there are longer acting therapeutic mechanisms suspected. In the present study, lymphoblastoid cell lines from ADHD patients and healthy controls were chronically treated with methylphenidate (MPH) to investigate methylphenidate-regulated genes.
Method: Lymphoblastoid cell lines (LCLs) were generated from 10 adult ADHD patients and 11 healthy controls. Cells were incubated for 3 weeks with methylphenidate stock solution (30 ng/μL) or vehicle every 24 h and cells were harvested 0, 1, 6, 12 h, 1 and 2 weeks after MPH incubation to isolate mRNA. First a hypothesis-free pooled microarray analysis was conducted and the most significant genes therein were selected to verify the results with quantitative Real Time PCR.
Results: ATXN1, GUCY1B3, HEY1 and SLC2A3 showed differential expression between ADHD patients and healthy controls as well as methylphenidate-induced gene regulation. ANOVA Analysis for repeated measures revealed significant effects for gene*time*diagnosis and treatment*time*diagnosis interaction.
Conclusion: It could be shown that MPH influences gene expression in LCLs in a time-dependent manner. We also found differences in gene expression between ADHD patients and healthy controls which were additionally influenced by MPH treatment. The significantly regulated genes belong to different pathways which were in previous studies shown to play a role in the pathogenesis of ADHD. There is evidence for genetic polymorphisms to be associated with ADHD or cognitive functioning in ADHD patients (HEY, ATAXN1, SLC2A3) and there are hints for a role of the nitrinergic system in ADHD (GUCY1B3). In conclusion we could find evidence for various pathways playing a role in the mode of action of MPH and the pathogenesis of ADHD.

YS-63-002 Expression study on the ADHD candidate latrophilin 3 in mononuclear blood cells

J. Fuchs*

* Würzburg, Germany

Abstract not received.

YS-63-003 Association between GUC2C and attention-deficit/hyperactivity disorder in Chinese Han subjects: Evidence from both categorical and quantitative traits

L. Liu*, Y. Wang, H. Li, L. Yang, Q. Qian

* Beijing, People's Republic of China

Objective: In a recent report in SCIENCE, guanylyl cyclase-C (GC-C) knocked out mice exhibit hyperactivity and attention deficits, which could be reversed by ADHD therapeutics amphetamine. This finding suggested that the GC-C mutation may play a role in the etiology of attention-deficit/hyperactivity disorder (ADHD). Our present study is to investigate the association between seven SNPs of Guanylate cyclase 2C gene (GUC2C) with ADHD in Chinese Han subjects.
Method: A total of 381 ADHD probands met DSM-IV diagnostic criteria (who along with their parents constituted trios) and 381 healthy controls of Chinese Han descent were included. Seven SNPs of GUC2C were genotyped using a Taqman allelic genotyping assay. Transmission disequilibrium test (TDT) for family-based association study and Chi square test for case–control study were conducted using Haploview. Multivariate analysis of variance using SPSS was conducted to explore the association between genotypes and ADHD symptom severity assessed by ADHD Rating Scale-IV (ADHD RS-IV) and Clinical Diagnostic Interview Scale (CDIS).
Results: From family-based association study, the T allele of rs2287171 was over-transmitted in ADHD-C trios ($P = 0.031$), especially in male ADHD-C ($P = 0.004$). From case–control study, the T allele of rs2278171 showed higher frequency in male ADHD than male controls ($P = 0.026$). The T alleles of rs2287172 ($P = 0.043$) and rs2287171 ($P = 0.008$) showed high frequencies in ADHD-C than controls, especially in male ADHD-C ($P = 0.014$, 0.004). Analyses of quantitative traits indicated that ADHD carrying the T alleles of rs2278171 or rs2278172 showed higher score of total symptom ($P = 0.001$, 0.010) and hyperactivity/impulsivity symptom ($P = 0.001$, 0.020) than non-carriers.
Conclusion: Our finding suggests the association between GUC2C and ADHD in Chinese Han subjects, especially in ADHD-C. However, it needs further work to replicate our finding in a larger sample and different ethnic population.

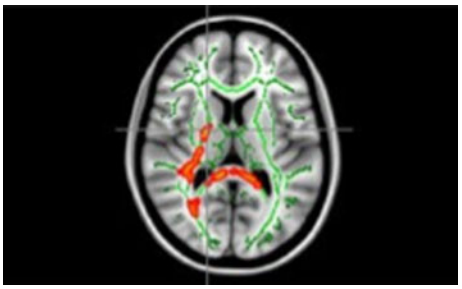
YS-63-004 Diffusion tensor imaging in a Brazilian sample of Attention Deficit Hyperactivity Disorder children: Preliminary data evidence reduced fractional anisotropy in tracts connecting anterior and posterior attentional systems

G. Pastura*, P. Mattos, E. L. Gasparetto, A. P.Q.C. Araújo

* Rio de Janeiro, Brazil

Objective: To study the connectivity between the anterior and posterior attentional systems in a sample of Attention Deficit Hyperactivity Disorder (ADHD) Brazilian probands when compared to normal subjects matched for age, sex and intelligence quotient, through Diffusion Tensor Imaging.
Method: Cross-sectional study. Seventeen ADHD subjects of both sexes, aged between 7 and 10 years old, and a control group composed by a sample of sixteen children matched for age, sex and intelligence quotient, were submitted to magnetic resonance imaging in order to obtain diffusion tensor imaging (DTI). All patients were recruited from the pediatric outpatient clinic of the university hospital. Tract-based spatial statistics (TBSS) was used in the analysis of the obtained data.
Results: Comparing ADHD probands to normal children, reduced fractional anisotropy (FA) was observed in six areas: splenium of the corpus callosum, posterior cingulate gyrus bilaterally, right corticospinal tract, right occipital region (lateral and pre-cuneus), the right inferior longitudinal fasciculus and right posterior temporal white matter.
Conclusion: ADHD is associated with reductions in FA in areas involved in the attentional control. This decrease may reflect a loss in the structural integrity of white matter tracts connecting the anterior and posterior attentional systems of the brain, what can explain the symptoms of this clinical condition.

DTI:



Friday, 7 June 2013, 15.00–16.00

P-01 Diagnosis I

P-01-001 Differences between normal children with high and low scores on sluggish cognitive tempo: Preliminary data

E. Cardo Jalón*, M. Servera, M. Bernad, G. Grasses, V. Meisel

* Palma de Mallorca, Spain

Objective: The present study aims to analyze differences between children with high and low scores in Sluggish Cognitive Tempo (SCT), on behavioral scales rated by parents and teachers.
Method: The sample consists of 723 healthy children selected from schools in Mallorca and Madrid. Participants were classified by their parents as high or low in SCT using an 8-item measure of SCT based on Penny et al.(2009), according to the 75th percentile. All children were evaluated by their parents and teachers using typical ADHD, ODD, anxiety, and depression scales, as well as in academic performance.
Results: Results indicate that boys scored higher than girls, but with small effect sizes (0.15). Children with high scores in SCT significantly differed from the others according to parent and teacher ratings. In the case of parents, the main difference was observed in ADHD scales, followed by ODD, and depression. In the case of teachers, considerable effect sizes were observed for inattention and academic performance.

Conclusion: In sum, these findings suggest that even in normal samples the tendency of elevated scores in SCT is related to more problems in ADHD (especially when rated by parents), and academic performance (rated by teachers). Despite the obvious relation between SCT and ADHD inattention scale, these preliminary results encourage further research using a clinical sample.

P-01-002 Can developmental screening tools accurately identify children with ADHD in primary care?

M. Limbos*, D. Joyce

* Vancouver, Canada

Objective: Guidelines of the AAP recommend that primary care clinicians initiate an evaluation for ADHD in any child who presents with academic/behavioral problems that may represent ADHD. However, without surveillance, many physicians may delay identification. Increasingly, clinicians are using developmental screening tests at regular intervals in children to identify developmental delays. In Canada, most physicians are familiar with the Rourke and the Nipissing District Developmental Screen (NDDS), while in the U.S., the Ages and Stages Questionnaire (ASQ) and Parents' Evaluation of Developmental Status (PEDS) are most commonly used. If such tools are able to identify behavioral markers of ADHD, they may aid in identifying children with ADHD at a younger age. The current study aimed to evaluate the accuracy of such tools in identifying children at-risk for ADHD.
Method: Three hundred three children aged 24–60 months were recruited. Parents completed 4 screening tests: the NDDS, Rourke, PEDS and ASQ. Children underwent a psychological assessment including a diagnostic interview for ADHD (DSM-IV-TR) and administration of the CBCL, tests of cognition, language and adaptive behavior.
Results: Six children (2 %) were identified as having ADHD. The PEDS had moderate sensitivity for identifying children with ADHD (83 %). All of the other broad-band tests had poor sensitivity for identifying ADHD: 50 % for the NDDS, Rourke, and ASQ. Specificity was low in all cases: NDDS (66 %), Rourke (75 %), PEDS (62 %), ASQ (72 %).
Conclusion: This study demonstrates that with the exception of the PEDS, most developmental screening tests lack the accuracy to identify preschool children with ADHD. Although it lacks specificity, the PEDS is very brief and easy to administer, and may be useful in eliciting symptoms of ADHD. For those physicians using other developmental screening tests, attention to parent concerns about academic and behavioral problems in addition to inattention, hyperactivity or impulsivity will be necessary.

P-01-003 A comparison of the ADHD symptoms between children and their both biological parents

J. Macek*, M. Tomori

* Ljubljana, Slovenia

Objective: ADHD is one of the most commonly diagnosed psychiatric disorders in childhood. Symptoms of ADHD are known to accumulate in families, yet there is paucity of scientific literature reporting on connection of ADHD symptoms between children and both parents. Typical features of children referred for evaluation and expression of ADHD symptoms in their parents with potential effect on child's metal health were assessed.
Method: We included 45 children in clinical group and 50 children in control group and both biological parents in both groups. Parents in both groups answered the Child Behavior Checklist, a Wender Utah Rating Scale and DSM IV modified scale. Teacher answered the Teacher Report Form in both groups. Other mental health problems were assessed in clinical group, comorbidites in parents were reported by themselves.
Results: There was strong expression of ADHD symptoms in children from clinical group. Children with ADHD expressed more emotional and behavioural symptoms and more aggressive behaviour as children from the control group. There was also stronger expression of ADHD symptoms in fathers of children with ADHD throughout their lifetime, while mothers expressed ADHD symptoms significantly more during childhood. Paternal ADHD symptom expression correlated with ADHD symptom expression in children with ADHD. Externalizing symptoms in children correlated with symptom expression in both parents.
Conclusion: Results of the study provide insight into clinical features of children referred for evaluation. Expression of ADHD symptoms is significant and independent of gender and disorder subtype. In addition, referred children already suffer from concomitant emotional and behavioural disorders, perhaps resulting from undiagnosed and/or untreated ADHD. ADHD symptom expression in children is correlated to paternal ADHD symptom expression and externalizing symptom expression in children is correlated to ADHD symptom expression in both parents. Clinical routine should include recognition of ADHD symptoms in parents and adequate provision of treatment, which often should include both parents.

P-01-004 Development of an instrument to evaluate executive functions, delay aversion and state regulation for children with Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: Assessment of executive functions through inventories that are answered by parents and teachers present relevant utility during the process of the cognitive evaluating of ADHD. However, to our knowledge there are no instrument that includes other relevant neuropsychological constructs related to ADHD, such as delay aversion and state regulation. Thus, the aim of the present study was to develop an inventory to evaluate executive functions (EF), delay aversion (DA), and state regulation (SR) in children with ADHD.
Method: Step 1: In the first step, items were developed based on the three components of executive functions identified by Miyake et al. (2000), set-shifting (SS), inhibition (I), and working memory (WM), as well as based on delay aversion (DA) and state regulation (SR) theories. Step 2: The items were submitted for evaluation by three different judges for establishment of content and construct validity. Step 3: All the items were reviewed. Step 4: Parents and teachers of 262 students answered the scale. MTA-SNAP-IV was also used to evaluation of clinical symptoms of ADHD.
Results: The exploratory factor analysis yielded five different mechanisms to the scale, confirming that items may represent the five different theoretical constructs. Internal consistency of the whole scale was excellent: scale answered by parents Cronbach′s alpha (0.94) and split half (0.85); answered by teachers Cronbach′s alpha (0.97) and split half (0.96). Pearson correlation analysis between the performances in new inventory and ADHD symptoms showed highly significant coefficients ($p < 001$) with low to moderate magnitude, indicating thereby that both instruments assess constructs different but related.
Conclusion: This study contributed to the provision of a valid and accurate test for evaluating different aspects of EF and two other

relevant skills related to ADHD, DA and SR in the Brazilian context. This instrument can fix on data for the development of future strategies for treatment of ADHD.

P-01-005 CBCL-derived psychopathological subtypes in children with ADHD

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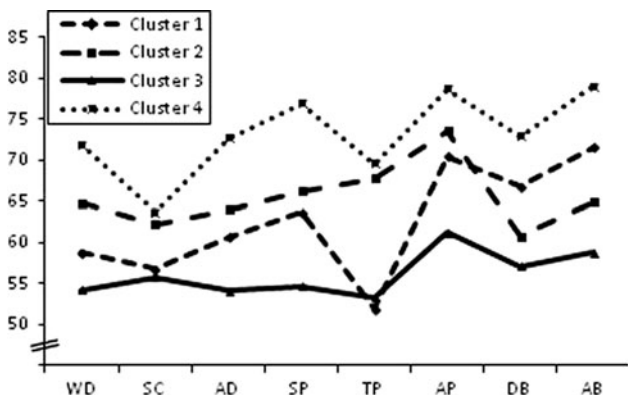
Objective: The aims of the current study were, first, to describe empirically derived homogeneous subgroups in a clinical sample of children with ADHD according to their parent-rated CBCL profiles; second, to contrast the empirically derived subgroups with the DSM-IV TR subtypes; and third, to compare the subgroups with regard to severity of ADHD symptoms, comorbid disorders, biological and psychosocial risk factors and the CAR.
Method: A clinical sample of 223 children with ADHD, aged five to 14 years old, was examined by the parent-rated Child Behavior Checklist (CBCL). Severity of ADHD symptoms, comorbid psychiatric disorders, biological and psychosocial risk factors, cortisol awakening response and socioeconomic status were also assessed. In order to identify subgroups of ADHD with regard to their CBCL profile, cluster analyses were performed.
Results: Cluster analysis of CBCL subscales yielded a solution with four distinct subgroups. While "externalizers" showed a high rate of comorbid ODD and CD, "obsessive–compulsives" exhibited thought problems (CBCL), low rates of comorbid CD, and high symptoms of inattention. "High psychiatric symptom carriers" had high rates of familial risk factors, acute life events, comorbid ODD, CD, and often showed the CBCL-Dysregulation Profile. "Low psychiatric symptom carriers" also scored low in all other variables studied.
Conclusion: In conclusion, the results of the current study suggest the existence of four CBCL-derived subgroups of ADHD, which can be identified by specific profiles of co-occurring behavior problems. These subgroups differ mainly regarding the amount of externalizing behavior problems and obsessive-compulsive symptoms, which were related to specific comorbid disorders pattern, as well as the amount and severity of psychopathological symptoms in general. In addition, as subgroups differed regarding familial risk factors, our findings may have implications for prevention and targeted treatment especially of the children with ADHD with high comorbid psychiatric symptoms.

CBCL-derived psychopathological subtypes in children with ADHD:



P-01-006 FAST MINDS™: An educational program for family care physicians to better recognize adult Attention Deficit Hyperactivity Disorder (ADHD) in primary care practice

T. Bilkey*

* Barrie, Canada

Objective: ADHD affects 4.4 % of adults and is a transcultural condition, crossing all ethnicities. While it is a common condition in general primary practice, it often goes unrecognized. With a mandate to assist in mentoring family physicians, the decision was made to develop an educational program for Primary Care Physicians (PCPs) which would fulfill criteria for accreditation within Canada. The program was developed to be purely clinical in nature; it would demonstrate interviewing techniques used to elicit symptoms of ADHD and present typical profiles of patients who would present with Adult ADHD.
Method: An acronym was developed to summarize the symptoms of Adult ADHD: FAST MINDS™: F—Forgetful—Fidgety A—Aptitudinal underachievement S—Symptom frequency T—Time challenged M—Motivationally challenged I—Irritable—Impatient—Inconsistent—Impulsive N–No tolerance for boredom D—Distractible—Disorganized S—Symptom severity From an interviewing clinical perspective, 10 typical profiles were developed to demonstrate how patients would present to a primary care practice with Adult ADHD, providing snapshot pictures of when PCPs need to think about underlying ADHD in their practices.
Results: In keeping with the College of Family Physicians of Canada accreditation protocol, each FAST MINDS™ presentation was evaluated by physicians in attendance. Data was recruited from evaluations of the FAST MINDS™ program and PCPS were asked to evaluate the following statements: "The program was relevant to my family practice." 156 responses: 119 "Strongly Agree"; 32 "Agree"; 5 "Disagree". "The program met the stated learning objectives of FAST MINDS™." 155 responses: 120 "Strongly Agree"; 33 "Agree"; 2 "Disagree". "The overall quality of the program was satisfactory." 163 responses: 134 "Strongly Agree"; 28 "Agree"; 1 "Disagree".
Conclusion: The FAST MINDS™ educational program has been demonstrated to be a helpful teaching program.

P-01-007 The virtual classroom: An ecological tool for the assessment of the three dimensions of ADHD

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Objective: Objectives: Use of virtual reality tool is interesting for the evaluation of Attention Deficit Hyperactivity Disorder (ADHD) patients. Previous studies showed that a virtual classroom was able to distinguish attentional and impulsive performances of children with and without ADHD. The aim of this work was to study the motor activity of ADHD children compared to controls in a virtual classroom (VC).
Method: Methods: 36 boys aged from 7 to 10 years completed the virtual classroom task. During this experiment, motor movements were recorded with the help of an actigraph on the subject's ankle on the one hand. On the other hand, head movements were captured and quantified by the inertial tracking system, which is part of the head mounted display (HMD).The variable used was the time spent in field of view to execute the task. We compared the performance of the children diagnosed with ADHD with those of the control children.
Results: Results: Our results showed that, ADHD children exhibited significantly more omissions than control subjects in the VC

($p < .0001$). Considering motor activity, results with the HMD system exhibited that ADHD children spent significantly more time out of field of view ($p < .003$) and performed a higher number of excursion out of field of view ($p < .002$). Moreover, the number of movements recorded by actigraph is significantly higher for ADHD patients compared to controls ($p < .0001$).
Conclusion: Conclusion: The virtual classroom appears to be a sensitive and ecologically valid assessment tool to explore the three dimensions of ADHD: hyperactivity, inattention and impulsivity.

P-01-008 Paediatric ADHD and bipolar disorder: From common symptoms to differential diagnosis: Can methylphenidate help to revise the diagnosis?

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* Cascais, Portugal

Objective: To assess the correlation between pediatric Attention Deficit Hyperactivity Disorder (ADHD) and Pediatric Bipolar Disorder (PBD), regarding both the overlapping characteristics and the specific signs and symptoms that can guide us to a differential diagnosis. Considering the literature a differential diagnosis of PBD may be assessed by the timeline of symptoms beginning, symptom inconsistency and uneven persistence throughout different contexts, decreased need for sleep, severe mood shifting, hallucinations and thought disorders such as grandiosity, family history for psychiatric disorders, hypersexuality and loss of therapeutic response to stimulants. Can in this context methylphenidate be used as a diagnosis tool?
Method: Case studies will be presented and analyzed, to illustrate and contextualize the discussion (v.g. a 13 year old girl, diagnosed ADHD at the age of 8 and medicated with methylphenidate showed PBD symptoms during assessment). Assessment included WISC-III (Wechsler 2003), CPM47 (Raven 1996), CBCL (Achenbach 1991), TRF (Achenbach 1991), Conners' Parent and Teacher Rating Scale—Revised: Long Version (1997), Child Mania Rating Scale—Parent Version (Pavuluri 2006).
Results: Higher severity of ADHD core symptoms, such as distractibility, impulsivity, planning difficulties, lack of self-control accompanied by manic discriminative symptoms, such as decreased need for sleep, irritability, grandiosity, delusions or hallucinations, severe mood swings and diminished response to methylphenidate, pointed toward the diagnose of PBD.
Conclusion: The emergence of some core maniac symptoms in association with a diminished response to methylphenidate lead us to consider that methylphenidate responsiveness can be considered as an additional tool to alert towards PBD diagnosis.

P-01-009 LINK: the adult Attention-Deficit Hyperactivity Disorder program (ADHD) connecting: educating: advancing

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Objective: The LINK program is a specialty service devoted to vocational education of Primary Care Physicians (PCPs), to improve diagnosis, assessment/treatment of adult ADHD. The program objectives are to increase the PCP's clinical comfort and confidence with: ·Screening suspected adult ADHD based on key clinical markers in a timely fashion, ·Diagnosing adult ADHD including differential diagnosis and co-morbidities ·Efficiently managing treatment initiation and maintenance of adult ADHD with or without co-morbidities.
Method: ADHD is an orphan disease in adulthood and the prevalence is 4.4 % worldwide. The PCP is often left alone with a medical condition that is misunderstood and underdiagnosed in adults. This project aims to create a pan Canadian network of ADHD specialists and PCPs. Each group of PCPs ($\sim$ 8) will be matched with an ADHD specialist. The ideal participant is a PCP already comfortable in a mental health practice that would refer their ADHD patients and/or would be able to diagnose/treat ADHD simplex to a certain extent. LINK program includes one session that will bring all participants to the same knowledge level of ADHD and one session where each PCP will complete a questionnaire on diagnosis, treatment optimization, patient management and knowledge transfer to clinical practice. Outcomes will be measured through questionnaires administered to PCP'S before and after the sessions. Metrics will include the comfort level making the ADHD diagnosis, the treatment initiation/titration, including co- morbidities and differential diagnosis.
Results: At the end of the sessions each PCP will be able to better diagnose/treat ADHD patients seen at their clinic. Otherwise, these patients will remain as undiagnosed ADHD patients, treated for other conditions.
Conclusion: Efforts are needed to increase the detection, treatment and follow-up of adult ADHD, and improve the understanding of related co-morbidities, resulting in more effective treatment. LINK program will provide metrics to evaluate these efforts.

Friday, 7 June 2013, 15.00–16.00

P-02 Diagnosis II

P-02-001 Study in progress: Validation of the Swedish version of Weiss Functional Impairment Rating Scale, self rating (WFIRS-S); the importance of functional impairment in the diagnostic process

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Objective: There is emerging evidence that more emphasis on assessments of functional impairment increases stringency in the diagnostic process. Since many ADHD symptoms are prevalent in the general population, stringent assessments of functional impairment are important to prevent over diagnosing and thus overuse of pharmacological treatment. The WFIRS-S was primarily developed as a practical instrument and has not been subjected to the necessary stringent psychometric tests of validity. The aim is to evaluate, in a retrospective study, the psychometric properties of the Weiss Functional Impairment Rating Scale, Self report format, Swedish version. The validated instrument will, in a subsequent stage, be compared to the established test of IRS. As further validation, the external validity will be taken into the account by way of the diagnostic properties of the WFIRS-S.

Method: Close to 200 patients have already been assessed according to the WFIRS-S protocol in connection with initial ADHD assessments at the psychiatric units of Region Halland. In the majority of cases, Russell Barkley's Impairment Rating Scales (IRS) were also employed (Barkley and Murphy 2006). The assessment protocols form the basis of the present study. The items of WFIRS-S for each individual will be compared with the corresponding Barkley scales (IRS), in order to explore the convergent validity of the investigated scale. Six of the seven impairment areas in the WFIRS-S target the same functions as the corresponding areas in Barkley's IRS. The individuals in this study have undergone an extensive diagnostic assessment process, which to date is considered to be the diagnostic gold standard. The ensuing ADHD diagnostic assessment is a clinical decision, based on all available information, of which the two scales are part of this process. Thus, the correlations between the diagnosis of ADHD, ADHD related symptoms and functional impairment are hypothesized to be elevated. Non-parametric analyses will be performed to explore statistical relationships between the different items in the WFIRS-S as well as between the two scales and the relationship to the final diagnosis.
Results: N/A.
Conclusion: N/A.

P-02-003 Reliability, validity and standardization of the Japanese version of the Conners' Adult ADHD Rating Scales (CAARS)

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Objective: The main purpose of the present study was to examine the reliability and validity of the Japanese version of the Conners' Adult ADHD Rating Scales (CAARS: Conners et al. 1999) self-report and observer rating forms. The authors also compared the normative data of Japanese version and the original version (including data collected in US and Canada) of the CAARS.
Method: The CAARS self-report and the Beck Depression Inventory–II (BDI-2: Beck et al. 1996) were administered to 786 nonclinical adults (354 males, 432 females) from several sites and to 30 adult patients with attention-deficit/hyperactivity disorder (ADHD; 12 males, 18 females) in Japan. The CAARS observer rating form was administered to 786 individuals who were relatives (e. g. spouse, parent, sibling) of those who were administered self-report form.
Results: Confirmatory factor analysis indicated that a four-factor structure was the good fit with the data, which is the same structure as the original version of CAARS. Internal reliability (i.e., Cronbach's alpha) and test–retest reliability for the CAARS self and observer forms were satisfactory. The adult ADHD group scored significantly higher than the normal group, indicating good discriminant validity. Overall, moderate to high correlations were observed between the CAARS self-report and observer ratings on the same subscales, and moderate correlations were observed between the CAARS self-report and the BDI-2; these results suggested construct validity of the CAARS. Lastly, the normative data of the Japanese and original version was compared using *t* test, which revealed that the participants in Japan scored significantly lower than the US and Canadian participants in all the subscales of CAARS self and observer forms except a "Problems with self-concept" subscale.
Conclusion: Japanese version of CAARS self-report and observer rating form developed with good reliability and validity.

P-02-004 A study on screening tools for Attention Deficit Hyperactivity Disorder (ADHD) in Korea

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Objective: The purpose of this study is to examine the validity of primary screening tools for attention deficit hyperactivity disorder (ADHD) children in community based sample using the Korean version of Child Behavior Checklist (K-CBCL) and the Korean version of ADHD Rating Scale (K-ARS).
Method: This study is a large-scale community based study of ADHD screening conducted in Jeonrabuk-do province for 2 years in a row, 2010 and 2011. In 2010, we surveyed all first graders of elementary school ($n = 15{,}808$). And, in 2011, we surveyed all first and fourth graders of elementary school ($n = 33{,}384$). All participants in this study were assessed by the K-ARS-Parent version (K-ARS-P) and the K-ARS-Teacher version (K-ARS-T) as the primary screening instruments. The Diagnostic Interview Schedule for Children Version IV (DISC-IV) was used as a diagnostic method for confirming ADHD. DISC-IV was administered to the subjects with top 10 % scores in K-ARS-P or K-ARS-T.
Results: The reasonable level of sensitivity, specificity, and negative predictive value were obtained in the total scores $\geq$90th percentile in the K-ARS-P. The positive predictive value and specificity significantly increased when combined the total scores $\geq$90th percentile in K-ARS-P, $\geq$60T scores in the attention problems of K-CBCL, and $\geq$63T scores in the total problems of K-CBCL.
Conclusion: These results suggest that the combined use of K-ARS and K-CBCL could serve as a useful screening instrument to identify first graders of elementary school with ADHD in community.

P-02-005 Diagnostic threshold prediction by gender according to the ASRS v1.1 in two samples of Mexican adults

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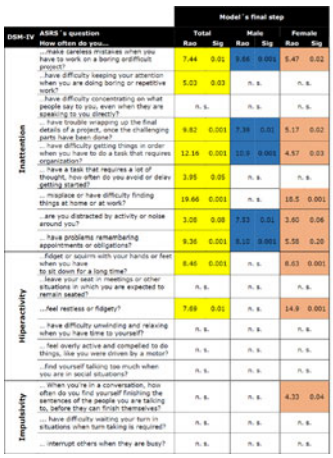
* México Df, Mexico

Objective: To Predict the threshold number of symptoms according to the 18 items ASRS v1.1 by gender in Mexican adults belonging to a University sample or a clinical sample from the National Institute of Psychiatry.
Method: This study was approved by two independent ethics commissions. Each subject was recruited prior explanation and informed consent. Clinical sample: Male and female subjects that requested psychiatric help, who could read and write and were, by clinical evaluation, free of cognitive deficits. We did not include patients who

had primary medical condition that required treatment, that had psychological or psychopharmacological treatment for ADHD or Axis I diagnosis of psychotic spectrum disorder. We included 683 adults (275 women, mean age = 29.67 years, SD = 7.58). University sample: 540 male and female bachelor students were evaluated (412 women, mean age = 25.40 years, SD = 8.19) from 16 careers in four universities. They all responded the ASRS v1.1. and a scale designed for ADHD in Mexican population (FASCT). For a sub-clinical sample (N = 399) we applied the MINI (Mini International Neuropsychiatric Interview) Plus.

Results: The data on sex, age and number of positive cases of ADHD for the final sample are shown in Table 1. In the final model, eight symptoms encompassed inattention, while the remaining two referred to symptoms of hyperactivity (Goodness of fit test, $\chi^2 = 2.89$, $p = 0.94$). We found differences in the final model by gender (Table 2).

Conclusion: Despite the limitations of our study, our data contribute to the current discussion of the DSM V referring to the importance of adapting the threshold for ADHD symptomatology and suggest that we should take into account gender and context to determine the diagnosis of an adult.



DSM-IV	ASRS 's question How often do you...	Model 's final step					
		Total		Male		Female	
		Rao	Sig	Rao	Sig	Rao	Sig
Inattention	...make careless mistakes when you have to work on a boring or difficult project?	7.44	0.01	9.66	0.001	5.47	0.02
	...have difficulty keeping your attention when you are doing boring or repetitive work?	5.03	0.03	n. s.		n. s.	
	...have difficulty concentrating on what people say to you, even when they are speaking to you directly?	n. s.		n. s.		n. s.	
	...have trouble wrapping up the final details of a project, once the challenging parts have been done?	9.82	0.001	7.39	0.01	5.17	0.02
	...have difficulty getting things in order when you have to do a task that requires organization?	12.16	0.001	10.9	0.001	4.57	0.03
	...have a task that requires a lot of thought, how often do you avoid or delay getting started?	3.95	0.05	n. s.		n. s.	
	...misplace or have difficulty finding things at home or at work?	19.66	0.001	n. s.		10.5	0.001
	...are you distracted by activity or noise around you?	3.08	0.08	7.33	0.01	3.60	0.06
	...have problems remembering appointments or obligations?	9.36	0.001	8.10	0.001	5.58	0.20
Hiperactivity	...fidget or squirm with your hands or feet when you have to sit down for a long time?	8.46	0.001	n. s.		8.63	0.001
	...leave your seat in meetings or other situations in which you are expected to remain seated?	n. s.		n. s.		n. s.	
	...feel restless or fidgety?	7.69	0.01	n. s.		14.9	0.001
	...have difficulty unwinding and relaxing when you have time to yourself?	n. s.		n. s.		n. s.	
	...feel overly active and compelled to do things, like you were driven by a motor?	n. s.		n. s.		n. s.	
	...find yourself talking too much when you are in social situations?	n. s.		n. s.		n. s.	
Impulsivity	...When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to, before they can finish themselves?	n. s.		n. s.		4.33	0.04
	...have difficulty waiting your turn in situations when turn-taking is required?	n. s.		n. s.		n. s.	
	...interrupt others when they are busy?	n. s.		n. s.		n. s.	

	Male	Female	Total	Sig
Sample n (% Row)	146 (33.72)	287 (66.28)	433 (100)	
¿ADHD? n (% column)	48 (32.88)	75 (26.13)	123 (28.41)	X^2= 3.92 p= 0.14
Mean age (SD)	23.84 (5.11)	23.46 (5.08)	23.59 (5.07)	t= 0.10 p= 0.92

P-02-006 What is considered abnormal sustaining of attention? a survey among teachers and parents of elementary school children

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* Tel Aviv, Israel

Objective: The diagnosis of attention deficit/hyperactivity disorder (ADHD) mostly relies on subjective reports of parents and teachers. One of the pivotal symptoms of ADHD diagnosis is "often has trouble keeping attention on tasks or play activities". The purpose of this study was to assess the judgment of parents and teachers regarding the expected attention span across tasks of children in third and fourth grade.

Method: Fifty parents of children 9–10 years old who were referred to the ADHD and Learning Clinic at Sheba Medical Center completed the attention span questionnaire (AtSQ) that was designed for this study. In addition, 50 teachers of third and fourth graders from the Center of Israel also completed the AtSQ. The AtSQ consists of items related to daily tasks of children that require sustaining of attention such as academic (e.g., home-work) and leisure (e.g., watching TV, free play) tasks.

Results: There was a large variability in responses of both parents and teachers to the AtSQ items. For example, the minimal time expected from a male child to listen in class lessons was mean ± SD 28.75 ± 13.30 min, (range 10–60 min) based on parents and 15.43 ± 10.88 min, (range 10–45 min), based on teacher reports. The expected time to sustain attention was significantly lower for boys than for girls except for watching TV and playing computer. Expectations of teachers for duration of sustaining attention on various tasks were lower and less variable than expectations of parents especially for girls.

Conclusion: To our knowledge this is the first survey evaluating the perception of parents and teachers regarding expected attention span of children. Our results indicate that there is a large variability within group.

P-02-007 Detecting Attention Deficit Hyperactivity Disorder (ADHD): Examining predictive factors

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* Toronto, Canada

Objective: Due to significant overlap in symptomatology among patients with Attention Deficit Hyperactivity Disorder (ADHD) and other mood and anxiety disorders, identifying the presence of ADHD within a mood and anxiety disorders setting can be challenging. The combined presence of these comorbidities (ADHD, depression, bipolar disorder, and an anxiety disorder), while quite common, confounds the diagnostic process. Research has revealed higher detection rates of mood and anxiety disorders relative to ADHD; And despite high comorbidity between ADHD and mood and anxiety disorders, ADHD is often undetected or misdiagnosed, particularly in adults. This study attempts to identify clinical clues that may assist in the detection of comorbid ADHD in mood and anxiety disorder patients.

Method: Data was collected from 100 consecutive referrals at the START Clinic for the Mood and Anxiety Disorders, a tertiary-care center. Referrals to an ADHD specialist were assessed relative to other clinical practitioners with regards to reasons for referral, source of referral, primary diagnosis, and medication history. Intake diagnoses were formed by the consensus between the treating physician and the MINI International Neuropsychiatric Interview 6.0.0 (M.I.N.I.). Descriptive and correlational analyses were conducted.

Results: The number of patients with ADHD referred for assessment of a mood or anxiety disorder will be presented, along with correlated factors to the presence of ADHD. Features of mood and anxiety disorders that hint at the presence of comorbid ADHD will be reviewed. Differences in the clinical course of patients prior to the clinic referral will be examined.

Conclusion: The authors hypothesize that the presence of ADHD can be detected by a variety of core clinical features present in patients' referrals. The presence of ADHD alters the clinical course of patients with comorbid mood and anxiety disorders unless ADHD is treated as part of the clinical presentation.

P-02-008 Delay in diagnosis of Attention Deficit/Hyperactivity Disorder influenced by psychiatric comorbidities and parental educational level

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* Vienna, Austria

Objective: Socioeconomic status and the presence of comorbid disorders seem to influence the clinical presentation of Attention Deficit and Hyperactivity Disorder (ADHD). Delayed or failed diagnosis of ADHD may cause worsening of symptoms, social maladaptation and promote psychiatric comorbidities. Therefore, our aim was to investigate the effects of comorbidities and socioeconomic status on diagnostic delay of ADHD in children.
Method: The caretakers (parents) (mean age = 42 years, 24 females) of 26 children suffering from ADHD determined using ICD-10 and previously admitted on day care of the Department of Child and Adolescence Medicine, psychosomatics division (Medical University of Vienna) underwent half standardised questionnaires regarding general demographic/epidemiological information and socioeconomic status.
Results: Based on the time of first symptomatic onset to final diagnosis, ADHD was confirmed 2.57 years later ($T = 2.086$, $p = 0.048$, uncorrected) in children with psychiatric comorbidities than in subjects without any comorbidities. Furthermore using ANOVA, educational level of the caretaker significantly influences diagnostic delay of ADHD ($F = 3.173$, $p = 0.044$). Post-hoc Tukey-test revealed that ADHD was confirmed after 3 years in children with parents who had completed compulsory education (8 years) and after 6 years in subjects with parents who had finished high-school (12 years; $p = 0.027$).
Conclusion: These findings reveal that the presence of psychiatric comorbidities and educational level of the parents influence the diagnostic delay of ADHD. In fact, psychiatric comorbidities may mask ADHD symptoms thereby leading to a delayed diagnosis and inadequate treatment. Moreover, contrary to our expectation, a higher educational level of the parents was associated with increased diagnostic latency, which may be caused by a negative attitude towards psychiatry (stigmatization) in higher educated person or by more prolific coping strategies in handling ADHD symptoms. Since diagnostic delay is detrimental for children with ADHD, further studies seem necessary to explore other risk factors influencing diagnostic delay.

P-02-009 Categorical and dimensional assessment of ADHD in adults: The Barkley Adult ADHD Rating Scale IV (BAARS-IV) and the Adult ADHD Self Report Scale 1.1 (ASRS-1.1)

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* Cluj-Napoca, Romania

Objective: The use of self-rating instruments beside the administration of clinical expert (observer) rating scales has become a cornerstone in psychiatric research. As there is no gold-standard or ideal rating scale, we investigated the advantages and disadvantages of the Romanian translations of the ASRS 1.1 (Kessler et al. 2005) and BAARS-IV (Barkley 2011) in screening for adults suffering from ADHD. Both scales have a short and a long version and assess the severity of the eighteen DSM-IV-TR criteria, both categorically or dimensionally. BAARS-IV has nine additional items that evaluate the symptoms of sluggish cognitive tempo (SCT).
Method: A battery of scales, including the above mentioned ones, was completed online (via Surveygizmo) by two samples. Sample 1 consisted in students ($N = 301$, aged 21.8 ± 2.5, 84.7 % women) attending the undergraduate psychology courses in Ia–i and Cluj-Napoca, while Sample 2 was formed by adults ($N = 251$, aged 38.6 ± 12.4, 70.4 % women) recruited from the general community from all over Romania via mass media adverts. Participation was voluntarily. Data analysis was performed in IBM SPSS Statistics 20.0.0.
Results: Internal consistency reliability was .678 and .909 for the ASRS screener and whole scale respectively, while .777, .914, .870, .754, .807 and .852 for the BAARS screener, total score, Inattention, Hyperactivity, Impulsivity and SCT subscales, respectively. Using the proposed cut-off points (Barkley 2011; Gau et al. 2007), we identified 46 participants (8.3 %, aged 26.93 ± 10.14, 69.6 % women), who were likely to meet the DSM-IV criteria for ADHD in adults.
Conclusion: Both scales showed comparable psychometric qualities with the originals. There is no decisive advantage in terms of details of scale construction and psychopathological items.

Friday, 7 June 2013, 15.00–16.00

P-03 Co-morbidity: Children and adolescents I

P-03-001 The association between parenting stress, children mental health and environmental pollution exposure

B. Balseviciene*, L. Sinkariova, S. Andrusaityte

* Kaunas, Lithuania

Objective: The purpose of this study was to examine the associations between parenting stress, children mental health and environmental pollution exposure (tobacco smoke). We hypothesize that the association between tobacco smoke exposure and children mental health problems is affected by parenting stress.
Method: Data were obtained from Kaunas cohort study (Kaunas KANC, Lithuania). Prenatal and postnatal tobacco exposure was based on mother report. 645 women filled Simplified version of Parenting Stress index–short form (S–PSI/SF, Abidin 1995; Yeh et al. 2001), Strength and Difficulties Questionnaire Lithuanian version (SDQ, Gintilienė et al. 2004). We used regression analysis to examine a model of these associations.
Results: Results indicated that children mental health problems (such as emotional problems, conduct disorder, hyperactivity, peer problems) were significantly predicted by postnatal exposure to tobacco smoke, parenting stress, mother‘s employment status and education, child age and sex. The best model of associations was when all predictors were included and neither parenting stress, neither exposure to tobacco smoke itself were significant predictors of children mental health problems in the regression model.
Conclusion: We conclude that exposure to postnatal tobacco smoke and parenting stress both are risk factors for child mental health problems, also SES of child and mother has an important role in these associations.

P-03-002 Relations with bipolar disorders, ADHD and ASD in childhood and adolescence

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Objective: In the present study, we investigated the relations with bipolar disorders, attention deficit hyperactivity disorder (ADHD) and autism spectrum disorders (ASD) in childhood and adolescence, and discussed their clinical significance and related issues.
Method: Subjects were a total of 30 children and adolescents (8 boys, 22 girls) aged 8–17 years who met the diagnostic criteria for bipolar disorders among patients who visited the outpatient child psychiatric unit of the Nirenokai Pediatric Clinic in Japan.
Results: The 30 patients (mean age, 14.1 ± 2.5 years) had the following diagnoses: bipolar I disorder (n = 1), bipolar II disorder (n = 12), and bipolar disorder not otherwise specified (n = 17). Patients were classified into the child (n = 7) and adolescent (n = 23) groups. Six patients (85.7 %) in the child group and four patients in the adolescent group (17.4 %) had a family history of mood disorders. Comorbidities included ASD (100 %), ADHD (42.9 %), and anxiety disorder (28.6 %) in the child group and ASD (43.5 %), ADHD (4.3 %), and anxiety disorder (43.5 %) in the adolescent group. Clinical presentations were mixed episodes (62.5 %), ultradian type (14.3 %), and rapid cycling (28.6 %) in the child group, while these presentations were seen in 0, 13.0, and 52.2 % in the adolescent group, respectively. A total of 34.8 % of patients in the adolescent group exhibited the features of adult-onset bipolar disorder.
Conclusion: Common clinical characteristics of the child group were a family history of mood disorders, presentation of mixed episodes, and comorbid developmental disorders, but those of the adolescent group were found to be similar to adult group. In addition, it was reported that the rates of comorbidity with ADHD was high among the children and adolescents with bipolar disorders in other countries, but in this study, those of ASD were high in Japan.

P-03-003 Language impairment in children with Attention-Deficit Hyperactivity Disorder

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* Lisbon, Portugal

Objective: Identify the age of language milestones in children with ADHD (First word and adding two words), study the prevalence of language impairment in this group and correlate the ADHD type with language impairment.
Method: A retrospective analytical study was performed at the Neurodevelopment Clinic of Santa Maria University Hospital, Lisbon, during a period of 3.5 years (from January 2009 to June 2012) with ADHD as main diagnose, according to DSM-IV-TR. Children with co-morbidities such as cognitive impairment and autism spectrum disorders were excluded. The statistical analysis was performed recurring to Excel® 2010 (relative frequencies) and SPSS v. 20® (χ^2, Fisher Test) software.
Results: Out of the 400 entries in the database, 282 met the inclusion criteria. The ratio male/female was 2:1. The mean age at the first consultation was 6.3 years. Combined ADHD sub-type was the most common (58.2 %). 62.5 % of the children had at least one co-morbidity, being language impairment (36.5 %) and learning disorders (36.9 %) the most frequent. The first word acquisition was performed in the expected time in 66.0 % and the capacity of joining 2 words was delayed in 46.0 % of the children. Specific language disorders were the most common (27.0 %) and delay in language acquisition was seldom found (4.0 %). Significant correlation between the ADHD type and language impairment ($p = 0.52$) wasn't found.
Conclusion: Co-morbidity is the norm in children with ADHD, being language impairment and learning disorders the most common in this study. A tendency towards the capacity of joining 2 words was verified. Children with ADHD require a multidisciplinary follow-up with individualized programmes directed to their needs and co-morbidities.

P-03-004 Comorbidity in children and adolescents with Attention Deficit/Hyperactivity Disorder in a Tunisian clinical population

A. Harbaoui*, F. Charfi, A. Zaineb, S. BenRjeb, S. Halayem, S. Othman, A. Bouden

* Tunis, Tunisia

Objective: The purpose of this study is to review comorbid disorders in a population of children and adolescents with ADHD.
Method: 60 children and adolescents have been diagnosed ADHD among the consultants in the Department of child and adolescent psychiatry in Razi's Hospital between 2009 and 2012. The diagnosis of ADHD has been made according to the criteria of DSM IV, with Schedule for Affective Disorders and Schizophrenia for School Aged Children lifetime version (K-SADS-PL) and the Conners Scale. Through these assessments and a review of medical files of patients with ADHD, comorbid disorders were identified.
Results: The male to female sex ratio is 2.1. The average age is 8.5 years old. 15 % of the children diagnosed with ADHD have epilepsy. In 17 % of the cases, a family history of bipolar disorders is found. The most frequent clinical subtype of ADHD is the mixed subtype (63 %). In 62.3 % of the cases, the comorbidity with another disorder is found. The Opposional Defiant Disorder (ODD) is diagnosed in 25 % of the cases and conduct disorder in 9 %. 23 % of the patients have specific learning disabilities and in only 5.3 % of the cases, a comorbidity ADHD and bipolar disorder is identified.
Conclusion: Children and adolescents with ADHD are at high risk of developing a wide range of impairments affecting multiple domains of psychopathology such as cognition, interpersonal, school, and family functioning. These findings strengthen the fact that it is imperative to systematically search related disorders to indicate the adequate management.

P-03-005 Cognitive function and symptom levels of ODD, ADHD and emotional problems in ADHD children with and without social impairment

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* Bergen, Norway

Objective: We aimed to explore the rate of social impairment and correlates of cognitive function and mental health problems in children with Attention Deficit/Hyperactivity Disorder (ADHD) to better understand the mechanisms contributing to these problems in the children's everyday lives.

Method: The sample comprised all children diagnosed with ADHD (N = 38, age 8–11 years) according to the Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS) with a Fullscale IQ ≥70 (measured by WISC-III) in the population-based third phase of the Bergen Child Study (BCS). Social impairment was defined as scoring above the population-based 90th percentile on a scale constructed by combining the parent and teacher items from the social sub-factor of the Autism Spectrum Screening Questionnaire (ASSQ) (Posserud et al. 2008). Cognitive measures and symptom levels on parent and teacher reports of oppositional defiant disorder (ODD), SDQ emotion (Strength's and Difficulties Questionnaire) and ADHD were compared in ADHD children with and without social impairment using t tests and significance level of $p < 0.05$.
Results: Social impairment was found in 24 of the 38 children with ADHD (63 %). ODD symptoms were significantly higher in children with social impairment, according to both parent and teacher reports. Teachers also rated the socially impaired children higher on both ADHD symptoms and emotional problems, whereas parent reports showed no differences. Measures of intellectual functions (total IQ, verbal IQ, performance IQ, processing speed) did not differ between the groups.
Conclusion: As many as 63 % of children with ADHD showed social impairment according to a combined parent and teacher social subscale based on the ASSQ. The socially impaired group had higher levels of ODD symptoms in particular, whereas measures of intellectual function did not differ between the groups.

P-03-006 Misdiagnosis of Attention Deficit/Hyperactivity Disorder (ADHD) and the role of comorbid anxiety, unipolar and bipolar depression

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* Toronto, Canada

Objective: In clinical practice, consensus regarding an optimal clinical approach to the diagnosis and management of Attention Deficit Hyperactivity Disorder (ADHD) does not yet exist. Psychiatric disorder commonly co-occurs with ADHD, with anxiety and unipolar and bipolar depression amongst the most frequent. The significant overlap in symptomatology across these conditions also represents a significant confounder to accurately and timely diagnosis and challenge to treatment. As such, ADHD may be easily misdiagnosed in the clinical settings when these comorbidities are not sufficiently considered, while effective treatment, including pharmacotherapeutic choice, can be similarly impaired. Further research is therefore warranted into the detection and contribution of these comorbidities to both the misdiagnosis and treatment challenges of ADHD.
Method: Data was obtained through an extensive literature search of the following topics through the Pubmed database: epidemiology of ADHD, challenges to early detection of ADHD in the presence of preexisting mood or anxiety diagnosis, biology of and pharmacotherapy for ADHD and these comorbidities, and psychological impact of ADHD with these comorbidities. To ensure that data represented current knowledge, articles selected were required to have been published in the past 5 years. Analyses of clinical trial results were reviewed.
Results: Our findings supported that ADHD is often misdiagnosed in the presence of concurrent anxiety disorder, unipolar and bipolar depression, and that effective assessment and management required consideration of the full spectrum of diagnosis. Findings furthermore indicated that recognition was beneficial in helping to direct treatment prioritization and polypharmacotherapeutic choice, and resulted in greater facilitation toward remission and wellness.
Conclusion: This systematic review applies a multifactorial approach to ADHD and its most common comorbidities to better address the diagnostic and treatment challenges associated with the highly heterogeneous presentation of these disorders.

P-03-007 Comorbidity in children with attention deficit hyperactivity disorder

A. Lakic*, A. Kesic

* Beograd, Serbia

Objective: Assessment of comorbidity in children with ADHD. Attention deficit hyperactivity disorder (ADHD) is a clinical entity, which core consists of a cluster of symptoms including hyperactivity, attention disorder and impulse control disorder. But often, in these children there are other symptoms that do not belong to the spectrum of ADHD. This, in daily practice, in some cases, may create diagnostic difficulties, especially with oppositional defiant disorder (ODD) and conduct disorder (CD). In other cases this leads to a complexity of the pharmacological approach because of the presence of other psychiatric disorders (i.e., because of comorbidity). psychiatric disorders (i.e., because of comorbidity).
Method: We evaluated 68 children with ADHD (aged 7–15 years). All diagnoses were appointed on the basis of DSM-IV-TR criteria and parental/teacher assessment (using the SNAP-IV questionnaires). Patients were treated with methylphenidate in sustained release form, 18–36 mg pro die (dose was individualized). Laboratory and paediatric check up were conducted. Neurological check up was conducted for all patients at the time of diagnosis and the time of starting the therapy. All results were statistically analysed.
Results: Twenty-seven patients with ADHD met the criteria of a dual diagnosis. Eight patients presented symptoms of ADHD and ODD/CD, thirteen ADHD and mental retardation and six patients ADHD and tic disorder.
Conclusion: Comorbidity in children with ADHD is not uncommon. Identification of comorbidity in these children is important for two reasons: treatment (adequate therapeutic approach) and prevention (assessment of comorbidity as a predictor of increased risk for psychopathology in adolescence and development of strategies to reduce it).

P-03-008 Attention Deficit Hyperactivity Disorder like behavioural problems and parenting stress in paediatric allergic rhinitis

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Objective: Thought the pathophysiological relation between allergic disease and attention deficit with hyperactive disorder (ADHD) are not revealed definitely, there has been studies about comorbidity of ADHD in allergic diseases. This study was done to evaluate behavior problems, especially Attention Deficit Hyperactivity Disorder (ADHD), and their effect on parenting stress in children with allergic rhinitis.
Method: 87 children (5–15 years) with allergic rhinitis and age matched 73 children with upper respiratory tract infection (URI) were recruited. The diagnosis and severity assessments of the allergic rhinitis were performed by the pediatrician. Korean versions of Parenting Stress Index-Short Form (K-PSI-SF),

ADHD Rating Scale (K-ARS), and Child Behavior Checklist (K-CBCL) were checked by parents. In case of high score of K-ARS children, computerized Comprehensive Attention Test (CAT) and ADHD diagnostic workup were done by child psychiatrist.
Results: In allergic rhinitis group, the total parental stress score ($p < 0.01$), ADHD rating scale score ($p < 0.01$), CBCL subscore (somatization $p = 0.01$; attentional problems $p < 0.01$; emotional instability $p < 0.01$) and ADHD diagnostic frequency ($p = 0.03$) were significantly higher than URI group. Among allergic rhinitis group, comorbid ADHD group showed significantly higher parenting stress than allergic rhinitis only group ($p < 0.01$). The parenting stress was correlated with the severity of allergic state (beta 0.50, $p < 0.01$) and the total score of K-ARS (beta 0.39, $p < 0.01$).
Conclusion: This study demonstrated that ADHD like behavioral problems were common in children with allergic rhinitis and these factor increased parenting stress and disrupt the parent–child relationship in allergic rhinitis. To resolve this problem routine evaluation and early management of ADHD symptoms in children with allergic rhinitis are recommended.

P-03-009 Evaluating co-morbidities in an Attention Deficit Hyperactivity Disorder (ADHD) sample: Can Quantitative Electroencephalogram (QEEG) measures discriminate?

N. Rutterford*, H. Wachnianin, G. Kewley, S. Andersen

* Horsham, United Kingdom

Objective: The purpose of this study was twofold. Firstly, to evaluate the extent of comorbidities in a paediatric ADHD sample. Secondly, to investigate if QEEG measures can discriminate between samples with different comorbidities. QEEGs have been used to evaluate brain activity profiles in children with varying clinical disorders. It has often been reported that the majority of children with ADHD show excess slow wave activity (Cantor and Chabot 2009), with other subsamples characterised by excess beta or excess alpha activity (Clarke et al. 1998). This area of research has been hampered by the common presence of comorbidities in patients with ADHD (Larson et al. 2007). Cantor and Chabot (2009) suggest it may not be possible to discriminate between sub samples with more than one childhood disorder using QEEGs.
Method: Data was collected from 195 children patients aged between 5 and 18 who underwent assessment for neurodevelopmental disorders. The assessment included cognitive tests, QEEGs, school/parent feedback, continuous performance tests and clinical consultation.
Results: In 51.8 % of cases, ADHD inattentive subtype was diagnosed compared to 41.5 % ADHD combined subtype. In 86.1 % of cases, the child had at least one comorbidity. The most common comorbidity was oppositional defiant disorder, which was diagnosed in 9 % of the ADHD inattentive subtype group compared to 43 % of the ADHD combined subtype group. Of those who suffered from impulsivity, 34 % showed excess slow wave activity (delta and/or theta), which was also the case for those who reported inattentive symptoms. Of those with ADHD and oppositional defiant disorder, those with excess slow wave activity increased, but a greater proportion also exhibited excess beta activity.
Conclusion: This study found that comorbidity within an ADHD patient sample is common, and with further investigation QEEG measures may provide a method to identify those with certain combinations of disorders.

P-03-010 Examination of spatial working memory performance in children and adolescents with Attention Deficit Hyperactivity Disorder, combined type (ADHD-CT) and anxiety

A. Vance*

* Melbourne, Australia

Objective: Spatial working memory (SWM) is known to be impaired in children with ADHD-CT, whether anxiety is present or not. Yet, it remains unclear whether anxiety disorders add to the SWM impairments evident in ADHD-CT and whether these findings extend into adolescents with ADHD-CT and anxiety. Further, it is not yet known whether children and adolescents with carefully defined anxiety disorders alone, demonstrate SWM deficits.
Method: This study explored the association of SWM and its strategy and spatial span components in carefully defined children and adolescents (age 6–16 years) with ADHD-CT alone (N = 163; 14 % female), ADHD-CT and anxiety (N = 243; 23 % female), anxiety disorders alone (N = 69; 25 % female) compared to age- and gender-matched healthy control participants (N = 116; 19 % female). The relationship between SWM and its strategy and span components and core ADHD-CT symptoms and anxiety symptoms were also examined.
Results: There was no evidence of an additive effect of ADHD and anxiety on SWM, strategy and spatial span deficits. But, anxiety disorders alone were associated with impaired SWM and span performance compared to healthy control participants. In contrast, strategy did not differ between children and adolescents with anxiety disorders alone and healthy control participants, suggesting that with anxiety span is the most affected component. Further, these findings were age-independent.
Conclusion: This study concurs with and extends current influential models about the cognitive effects of anxiety on performance in the setting of ADHD-CT. Clinical implications and future research directions are discussed.

Friday, 7 June 2013, 15.00–16.00

P-04 Co-morbidity: Children and adolescents II

P-04-001 Behavioural sleep problems and internalising and externalising co-morbidities in children with Attention-Deficit/Hyperactivity Disorder

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Objective: Behavioural sleep problems are common in children with ADHD, as are internalising and externalising co-morbidities such as anxiety and conduct disorder. However, the extent to which they co-exist is unclear; such knowledge could inform clinical practice. We examine the relationship between sleep problems and internalising and externalising co-morbidities amongst a cohort of children with ADHD.
Method: Design: Cross-sectional study. Setting: 21 paediatric practices across Victoria, Australia. Participants: 392 families of children with ADHD (5–13 years). Outcomes: Sleep problem severity by parent report, no/mild (N = 244) versus moderate/severe (N = 148).

Sleep problem domain scores assessed using the Child Sleep Habits Questionnaire (bedtime resistance, sleep duration, parasomnias, night waking, daytime sleepiness, night anxiety, sleep onset delay). Exposure: Internalising and externalising co-morbidities (none/internalising/externalising/both) assessed by the telephone administered Anxiety Disorders Interview Schedule for Children (Parent version). Analyses: Logistic and linear regression models for dichotomous (sleep problem severity) and continuous (sleep problem domains) outcomes, respectively. Models adjusted for ADHD symptom severity, medication use, and socio-demographic characteristics.
Results: Children with co-occurring internalising and externalising co-morbidities had twice the odds of having a moderate/severe sleep problem compared to children without either co-morbidity. However, neither internalising nor externalising co-morbidities alone were associated with moderate/severe sleep problems. Similarly, children with both internalising and externalising co-morbidities experienced higher levels of problems with bedtime resistance, daytime sleepiness and sleep anxiety. Children with internalising co-morbidities alone experienced greater sleep anxiety; yet externalising co-morbidities alone were not associated with sleep problem domain scores.
Conclusion: Children with ADHD and co-occurring internalising and externalising co-morbidities are at increased risk of experiencing sleep problems—suggesting that together these co-morbidities have a synergistic association with sleep problems. The presence of co-occurring internalising and externalising co-morbidities in children with ADHD, should flag clinicians to routinely ask and manage sleep problems and vice versa.

Adjusted regression models comparing odds/mean difference in sleep problems by co-morbidities

Co-morbidities	n	Sleep problem severity		Sleep problem domains					
		Moderate/severe		Bedtime resistance		Daytime sleepiness		Sleep anxiety	
		OR (95th CI)[a]	*p*	Mean diff (95th CI); ES[a]	*p*	Mean diff (95th CI); ES[a]	*p*	Mean diff (95th CI); ES[a]	*p*
None (ref)	84	–		–		–		–	
Internalising	60	1.2 (0.6; 2.4)	0.68	0.5 (−0.4; 1.3); 0.17	0.29	0.5 (−0.8; 1.9); −0.12	0.46	1.0 (0.3; 1.6); 0.47	**0.003**
Externalising	81	1.0 (0.5; 1.9)	0.90	0.2 (−0.6; 1.0); 0.07	0.63	0.1 (−1.4; 1.2); −0.03	0.85	0.08 (−0.5; 0.7); 0.04	0.90
Both	143	2.4 (1.2; 4.5)	**0.01**	1.4 (0.6; 2.2); 0.51	**<0.001**	2.0 (0.8; 63.2); 0.47	**0.001**	1.3 (0.7; 1.9); 0.62	**<0.001**

OR odds ratio, *CI* confidence interval, *ES* effect size

[a] Adjusted for ADHD symptom severity, medication use, and socio-demographic characteristics

P-04-002 High incidence of ADHD co-morbidities in Jordanian children

O. Nafi*

* Karak-Jordan, Jordan

Objective: The treatment success of attention-deficient/hyperactivity disorder (ADHD) is limited by misdiagnosis or underestimated co-existing conditions, including epilepsy, mental retardation, and autism spectrum disorder. The aim of this study was to document the incidence of these three ADHD co-morbidities in a single patient population.
Method: A total of 107 children (3–12 years) diagnosed with ADHD were enrolled in this study. The existence of co-morbidities was determined using Parent interview, family history, medical history, developmental history, systemic and neurological evaluation.
Results: Results show that 82 patients (60 males; 22 females) fulfilled the criteria for ADHD diagnosis. The patient population was composed of combined ADHD (51 %), inattentive (21 %) hyperactive/impulsive (28 %). Boys were about three times more likely to develop combined or hyperactive/impulsive ADHD than girls. Among all ADHD children, 70 % presented co-morbidity: epilepsy (29.3 %), mental retardation (28 %) or autistic spectrum disorder (ASD) (12.2 %).
Conclusion: Such common occurrence suggests that the current protocols used to diagnose ADHD should be refined to identify these co-morbidities for the development of effective treatments.

P-04-003 The relationship between weight and risk-taking behaviours in children with ADHD and other Disruptive Behaviour Disorders (DBDs)

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* Singapore, Singapore

Objective: Previous studies examined the relationship between weight and risk-taking behaviours in children with DBD focusing on obesity. This study sought to examine risk-taking behavior in DBD based in relation to weight across the population range and emotional/behavioural problems. We hypothesized that deviant weight groups would perform poorer on risk-taking measures compared to normal weight group. Additionally, the relationship between risk-taking and the Child Behavioural Checklist (CBCL) was examined.
Method: We recruited 115 boys, aged 9–11 with DBD at an outpatient child psychiatric clinic in Singapore. Of these, 42 were diagnosed with ADHD. Participants were assessed on decision-making, risk-taking, attention and vigilance through the Cambridge Neuropsychological Test Automated Battery (CANTAB). Body Mass Index was calculated and participants were categorized into underweight (<15 %), normal (16–85 %), or overweight (>85 %) according to Singapore population databases. ANOVAs and correlational analyses were used to examine group differences in risk-taking behaviour and emotional/behavioural problems on the CBCL.
Results: The underweight group showed a trend for greater risk-taking and overall proportion bet on the Cambridge Gambling Task. No association was found between these measures and the CBCL subscales among the weight groups. Interestingly, on the Stop-Signal Task, a negative association was found between stop-signal delay (SSD) and externalizing behaviours in the underweight children.

In contrast, there was a positive association between SSD and internalizing behaviours in the overweight children.
Conclusion: Children in deviant weight groups showed greater risk-taking behaviours. Additionally, in the underweight group, poorer inhibition was associated with greater internalizing behaviour but in the overweight group, inhibition was associated with externalizing behaviours. These findings highlight the relationship between weight and measures of cognition. Additionally, social and emotional problems in children with DBD, knowledge, which can contribute to our understanding and management of children with DBD and inform on psychological correlates of problems associated with over and underweight conditions in childhood.

P-04-004 Long-term outcome in Tourette syndrome: The complexities of phenotype and treatment

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Objective: To study the long term impact of coexisting psychiatric problems on clinical course, quality of life and response to pharmacological treatment in individuals with Tourette Syndrome (TS).
Method: We enrolled 100 children (aged 3–8 years, mean age 3.8 years) for a average period of 10 years. The patients were assessed at the onset and at the follow-up with YGTSS, YBOCS, CADS to evaluate respectively the severity of tics, and the presence of the OCD, and ADHD. Moreover they completed a general scale to evaluate their quality of life. The following three groups of patients were compared according to the presence of comorbid conditions: "only TS" (38 subjects), "TS + ADHD" (48 subjects), "TS + ADHD + OCD" (16 subjects).
Results: At the follow up the "only TS" subgroup showed that 58 % carried on with the same clinical phenotype, whereas 42 % changed in "TS + OCD" phenotype. 55 % required pharmacological treatment. The "TS + ADHD" subgroup showed different clinical phenotypes: "only TS" (62), "TS + OCD" (35), "TS + ADHD + OCD" (2 %). 65 % of the subjects required pharmacological treatment. The "TS + ADHD + OCD" subgroup showed that 14 % carried on with the same clinical phenotype, whereas 8 % presented "only TS" and 92 % presented a "TS + OCD" phenotype. 71 % were in need of therapy.
Conclusion: Our findings suggest that TS is characterized by different clinical phenotypes that are not always stable over the years. The presence of comorbidities increase the need of pharmacological treatment and cause widespread impairment in quality of life.

P-04-005 Epileptiform abnormalities and epileptic seizure occurrence in children with ADHD and Tourette syndrome at baseline and at five–year follow up

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Objective: Tourette syndrome (TS) and attention-deficit/hyperactivity disorder (ADHD) can occur as co-morbidities in many children and children with epilepsy often have co-morbid ADHD. The purpose of this study was to investigate the occurrence of epileptiform abnormalities (EA) and epileptic seizures (ESz) in children diagnosed with attention-deficit/hyperactivity disorder (ADHD) and Tourette syndrome (TS) at baseline and at 5-years follow-up.
Method: Subjects of this retrospective study were 517 ADHD children (82.4 % male), aged between 5 and 14 years, who were diagnosed between January 2000 and December 2005. At least one standard EEG was performed on all patients. EEG findings were coded as either EEG with EA or EEG with non-EA. Of these 517 cases, 33 (6.4 %) had TS co-morbidity. The group with TS was compared with group without TS and EA and ESz occurrence was investigated twice, at ADHD assessment and at 5 years follow-up.
Results: At baseline: of the 33 ADHD patients with TS (ADHD-TS), 6 (18.2 %) had EEG with EA. One patient (16.7 %) had previous history of ESz. Among 484 ADHD patients without TS, 33 (6.8 %) had EEG with EA and 11 (33 %) had previous history of epilepsy. EA occur more often in children diagnosed with both ADHD and TS, than in ADHD children without TS co-morbidity. At 5 years follow-up: 5 of 6 (83.3 %) ADHD-TS patients with EA at baseline demonstrated EEG without EA. None of the patients who had only EA at baseline developed ESz during follow-up. The patient who had epilepsy co-morbidity was without experienced ESz.
Conclusion: EA occur more often in children diagnosed with both ADHD and TS, than in ADHD patients. The vast majority of them had no epilepsy. A careful diagnostic consideration is warranted in order not to overestimate the temporarily occurrence of EA at ADHD assessment.

P-04-006 Association of Attention Deficit Hyperkinetic Disorder and epilepsy: Further explored

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Objective: There is a bidirectional relation between ADHD and epilepsy. Better knowledge of clinical pattern of ADHD with and without epilepsy might help us understand the etiology for association of these two disorders. In this study, we aimed to compare clinical profile, ADHD symptoms and psychiatric co-morbidities in ADHD children with and without epilepsy and also analyse the correlation of seizure characteristics on ADHD profile.
Method: This was a case control study. 25 ADHD children with epilepsy were compared with 17 ADHD children without epilepsy. Their demographic profile, antenatal, birth and developmental history and IQ were compared. They were analysed with Vanderbilt Diagnostic Parent Rating Scale (VADPRS) and Child Behaviour Checklist (CBCL) for ADHD symptoms and psychiatric co-morbidities. The cases were further classified according to seizure type, adequacy of seizure control, imaging, EEG findings and antiepileptic drugs and compared to find any differences in ADHD profile in each of them.
Results: The demographic and clinical characteristics were comparable in either group. Controls had more number of preterm delivery ($p = 0.092$) and lower IQ ($p = 0.06$), though not statistically significant. ADHD-combined type was common in both groups. Among the associated co-morbidities, oppositional defiant disorder and rule breaking behaviour ($p = 0.03$) were more common in controls. Comparison of the seizure characteristics with ADHD and other psychiatric symptoms revealed no significant differences.
Conclusion: The demographic profile, ADHD symptoms and pattern of psychiatric co-morbidities are almost similar in both groups. This gives indirect evidence that both disorders may have shared underlying pathogenetic mechanisms.

P-04-007 ADHD and comorbidity-report from India

A. Vaithiyam*

* Madurai, India

Objective: Attention Deficit Hyperactivity Disorder (ADHD) affects 3–6 % of school aged children. The risk for co-morbidity with other psychiatric disorder is high and the presence of co-morbidity disorder warrants special consideration in the treatment of patients with this disorder. 3 subtypes of the syndrome have been delineated in DSM-IV, including ADHD predominantly inattentive, ADHD predominantly hyperactive—impulsive and ADHD combined type.
Method: There is a paucity of research concerning ADHD and co-morbidity from Indian country. The presentation highlights the prevalence of ADHD among children (aged 3–12 years) attending psychiatric out-patient departments and the psychiatric co-morbidity. The present study was conducted in a psychiatric out-patient department in the post-graduate teaching hospital. Appropriate scales for the study were used with the inclusion and exclusion criteria.
Results: Of 100 children attending the out-patient clinic, 64 (16.7 %) were found to have ADHD. The mean age of boys with ADHD was 9.1 years whereas the mean age of girls was 7.8 years. 22–44 % of ADHD had co-morbid conduct disorder. 15–50 % of ADHD had co-morbid mood disorders. 8–20 % of ADHD had co-morbidity with Anxiety disorders.
Conclusion: There are many important clinical implications for the study. The higher incidence of delayed development, broken homes, and parental discord in children with ADHD calls for appropriate intervention in the family both for treatment and prevention.

P-04-008 Relations between callous-unemotional traits and behavioural symptoms in adolescent boys with ADHD

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Objective: Callous-unemotional (CU) traits are strongly related to juvenile psychopathy and conduct problems. Literature data indicate that CU traits also occur in other disruptive disorders such as ADHD, but the relation between CU traits and the behavioral correlates of ADHD is still not clear. The aim of the present study was to evaluate the connection between CU traits and general behavioral symptoms (based on parental report datas) in adolescent boys with ADHD.
Method: Parental assessments with the Inventory of Callous-Unemotional Traits (ICU) and Strengths and Difficulties Questionnaire (SDQ) were collected in a clinical sample of 190 male adolescents (age 11–16, mean: 12.4, SD: 1.5) diagnosed with ADHD.
Results: According to parental reports, boys with ADHD and high CU traits showed significantly greater levels of conduct problems, hyperactive symptoms, social difficulties, and less prosocial behavior compared to boys with ADHD and lesser levels of CU traits. The differences between groups were most prominent on the Conduct and Prosocial subscales of SDQ. There were no main effects or interactions related to age.
Conclusion: In our sample (adolescent boys with ADHD), CU trait was accompanied by prominent differences on those SDQ subscales (conduct and prosocial) which connects to conduct problems strongly. These findings supports that CU traits can be relevant in defining symptomatologically different subgroups of ADHD.

P-04-009 Foster children and adolescents as inpatients: Risk factors and psychopathological specificities

C. Kayser*, M. Giannitelli

* Rosny Sous Bois, France

Objective: Foster children and adolescents are at high risk of psychosocial constraints and psychopathologies. Are they specificities in terms of risk factors or psychopathology, respect to control patients?
Method: Through a case–control study (N = 103) assessing inpatients in a University Department of Child and Adolescent Psychiatry, we explored psychopathological risk factors, psychiatric disorders and dimensional variables in foster inpatients and matched controls.
Results: Compared with matched controls, foster inpatients suffered from more early and recent life event stressors (family conflicts, single parents, repeated dislocations) and were exposed to more parental psychiatric disorders (antisocial personality disorder, drug and alcohol addiction). We found that the severity, impact of psychiatric disorders and clinical improvement observed during the course of hospitalization were comparable in both samples. However, externalizing disorders were more prevalent in the foster sample, as found in previous studies conducted in clinical samples and in the general population. Foster inpatients showed more conduct disorders and, in terms of dimensional variables, more borderline organization traits. In addition, they had more academic failures.
Conclusion: This overrepresentation of externalizing disorders underlines the correlation between psychosocial constraints and behavioral disorders. The dimensional aspect shows a correlation between borderline traits and conduct disorder that could be further investigated. Young foster inpatients accumulate psychosocial, psychiatric and learning risk factors. Moreover, foster care is often a vicious circle where psychopathological risk factor and inadequate childcare can exacerbate behavioral problems, and provoke placement changes that will in turn disrupt the child's identity development and academic investment. Mental health intervention should encompass these factors to promote better outcomes.

P-04-010 The correlation between comorbidity of ADHD and the aggression in adolescent with problematic online game play

D. H. Han*, Y. S. Lee

* Seoul, Republic of Korea

Objective: Based on the debate between online game addiction and aggressive behaviors view, the aim of this study is to investigate the correlation between comorbidity including depression and attention deficit and hyperactivity disorder and the aggression in adolescent with problematic online game play.
Method: One hundred twenty-nine adolescents with problematic online game play were enrolled in online game clinic and research center, Chung Ang university hospital. To rule out other psychiatric diseases, all participants were interviewed by psychiatrist. In addition, their symptoms were assessed with, Young Internet Assessment Scale-Korean (YIAS-K), Korean ADHD Rating Scale, Child depression index, aggression scale extracted from Korean child behavior checklist, and Behavioral Inhibition System (BIS)/Behavioral activation system (BAS). The participants were classified into three groups; pure online game addiction group (pure-Game), online game addiction with attention-deficit hyperactivity syndrome (ADHD-Game) group, and online game addiction with depression group (Dep-Game).
Results: Thirty-seven pure-Game, 53 ADHD-Game and 39 Dep-Game groups showed the significant differences in the severity of online game

addiction and aggression. Both of ADHD-Game and Dep-Game groups showed higher scores of YIAS-K and aggression scale score, compared to pure online game addiction group. Aggression scale was positively correlated with BAS-drive in ADHD-Game group. Aggression also was positively correlated with BIS in Dep-Game group.
Conclusion: Current results suggested that the comorbidity, especially ADHD, of online game addiction would be critical factor in the aggression and impulsivity in adolescent with problematic online game play.

Friday, 7 June 2013, 15.00–16.00

P-05 Co-morbidity: Adults

P-05-001 Anxiety and depression in caregivers of children with Attention-Deficit Hyperactivity Disorder

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Objective: Attention-deficit Hyperactivity Disorder (ADHD) is a common neuro-psychiatric disorder among children presenting to psychiatric services. The task of caring for a child with ADHD is enormous and may negatively impact on the emotional wellbeing of the caregiver. There is dearth of information on the psychological consequences of caring for children with ADHD in Nigeria. This study determined the prevalence and correlates of anxiety and depression in informal caregivers of patients with ADHD attending a child psychiatric clinic in Nigeria.
Method: A cross-sectional study conducted among the caregivers of 69 patients with ADHD, recruited consecutively from the Child and Adolescent Clinic of the Federal Neuro-Psychiatric Hospital Yaba, Lagos, Nigeria. The caregivers completed a socio-demographic questionnaire, the Zarit Burden Interview, Hamilton Anxiety and Depression Scale and the Vanderbilt ADHD Diagnostic Parent Rating Scale.
Results: A high level of burden was reported by 60.9 % of the caregivers. Nearly half (48.6 %) of the caregivers had depression, while 28.9 % had anxiety. The correlates of depression among the caregivers included a high level of caregiver burden ($p = 0.04$), poor social support ($p = 0.01$), greater number of ADHD symptoms ($p = 0.03$) and poor level of functioning in the patients ($p = 0.02$). Caring for patients with co-morbid Intellectual disability ($p = 0.03$), greater number of ADHD symptoms ($p = 0.04$) and poor level of functioning ($p = 0.02$) were associated with anxiety in the caregivers.
Conclusion: Caring for patients with ADHD is associated with a high level of caregiver burden and emotional distress. Evaluation of caregiver burden should be incorporated into the routine assessment procedure of children with ADHD. Furthermore, there is need to develop interventions targeted at the prevention and alleviation of emotional distress among caregivers.

P-05-002 Subjective sleep quality in a sample of patients presenting at an outpatient centre for adult Attention-Deficit/ Hyperactivity Disorder

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Objective: Attention Deficit/Hyperactivity Disorder (ADHD) and sleep disorders are frequent co-morbid conditions. In the present study subjective sleep quality was analyzed.
Method: In a sample of patients of an outpatient center for adult ADHD subjective sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI, n = 262, 58.8 % males; mean age ± SD: 34.2 ± 9.8 years) and excessive daytime sleepiness by Epworth Sleepiness Scale (ESS, n = 128, 61.7 % males; mean age ± SD: 33.6 ± 10.0 years). Patients were stratified into groups according to leading diagnosis: ADHD (PSQI/ESS, n = 146/76), suspected ADHD (sADHD, i.e. in case of predominant co-morbidity that formally prohibited diagnosing ADHD, n = 68/30) and other psychiatric disorders (oD, i.e. depression, others, n = 48/22). The ADHD group was subdivided into ADHD with and without psychiatric co-morbidity (ADHDco/nco, n = 63/83 (PSQI), 23/53 (ESS)). χ^2-statistics and parametric analyses of variance were used.
Results: Frequency of bad sleepers as indicated by PSQI > 5 was different between groups: ADHD 56.8 %, sADHD 76.5 % and oD 60.4 % ($p = 0.021$). Differences between ADHDco (63.5 %) and ADHDnco (51.8 %) were not significant ($p = 0.158$), but groups differed in mean PSQI (ADHDco: 7.4 ± 3.6, ADHDnco: 6.1 ± 3.0, $p = 0.023$). Differences in the frequency of excessive daytime sleepiness indicated by ESS > 10 missed significance: ADHD 25.0 %, sADHD 46.7 % and oD 40.9 % ($p = 0.068$). ADHDco and ADHDnco did not differ in frequency of excessive daytime sleepiness (30.4 vs. 2.6 %, $p = 0.471$) or mean ESS (8.2 ± 4.4 vs. 7.6 ± 4.0, $p = 0.515$).
Conclusion: Sleep quality is impaired in adult ADHD. Sleep quality is reduced by co-morbid psychiatric conditions and is worse in probable ADHD and predominant co-morbidity. In clinical practice sleep problems should regularly be assessed in ADHD focussing on underlying co-morbidity.

P-05-003 A follow-up study of Spanish young adults with ADHD: I. school functioning and risk behaviour

C. Colomer*, A. Miranda, R. Roselló

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Objective: Follow-up studies provide different rates of ADHD persistence in adulthood (Faraone et al. 2006). This variability may be due to the criteria used to define persistence: syndromatic persistence (full diagnostic status) or symptomatic persistence (partial diagnostic status) (Biederman et al. 2000). Furthermore, the persistence of the disorder is associated with worse outcomes (Barkley 2006). Objectives: (1) to examine the rates of syndromatic and symptomatic (only four DSM-IV symptoms required) persistence in young adults with a childhood ADHD diagnosis, and (2) to investigate the differences between an ADHD-persistent group, an ADHD-remittent group and a control group in school functioning and risk behavior variables.
Method: Fifty-two adults (19–24 years), 25 with a childhood diagnosis of ADHD-combined subtype and 27 non-ADHD controls participated in this study. The ADHD participants were part of the sample for the IMAGE project (mean follow-up time = 8 years). An interview was carried out in which information was obtained on risk behavior (use of alcohol, drugs, smoking, legal, driving and sexual history) and school functioning (repeated grade, educational stages completed), and the CAARS (Conners et al. 1999) was applied to evaluate the ADHD symptomatology.
Results: According to the syndromatic persistence criteria, about 55 % of the subjects met the criteria for one of the ADHD subtypes in adulthood. About 20 % presented symptomatic persistence. The ADHD-persistent group presented worse school functioning and legal history. The use of marihuana and other drugs apart from tobacco and alcohol was superior in the persistent group.

Conclusion: In our eight-year follow-up sample, ADHD persists to different degrees (syndromatic and symptomatic) in 75 % of the cases, with these individuals having worse academic results and riskier behaviors.

P-05-004 Personality disorders and executive function among adults with and without ADHD

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Objective: Compare the distribution of personality disorders according to DSM-IV TR and evaluate the association between executive functions and personality disorders in adults with and without ADHD.
Method: During June–December 2010 the patients who received a first time psychiatric consult between the ages of 19–45 where invited to participate in this study. If they accepted and informed consent was signed. After the signature a mental health specialist applied the Mini International Neuropsychiatric Interview (MINI) and the Structured Clinical Interview for personality disorders (SCID II), the patient completed the evaluation when answering the Behavior Rating Inventory of Executive Function Adult (BRIEF A).
Results: The group of patients with ADHD had a bigger prevalence of personality disorders when compared with patients without ADHD with the exception of patients with antisocial personality disorder and Histrionic personality disorder. Patients with ADHD are frequently diagnosed with cluster A ($p = 0.002$) and cluster B ($p = 0.001$) personality disorders, and patients without ADHD with cluster C personality disorders. The behavioral regulation index showed Higher T scores for those who had ADHD/Personality disorders with the exception of schizotypal and schizoid personality disorders versus who only had the personality disorder. The metacognitive index showed higher T scores in those patients who had ADHD and a personality disorder with the exception of schizotypal, histrionic and antisocial personality disorders whose T scores where higher on those with only ADHD. Finally the global executive composite showed higher T scores in those patient with ADHD and Personality disorders.
Conclusion: A higher prevalence of personality disorders was found in those subjects with ADHD compared to those without ADHD. In this study we can not demonstrate that a problem in executive functions is due to the interaction between ADHD and personality disorders.

P-05-005 Depression and anxiety in young male adults with ADHD

J. Ng*, C. Cheok

* Singapore, Singapore

Objective: Attention Deficit Hyperactivity Disorder (ADHD) is a common psychiatric disorder diagnosed in childhood with persistence of symptoms and impairment as the patient enters into adulthood. ADHD is a major risk factor for many co-morbid psychiatric conditions. However, most of the research about the disorder comes from studies conducted in the West. There is little information about the characteristics and outcomes of children with ADHD as they enter into adulthood in the Singaporean context. The study investigated the relationship between ADHD and depressive and anxiety symptoms in young men between the ages of 17 and 25 in Singapore.
Method: One hundred and two males doing their conscript military service comprising of 52 previously diagnosed ADHD and 50 normal controls without ADHD completed the Adult ADHD Self-report scale, the Zung Self-rating Depression Scale and the Zung Self-rating Anxiety Scale.
Results: There were significant differences between the scores for Zung Depression Scale and Zung Anxiety Scale when the two groups were compared. 17 (32.7 %) of the group with ADHD were not found to be depressed compared to 31 (62 %) of the control group. 34 (67.3 %) of the group with ADHD were found to be mildly to severely depressed compared to 19 (38 %) of the control group ($p = 0.008$). 20 (38.5 %) of the group with ADHD were assessed as not anxious compared to 36 (72 %) of the control group. 31 (61.5 %) of the group with ADHD were assessed as mildly to severely anxious compared to 14 (28 %) of the control group ($p = 0.009$).
Conclusion: ADHD is strongly associated with depression and anxiety. Young men enlisting into the military with a history of ADHD should be actively screened for other psychiatric co-morbidities such as depression and anxiety.

P-05-006 Clinical and cognitive differences by gender and comorbidity in adult with ADHD symptoms

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Objective: To establish clinical and cognitive differences by gender and comorbidity in adults with ADHD symptoms.
Method: An open-population sample was used, and participants who accepted signed an informed consent. The ASRS-v1.1 screening instrument was applied and probable cases were selected and clinically evaluated using MINI–Plus to identify comorbidity, and a questionnaire to assess the executive functions (BRIEF-A) was administered for adults. The data obtained were analyzed using frequencies and averages according to the level of measurement of the variables, and $\times 2$ was used to compare percentages. The Odds Ratios (OR) were calculated to associate risk with the EF scales and comorbidity in relation to gender.
Results: One hundred five adults with ADHD were assessed. Symptoms of inattentiveness were present in a 68.6 % of sample. Women presented a higher percentage of six or more symptoms of Hyperactivity-Impulsivity, which were at the expense of greater impulsivity symptoms (32.8 vs. 15 %, χ^2 3.6; $p = 0.05$). Fifty-nine percent presented comorbidity, the affective disorders were the most frequent comorbid disorders (43.8 %) followed by anxiety disorders (38.1 %). Men with a history of conduct disorder showed 5.1 times higher risk for difficulties on the inhibition scale (95 % CI 1.0–1.5, $p = 0.023$) and those with affective disorders showed a 7.3 times higher risk for difficulties on the materials' organization scale (95 % CI 1.6–33.0, $p = 0.006$). Women with affective disorders were found

to be at greater risk for difficulties on the self-reporting scales (OR = 2.8, 95 % CI .9–7.9, $p = 0.046$) and initiative scales (OR = 3.3, 95 % CI 1.1–9.8, $p = 0.023$).
Conclusion: The findings of this study provide data that inattention symptoms predominate in both adult men and women, and that women had a higher number of symptoms of impulsivity. The differences in the alterations of executive functions are associated with comorbid conditions.

P-05-007 Could comorbid bipolar disorder account for a significant share of executive function deficits in adults with ADHD?

K. Silva*, D. Rovaris, P. Guimarães-da-Silva, E. Grevet, M. Victor, C. Salgado, E. Vitola, V. Contini, G. Bertuzzi, F. Picon, R. Karan, P. Belmonte-de-Abreu, L. Rohde, C. Bau

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Objective: The frequent comorbidity between Attention-deficit/hyperactivity disorder (ADHD) and Bipolar Disorder (BD) makes a challenge disentangling specific impairments of each disorder in adulthood. Their functional impairments seem to be mediated by Executive Function (EF) deficits. However, little is known about the extent to each EF deficit might be disorder specific or explained by the comorbidity. The aim of the present study is to address for the first time if comorbid BD could account for a significant share of executive function deficits as measured by Wisconsin Card Sorting Test (WCST) in adults with ADHD.
Method: Adult patients with ADHD and healthy subjects were evaluated in the ADHD program of a University hospital, and diagnoses were based on DSM-IV criteria. WCST scores were compared by MANCOVA among three groups: ADHD with BD (n = 51), ADHD without BD (n = 278) and healthy subjects (n = 91).
Results: ADHD patients with comorbid BD when compared to patients without BD and healthy subjects evidenced lower scores in total correct answers ($p = 0.003$), and higher scores in total errors ($p = 0.004$), non-perseverative errors ($p = 0.002$) and completed less categories ($p = 0.009$). Patients with ADHD without BD did not differ from healthy subjects.
Conclusion: WCST impairments among patients with ADHD seem to be in a large fraction attributable to comorbid BD. Although other EF deficits as in the inhibitory control domain have been demonstrated to accompany ADHD, the present findings suggest that set shifting deficits are strongly related to comorbid BD.

P-05-008 Affective temperamental traits in adults with Attention Deficit/Hyperactivity Disorder and their relationship with psychopathological symptoms

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Objective: To investigate the presence of affective temperamental traits in adults with attention deficit hyperactivity disorder (ADHD) and to evaluate their impact in several psychopathological dimensions.
Method: Sixty patients with ADHD were assessed with the scale TEMPS-A (Temperament Evaluation of Memphis, Pisa, Paris and San Diego, self-report version). The TEMPS-A is a 110-item self-report questionnaire that measure affective temperamental traits represented in five dimensions (depressive, cyclothymic, hyperthymic, irritable and anxious). In addition, patients were evaluated with the BDI-II (Beck Depression Inventory II), the BIS-11 (Barratt Impulsiveness Scale 11), the STAI-R (State-Trait Anxiety Inventory, Trait version), the Disexecutive Subscale of the FrSBe (Frontal System Behavior Scale), and the Rosenberg Self-esteem Scale.
Results: Thirty-eight percent of patients with ADHD scored above the cut-off for at least one of the affective temperaments. Patients with concomitant affective temperament were more depressed, impulsive, anxious, and disexecutive than patients without concomitant affective temperament. Cyclothymic temperament was the more common affective temperament (25 % of patients), meanwhile no patient scored positively for hyperthymic temperament.
Conclusion: Concomitant affective temperamental traits constitute a common occurrence in adults with ADHD that carry severe psychopathological consequences. The concept of affective temperaments may be an interesting link for explaining depressive symptomatology, mood lability, and emotional impulsivity in a subgroup of patients with ADHD, beyond the classical idea of comorbidity.

Saturday, 08 June 2013, 15.00–16.00

P-06 Austims spectrum disorder II

P-06-001 Attention Deficit Hyperactivity Disorder symptoms in autism spectrum disorders: Prevalence and pharmacologic intervention

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Objective: Children with autism frequently have problems with inattention, hyperactivity, and impulsivity. The purpose of this study is to identify the presence of attention deficit hyperactivity disorder (ADHD) symptoms in autism spectrum disorders (ASD) and the impact of pharmacologic intervention with methylphenidate in ASD population.
Method: Medical records were reviewed in Neurodevelopment Clinic of Paediatrics Department of Santa Maria University Hospital. The sample included 80 children (63 males, 17 females) with ASD diagnoses (Autism, Asperger, PDD-NOS) that were currently followed in our clinic. All children were evaluated with Ruth Griffiths Developmental Scale (RG), Wechsler Scale (WISCIII), and Childhood Autism Rating Scale (CARS), Conners scales for teachers and parents and DSM-IV-TR criteria (for ASD diagnoses). From the 80 children with ASD we selected 48 and create a subsample of children with ASD and ADHD symptoms so we could analyze the prevalence, the type, doses and impact of pharmacologic

intervention with methylphenidate. Statistical analysis was made with SPSS program.
Results: The results show that 60.0 % (48) of ASD sample had ADHD symptoms. In this subsample 77.8 % (37) of children take currently methylphenidate and 22.9 % (11) did not (refuse from parents or adverse effects). The average doses of methylphenidate were 0.4 mg/Kg/day which is small dose because the effects are less well tolerated in the ASD population. The results of pharmacological intervention with methylphenidate were positive.
Conclusion: The results suggest that the presence of attention deficit hyperactivity disorder symptoms is frequent in autism spectrum disorders and these have a very important impact in these children behaviour. It's important to identify these symptoms so that specific intervention (pharmacologic and therapeutic) can be activated to improve the quality of life of these children and their family relationships.

P-06-002 Neuromotor performance and imitation abilities in Attention Deficit/Hyperactivity Disorder and Autism Spectrum Disorders

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Objective: While patients with ASD have been postulated to have deficient imitation abilities, little is known about imitation abilities in patients with ADHD. Furthermore, although imitation abilities include a motor component (in addition to their cognitive aspects), it is unclear whether they are correlated with other indices of neuromotor functioning. These two issues were addressed in the present study.
Method: N = 22 ASD patients, N = 24 ADHD patients and N = 20 healthy children participated (all males, 6–13 years, IQ > 80). Neuromotor functioning was assessed with the Zurich Motor Assessment (ZNA; Largo et al. 2007), comprising of timed performance in pure motor tasks and adaptive tasks, diadochokinesis and associated movements. Imitation abilities were assessed with the Face Apraxia Test (assessing facial imitation; Bizzozero et al. 2000) and the Test Battery of Ideomotor Apraxia (assessing hand/figure gestures; Goldenberg 1996).
Results: Both patients with ADHD and ASD showed deficits in pure motor performance, diadochokinesis and quality of movement; dynamic balance was not impaired in ADHD patients, and peg board performance was normal in both patient groups. ASD patients showed striking imitation deficits, in particular those ASD patients with comorbid ADHD. Neuromotor functioning and imitation abilities were significantly correlated only in the ASD group and uncorrelated with IQ in all groups.
Conclusion: The present study extends results of previous work, and shows that neuromotor deficits can also be found in patients with ADHD and comparatively young patients with ASD. While both disorders may involve dysfunctions in basic motor programming, self-other motor representations and motor learning appear to be intact in patients with ADHD. Bizzozero et al. (2000). Brain, 123, 2213–2230. Goldenberg (1996). J. Neurology Neurosurgery Psychiatry, 61, 176–180. Largo et al. (Eds) (2007). Zürcher Neuromotorik. Zürich: AWE-Verlag.

P-06-003 The Social Communication Questionnaire (SCQ) discriminant validity in an epidemiological sample of national school children

A. Boilson*, A. Staines, M. R. Sweeney

* Dublin 9, Ireland

Objective: The discriminant validity of the Social Communication Questionnaire—"Lifetime Form" (SCQ: Rutter et al. 2003) was demonstrated in the validation study (n = 200) 4-40 years of age autism spectrum disorders (ASDs) 76 % (n = 153) from other developmental disorders 23 % (n = 47) (Berument et al. 1999). A recommended cut off score (>15) was identified providing sensitivity (Se) 0.85, specificity (Sp) 0.75, positive predictive value (PPV) 0.93, and negative predictive value (NPV) 0.55 for differentiating ASDs from other developmental disorders. Studies which included clinical samples of older children by Corsello et al. (2007) (n = 590) 2–16 years, Chandler et al. (2007) (n = 255) 9–12 years also demonstrated the utility of the screener for differentiating ASDs from other developmental disorders. The discriminant validity for the SCQ for differentiating children with an ASD diagnosis from those with and without other developmental disorders was explored at the optimal cut off score.
Method: The SCQ was completed by 68 % (n = 5,457) parents of national school children screened. The diagnostic composition of the sample was as follows: ASD diagnosis (n = 58) 1 %, other diagnosed developmental disorders (n = 353) 6 %, remaining cases (n = 5,046) 92 %.
Results: The screen performed well at differentiating children with ASDs from those with and without other developmental disorders, Se 0.91, Sp 0.92, PPV 0.12, NPV 0.99 at an optimal cut off score (>12). The SCQ was equally effective at differentiating ASDs 14 % (n = 58) from other diagnosed developmental disorders 86 % (n = 353) providing Se 0.90, Sp 0.81, PPV 0.43, NPV 0.98 at an optimal cut off score (>13).
Conclusion: The utility of the SCQ was demonstrated as part of an epidemiological screening programme for differentiating national school aged children with ASDs from those with and without other developmental disorders.

P-06-004 Development and Implementation of a European protocol for Autism Spectrum Disorder Prevalence (EPAP)

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Objective: The European Autism Information Systems Project (EAIS: Posada and Ramirez 2008) highlighted the lack of systematic, and reliable data on the prevalence of autism spectrum disorders (ASDs) in Europe. As part of the project a standardised protocol was developed for screening and diagnosing children across the EU called the European Protocol for Autism Prevalence (EPAP). This is the first study to operationalize the screening phase of the protocol. The objective was to screen 10,000 children 6–11 years of age through national and special education schools in the Republic of Ireland.
Method: The study team collaborated with clinicians with expertise in the diagnosis and epidemiology of ASDs to facilitate the selection of

the screening instrument, and discuss protocol amendments. A study booklet was developed for completion by parents to capture: study child and parent's socio-demographic characteristics, developmental history, family composition. Tracking logs, information leaflets, and reminder letters were also developed. Study regions were identified through the Department of Education national school enrolment data and Health Services Executive (HSE) GIS mapping system. Meeting were scheduled with local psychiatric and psychological services to discuss accessing psychological assessments for potential cases.
Results: Seventy-three percent (n = 40) of national and (n = 12) 100 % of special education schools contacted agreed to participate in the study, children eligible to participate national (n = 7,951) 98 % and special education (n = 186) 2 %. Participation rates were high at national (n = 5,589) 71 % but poor at special education schools (n = 69) 37 %.
Conclusion: Response rates at national schools were high. Teacher's encouraged parental participation especially for children they suspected of having underling undiagnosed developmental difficulties. At special education schools fieldworks did not have the opportunity to liaise with teachers as one to one teaching sessions could not be interrupted during the school day.

P-06-005 The Social Communication Questionnaire (SCQ) Distribution of scores by gender in an epidemiological sample of national schoolchildren

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* Dublin 9, Ireland

Objective: The distribution of SCQ scores in the general population has been previously reported in small samples of children, Chandler et al. (2007) among children 9–10 years of age general population sample (n = 247) school sample (n = 936) and Mulligan et al. (2009) among a general sample 5–13 years. As part of an Irish prevalence study of autism spectrum disorders a study booklet was completed by parents for children 6–11 years who were willing to take part in the study. The booklet contained a screening instrument the Social Communication Questionnaire—"Lifetime Form" (SCQ: Rutter et al. 2003). The distribution of SCQ total scores were compared by gender for the whole sample.
Method: Sixty-nine percent (n = 5,457) of parents for eligible children completed booklets males 56 % (n = 2,073) females 44 % (n = 2,384).
Results: The distribution of total scores for all children was strongly skewed towards lower scores Skewness = 1.93, Krutosis = 5.05, mean 4.65 SD (4.75) median = 3, mode = 1, range 0–36. The majority of children scored in the normal score (0–11) range 92 % (n = 5,002), moderate (12–14) 4 % (n = 225) and high score (>15) 4 % (n = 230). The mean SCQ total score was significantly higher for males 5.08 (5.03) compared to females 4.10 (4.29) $p < 0.001$. A higher percentage of males scored in the moderate 4.4 % (n = 136) and high score 5.4 % (n = 167) range compared with their female counterparts moderate 3.7 % (n = 89) and high score 2.6 % (n = 63) range $p = 0.006$.
Conclusion: This is the first study to describe the distribution of SCQ total scores in a large epidemiological sample of national school children. The majority scored in the normal range. A higher percentage of boys were identified in the moderate and high range.

P-06-006 Implementation of a European protocol for autism spectrum disorder prevalence

A. Boilson*, A. Staines, M. R. Sweeney

* Dublin 9, Ireland

Objective: A standardized screening protocol was developed based on the European Autism Information System (EAIS) project designed for the study of autism spectrum disorder (ASD) prevalence at a European level. This was the first study to operationalize the screening phase of the protocol and validate the use of a screening instrument the Social Communication Questionnaire—"Lifetime Form" (SCQ: Rutter et al. 2003) as a primary screener for ASDs among national school children.
Method: There were (n = 7,951) national school children screened males 54 % (n = 4,268) females 46 % (n = 3,683) 6–11 years of age, special education school children (n = 186) males 66 % (n = 125) females 34 % (n = 64), in three regions: Galway, Waterford and Cork in the Republic of Ireland. Participation rates for parents of eligible children were 68 % (n = 5,457) in the national schools, and 47 % (n = 69) in the special education schools.
Results: The distributions of SCQ total scores for the national school sample were strongly skewed towards lower scores, Mean = 4.65 SD = 4.75, Range 0-36. The majority of children (92 %) scored in the normal range (0–11) (n = 5,002), 4 % moderate range (12–14) (n = 225), and 4 % in the high range (>15) (n = 230). For distinguishing children with a diagnosis of ASD from those without, a cut off (>12) gave good sensitivity 0.91, and specificity 0.92, with a low positive predictive value of 0.11, and high negative predictive value 0.99.
Conclusion: The feasibility of screening children for ASDs with the EAIS protocol, using the SCQ in a non-clinical setting of Irish primary and special schools was demonstrated.

P-06-007 Autistic symptoms in adults with ADHD

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Objective: According to DSM-IV criteria, the diagnosis of Attention-deficit/Hyperactivity disorder (ADHD) centers on the attention impairment in combination with impulsivity and hyperactivity. The clinical nature of Autism spectrum disorder (ASD) or Pervasive developmental disorder (PDD) is characterized by a triad of behavioral deficits in the development of reciprocal social interactions and verbal and non-verbal communication, and a restricted patterns of interests and stereotyped behaviors. However, many patients with ASD show attention impairment similar to that observed in persons with ADHD. Accordingly, the discrimination between ASD and ADHD can be difficult due to attention symptoms in both disorders. Particularly it may be difficult to distinguish between ASD and ADHD when motor hyperactivity is not observed in the subjects. Several studies indicated that the Autism-spectrum quotient (AQ) developed by Baron-Cohen and colleagues can differentiate well between ASD and normal controls.

Method: In the present study, we evaluated autistic symptoms in adults with ADHD with AQ. The present study was approved by the ethics committee of faculty of medicine of Showa University. Subjects of this study were 20 outpatients with ADHD of Showa University Hospital. The diagnosis was made according to the criteria of DSM-IV. The normal control group is comprised 20 adults.
Results: The two groups did not differ significantly in age and sex ratio. The Autism-Spectrum Quotient Japanese version (AQ-J) and the Conners' Adult ADHD Rating Scales (CARRS) were used as instruments. The total scores of AQ-J and CARRS were significantly higher in persons with ADHD than those in normal controls.
Conclusion: These findings indicated that subjects with ADHD have considerable autistic symptoms and further studies are needed to examine the relationships between ADHD and ASD.

Friday, 7 June 2013, 15.00–16.00

P-07 Austims spectrum disorder I

P-07-001 Social–communicative effects of the Picture Exchange Communication System (PECS) in autism spectrum disorders

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Objective: The Picture Exchange Communication System (PECS) is a common treatment choice for nonverbal children with autism. However, little empirical evidence is available on the usefulness of PECS in treating social–communication impairments in autism. Objective to test the effects of PECS on social–communicative skills in children with autism, concurrently taking into account standardized psychometric data, standardized functional assessment of adaptive behaviour, and information on social–communicative variables coded in an unstructured setting.
Method: Eighteen preschool children (mean age = 38.78 months) were assigned to two intervention approaches, i.e., PECS and Conventional Language Therapy (CLT). Both PECS (Phases I–IV) and CLT were delivered three times per week, in 30-min sessions, for 6 months. Outcome measures were the following: Autism Diagnostic Observation Schedule (ADOS) domain scores for Communication and Reciprocal Social Interaction; Language and Personal–Social subscales of the Griffiths' Mental Developmental Scales (GMDS); Communication and Social Abilities domains of the Vineland Adaptive Behavior Scales (VABS); and several social–communicative variables coded in an unstructured setting.
Results: Results demonstrated that the two groups did not differ at Time 1 (pre-treatment assessment), whereas at Time 2 (post test) the PECS group showed a significant improvement with respect to the CLT group on the VABS social domain score and on almost all the social–communicative abilities coded in the unstructured setting (i.e., joint attention, request, initiation, cooperative play, but not eye contact).
Conclusion: These findings showed that PECS intervention (Phases I–IV) can improve social–communicative skills in children with autism. This improvement is especially evident in standardized measures.

P-07-003 On the role of the imbalance of macro-and micronutrients in the development of autism spectrum disorders

D. Tatiana*, M. Sergey, S. Natalia

* Minsk, Belarus

Objective: The objective of this study was to identify and determine the nature of the imbalance of macro-and microelements in the development of autism spectrum disorders (ASD) in children born and living in the Republic of Belarus.
Method: Eighty six children with ASD: 62 boys and 24 girls, aged 3–14 years, and 86 parents were examined. A radical part of the hair was used as biosubstrate. The studies were conducted on a laser multiatomic emission spectrometer LSS-1. The data of Skalny A.V. (2002) and Kolomiytseva M.G. (1970) was used as the norm for the content of analyzed bioelements.
Results: It was found that children with ASD and their parents were used to have metabolic disorder of microelements such as calcium, copper, zinc, iron, aluminum. The most distinct deviation can be traced by the concentrations of copper and zinc. The vast majority of the examined children (90.7 %) had a deficit of copper and 65.1 %—zinc deficiency. Normal zinc was noted in 29.1 % of the patients, and copper—only in 3.6 %. Excessive content of elements was rare: 5.9 % for copper and zinc. Results of the parent hair's research correlated with those of their children. This may be due to genetic characteristics, environmental situation or existing food habits of these families.
Conclusion: In the study of the content of microelements contained in the hair, changes to the downside performance (reduction of copper in 90.7 % of cases, zinc—65.1 %) are more often observed. Considering that the change in the content of copper and zinc is an indirect marker of the protein metallothionein's exchange, a rejection of that protein content can be suggested, which is a possible etiopathogenetic factor for autism spectrum disorders.

P-07-004 Neurophysiological research of autism

D. Tatiana*, M. Sergey, M. Nikolai

* Minsk, Belarus

Objective: The purpose of this research is to study the features of the EEG of children with autism at the age of 3–15 years compared with children with schizophrenia and healthy children of the same age.
Method: EEG.
Results: The results of computer processing of EEG files showed that the main EEG syndrome of autism in all age groups is the total reduction in the relative power of the alpha activity in all regions of the brain in patients with severe enhanced activity of beta2-range in the central, temporal and parietal-occipital. The relative power of alpha activity was reduced by 3–4 times, and the power of the beta2-activity was 1.5–2 times higher than in healthy children. In addition, in all age groups a pathological computer sign was observed: beta activity's focusing, which occurred in 50 % of patients with autism and healthy children—only 3 %.

Conclusion: An important feature of the EEG in patients with autism from the EEG of healthy children was the lack of power peak in the frequency range of 4–30 Hz. For the differential diagnosis of children with autism EEG and EEG of patients with schizophrenia and healthy children were used the following three features: the absence of the peak power of the fundamental rhythm, the presence of a pathological focus beta1-and beta2-activity, index of the alpha rhythm of less than 15 % for children under the age of 4 years, and the index of the alpha rhythm less than 20 % for children aged 4 years and older. The following diagnostic rule was applied: the presence of at least one of these symptoms indicates the presence of autism. When using this rule, the EEG of children with autism at the age of 3–15 years has been recognized correctly in 90 % of cases.

P-07-005 Intra-subject variability in patients with Attention-Deficit/Hyperactivity Disorder or autism spectrum disorders

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* Freiburg I. Br., Germany

Objective: While increased intra-subject variability (ISV) of reaction times (RT) is among the most consistent findings in patients with Attention-Deficit Hyperactivity Disorder (ADHD), and a candidate endophenotype of the disorder, comparatively little is known about ISV in patients with autism spectrum disorders (ASD; Geurts et al. 2008). Finding increased ISV in ASD would support recent considerations of etiological overlap between these disorders (Rommelse et al. 2011). Therefore, the aim of this study was a comparison of different measures of ISV in patients with ADHD or ASD, using tests of candidate cognitive endophenotypes of ADHD.
Method: N = 28 patients with ASD (10.65 ± 1.84 years; 82 % male) and N = 33 healthy controls (10.69 ± 1.88 years; 85 % male) as well as N = 64 patients with ADHD (9.70 ± 1.11 years; 75 % male) and N = 62 controls (9.57 ± 0.96 years; 77 % male) carried out two visual N-back tasks (0 back, 1 back), a visual Stop Signal Task (with tracking algorithm), and a Time Reproduction Task (using a visual stimulus to present intervals). Both standard RT analyses and ex-Gaussian modeling was applied to the data. ANCOVAs and MANCOVAs were used to identify group differences.
Results: Patients with ADHD showed deficits in all tasks, with the largest effect sizes for the measures of RT-ISV and ISV of time reproduction. Patients with ASD, by contrast, differed from their respective controls in RT-ISV during the N-back tasks (with largest group differences in tau), but not during the SST.
Conclusion: Our results suggest that increased ISV, a candidate endophenotype of ADHD, can indeed also be found in ASD patients, but that the abnormality may be confined to certain tasks and is thus less pervasive than in ADHD. Geurts et al. (2008). Neuropsychologia, 46, 3030–3041. Rommelse et al. (2011). Neuroscience and Biobehavioral Reviews, 35, 1363–1396.

Friday, 7 June 2013, 15.00–16.00

P-08 Epidemiology: Children and adolescents I

P-08-001 The Social Communication Questionnaire (SCQ) test-retest reliability in an epidemiological sample of national schoolchildren

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* Dublin 9, Ireland

Objective: The Social Communication Questionnaire—"Lifetime Form" (SCQ: Rutter et al. 2003) is a 40 question parental self completion questionnaire developed to screen for ASDs. Bolte et al. (2008) examined the test accuracy of the German SCQ adaptation in a sub sample of 43 children mean age 14.1 years ASD (n = 31) and (other clinical cases = 12) over an interval of 6 months to 2 years was Pearson r = 0.76. School children (n = 7,951) 6–11 years were screened with the SCQ in three regions in Ireland. Test accuracy of SCQ total scores was demonstrated among sub samples of children screened.
Method: The parents of (n = 485) children were identified who scored in the moderate (12–14) 4 % (n = 225) and high (>15) 4 % (n = 230) score ranges. The screen was also re-administered to a random validation sample of normal scoring (<12) children 6 % (n = 300) children, mean interval 15 months. The parents of (n = 499) children 63 % re-completed the SCQ who scored in the normal 69 % (n = 206), moderate 62 % (n = 139) and high score 76 % (n = 154) range.
Results: The strongest Pearson correlations at Time 1 and Time 2 were observed for children with a diagnosis of ASD r = 0.75, ($p < 0.001$) correlation coefficients were weaker for children with other diagnosed developmental disorders r = 0.59, $p < 0.001$), parents who reported no concerns r = 0.56, ($p < 0.001$) and undiagnosed parental concerns r = 0.43 ($p < 0.001$).
Conclusion: The stability of SCQ total scores was demonstrated (mean interval = 15 months) among an epidemiological sample of national school children with diagnosed ASDs. Correlation coefficients were weaker for children with and without other developmental disorders which are attributed to regression of scores to the mean, literacy, language issues and long follow up duration for re-administering the SCQ.

P-08-002 Gender differences in Egyptian adolescents with Attention Deficit Hyperactivity Disorder

M. El Missiry*, H. Rami, M. El Sheikh, A. El Missiry, Z. Bishry

* Cairo, Egypt

Objective: To examine ADHD gender patterns among a group of Egyptian adolescent students with respects to prevalence, socio-demographic, clinical characteristics, comorbidity and academic performance.

Method: Nine hundred twenty five students were randomly selected from private and public preparatory schools in Eastern Cairo. We used the Conners-Well's Adolescent Self report Scale Short form (CASS:S), as a screener for ADHD symptoms among students. Potential ADHD cases 87 cases were further assessed by The Kiddie Schedule for affective Disorder and Schizophrenia. Present and Lifetime versions (K-SADS-PL), Conners' Adolescent Self Report Scale—Long Form (CASS-C)and Weckslr Intelligence Scale for Children (WISC), al data were analyzed using the suitable statistical parameters.
Results: ADHD symptoms are more significantly prevalent in adolescent boys (13.8 %) than girls (58 %). No difference were elicited between the two groups are regards, socioeconomic class, age, family circumstances, emotional, conduct problems, psychiatric comorbidity and academic performance. Boys reported aggressiveness of their parents, more frequent mental illness among their family members and they scored lower in terms of comprehension, digit spam in Wecksler Intelligence Scale. Girls are more likely the report more natal problems, less language developmental problems, they expressed their symptoms especially the inattentiveness at an earlier age than boys (4.86 vs. 5.47 years), they have also significant longer duration of illness and they reported more problems in anger control than boys.
Conclusion: ADHD pattern seems to be more similar than different among adolescent girls and boys.

P-08-003 The DSM-IV rates of childhood disorders in Turkey: Is ADHD a Turkish disorder?

E. S. Ercan*, Ö. Bilaç, T. Uysal, C. Aydin

* Izmir, Turkey

Objective: The aim of this study is to determine the prevalence of psychiatric disorders in a sample of primary school children in Turkey. The second aim of this study is to compare prevalance rates for Attention-deficit/hyperactivity disorder (ADHD) using DSM-IV and proposed DSM-5 criteria within the same population.
Method: Twelve schools were randomly selected and stratified according to socioeconomical status. The sample consisted of randomly selected 419 primary school children with 5 % margin of error, alpha (t) 1 % and assuming psychiatric disorders prevalences around 20 %. 417 cases were interviewed with a response rate of 99.5 %. The cases aged between 6 and 14 were assessed using the K-SADS-PL (Schedule for Affective Disorders and Schizophrenia for School Age Children- Present and Lifetime Version), impairment criterion scale and also proposed DSM-5 criteria for ADHD.
Results: The results showed that 14.1 % of the sample met 1 or more of the DSM-IV disorders when a measure of impairment specific to each diagnosis was considered. The most prevalent disorders were ADHD and anxiety disorders. The prevalence of ADHD, Oppositional defiant disorder (ODD) and Conduct disorder (CD) were found respectively as 12.7, 1.2, 1.9 % by clinical assessment with considering impairment criterion. The prevalence of mood disorders and anxiety disorders were 1.4, 2.6 % with considering impairment. According to proposed DSM-5 criteria prevalence of ADHD and ODD were respectively 12.7, 3.6 % when the impairment criterion was added to the symptom criteria for diagnosis.
Conclusion: ADHD prevalence obtained in our study is higher than the worldwide pooled prevalence for childhood ages (5.29 %). However the prevalence of mood and anxiety disorders are similar to those in Western studies. ODD and CD prevalance obtained in our study is lower than the worldwide pooled prevalence (3.2 and 3.3 %). ADHD prevalence was same with DSM-IV and proposed DSM-5 criterion.

P-08-004 Primary headaches, ADHD and learning difficulties in children and adolescents

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* Haifa, Israel

Objective: To asses the prevalence of learning difficulties and ADHD in children and adolescents with primary headaches.
Method: Children presenting with headache to the outpatient pediatric neurology clinics in Bnai Zion Medical Center and Meyer Children's Hospital, Haifa, during the years 2009–2010 were assessed. Inclusion criteria included primary headaches in children 6–18 years of age. Data regarding headache classification, school achievements, learning difficulties and ADHD diagnosis was assessed.
Results: Two hundred fourtythree children met the inclusion criteria: 135 (55.6 %) girls and 108 (44.4 %) boys. Among the primary headache patients 24 % reported learning difficulties and 28 % were diagnosed with attention deficit. Boys were significantly more likely to present with Tension Type Headache, whereas girls were more likely to present with Migraine. Diagnosis of Attention deficit disorder was more prevalent among those with Tension Type Headache than among those with Migraine. Low to moderate school grades were more prevalent among those with Tension Type Headache, whereas good to excellent school grades were more prevalent among those with Migraine. Learning Disorders as well as low to moderate school grades were more prevalent among those with longer episodes of headaches.
Conclusion: Learning difficulties and attention deficit disorders are more common in children and adolescents who suffer from primary headaches than is described in the general pediatric population. There is a clear correlation between headache diagnosis and school achievements. Thus relating to school performance is an essential component in evaluating children and adolescents with primary headaches.

P-08-005 Childhood ADHD in Micronesia

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* Honolulu, USA

Objective: Little is known about child mental health in Micronesia. The objective of this abstract is to describe some features of childhood ADHD in one Micronesian state, Yap.
Method: A retrospective review of records from 2 site visits made to the island of Yap in 2010 was conducted. The purpose of the 2 visits (March 2010 and July 2010) was for expert consultation and input on mental health care delivery in Yap state. During the 2 visits, the author assessed the majority of the children on the island who had been identified as having "special needs" by their primary care provider. The author's assessment included clinical interview with the child, caregivers and special education teachers, as well as review of medical records and school reports, when available. Diagnoses were updated and treatment recommendations were made.
Results: A total of 16 child cases were reviewed. The ages of the children ranged from 2 years 3 months to 20 years. Of the 16, 9 children carried a diagnosis of ADHD. 6 of the children were on clonidine, the only medication available for ADHD in Yap. Most

children had multiple diagnoses, usually a seizure disorder or some form of developmental delay. Behavior management strategies used by parents and teachers varied from child to child.
Conclusion: ADHD is a very common diagnosis among Yapese children who are seen in the special needs clinic. Very few children have ADHD as their sole diagnosis. As psychostimulants are unavailable in Yap, clonidine has been used with good effect. Psychoeducation on ADHD and behavior management strategies (while respecting Micronesian culture and family structure) are potential areas to focus on during future site visits.

P-08-006 Attention Deficit Hyperactivity Disorder in children and adolescents with traumatic dental injuries

S. Hergüner*, A. Hergüner, A. Erdur, F. A. Basçiftçi

* Konya, Turkey

Objective: Recent studies have shown that children with ADHD were on increased risk for traumatic dental injuries. The aim of this study was to measure ADHD symptoms in children with dental trauma and to compare with non-injured controls.
Method: A retrospective chart review of all children and adolescents between 6- and 18- years-old who were admitted to the Selcuk University, Faculty of Dentistry between September 2009–August 2012 for treatment of dental trauma was conducted. Parents of the subjects were called via telephone, and the purpose and procedure of the study were explained to them. Upon their agreement they were invited to complete the Conners' Parent Rating Scale-Revised: Short Form (CPRS-R: SF). As a control group children and adolescents with no reported history of trauma were recruited from the Department of Orthodontics.
Results: The Study Group (SG) composed of 55 subjects with dental injuries and the Control Group (CG) included subjects without dental trauma. There were no significant differences in age, gender and duration of education between the two groups. According to the CPRS-R: SF, SG had higher Total Score than the CG however this was not significant (21.5 ± 13.5 vs. 17.3 ± 10.1; $p = .069$). However Hyperactivity Subscale was significantly higher in the SG (4.1 ± 3.7 vs. 2.7 ± 2.6; $p = .033$). Subjects in the SG also had higher scores in the other subscales including Oppositional, Cognitive Problems and ADHD Index, these differences were not significant.
Conclusion: The findings of our study indicated that children with traumatic dental injuries had more hyperactivity scores than children without trauma. Clumsiness, recklessness and/or carelessness may be the leading causes for accidental injuries. Awareness of ADHD in dental traumatization should guide clinicians to seek child psychiatry consultations either at emergency or routine settings.

P-08-007 The attention deficit hyperactivity disorder and family relationship

V. L. Lima Ladeira Colonelli*

* Sao Paulo, Brazil

Objective: Children with Attention Deficit Hyperactivity Disorder (ADHD) symptoms present relationship and learning difficulties and can also show low self-esteem. They can make their parents, family members and teachers impatient. Researches indicate that factors such as conflicts, aggressions, cold relationship and lack of family support, together with a genetic predisposition, can add vulnerability to the ADHD development. The objective of this study was to verify and describe the psychosocial risks that are part of the family dynamic, which can contribute to the development, and maintenance of ADHD.
Method: The methodology used was semi-directed interviews with the parents based on the model of Structural Family Therapy created by Salvador Minuchin. The sample was composed of 15 families of children between 6 and 12 years, who had gone through a multidisciplinary diagnostic evaluation in the Ambulatory of the Children Neuropsychological Center (NANI) at Universidade Federal de São Paulo (UNIFESP). They presented positive results for the different ADHD types: Inattentive, hyperactive and the combined type, without the presence of comorbidities.
Results: The results of the interviews allow for the verification of the following risk factors: deficient family structure with lack of clear limits (53 %), undefined parental roles (33 %), painful histories of parent′s families of origin, which can interfere in the formation of a positive bonding in the family (33 %), bonding fragility (26 %).
Conclusion: A functional dynamic in the family, the presence of parental care, a clear and flexible definition of parental roles, the expression of feelings, affection security and the acceptance of parents as authority figures are not enough to inhibit ADHD, however, these factors work as protection against the development of the disorder. The evaluation of the psychosocial risk factors in the family is crucial to obtain better results in the disorder′s treatment.

P-08-008 Psychosocial risk factors associated with Internet addiction in Korea

Y. Shin*, J. Lee

* Suwon Si, Republic of Korea

Objective: The aim of this study was to examine the prevalence of Internet addiction in middle school students and to identify associated psychosocial risk factors and depression.
Method: This study was part of a larger epidemiological study on childhood psychiatric disorders conducted in Osan, a small city southwest of Seoul, Republic of Korea. We used the Korean version of Internet Addiction Scale (IAS) for Internet addiction, Korean-Youth Self Report (K-YSR) for the subjects' emotional and behavioural problems, and Korean Children's Depression Inventory (K-CDI) for depressive symptoms. We used the data of $N = 1{,}217$ completed cases. To study predicting factors of internet addiction, we put on independent variables, which are sex, grade, smoking and alcohol experiences, economic status, age of first Internet use, subitems of K-YSR and K-CDI score.
Results: The subjects consisted of addicted users ($N = 449$, 2.38 %), over users ($N = 739$, 36.89 %) and normal Internet users. Attention problems were the most powerful predictor, followed by sex, delinquent problems, K-CDI total score, thought problems, and aggressive behaviours. Age of initial Internet use negatively predicted Internet addiction ($\beta = -1.57$). The above variables accounted for 30.7 % variance in explaining Internet addiction ($R^2 = .305$).
Conclusion: The close correlation between ADHD and Internet addiction suggests that children with attention problems might also have problems with Internet addiction. Thus, it is important to monitor the Internet use of children with ADHD. In addition, Internet use at a younger age may result in Internet addiction; thus, the management of Internet use among ADHD children is of greater importance.

Friday, 7 June 2013, 15.00–16.00

P-09 Epidemiology: Children and adolescents II

P-09-001 ADHD and the use of Internet

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* Puebla, Mexico

Objective: To identify the association between ADHD and the use of internet.
Method: We studied high school students from a small town in Mexico. ADHD was assessed by Adult ADHD self-report questionnaire (Kessler et al. 2005), and Internet use was assessed with a questionnaire developed ad hoc.
Results: Four hundred thetytwo students participated (187 mens and 244 womens). Thirty-four students (37.78 %) were diagnosed with ADHD. Women use internet more often than men (99.15 vs. 93.85 %) and the objectives for using social networks are different ($p = 0.007$) between men and women. Students with ADHD use the Internet more frequently and for longer time than students without ADHD, these differences were statistically significant.
Conclusion: Subjects with ADHD are able to focus their attention longer while using internet because internet provides immediate reward. This would make the internet a useful tool in the training of impaired skills in these subjects.

P-09-002 Qualitative sociological study on unmet needs (UN) among professionals involved in the detection and treatment of attention deficit hyperactivity disorder (ADHD): Spanish ADHD Action Plan (PANDAH)

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* Madrid, Spain

Objective: To describe with a multidisciplinary approach, the UN on the diagnosis and therapeutic on ADHD in Spain.
Method: Included as a part of the PANDAH project; this sociological study based on 7 focus groups (10 attendees) through 2011–2012: Family associations, teachers, clinical psychologists, pediatricians/neuropediatricians, child and adolescent psychiatrists and adults psychiatrists. 10 in-depth interviews were conducted per group with a final consensus report about Spanish UN on ADHD.
Results: It was observed the following UN: Evolutionary and differential diagnosis, which must be managed through a correct, empathic and convincing communication to the patients/families. Information, training and awareness on ADHD. An agreed-upon, binding and multidisciplinary national self-guide that will include a smooth coordination among the different stakeholders. Healthcare and financial support for families. Improved patients' flow.
Conclusion: The UN identified have negative consequences for those affected and the professionals involved on ADHD. The results suggest that Involving different professionals implicated for the diagnosis and management of ADHD, as proposed by DSM-V, would be very valuable in Spain as well as probably other countries.

P-09-003 Motor coordination dysfunction in AD/HD: Estimated prevalence of DAMP syndrome in Japan, using Japanese version of the Developmental Coordination Disorder Questionnaire (DCDQ)

A. Nakai*, M. Ohnishi, Y. Mitsuhashi, B. N. Wilson

* Fukui, Japan

Objective: The children with AD/HD often have so-called "clumsiness", and previous studies showed that the high prevalence of the comorbidity as 30–50 %. This motor coordination problem is applicable to Developmental Coordination Disorder (DCD) in DSM-IV. The frequent and specific comorbidity has lead to new concepts or terms, such as DAMP (Deficits in attention, motor control and perception) syndrome (Gillberg), or DCD-Plus (Gibbs et al.). The purpose of the study was to investigate the relationships between DCD and AD/HD tendencies, using the Japanese version of Developmental Coordination Disorder Questionnaire (DCDQ-J).
Method: DCDQ is a parent questionnaire consisting of 15 items and was designed to screen for DCD in children aged 5–15 years. Recently, we developed the Japanese version (Nakaiet al. 2011). The DCDQ-J and the Japanese version of ADHD-rating scale were completed by parents on a nationally-representative sample of 25,484 children, age 6–15.
Results: All subscales and total scores of the DCDQ-J were significantly associated with the total and each subscales scores of ADHD-RS. The results, using the 5th percentile cut-off point, revealed that, in Japan, 3.9 % had DCD alone, 4.0 % of children had AD/HD alone, and 1.4 % had DAMP syndrome. Concurrently, 26 % of AD/HD had DCD, and 26 % of DCD had AD/HD.
Conclusion: Recent brain imaging study revealed that lower rCBF of some brain lesions and different rCBF response to MPH were found in AD/HD comorbid DCD group compared to AD/HD alone, and genome-wide association study suggested that MAP2K5 and CHD6, and 15 SNPs might be involved. The assessment as DAMP syndrome could help to identify the under treatment of these problems and to promote the new concept of the pathophysiology. Acknowledgement: This study was supported, in part, by the JSPS and the Ministry of Health, Labour and Welfare.

P-09-004 Distribution of ADHD in North West of England: Effect of socio-economic deprivation and access to community health services

M. Ogundele*, R. DeSoysa, I. Omenaka

* Liverpool, United Kingdom

Objective: There is a controversy about the factors which determine the prevalence of ADHD in the society. We studied the relationship between the prevalence of ADHD in 3 distinct regions in North West of England and the socioeconomic status in each locality.
Method: Patients were diagnosed with ADHD using standard clinical procedures based on DSM-IV criteria. All ADHD patients were identified from the specialist database of the community paediatric services in Liverpool, St Helens/Knowsley and Warrington. The prevalence of ADHD in each districts were studied in relation to the census derived Index of Multiple Deprivation scores (2007) as a measure of socio-economic deprivation.
Results: Warrington is a relatively affluent area while the other 2 districts are among the most deprived areas of England (Table 1). The

prevalence of ADHD was significantly associated with the degree of deprivation in a linear fashion in both Warrington and Liverpool districts, while showing a bimodal distribution in St Helens/Knowsley with a higher peak in the most affluent Quintiles of the community (Fig. 1). The highest and lowest prevalence of ADHD was in Warrington and St Helens/Knowsley respectively.

Conclusion: Socioeconomic deprivation appears to be significantly associated with the prevalence of ADHD in children and adolescents living in the North West of England (coefficients of correlation up to 1.0). A bimodal distribution of prevalence was found only in the district with the lowest rate of ADHD prevalence. This suggests that the more affluent parents are more likely to seek for medical diagnosis first in the presence of limited service delivery/coverage. It is hypothesised that as the rate of diagnosis and pick-up rate improves, progressively more patients from the deprived areas of the society are diagnosed, and their overall numbers eventually surpass those of children from the more affluent backgrounds.

Table 1 and Figure 1 summarizing the characteristics of children with ADHD in 3 different Local Authorities in the North West of England

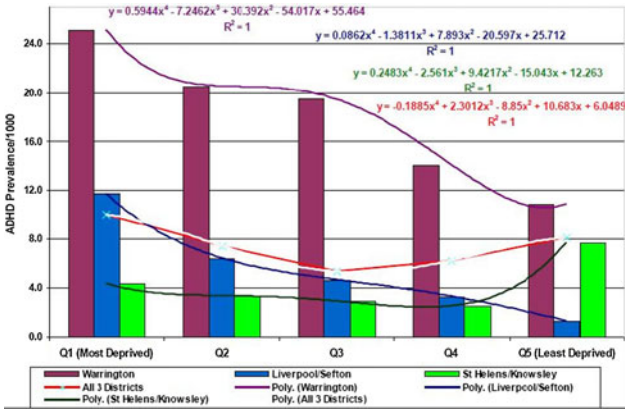

Fig. 1 Comparative ADHD prevalence by quintiles of deprivation distribution

P-09-005 Is socio-economic deprivation a common risk factor for the distribution of ADHD and ASD?

M. Ogundele*, R. DeSoysa

* Liverpool, United Kingdom

Objective: Some authors have argued that both ADHD and ASD may have a common aetiopathogenesis. We compared the relationship between socioeconomic deprivation and the prevalence of ADHD and ASD in a local district of North West of England.

Method: Patients were diagnosed with ADHD by the community paediatricians while ASD diagnosis was made by a multi-disciplinary team of paediatricians, SLT and Educational Psychologists, both based on DSM-IV criteria in Liverpool. The distribution of all patients were studied in relation to the census derived Index of Multiple Deprivation scores (IMD 2007). The coefficients (Spearman's) of correlation between prevalence rates in each Decile and Quintile of lower superior output areas (LSOA) were calculated. The statistical relationship between the normal childhood population and the ADHD/ASD prevalence rates respectively was tested with the Chi squared test of goodness fit.

Results: 1,357 children with ADHD and 672 with ASD were identified, with a prevalence of 11.1 and 5.5 per 1,000 population respectively. The prevalence of ADHD and ASD patients in each Decile and Quintile of LSOA bands was negatively correlated with the degree of deprivation. Spearman's correlation (rs) and probability (statistical significance) were similar for both conditions (Table 1). Both ADHD and ASD prevalence rates were significantly different from the normal distribution of children in the general population (χ^2 $p = 0$).

Conclusion: The prevalence of both ADHD and ASD in a relatively deprived city of England appears to be associated with the degree of the socio-economic deprivation of their residential areas. This study suggests that poverty is a common determinant factor for the distribution of both conditions and that improved socio-economic environment may significantly improve the overall neurodevelopmental outcome of children in the community. Further research is needed to ascertain the validity of this finding in other socio-economic regions.

Table 1 Summarizing the characteristics of children with ADHD in 3 different local authorities in the north west of England

	Relative district rank of deprivation (1 is most deprived of 354)	Total child population*	Proportion of LSOAs in most deprived quintile	Proportion of LSOAs in least deprived quintile	Prevalence of childhood ADHD (%)	Risk ratio between the most deprived and least deprived quintile	Spearman correlation coeff (prob)
Liverpool/Sefton	1–5	1,22,762	246/481 (51 %)	19/481 (4 %)	0.85	11.7/1.3 (9)	−1 (0.044)
Knowsley/StHelens	2–71	62,876	106/217 (49 %)	4/217 (2 %)	0.37	4.3/7.7 (0.6)	0 (0.99)
Warrington	79–202	30,803	18/125 (14 %)	40/125 (32 %)	1.62	25.2/10.9 (2.3)	−1 (0.044)
All 3 areas		2,16,441	370/823	63/823	0.82	10/8.1 (1.2)	−0.3 (0.54)

Mid-year estimate from 2009 (0–15 years) or 4–16 years

Table 1 Spearman's correlation (r_s) and probability (statistical significance) for the prevalence of ADHD and ASD based on deciles and quintiles of IMD 2007 ranking distributions

	ADHD		ASD	
	Decile distribution	Quintile distribution	Decile distribution	Quintile distribution
Spearman's correlation (r_s)	−0.987879	−1.000000	−0.951515	−1.000000
Probability (p)	0.003000	0.044400	0.004200	0.044400
Yates' corrected Chi-square χ^2 test	258.89 (df = 9)	250.36 (df = 4)	62.56 (df = 9)	59.74 (df = 4)
Comparison with normal childhood population (0–15 years)[a]	$p = 0$	$p = 0$	$p = 0$	$p = 0$

[a] Mid-year estimate from 2009 (0–15 years)

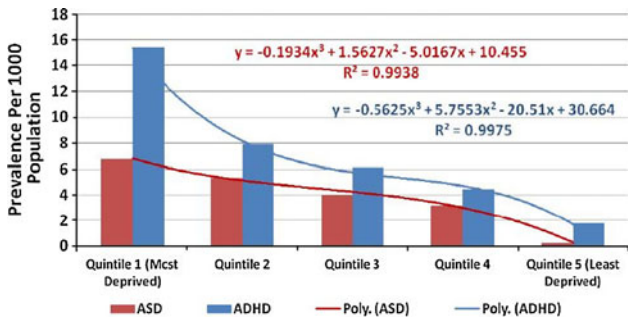

Fig. 1 ADHD and ASD prevalance per IMD 2007, Quaintila

P-09-006 Behaviour disorders of children between 7 and 15 years old in Kayseri and the effecting factors

V. Senol*, D. B. Oztop, D. Unalan, D. Oztop, R. Peksen Akca, Y. Udül, S. S. Adanur, Ö. Metin, A. Günes, P. R. Cicek

* Kayseri, Turkey

Objective: The aim of this study is to identify the ADHD prevalence in school children between 7 and 15 years old from different socio-economic backgrounds and to define the relation between the problem and demographic and socioeconomic factors.
Method: This cross-sectional study was conducted on 2,045 students (88.9 %) between 7 and 15 years old in 7 secondary schools in Talas and Develi Provinces and Kocasinan and Melikgazi Central Provinces of Kayseri between February and April, 2012. As the data collection tool, we used a demographic data form and the Scanning and Assessment Scale based on DSM-IV for Behavior Disorders in Children and Adolescents. For statistical analysis, we conducted descriptive statistical methods (percentile and frequency distribution, mean score, standard deviation) t test, Single Direction Variant Analyses (ANOVA) and Spearman Correlation Analysis.
Results: Of the students, 2.0 % had AD, 4.2 % had over-activity and impulsivity, 6.7 % had oppositional defiant disorder (ODD) and 24.4 % had conduct disorder (CD) problems. Total ADHD mean scores were significantly higher in boys, children with uneducated father and mother, children whose mothers were housewives, children whose fathers were workmen and children in the families with lower monthly incomes. Total ADHD scores were correlated positively with the sex of the child ($r = 0.192, p < 0.01$) and negatively with the monthly income levels and academic status of their father (respectively $r = -0.078$, $p < 0.01$, $r = -0059$, $p < 0.01$) ODD and CD mean scores were significantly higher ($p < 0.01$) in boys and children with uneducated fathers, with housewife mothers and with low income families.
Conclusion: The prevalence of behaviour disorder is between 2 and 14.4 %. The prevalence and level of ADHD were higher in boys and children with families who had lower educational status and lower income and who worked at jobs with lower status.

P-09-007 Some characteristics of children diagnosed with ADHD and referred to the child protection centre of Zagreb

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Objective: The first aim of this paper is to establish whether children with ADHD (N = 471) who were referred to the Child Protection Centre of Zagreb differ by individual characteristics (extraversion/introversion, aggressive behavior) and some general characteristics (gender, school grades) from their non-ADHD (N = 472) peers who were also referred to the Child Protection Centre. The second aim is to examine whether there are statistically significant differences in certain characteristics between children diagnosed with ADHD who witnessed family violence and children not diagnosed with ADHD who witnessed family violence.
Method: The data will be shown with descriptive statistics and analyzed by appropriate parametric and nonparametric methods.
Results: The results demonstrate that ADHD was more prevalent in boys than girls, and amongst extraverted and aggressive children. Also, children diagnosed with ADHD are more emotionally hypersensitive and have more difficulty reading comprehension than children without ADHD. Although there were no statistically significant differences in academic achievement between children with ADHD and children without ADHD, children with ADHD who witnessed family violence had significantly poorer academic achievement than children without ADHD. Therefore, witnessing family violence might represent a risk factor for poor academic achievement amongst children with ADHD.
Conclusion: It is important to note that the sample used in this study only included children referred to the Child Protection Centre, an institution specialised for psycho traumatised children. Therefore, the results cannot be generalised to the entire population of children. However, we hope that the results of this study will contribute to better quality services delivered to children with ADHD, as well as to preventing their secondary difficulties and encouraging future research on this topic.

P-09-008 Prevalence of asthma in patients with Attention-Deficit/Hyperactivity Disorder: A nationwide population-based study

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Objective: Attention-deficit/hyperactivity disorder (ADHD) is one of the most prevalent and researched childhood-onset psychiatric

disorder and affects 4–12 % of children. Prominent asthma symptoms bother daily activities and disturb sleep, and would have high risk of having poor attention, irritability which are also components of ADHD. However, previous studies revealed conflicting results about the association between ADHD and asthma. The aim of this study is to examine the prevalence and risk of asthma in ADHD patients.
Method: Data from a total of 221,068 pediatric patients were collected from Taiwan's National Health Insurance Research Database from January 1 to December 31, 2005 and analyzed. The study subjects included 469 ADHD patients and we calculated the prevalence of allergic diseases based on various demographic variables in ADHD patients. We also used multivariable logistic regression to analyze the risk factors of asthma.
Results: The prevalence of asthma was 9.6 % in ADHD group and 6.4 % in the general population. Prevalence of asthma in ADHD group was higher than the general population group in those aged between 12 and 17 years old, boys and living in urban areas ($p < .05$). Multivariate logistic regression models showed significant higher prevalence of asthma in ADHD group than general population group after controlling age, gender, and living areas (OR = 1.43; 95 % CI 1.05–1.95; $P = 0.025$). If we further considered the influence of other 2 allergic diseases, the prevalence of asthma in ADHD was no higher than the general population group (OR = 1.06; 95 % CI 0.76–1.47; $P = 0.753$).
Conclusion: Pediatric ADHD patients have an increased rate of asthma but their relationship might be influenced by allergic rhinitis (AR). Psychiatrist's notice about the assessment of allergic sensitization, especially asthma and AR, may be beneficial in children diagnosed with ADHD.

Prevalence of Asthma in ADHD:

Table 1 Prevalence of asthma in the general population group and ADHD group

Variable	General population group (n = 220,599) n (%)	ADHD group (n = 469) n (%)	Odds ratio	95 % CI	*P* value for χ^2 test
Age, year					
<6 years	8,075 (11.1)	12 (15.4)	1.5	0.79–2.70	0.209
6–11 years	4,847 (6.1)	28 (8.6)	1.5	0.99–2.14	0.063
12–17 years	1,271 (1.9)	5 (7.5)	4.3	1.71–10.6	0.008**
Gender					
Female	5,701 (5.4)	5 (5.8)	1.1	0.44–2.65	0.810
Male	8,492 (7.4)	40 (10.5)	1.5	1.05–2.03	0.031*
Living environments					
Rural area	3,820 (6.3)	7 (8.4)	1.4	0.64–2.99	0.364
Urban area	8,322 (6.5)	34 (10.0)	1.6	1.12–2.28	0.015*
Suburban area	2,051 (6.5)	4 (8.7)	1.4	0.49–3.83	0.541

AR allergic rhinitis, *AD* atopic dermatitis
* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

P-09-009 Prevalence of attention-deficit/hyperactivity disorder and oppositional defiant disorder: A national survey in Thailand 2012

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* Bangkok, Thailand

Objective: To obtain the estimates of the national prevalence of ADHD and ODD of Thai children.
Method: The study was used three-stage stratified sampling to represent most population of each level. 7,118 Thai students graded 1–5 in primary school were recruited in the study and were screened by the SNAP-IV Thai version with the sensitivity 82 %. The subjects, whose scores were positive for any subtypes of ADHD or ODD, were interviewed by child and adolescent psychiatrists using DSM-IV criteria. The percentage and 95 % Confidence Intervals were used to represent the results.
Results: Five Twenty one subjects and 200 subjects were diagnosed ADHD and ODD, making a national prevalence of Thai students equals 8.1 % (95 % CI 7.5–8.7). The prevalencein boy 12 % (95 % CI 10.9–13.0) was substantially higher than girl 4.2 % (95 % CI 3.6–4.9), the ratio was 3:1. Considering the difference in regions were found southern region was highest at 11.7 % (95 % CI 10.0–13.4) and northern region was lowest prevalence equals 5.1 % (95 % CI 4.0–6.2). The prevalence of ADHD with comorbidity of ODD was 2.1 % (95 % CI 0.8–2.4). Prevalence of ODD was 3.1 % (95 % CI 2.7–3.5), which was found highest 5.5 % (95 % CI 3.7–7.2) in Bangkok.
Conclusion: ADHD prevalence in Thailand is higher, thus an early intervention to prevent the mental health problems and loss of quality population is needed. The health services and education system require changes in attitudes and development of resources.

Friday, 7 June 2013, 15.00–16.00

P-10 Epidemiology: Adults

P-10-001 Circadian rhythm in adults with ADHD and the delayed sleep phase syndrome (DSPS): Melatonin profiles, activity and temperature

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Objective: The majority of adults with ADHD have a delayed sleep phase. This is characterized by late slaap and late rise times. Most of these patients sleep too short on a chronic basis, which often causes psychological, physical, and/or social problems. We investigated whether circadian abnormalities underlie these sleep problems.
Method: The present case–control study examined melatonin, activity, and body temperature profiles in adults with attention-deficit/hyperactivity disorder (ADHD) who have a delayed sleep phase syndrome

(DSPS) in a naturalistic home setting. We included twelve medication-naïve patients with ADHD and DSPS, and 12 matched healthy controls. We examined association between sleep/wake rhythm in ADHD and circadian parameters (i.e., salivary melatonin concentrations, core and skin temperatures, and activity patterns) of patients with ADHD with DSPS and healthy controls during 5 consecutive days and nights.
Results: Daily bed times were more variable within patients compared to controls ($F = 8.19$; $p < 0.001$), but melatonin profiles were equally stable. Patients slept about 1 h less on nights before work days ($F = 11.21$, $p = 0.002$), and were more active during sleep ($F = 92.10$, $p < 0.001$). The duration between dim-light melatonin onset (DLMO) and sleep onset was 1 h longer in patients ($F = 9.07$, $p = 0.003$), especially in extremely late chronotypes. Melatonin, activity, and body temperatures were delayed in patients and overall temperatures were lower in patients than controls. Sleep-onset difficulties were related to greater distal-proximal temperature gradient (DPG; i.e., colder hands) ($r^2 = -0.32$; $p = 0.028$) in patients.
Conclusion: Clinically observed day-to-day bed time variability of individuals with ADHD and DSPS is not reflected in their melatonin profiles, which were stable. Cold extremities were related to sleep-onset difficulties. Irregular sleep-wake patterns and delayed sleep times for individuals with ADHD and DSPS are associated with delays and dysregulations of the thermostatic system.

P-10-002 Using a national quality registry for monitoring ADHD treatment to study suicide attempts in young people and adults with ADHD

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* Stockholm, Sweden

Objective: The main objective with this survey was to study suicide attempts in young people and adults diagnosed with ADHD using a Swedish national quality registry.
Method: The Swedish national quality registries contains individualised data concerning patient problems, medical interventions, and outcomes after treatment. Approximately 200 units, both child and adolescent psychiatric units and adult psychiatric units are included in the registry. There are 3,400 baseline registrations and 2,770. Follow-up registrations. Approximately 74 % of the patients in the registry are under 18 year of age.
Results: 46 % of the adult female with ADHD had at least one previous suicide attempt and for children and adolescents there were 19 % of the females with at least one suicide attempt. For both children and adolescents and adults, suicide attempts where statistically significant overrepresented in females compared to males.
Conclusion: We found that suicide attempts were more common in women, both in adults and adolescents with ADHD.

P-10-003 Attention Deficit Hyperactivity Disorder and violence: Findings from the adult psychiatric morbidity survey for England, 2007

R. Gonzalez*, C. Kallis, J. Coid

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Objective: It is unclear whether the association between Attention Deficit/Hyperactivity Disorder (ADHD) and violence is explained by ADHD symptoms or co-existing psychopathology. We investigated the effects of ADHD and its symptom domains of hyperactivity and inattention, among individuals reporting frequency, severity, victims and locations of violence in an English population sample.
Method: We report data from the Adult Psychiatric Morbidity Survey (APMS 2007), a representative sample of the household population of England. A randomly selected sample of 7,393, 16 years or older, completed the Adult Self-Report Scale for ADHD. Self-report of violent behavior in the past 5 years included: repetition (5 or more incidents), violence when intoxicated, injury, police involvement, and minor violence, victims and location of incidents. All models were weighted to account for non-response and adjusted for demography and established clinical predictors of violence.
Results: ADHD was only moderately associated with violence at the population level after adjustments (OR 1.44, $p = .006$). Significant interactions were observed between ADHD with substance dependence, antisocial personality, and anxiety/affective disorders on violence outcomes. Hyperactivity, but not inattention scores were associated with several indicators of violence, particularly in close personal relationships (OR 1.15, $p = .04$). Mild (OR 1.53, $p = .04$) and moderate (OR 1.63, $p = .03$) ADHD symptoms were associated with repetitive violence, but not severe ADHD, where the association was explained by co-existing disorders.
Conclusion: The independent effect of ADHD on violence is moderate at the population level, driven by hyperactivity, and involves close persons. Because violence associated with severe ADHD is primarily due to co-existing psychopathology, treatment interventions should target co-existing disorders. Medication treatment may be important if the aim is to reduce violence experienced by intimate partners and family from individuals with ADHD of moderate severity. The moderating effects of co-occurring psychopathology on the association between ADHD and violence will be discussed.

P-10-004 Factors related with the prevalence of ADHD in university students

Y. Kwak*, M. Kim

* Jeju, Republic of Korea

Objective: The prevalence of Adult ADHD in Korea was reported as around 1 % but still more studies are needed. To know the prevalence of ADHD and related factors in young adults we investigated University students.
Method: Subjects are 909 University students who were gathered by proportional stratified sampling. We evaluated them using questionnaire on sociodemographics, family relation information, and academic achievements. They are also evaluated by structured self rating scales including AUDIT, CES-D, Korean-Wender Utah Rating Scale (K-WURS), Conners Adult ADHD Rating Scale-Korean version (CAARS-K), and Korean Adult ADHD Scale. They were analyzed by multiple logistic regression analysis.
Results: The prevalence rate was 6.8 % (7.2 % in male and 6.5 % in female). ADHD was more prevalent in older age (OR 0.841 95 % CI 0.726–0.975), in students whose academic achievements was better than average (OR 3.204 95 % CI 1.640–6.257) or worse than average (OR 3.204 95 % CI 1.640–6.257), and in students who have alcohol abuse (OR 2.818 95 % CI 1.433–5.541), comorbid mental disorders (OR 1.944 95 % CI 1.057–3.574), and lower family support (OR 3.237 95 % CI 1.264–8.290).
Conclusion: We found that ADHD in university students is more prevalent than the prevalence of adult ADHD previously reported. Early intervention is needed because it becomes more prevalent with

age and accompanies more mental problems. Family support could be protective factor.

P-10-005 A population-based examination of the prevalence of adult ADHD screening status and correlates in a Canadian samples

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Objective: To develop an understanding of prevalence of ADHD, using an ADHD screening measure, and of the relationships between ADHD screening status and other psychiatric and social problems among a representative sample of adults 18 years and older living in a province of Canada.
Method: The Centre for Addictions and Mental Health (CAMH) Ontario Monitor is an ongoing repeated cross-sectional telephone survey with validated measures: ADHD measures (Adult ADHD Self-Report Scale-V1.1, previous diagnosis, medication use); psychiatric distress measures (General Health Questionnaire, anxiety/depression medication use); antisocial behaviour measure (The Antisocial Personality Disorder screen); health status (Health–Related Quality of Life); substance use and abuse measures (alcohol, tobacco, cannabis and cocaine, Alcohol Use Disorders Identification Test, Alcohol, Smoking and Substance Involvement Screening Test); criminal activities (arrest for criminal offence) and socio-demographics (age, sex, education, occupation, SES).
Results: 4,014 Ontario residents were sampled between 2011 and 2012. Based on data for 2011, 3.5 % screened positively for ADHD. Of those who screened positively, 55.7 % were female and 44.3 % were male. Most who screened positively for ADHD were not diagnosed; only 10 % reported previous diagnosis by a doctor. Moreover, 94.9 % reported that they were never treated with medication while 7.4 % reported being treated with medication but not in the past 12 months. However, small cell sizes for the first year (2011) data precluded detailed analysis. This presentation will provide statistically weighted results of ADHD screening status by other psychiatric and social problems for 2 years (N = 4,014) of a 3-years study.
Conclusion: This study is the first population-based survey in Canada to assess ADHD in a large and representative sample of adults. These early results indicate that the prevalence of adults screening positively for ADHD are consistent with other countries. This presentation will provide additional information on symptom clusters and associations with other psychiatric and behavioural problems.

Friday, 7 June 2013, 15.00–16.00

P-11 Substance abuse

P-11-001 Maternal recall, Second hand Smoke Exposure (SHS) and early childhood Attention-Deficit/Hyperactivity Disorder (ADHD) and disruptive disorders

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Objective: Sixty percent of children ages 4–11 are exposed to secondhand smoke exposure (SHS) in the US. Less is known regarding SHS and mental health compared to other medical disorders. The aims were to (1) Examine association of SHS exposure and child ADHD/disruptive disorders and (2) Examine association of maternal recall of child's SHS compared to actual bioassay measured exposure.
Method: N = 60 children had saliva collected at ages 4 and 6 yo, as part of a larger study (Joan Luby, PI). Saliva was assayed for cotinine. Phone interview data were collected on maternal recall of child's exposure to SHS at ages 4 and 6 yo. Child diagnoses of ADHD, Oppositional Defiant Disorder/Conduct Disorder (ODD/CD) were collected using age appropriate assessment. Repeated measures analysis of exposure level by child characteristics was performed. Separate analyses utilizing Fisher's Exact tests and linear regression were conducted at ages 4 and 6.
Results: Prenatal smoke exposure was associated with early childhood smoke exposure, measured as SHS (cotinine level) in this sample, in a repeated measures model (Est = 1.89, SE = 0.62, F = 9.23, df = 1.56, $p = 0.004$). Mother's recall of child's exposure to SHS was associated with greater child smoke exposure (Est = 1.97, SE = 0.35, F = 31.20, df = 1.56, $p < 0.001$); however, a number of mothers reported child had "no exposure" despite high actual measures. Greater child ADHD and CD severity scores were associated with greater child smoke exposure (ADHD severity: Est = 0.11, SE = 0.05, F = 4.56, df = 1.59, $p = 0.037$; CD severity: Est = 0.35, SE = 0.17, F = 4.15, df = 1.59, $p = 0.046$) after controlling for parental ADHD and CD.
Conclusion: While preliminary, this study on secondhand smoke exposure and ADHD along with other recent investigations provide converging evidence for neurotoxicity warranting additional investigation in larger samples. Reducing early childhood SHS in the risk trajectory for ADHD would first require increasing public awareness of such putative risks (Braun et al. 2008; Hamer et al. 2011).

P-11-002 ADHD with co-existing severe substance disorder (SUD) is characterized by early and persistent antisocial behaviour as well as poor general cognitive capacity

B. Bihlar Muld*, J. Jokinen, S. Bölte, T. Hirvikoski

* Stockholm, Sweden

Objective: Clinical characterization of involuntary treated adult male substance abusers with Attention Deficit Hyperactivity Disorder.
Method: The study group of 60 compulsory cared male adults with ADHD and SUD (ADHD/SUD group)is compared with (1) 120 male adults, matched for age and year of admission, in compulsory care due to SUD, but without known ADHD (psychosocial background, treatment history in childhood an adulthood, educational level, working experience, psychiatric symptoms and preferred abused drug)(general SUD group). (2) 107 group matched males with ADHD, assessed at an outpatient psychiatric clinic (rated ADHD-symptoms during childhood, measured with Wender Utah Rating Scale and cognitive functions, measured with WAIS III) (ADHD/Psych group).
Results: The ADHD/SUD group had significantly (1) more frequently been in compulsory care during childhood due to antisocial behaviour (2) more frequently been imprisoned and (3) more frequently preferred stimulant drugs (and less often alcohol). Both groups had often had (1) adverse growing up conditions, (2) low educational level and

lack of longer working experience (3) high degree of psychiatric symptoms. The ADHD/SUD group had in comparison with the ADHD/Psych group (1) more reported ADHD symptoms during childhood and (2) lower cognitive capacity in all measured parameters.
Conclusion: ADHD with co-existing of SUD is a more severe and disabling condition than ADHD and SUD as such. Additional to psychiatric comorbidity, early and pervasive antisocial behaviour and poor general cognitive functions also characterize the combined disorder.

P-11-003 Relationship between ADHD symptoms and alcohol use among patients with mood disorders

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Objective: Individuals with attention deficit/hyperactivity disorder (ADHD) are likely to suffer from such comorbid psychiatric disorders as depression or anxiety, as well as to engage in recreational or abusive substance use throughout their lifetime. The aim of this study was to examine the moderating effects of these forms of mood disorders on the relation between substance use and ADHD symptoms in young adults.
Method: Data for this study was collected from 65 patient charts (mean age = 20.31, SD = 3.79; 68 % males) at The ADHD Clinic in Toronto, Canada. Self-reports of substance use as well as clinical diagnoses of anxiety (31 %), depression (15 %), and total ADHD symptoms were recorded for each patient.
Results: Hierarchical Linear Regression analyses revealed that although both marijuana ($p = .01$) and alcohol ($p = .02$) use were associated with ADHD symptoms, only depression and alcohol use accounted for significant unique variance in total ADHD symptoms. The significant interaction effect revealed that, regardless of alcohol consumption, depressed patients had significantly more ADHD symptoms relative to non-depressed patients when there was no alcohol consumption. However, ADHD symptoms were equally as high in quantity within both groups of patients when alcohol consumption was reported.
Conclusion: These results emphasize the importance of considering depression, and not only anxiety, when treating adolescents and young adults with ADHD. Unexpectedly, marijuana use did not predict total ADHD symptoms differently for patients with versus without a co-morbid diagnosis of anxiety or depression. Depression was the only significant moderating factor. The findings suggest that although depressed patients seem to be a high risk group, symptoms of non-depressed patients with ADHD may be greater when alcohol is used. Implications will be discussed in terms of the involvement of other potential risk factors, as well as limitations to this work and considerations for future clinical research.

P-11-004 Adult attention-deficit/hyperactivity disorder: Associations between subtype and lifetime substance use: a clinical study

M. Liebrenz Rosenstock*, A. Gamma, A. Frei, A. Buadze, E. Seifritz, D. Eich-Höchli

* Zurich, Switzerland

Objective: Numerous studies have demonstrated significant comorbidity between attention-deficit/hyperactivity disorder (ADHD) and substance use disorder (SUD), both in children and adolescents. However, little is known about how differences between ADHD subtypes correlate with SUDs in adults. The purpose of this study was to characterize an adult sample and identify possible associations between ADHD subtypes, lifetime substance use, and preferences for specific substances.
Method: We recruited 134 patients who presented to a specialized ADHD outpatient clinic of the Psychiatric University Hospital Zurich, performed a thorough evaluation of their ADHD, collected information on their past medical history, and conducted an in-depth interview on their use of psychotropic substances. Complete data was obtained for 100 patients.
Results: Lifetime substance use was high (>75 %) in this adult sample, although we did not find significant differences between patients with combined- type ADHD and the inattentive subtype with respect to their rate of lifetime use of substances or their substance of choice, with the exception of cocaine. In the combined subgroup, we recorded significantly higher (26.2 %) cocaine use, as compared to the inattentive subgroup (0 %, $p = < 0.005$). Due to small sample size, no evaluation for the predominantly hyperactive-impulsive type was possible.
Conclusion: Our findings corroborate the high rate of comorbidity between substance use and adult patients with ADHD. While few differences were found between subgroups' preference for specific drugs, more frequent use of cocaine by adult patients with both inattentive and hyperactive-impulsive symptoms should be kept in mind when treating this patient group.

P-11-005 Adult Attention-Deficit/Hyperactivity Disorder and nicotine withdrawal: A qualitative study of patient perceptions

M. Liebrenz Rosenstock*, A. Gamma, C. E. Fisher, A. Frei, A. Buadze, D. Eich-Höchli

* Zurich, Switzerland

Objective: Nicotine use has been reported to positively influence some core symptoms of Attention-Deficit/Hyperactivity Disorder (ADHD). This finding is notable in light of the high prevalence of cigarette smoking in adults with ADHD and this group's greater difficulty abstaining from smoking. Overall, though, there is scant literature investigating the beliefs, perceptions and experiences of smokers with ADHD regarding smoking cessation and withdrawal.
Method: The current study's participants (n = 12) were recruited from a larger epidemiological sample. Eight subjects consented to participate in a smoking cessation program, and in-depth interviews were conducted after this program's completion to explore motivations to quit, past experiences with smoking cessation and withdrawal, expectations about cessation and withdrawal, and participant views of the most helpful measures, including thoughts about smoking interventions specifically designed for patients with ADHD. We also interviewed four subjects who declined to participate in the smoking cessation program, in order to obtain a greater variation of themes and motives. Mayring's qualitative content analysis approach was used to evaluate findings.
Results: Adult smokers with ADHD had made several attempts to quit, had experienced intense symptoms of withdrawal, and had relapsed early and frequently. Of note, subjects frequently noted a perceived worsening of ADHD symptoms with phases of nicotine

abstinence. We identified three motives to quit smoking: (1) health concerns, (2) the feeling of being addicted, and (3) social factors. The majority of the smoking cessation program's participants viewed it as helpful, emphasizing the benefits of both structure and specific counseling. Furthermore, participants favored a smoking cessation program specifically designed for individuals with ADHD, as they believed that their nicotine withdrawal was complicated by this disorder and that treatment should address these symptoms.
Conclusion: Considering that treatment initiation and adherence are closely associated with individual perceptions, we offer these findings in the hope that cessation interventions for smokers with ADHD might better serve this vulnerable subgroup.

P-11-006 Demographic profile of adults with Attention Deficit/Hyperactivity Disorder (ADHD) with or without cocaine dependence

C. S. Miguel*, M. A. Gobbo, P. Martins, M. Klein, M. A. Silva, T. M. Alves, M. R. Louzã

* São Paulo, Brazil

Objective: To identify socio demographic and clinical variables of adults with ADHD with or without cocaine dependence.
Method: Seventy subjects fulfilling DSM-IV criteria for ADHD were included. Thirty-four had only ADHD and 36 had ADHD and cocaine dependence (ADHDCD). They were interviewed with the Mini International Neuropsychiatric Interview (MINI version 5.0.0) to verify the presence of psychiatric comorbidities, the Addiction Severity Index (ASI 6) Drugs module to confirm the history of drug use and Adult ADHD Self-Report Scale (ASRS-v1.1) to trace ADHD symptoms.
Results: The Combined ADHD subtype (23/18 ADHD and ADHDCD respectively) and male sex (28/25 ADHD and ADHDCD respectively) were predominant. The mean age of the ADHD group was 28.00 ± 6.81 years, the majority (78.8 %) was single, all had more than 8 years of studies and 14.7 % had experimented marijuana once in their lifetime. In the ADHDCD group 44.4 % were married, without occupation (47.2 %), their mean age 30.06 ± 7.54 years. A larger number of comorbidities was present in the ADHDCD group, compared to the ADHD, with actual major depression (44.4 vs. 35.3 %) $p = 0.442$ actual risk of suicide in (61.1 vs. 3 %) $p = 0.000$ and anti-social personality disorder (69.4 vs. 0 %) $p = 0.000$, and maniac period (38.9 vs, 0 %) $p = 0.000$, but ADHD group presents a higher generalized anxiety disorder (23.5 % versus 16.7 %) 77.1 % of the ADHDCD group had a daily use of drugs. Tobacco and alcohol use began before the age 15 years. The ADHDCD group had a high frequency of dependence in multiple drugs cocaine powder (77.8 %), alcohol (63.9 %), crack (58.3 %) and marijuana (22.2 %).
Conclusion: The ADHDCD group have a highest number of psychiatric comorbidities and have a higher risk of suicide and antisocial personality disorder than ADHD group.

P-11-007 Decision-making and impulsiveness in adults Attention Deficit/Hyperactivity Disorder (ADHD) with and without cocaine dependence

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* São Paulo, Brazil

Objective: Higher levels of impulsive behaviours are present in subjects with ADHD or with drug dependence. In this study we examine decision process and impulsivity in a Brazilian sample with ADHD with or without cocaine dependence (ADHDCD).
Method: Sixty-four patients fulfilling DSM-IV criteria for ADHD were included. Thirty-three had only ADHD and 31 had ADHD and cocaine dependence (ADHDCD). They were interviewed with the Mini International Neuropsychiatric Interview 5.0.0. (MINI) to verify the presence of psychiatric comorbidities, the Addiction Severity Index (ASI 6) Drugs module to confirm the history of drug use and the Adult ADHD Self-Report Scale (ASRS-v1.1) to quantify ADHD symptoms. Decision making was investigated with the Iowa Gambling Task (IGT). The Barratt Impulsiveness Scale (BIS version 11) was used for self-rating of Decision Making and impulsiveness.
Results: In the IGT the ADHDCD group chose more cards from the disadvantageous decks in every one of the five blocks of twenty cards. The ADHD group showed progressively a more advantageous strategy among the blocks. There was significant differences between groups in block 2 and total score block ($p = 0.020$ and 0.047 in the ADHD and ADHDCD groups, respectively) with the ADHDCD group with worse results. In the total score of the BIS and in its three dimensions (attentional, motor and non-planning) of impulsivity the ADHDCD group showed worse scores, but only in the motor dimension there was significant difference between groups ($p = 0.015$).
Conclusion: Patients with ADHDCD show a poorer strategic planning in order to obtain rewards and deficits related to response inhibition, specially motor, in comparison to ADHD patients.

Friday, 7 June 2013, 15.00–16.00

P-12 Aetiology I

P-12-001 Theory of mind deficits in adults with Attention Deficit/Hyperactivity Disorder

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Objective: Theory of Mind (ToM) is a specific cognitive ability to understand others as intentional agents, to interpret their minds in terms of theoretical concepts of intentional states like beliefs and desires. ToM deficits are reported in patients with autism spectrum disorders, schizophrenia, and children with Attention Deficit/Hyperactivity Disorder (ADHD). The aim of the present study is to evaluate ToM abilities of adults with Attention Deficit/Hyperactivity Disorder (ADHD).
Method: Thirty adults with ADHD (mean age: 25.7 ± 7.7, Range 18–48) and 30 healthy controls (HC) (mean age: 36.3 ± 1.0, Range 24–59) were enrolled in the study. Patients were given SCID-I, Hamilton Depression Scale (HAM-D), Hamilton Anxiety Scale (HAM-A), Young Mania Rating Scale (YMRS). Patients with comorbid psychiatric disorders, active mood symptoms or patients with scores over the cut-off points of anxiety, depression and mania scales were excluded. To assess ToM; First Order ToM Tests (ToM-1), Second Order ToM Tests (ToM-2), Hinting Tasks (HT), Faux-Pas Recognition Tests (FRT) were applied.
Results: HC group was significantly older than ADHD group ($t = 20.7$; $p < 0.0001$). Results of Pearson correlation test revealed that there was no relation between age and the test scores of ToM-1,

ToM-2, HT, and FRT. Mann–Whitney U test yielded no statistical difference between ADHD and HC groups in terms of ToM abilities (ToM-1 $p = 0.962$; ToM-2 $p = 0.602$; HT $p = 0.500$; FRT $p = 0.201$).
Conclusion: To our knowledge this is the first study focusing on ToM deficits in adults with ADHD. We found no difference between ADHD and HC groups in terms of ToM abilites.

P-12-002 A factorial structure of ADHD, sensation seeking and type A behaviour

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Objective: There seems to be consensus that Attention Deficit Hyperactivity Disorder (ADHD) manifests differently in adulthood than it does in childhood. The majority of authors in this regard maintain that levels of hyperactivity diminish over time; however there is also research that indicates that adults with ADHD are more prone to risk taking behaviour than those who do not have ADHD. Risk taking behaviour is however not unique to ADHD but also a characteristic of both sensation seeking behaviour and Type A behaviour. The question arises as to what extent there is an overlap between the manifestation and aetiology of ADHD, sensation seeking and Type A behaviour.
Method: A sample of 402 young adults (18–30 years) was recruited. All the participants completed the Adult ADHD Self Report Scale (ASRS), the Zuckerman Sensation Seeking Scale (SSS) (subscales: thrill seeking, experience seeking, disinhibition and boredom), the Arnett Inventory of Sensation Seeking (subscales: intensity and novelty) as well as the Jenkins Activity Survey (subscales: speed/impatience, hard driving/competitiveness and job involvement). An exploratory factor analysis was performed.
Results: The results of the factor analysis indicated that the items of the ASRS formed a separate and distinct cluster from the sensation seeking constructs. Despite the separate subscales on the SSS and the Arnett Inventory, the items of these questionnaires clustered together as two separate factors labelled disinhibition and novelty. Two further factors were extracted that related mainly to Type A behaviour, these being speed/impatience and hard driving/competitiveness.
Conclusion: It was concluded that although there may be behavioural overlaps between ADHD, sensation seeking and Type A behaviour, they are distinct and separate constructs.

P-12-003 A study on the emotion understanding in children with ADHD

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Objective: The ability to identify and discriminate between the different emotions have been identified as relevant to the development of the capacity to understand emotional and social skills. Assuming that children, adolescents and adults with ADHD have symptoms such as restlessness, inattention and impulsivity, the present study aimed to evaluate the understanding of emotion in children with ADHD.
Method: Understanding emotion was conceptualized as the ability to identify emotions in others and in himself, through facial expressions, body movements and postures (nonverbal behaviors). To study the development of an instrument was constructed based on the research of reading the emotions developed by Ekman (Ekman and Friesen 1976). The task was to identify, by children, the six universal facial expressions considered by that study. The study included 60 children, 30 with ADHD and 30 control children. Two groups were formed, distributed at the discretion of the ages: 6–8 years and 9–12 years. The analysis was divided into three categories: face recognition, emotion recognition and acknowledgment of the other's emotions.
Results: The results showed a positive correlation between children who had little or no understanding of the emotion and the diagnosis of ADHD. The results indicated that children with ADHD, compared with the control group, show little understanding of emotion in themselves and others, when it is the identification and understanding of emotion through nonverbal behaviors.
Conclusion: Knowing these skills seeking scientific data clarifies possible relations between them and the symptoms of the diagnosis.

P-12-004 A comparison of million clinical multi-axial inventory profiles between non-clinical, schizophrenia, substance use disorder and ADHD groups

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Objective: Although there has been extensive research on ADHD as a clinical disorder in adulthood, many clinicians remain sceptical about the validity of this disorder. Among the many reasons for this are comorbid conditions which may complicate the disorder, and together with this a lack of consensus in appropriate and reliable diagnostic procedures. The aims of this study was twofold, i.e., to determine whether the MCMI could be used as a reliable diagnostic instrument to distinguish ADHD from other forms of pathology, and to determine the prevalence rates of other disorders amongst a group of adults with ADHD.
Method: In order to meet these aims four groups were selected namely ADHD (n = 51), Schizophrenia (n = 21), SUD (n = 18) and a non-clinical group (n = 43). All participants were screened by means of interviews, the ASRS as well as the MiniPlus. All participants completed the MCMI. Mann–Whitney-u and Fisher's Exact tests were used to determine significant differences between the 4 groups.
Results: Although the results fall mostly within the parameters of other studies, there are a number of differences which requires some discussion. In terms of Cluster B personality disorders, the following prevalence rates were found for the ADHD group: 23 % Borderline, 27.4 % Antisocial, 19.6 % Histrionic and 19.6 % Narcissistic.
Conclusion: There is no distinct and separate MCMI profile for adults with ADHD, but definite indications of co-morbid conditions.

P-12-005 Nutritional assessment of children and adolescents with Attention Deficit/Hyperactivity Disorder

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Objective: Assessing the Nutritional Status, Food Consumption and reduction of appetite in children and adolescents with Attention Deficit Disorder/Hyperactivity treated in neuropsychological Child Care Center.

Method: Descriptive observational cross-sectional study. Evaluated: Nutritional status—BMI (Z score) and height/age (Z score), Food Consumption—24-hour recalls and a Food Frequency Questionnaire; Complaining of decreased appetite (yes/no). Work performed descriptive statistics with median, interquartile range, minimum and maximum, and absolute and percentage for qualitative variables.
Results: None of the subjects had low height for age (Z score) or low BMI for age (Z score). 32 % of the sample were overweight, and 12 % obese. The median energy intake of the population was 8 % higher than the recommendation and the percentage distribution of macronutrients consumed according to the caloric value was within the recommended limits. Most individuals did not meet the recommendations of micronutrients, especially the low number of individuals who did not achieve the recommended folate, manganese, calcium and vitamin D levels. There was a high consumption of sweets, fats and sodium. The complaint of reduced appetite was reported by 72 % of individuals.
Conclusion: There is no deficit in height or weight and levels of overweight is high, consumption of macronutrients reached the recommendation and energy consumption and micronutrients was improper, there was a reduction of appetite within the individuals with ADHD using methylphenidate, with absolute presence on those of the Combined subtype.

P-12-006 The influence of parental behaviour on hyperactive-impulsive traits in children: Inattention as a mediator factor

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Objective: To investigate mediation models that may explain the relationship between parental and children ADHD-related dimensions (inattention and hyperactivity-impulsivity).
Method: 117 mothers and 52 fathers of 117 normal developing students with ages ranging from 6-to-16 years (53 % male) answered a set of questionnaires about ADHD-related symptomatology. Generalized estimated equations (GEE) were performed to test associations. Mediation effect sizes were computed using a multiple mediation analysis.
Results: The relationship between maternal and children′s inattention was completely attenuated (B = 0.19, $p < 0.05$ vs. B = 0.11, ns) when maternal hyperactivity-impulsivity was taken into account. Maternal hyperactivity-impulsivity was confirmed as a mediator factor between inattentive dimension of mothers and their children by a multiple mediation analysis, effect (z) = 1.96, 95 % CI 0.0001–0.16, $p < 0.05$. When children's inattention was considered as a mediator factor of the influence of maternal hyperactivity-impulsivity over children's hyperactivity-impulsivity we also observed an entirely reduction (B = 0.23, $p < 0.05$ vs. B = 0.09, ns). The effect of beta change was significant in multiple mediation analysis, effect (z) = 2.62, 95 % CI 0.03–0.24, $p < 0.01$.
Conclusion: Our findings suggest that part of the relationship between parental and children's hyperactive-impulsive symptoms can be accounted for by children's inattentive symptoms. This means that hyperactivity/impulsivity traits may be mediated by the inattentive dimension or, at least, by mechanisms that are more closely related with inattentive symptoms. Such result encourages research to elucidate the bases of common variances of ADHD dimensions. However, further studies are needed to confirm these results and ensure that our findings can be extended for other populations.

P-12-007 Fatty acid status and cognitive/behavioural symptoms in children with Attention Deficit/Hyperactivity Disorder (ADHD): Preliminary data from an Italian study

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Objective: The observation of a systematic association between ADHD symptoms and low polyunsaturated fatty acid (PUFA) status has led to the hypothesis that PUFAs might be involved in the etiology of ADHD (Stevens et al. 2004; Colter et al. 2008). As part of a larger randomised, intervention trial investigating the effect of docosahexaenoic acid (DHA) in reducing symptoms in children with ADHD, the purpose of this preliminary study is to investigate if there are relationships between circulating concentrations of PUFAs and clinical and cognitive measures of ADHD difficulties in an Italian sample.
Method: Nineteen children with ADHD aged 7–14 years were presented with six cognitive tasks from the Amsterdam Neuropsychological Tasks program (De Sonneville 1999); moreover, parents rated behavioral symptoms using Strength and Difficulties Questionnaire (SDQ), ADHD rating scale IV Parent Version-Investigator completed, Conners' Parent Rating Scale–R, Children' Global Assessment Scale, Clinical Global Impression-severity, Child Health Questionnaire (CHQ). A blood sample was taken from all patients for analysis of the blood fatty acid profile (Risè et al. 2007). Correlation analysis was performed between the cognitive tasks/behavioral questionnaires and PUFAs parameters.
Results: Children with ADHD presented with significantly lower DHA, n-6/n3 ratio, arachidonic acid/EPA ratio, and n-3/n-6 ratio (Risè et al. 2007). There were significant positive correlations between PUFAs level and the response time and number of errors in cognitive tasks (ANT). Moreover, significant correlations were also found between PUFAs, in particular DHA level, and behavioral scales (SDQ and CHQ).
Conclusion: These data confirm also in an Italian sample that children with ADHD display abnormal essential fatty acid profiles, suggesting that PUFA deficiency could be one of the multiple etiological factors of ADHD (Transler et al. 2010). Abnormalities in fatty acid profile were also significantly correlated with performance on cognitive tasks and with behavioral ratings.

P-12-009 Psychophysiological, cognitive and behavioural correlates of emotional dysregulation in children and adolescents with internalizing and externalizing symptomatology

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Objective: In recent years the emotional dysregulation in children and adolescent patients has become an important issue. Emotion regulation deficits have been consistently linked to psychopathology in crosssectional studies, it is unknown whether different aspects of emotion functioning are best represented by a latent factor of emotion regulation or are better characterized as distinct processes in adolescence. Various emotional components (i.e., experiential, behavioral, physiological) may not be the same within the same individual. For example, one may have a low tolerance for anger and therefore subjectively report experiencing high levels, whereas physiologically, they may not appear angry (i.e., no increase in heart rate). Objective. The objective of the our study was to examine, with a specific

assessment, the psychophysiological, cognitive and behavioral correlates of a clinical population during a two type of tasks: competitive versus collaborative tasks.
Method: The sample was recruited from 'E. Medea' Scientific Institute, an institute for diagnosis and rehabilitation of developmental disorders. For inclusion in the study each child was required: (1) to have (in according with DSM IV) a diagnosis of ADHD, DOC, DOP for a externalizing symptoms, and a diagnosis of Depression, Anxiety for a internalizing symptoms; (2) to be aged between 6 and 17 years; (3) Intelligence Quotient in the normal range; (4) not use of drugs. The assessment phases was divided in three session: (1) Psychophysiological evaluation of heart rate, skin conductance, muscle activity; (2) Cognitive evaluation with (a) self-report measures of emotional state during Wii task, (b) check list about coping skill; (3) Behavioral evaluation with behaviors videotaped and coded during the Wii tasks using the Observer Video Pro (version XT.7 of Noldus Information Technology 2007).
Results: preliminary results.
Conclusion: Findings using this methodology suggest there are a specific patterns of emotion regulation in the development and maintenance of psychopathology.

P-12-010 When parents and children have ADHD symptomatology: A literature review

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Objective: Objective: The aim of this review was to examine the relationship between parents' attention-deficit hyperactivity disorder (ADHD) symptoms and those of their children also with ADHD.
Method: Method: A systematic review of studies between 2007 and 2012 was conducted using Medline and PsycINFO. The selection criterion was the presence of ADHD symptomatology in parents and their ADHD children. Search terms used were ADHD, parents, children, symptoms, and relationship. After assessing both the quality of the retrieved studies and the presence of the inclusion criterion, 10 studies were selected.
Results: Results: Although it is well established that the core symptoms of ADHD are highly heritable some research argue that parenting behaviours play a role in the development and/or maintenance of child ADHD symptoms (see Johnston et al. 2012). Previous investigations support that mother-son hostility and ADHD symptoms are environmentally mediated. There is evidence to suggest that poor parental skills may exacerbate children's self-control deficits and contribute to the development of additional disruptive disorders that worsen ADHD outcomes. Furthermore, adult ADHD may interfere with parenting behaviours relevant to child socialization, such as guiding children during peer interactions, scheduling playdates, or modelling appropriate interpersonal skills. Finally, it has been observed that children having a mother with ADHD symptoms, especially inattention, are more prone to experience maladaptive social functioning and peer rejection.
Conclusion: Conclusion: Parental ADHD symptoms may influence the behavioural outcome of children with ADHD symptoms. Specifically, mother inattention contributes to greater social problems in their children. Future interventions should focus on parental ADHD symptoms closely related to guiding their children's social behaviours.

P-12-011 Correlation between child-environment interaction and Attention Deficit/Hyperactivity Disorder

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Objective: The aim of this study is to evaluate the prevalence of child-environment interaction dysfunction during the first phases of life in patients with ADHD.
Method: It's a retrospective study carried out among the medical records of patients who had consulted the child and adolescent psychiatry department of Razi hospital between January 2009 and February 2013. The diagnosis of ADHD has been made with the semi-structured diagnostic interview The K-SADS-PL (DSMIV criteria). An epidemiological fact sheet with data on primary interactions, family dynamics and other social factors has been filled.
Results: Fifty patients aged between 5 and 15 years were included in the study with a sex ratio of 2.57. 78 % had a diagnosis of ADHD combined type (ADHD/C) and 22 % had a diagnosis of ADHD inattentive type (ADHD/I). 22 % of patients had a disorganized family dynamics: in 45 % of cases the parents were divorced and in 54 % of the cases the father wasn't involved in his child's life. In 16 % of cases, the children were adopted at different ages after they have been raised in unstructured families, crowded institutions or hospitals with the subsequent low physical and emotional care, lack of hygiene and under stimulation.
Conclusion: ADHD is a complex and heterogeneous disorder, which results mainly from the interaction between biological predisposition (neurobiological and genetic factors) and environmental factors.

P-12-012 Autoantibodies targeting neurotransmitter biosynthetic enzymes in an ADHD sample

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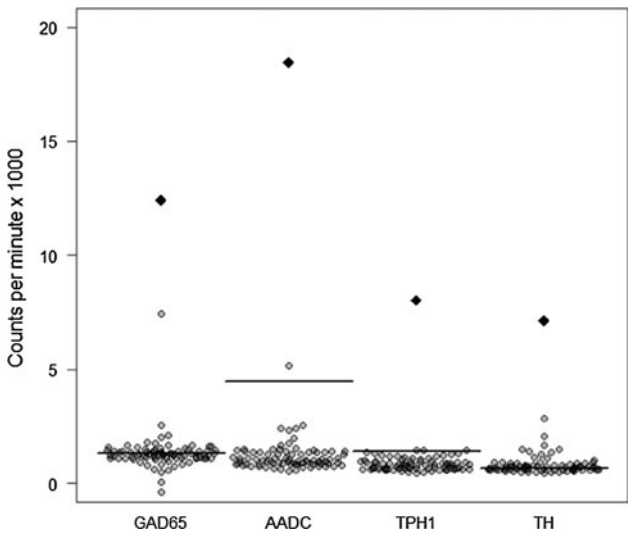
Objective: The aetiology attention-deficit/hyperactivity disorder (ADHD) is probably multifaceted involving different genetic and environmental risk factors with many of the symptoms being attributed to dysregulation of neural pathways involving neurotransmitters, such as dopamine, noradrenaline, serotonin, glutamate and GABA. It was recently reported that four out of 15 children with ADHD had serum autoantibodies targeting glutamate decarboxylase 65 (GAD65), the rate limiting enzyme in the synthesis of the inhibitory neurotransmitter GABA [Rout UK, Mungan NK, Dhossche DM (2012) Presence of GAD65 autoantibodies in the serum of children with autism or ADHD. Eur Child Adolesc Psychiatry 21 (3):141–147.].We aimed to replicate this finding in a larger cohort of ADHD patients and examine whether the patients also had antibodies towards other key enzymes in catecholamine and serotonin biosynthesis.
Method: Radioactive GAD65, aromatic-L-amino-acid decarboxylase (AADC), tryptophan hydroxylase 1 (TPH1) and tyrosine hydroxylase (TH) were produced through in vitro translation of pure plasmid DNA from *E. coli* plasmid vectors. Sera from 79 ADHD patients, positive control serum and negative control serum, were mixed with buffer and antigen in wells and left to incubate overnight. The day after,

Protein A-Sepharose was added and the wells were washed using a vacuum manifold and dried before β-radiation was measured from each well.
Results: Only one of the 79 patients had clearly evident GAD65 autoantibodies. One patient had slightly elevated levels of AADC antibodies and another had slightly elevated levels of TH antibodies. None had autoantibodies directed at TPH1.
Conclusion: As the prevalence of the investigated autoantibodies were low in our ADHD sample, we conclude that they are not likely to be frequently observed, or causally linked to ADHD. Nevertheless we cannot eliminate the possibility that ADHD has an autoimmune component in a subgroup of the patients.

Antibody reactivity (counts per minute) against the antigens



Friday, 7 June 2013, 15.00–16.00

P-13 Aetiology II

P-13-001 ADHD-related symptoms and stress oxidative hypothesis: Gender differences

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Objective: Attention deficit hyperactivity disorder (ADHD) is a complex neurobiological disorder, with higher prevalence in age-school children and consistent in adults. Various psychological, social, genetic, and biochemical factors are thought to be involved in its aetiology. In particular, oxidative stress is considered as one of the common causes in etiopathogenesis of ADHD. In our study, we aimed to evaluate the Super Oxide Dismutase (SOD) activity relating to Brown ADD Scales psychometric response, in order to verify potential relationship between key protein in redox homeostasis and major behavioral symptoms related to ADHD in adults.
Method: We investigated a sample of 55 undergraduate students: 20 males (24.75 ± 2.8) and 35 females (24.34 ± 2.5). All subjects were underwent to psychological assessment with adult version of Brown ADD Scales. At the same time, blood samples were taken for PBMCs isolation and spectrophotometric evaluation of SOD activity.
Results: The samples analyzed resulted normally distributed both for SOD activity and Brown ADD Scales score. The gender comparison showed significative high level in male subjects for SOD activity (M, 3.2 ± 0.8 vs. F, 2.3 ± 0.5, $p < .05$) and Brown ADD Scales score (M, 52.1 ± 5.3 vs. F, 47.2 ± 4.3, $p < .05$). In a linear regression analysis, SOD activity was related to Brown ADD Scales score, and confounders factors (age, BMI, smoking and drinking). In male, the SOD activity levels resulted significantly and independent correlated with psychometric scores (Pearson = 0.59, $p < .05$).
Conclusion: Gender differences resulted in analyzing major behavioral symptoms related to ADHD in adults. Also, male subjects showed high levels of SOD activity. These levels positively correlated with psychometric evaluation of ADHD symptoms, suggesting a perturbation in oxidative metabolism in the etiopathogenesis of ADHD and potential role for SOD as biomarker for this disorder.

P-13-002 ADHD and environmental toxic metal exposure

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Objective: Attention-deficit/hyperactivity disorder (ADHD) is highly prevalent psychiatric disorder and known as neurodevelopmental disorder showing many neuropsychological deficits. Many environmental risk factors have been thought to increase the risk for the disorder. We examine 18 heavy metal levels in ADHD children and control group to find the association of heavy metal levels and clinical features and neuropsychological test of ADHD.
Method: We recruited ADHD group (n = 50) and control group (n = 45) 6–12 years of age. Both groups were diagnosed by semi-structured interview. And they were evaluated via Korean version of ADHD rating scale (K-ARS), Conner's rating scale—revise, intelligence quotient (IQ), and neurocognitive function tests (continuous performance test, children's color trails test, stroop color–word test). Eighteen heavy metal level were examined from whole blood and hair level. Heavy metal determination was carried out using the ICP-MS instrument. Independent *T* test, correlation, and regression were used.
Results: Blood nickel, arsenic and chromium level were significantly high in ADHD group and zinc, aluminium and iron were low in same group. Blood nickel, arsenic and chromium level were positively correlated with K-ARS score and Conner's rating scale score. Moreover blood chromium level showed association with low scores in IQ and neurocognitive function test. Hair level didn't show any significant differences between two groups.
Conclusion: The exposure of nickel, arsenic and chromium is associated with diagnosis, and severity and neurocognitive function of ADHD. Strict regulation for environmental metal exposure is needed.

P-13-003 Personality traits and comorbidity in adults with ADHD

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Objective: ADHD has been associated with specific personality traits. Our aim was to examine personality traits using the Temperament and Character Inventory (TCI) in adult ADHD patients compared to a

control group, and investigate the impact of common comorbid psychiatric disorders on these personality measures.
Method: A sample of 63 previously diagnosed ADHD patients (age 34.4 ± 9.3 years, 54.0 % females) and 68 population controls (28.3 ± 6.3 years, 57.4 % females) were interviewed using the Mini International Neuropsychiatric Interview Plus (M.I.N.I Plus). Personality traits were assessed using the TCI version 9 (240 items). Analysis of Variance (ANOVAs) were performed to adjust for comorbid anxiety disorders, depression and antisocial personality disorder (ASPD).
Results: The ADHD group had significantly higher scores on the TCI dimensions Harm avoidance, Novelty seeking and Self-transcendence and significant lower scores on Reward dependence, Self-directedness and Cooperativeness compared to the control group ($p < 0.05$). In the ADHD group 39.7 % had current depression and/or anxiety disorder compared to 4.4 % in the control group. When adjusting for current comorbid depression and anxiety disorder, the Harm avoidance score in the ADHD group was no longer significantly different from the control group. The difference in Novelty seeking between the patient and control group was correlated with life-time and current diagnoses of ASPD and ADHD, with ASPD having the greatest impact. The ADHD group still showed significantly lower scores in Reward dependence and Self-directedness after adjusting for these comorbid conditions.
Conclusion: In line with previous results, adults with ADHD showed high scores on Novelty seeking and high Harm avoidance. However, it is important to take comorbid disorders into account while investigating personality traits in ADHD. In our study the high Harm avoidance was explained by the high comorbidity of depression and anxiety disorder in the ADHD group.

P-13-004 Defining Deficient Emotional Self-Regulation (DESR) in pre-schoolers with Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: (1) to identify cut-off scores best fit to detect Deficient Emotional Self-Regulation (DESR) in ADHD preschoolers using the Anxiety/Depression (A/D), Aggression behaviours (AB), and Attention Problems (AP) dimensions of Child Behavior Checklist (CBCL) and Teacher Report Form (TRF) (2) to define psychopathological and functional profile of ADHD DESR subgroup.
Method: Participants: 80 ADHD (74 M: 6 F; mean age 58.4 ± 9 mo.) and 103 control (59 M: 44 F; mean age 60.0 ± 8 mo.) preschoolers. Psychometric measures: CBCL- TRF 1.5–5 by parents and teachers; Leiter-R; Psychiatric Interview to Parents (PAPA) and behavioural observation for patients only. Statistical Analyses: descriptives, Chi square test, univariate parametric and non-parametric ANOVA, Kendall's tau correlation, ROC analyses and linear or logistic regression.
Results: ROC analyses define novel cut-offs for preschooler DESR of A/D > 59, AP > 60, AB > 59 with aggregate cut-off > 179: sensitivities and specificities of 100.0/97.0 for CBCL and 100.0/98.8 for TFR. DESR is found in 36.5 % ADHD vs. 2.9 % control preschoolers by CBCL ($\chi 2$ (1) = 33.536, $P < 0.0001$) and in 29.4 % ADHD vs. 3.7 % controls by TRF ($\chi 2$ (1) = 22.100, $P < 0.0001$). AAA t-scores for CBCL and TRF. ADHD show significant positive correlations ($P < 0.05$) and high concordance. ADHD-CBCL-DESR is associated with higher rates of anxiety ($P < 0.01$) and disruptive behaviour ($P < 0.01$) as well as significant more impairments in interpersonal functioning ($P < 0.01$) as compared to ADHD group only.
Conclusion: Preschoolers children with ADHD-DESR require clinically-meaningful adjustments in the cut-off score. Also in preschoolers, CBCL-DESR helps to identify a clinical subgroup of ADHD having a psychopathological and functional profile consistent with the clinical concept of DESR.

P-13-005 A follow-up study of maternal expressed emotion towards children with ADHD: Its relation with severity and persistence of ADHD and comorbid behaviour

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Objective: Attention-Deficit/Hyperactivity Disorder (ADHD) is associated with greater family stress, parental psychopathology and conflicted parent–child relationships (Deault 2010). The underlying mechanisms of these associations are not yet fully understood. The aim of this study is to investigate the cross-sectional and longitudinal relationships between maternal Expressed Emotion (EE) and the severity of ADHD, oppositional and conduct problems in children with an ADHD combined diagnosis, adjusting for maternal psychopathology. In addition we studied the stability of maternal EE over a period of 6 years.
Method: In this six year follow-up study 399 children with an ADHD combined diagnosis were included at baseline, of which 299 children were available at follow-up. At both time points measures of maternal EE, ADHD severity, oppositional and conduct problems were obtained of children, and measures of ADHD and psychic problems of mothers.
Results: Correlation analyses revealed maternal EE was not stable over a period of 6 years. Using GEE linear regression analyses, we found that at baseline maternal warmth was negatively related to child ADHD severity. In contrast, at follow-up, maternal criticism was positively associated with child oppositional and conduct problems. Both associations survived correction for the presence of maternal psychopathology. No significant longitudinal predictions were found for either child psychopathology at follow-up from EE at baseline or vice versa.
Conclusion: The results support previous findings of cross-sectional associations between parental EE and child psychopathology, which do not appear to be stable over time. This might be explained by the fact that maternal EE appears not to be a stable factor over time. More longitudinal research is needed to help us unravel the associations between parental EE and child psychopathology.

P-13-006 Variation in the use of diagnostic and screening tools in children and adolescents with Attention-Deficit/Hyperactivity Disorder (ADHD) across European (EU) countries

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Objective: Current approaches to diagnose ADHD in children/adolescents are based on: the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV and the International Classification of Diseases (ICD) 9/10 manual. ICD-9/10 has a higher threshold to meet diagnostic criteria for ADHD. In addition, various ADHD diagnostic tools are used. We examined variations in ADHD diagnostic approaches and tools across EU countries using chart audit data.
Method: Retrospective medical record review of 779 ADHD patients (6-17 years) diagnosed by 340 clinicians (psychiatrists/pediatricians)

between 2004 and 2007 in France, Germany, Italy, Netherlands, Spain, UK. Physicians recorded the diagnostic approach (DSM-IV, ICD-9/10, or both) and tool (Swanson, Nolan and Pelham (SNAP)-IV or Conners Rating Scale (CRS)/IOWA Conners) employed.
Results: Physicians had, on average, 15 years of practice; 47 % were psychiatrists. Diagnostic approach and screening tool information was available for 677 and 401 patients, respectively. DSM-IV (47 %) was more common than ICD-9/10 (36 %) as a diagnostic approach. There were significant inter-country differences in utilization rates ($P < 0.0001$). DSM-IV was used most commonly in Netherlands (95 %) and Spain (64 %), while ICD-9/10 was most common in Germany (79 %). Psychiatrists used ICD-9/10 more than other medical specialties ($P = 0.034$). CSR/IOWA Conners was the preferred screening tool, administered to 90 % of all patients with high rates across all countries. SNAP-IV was more frequently used among patients seen by pediatric/other specialty (16 vs. 4 %, $P < 0.0001$). Clinicians who used screening tools (44 %) were less likely to adopt DSM-IV as a diagnostic approach ($P < 0.0001$).
Conclusion: Physicians in different European countries use various approaches for diagnosing ADHD. Given the more stringent criteria in the ICD-9/10 versus the DSM-IV criteria, variation in diagnostic approach could potentially contribute to international variation in diagnostic prevalence of ADHD. This may also subsequently lead to national differences in the clinical management of patients.

P-13-007 The role of family emotional context in the development of emotion regulation in children with Attention Deficit Hyperactivity Disorder

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Objective: An emerging literature suggests that emotion dysregulations are apparent in children with ADHD. Despite the strong biological underpinnings of ADHD, family factors remain salient influences on the course of the disorder. The Tripartite Model of the Impact of the Family on Children's Emotion Regulation and Adjustment (Morris et al. 2007) argues that socialization of emotion regulation (ER) occurs via three processes: observation/modeling, emotion-related parenting practices and the emotional climate of the family. Guided by the model, the purpose of this study was to examine ADHD children's ER response to an emotional stimulus in the context of family interaction. Different impacts of the family emotional contexts on children's ER in children with ADHD were compared.
Method: Participants included 60 children with ADHD and 60 non-ADHD comparison controls ages 6–12 years. Children's ER strategies and their emotion reactivity to a family conflict video were coded. Their parents were asked to fill out the questionnaires about parent's emotional expressiveness, parent's meta-emotion philosophy, emotional climate of the family, and children's ER abilities.
Results: Children with ADHD tended to underestimate their emotion reactivity and overestimate their ER ability than controls. As the reports of parents, children with ADHD displayed more ER difficulties than controls. Furthermore, the families of children with ADHD showed a significantly less constructive pattern of emotional contexts. With statistical control of core ADHD symptoms, multiple regression analyses revealed that parent's meta- emotion philosophy was the significant predictor of emotion reactivity and ER in children with ADHD. Children's ER ability was predicted by parent's emotion coaching. Children's emotion over- reactivity was predicted by parent's emotion dismissing type and emotion dysfunction type.
Conclusion: These findings highlight a pivotal link between family emotional contexts and the emotion regulation behaviors in children with ADHD. Especially, the parents' emotion coaching behaviors were most highly associated with children's ER abilities.

P-13-008 Association between poor sleep and early symptoms of Attention Deficit Hyperactivity Disorder

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Objective: The objective of this study is to examine the association between poor sleep and early signs of Attention Deficit Hyperactivity Disorder (ADHD), or Regulatory Disorder (RD).
Method: Children at the age of 24–27 months in a regional birth cohort were included. Parents and pre-school teachers answers the CBCL 1½–5 and C-TRF questionnaire. Sleep problem score and ADHD-problem score will be analysed for associations. Participants with a sleep-problem score above the 60th percentile and a gender matched group with scores below the 50th percentile will be invited to participate in a 7-days Actigraphic monitoring and parents will fill in further sleep questionnaires (CSHQ). We expect the total number of participants to be 500 of which 40 participants will be selected for Actigraphic monitoring.
Results: Data are currently being analysed. We expect an association between ADHD symptoms and sleep problems and a difference in activity during sleep and wake-hours. Agreement between the parental rated sleep problem and Actigraphic data will be evaluated.
Conclusion: If sleep problems are reported and related to early ADHD symptoms it may be a focus for intervention.

P-13-009 The assessment of risk factors related with obesity in Attention Deficit Hyperactivity Disorder

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* Istanbul, Turkey

Objective: A possible new comorbidity between ADHD and obesity has been suggested recently. The aim of this study was to investigate the risk factors related to obesity in children with attention deficit hyperactivity disorder.
Method: Age, height, weight, body mass index, nutritional habits, duration of watching television, time spent with using computer were recorded in 118 children with attention deficit hyperactivity disorder (aged 6–11 years), and compared with 116 healthy controls. Statistical analysis was performed using SPSS, version 15.0.
Results: The nutritional habits and duration of watching television were found greater in ADHD group than control group. Significant relationships were found between nutritional habits (fastfood consumption), duration of watching television and ADHD ($p < .05$) while there were no significant relationships between age, BMI and time spent with using computer and ADHD ($p < .05$).
Conclusion: The findings of the study revealed that suggesting therapeutic strategies for obesity and ADHD when they coexist could be an important implication for the management of patients with these two conditions together.

P-13-010 Actually really irresistible: Impulsivity predicts M&M (Smarties/cookies) consumption

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Objective: There are high rates of comorbidity between ADHD and overweight/obesity and this could be due to high impulsivity associated with binge eating (Cortese et al. 2008). However, others see a cause of obesity in the constant priming with food, for example in TV advertising (Harris et al. 2009). We wanted to find out whether snacking was due to food priming or to heightened impulsivity.
Method: Forty-one college students participated in the study (M-age = 22.59 years, SD = 4.73; 29 females), which followed a 2-between design (Priming: food advertising vs. normal advertising). The dependent variable was the amount of consumed snacks (M&Ms, cookies, chips, jelly bears). Participants watched one cartoon intermitted by food advertising or normal advertising and filled out the Conners Adult ADHD Rating Scales (CAARS) to measure symptomatology that is associated with ADHD.
Results: The group that watched food advertising consumed significantly more M&Ms (M = 24.00, SD = 25.21) compared to the group that watched normal advertising (M = 10.25, SD = 16.10), $t(39) = 2.07$, $p < .05$. When entering condition and the CAARS scales (i.e., inattention, impulsivity and hyperactivity) as predictors into one linear regression to predict M&M consumption we found that condition was a significant predictor, $t(39) = 2.04$, $p < .05$, and impulsivity a marginally significant predictor, $t(39) = 1.34$, $p < .10$.
Conclusion: Priming through food advertising and impulsivity predicted M&M consumption. Future study should try to replicate this finding in a group of participants with ADHD diagnosis and if children and adolescents with ADHD are even more vulnerable to food advertising, try to take preventive steps, to protect them from the risk of obesity.

P-13-011 Mean platelet volume in children with Attention Deficit Hyperactivity Disorder

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Objective: The aim of this study was investigation of mean platelet volume and platelet count in children with attention deficit hyperactivity disorder and healthy subjects.
Method: The mean platelet volume and the platelet count were measured in 70 children with attention deficit hyperactivity disorder (aged 6–16 years), and compared with 41 healthy controls.
Results: The mean platelet volume was found to be significantly increased in attention deficit hyperactivity disorder group compared to control group ($p = .006$). There was no significant difference in the platelet count between groups ($p > .05$). After reviewing literature, we hypothesized that attention deficit hyperactivity disorder in childhood may be a risk factor for coronary heart disease in adulthood.
Conclusion: Although significance and cause of elevated the mean platelet volume level in attention deficit hyperactivity disorder remain unclear in present study, further studies are warranted to investigate relationships mean platelet volume, attention deficit hyperactivity disorder in childhood, and coronary heart disease in adulthood.

P-13-012 Attachment styles and Attention Deficit/Hyperactivity Disorder (ADHD) symptoms in parents of the children and adolescents with ADHD

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Objective: Attachment style is the pattern of establishing relationship with other people thought to determine early in life and show the continuity. Insecure attachment may be associated with neuropsychiatric disorders in children and adults. The aim of this study is examining adult attachment styles and adult ADHD symptoms in mothers of children diagnosed with ADHD.
Method: Conners Teacher Rating Scale data and sociodemographic data of children diagnosed with ADHD were collected (n: 238, mean age: 10.1 ± 2.6). Adult Attachment Style Scale (AAS) and the Wender Utah Rating Scale (WURS) was given to parents of the children.
Results: According to the first section of the AAS, 84.5 % of the mothers showed secure and 15.5 % insecure attachment. They showed 74.4 % secure and 25.6 % insecure attachment in the second part of the AAS. Fathers showed 67.5 % secure and 32.5 % insecure attachment in the first part and 83.3 % secure and 16.7 % insecure in the second part of the AAS. In order to increase the reliability of the study, parents who had same attachment styles in both section of the AAS were chosen and the WURS scores were significantly higher in the parents who demonstrate insecure attachment scores ($P = 0.000$). In addition, insecure attachment scores of parents were positively correlated with the WURS scores ($P = 0.000$).
Conclusion: The findings of this study showed that children with symptoms of ADHD and their parents carry risks in the interpersonal relationships from a very early period of life. Defining the relationship between generation transitive different situations, such as ADHD and attachment will positively affect the health services. Further studies are required in this area.

P-13-013 Meta-analysis of deficiencies in three domains of decision-making in adult ADHD

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Objective: Impaired decision-making (DM) has received modest attention in adult ADHD. Tests of DM could prove useful in diagnostics and advance the understanding of pathogenesis. To provide an overview of current DM research in adult ADHD, we conducted a meta-analysis for three DM domains—delayed reward (DR), risky DM and reinforcement learning (RL)—and for the continuous performance task (CPT) as a classical paradigm for ADHD.
Method: Relevant articles were identified in WoK, Scopus, and pubmed. Articles listing at least one measure of a relevant DM-domain and sufficient information to calculate effect sizes (ES), comparing DSM-IV ADHD in ages 18–50 years to healthy controls

were included. Average effect sizes (Cohen's d) were calculated for each domain, giving greater weight to larger studies. Separate ES were calculated for the different dependent variables reported for CPT. Cochran's Q-test was used to assess study heterogeneity.
Results: A total of 41 articles (7 + 6 + 7 + 21) were included. Significant effect sizes were found for DR (d = .46; 95 % CI = .23–.70), RL (d = .53; .32–.73), and CPT (average d = .84; .59–1.16). CPT errors (combined omission and commission) had large ES (d = 1.04; .70–1.39), while reaction times (d = .36; .03–.69) and perceptual sensitivity (d = .66; .46–.86) had small and medium ES respectively. No significant ES was found for risky DM (d = .27; −.08–.63). Qs were significant for CPT errors and reaction times, in addition to risky DM, indicating systematic heterogeneity of studies.
Conclusion: Results show small to medium ES for DM tasks, which are significantly above zero in all but risky DM, but generally much lower than for the CPT. More generally, we show that meta-analyses can uncover small but important ADHD-related impairments. The combination of small to medium ES with large study heterogeneity suggests that better methods to investigate DM deficits in adult ADHD need to be developed.

Mean effect size by experimental task with confidence intervals

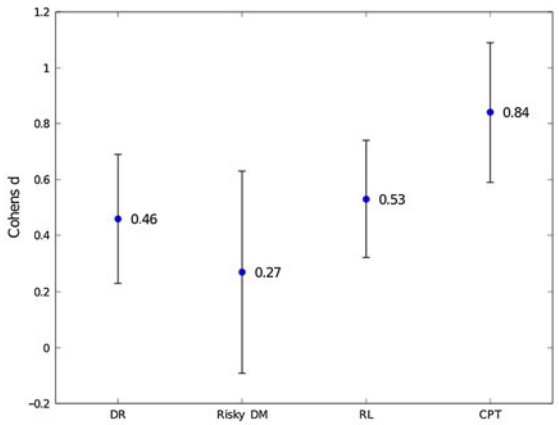

Figure 1. Effect sizes with 95 % confidence intervals for each decision domain. Effect size for CPT is averaged across categories (reaction time, errors & sensitivity).
DR = delayed reward; Risky DM = rsky decision making; RL = reinforcement learning; CPT = continuous performance task.

P-13-014 The role of omega-3 polyunsaturated fatty acids in clinical manifestation in children with Attention-Deficit/ Hyperactivity Disorder

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Objective: Attention-deficit/hyperactivity disorder (ADHD), the most common developmental disorder in childhood. The present study investigates the role of omega-3 PUFAs status in ADHD symptoms and its correlation with cognitive dysfunction in ADHD children.
Method: In this study, we recruited 21 ADHD children and 21 healthy age-match children. The assessments included the Chinese parents version of Swanson, Nolan, & Pelham-4th edition questionnaire (for ADHD symptoms),the food frequency questionnaire and essential fatty acids deficiency questionnaire (for omega-3 PUFA status), and three computerized tasks (Go/No go task, Delay related time task, and Tapping task) for cognitive function.
Results: Children with ADHD had higher EFA deficit scores ($p = 0.024$) when compared with normal control groups and it was observed that high EFA deficit score showed high risk (odd ratio = 1.272, 95 % CI 1.02–1.59) of developing increased ADHD symptoms. ADHD children showed a significant difference in motivational deficit (Delay related time task: t = −2.419, $p = 0.02$), and temporal processing (Tapping task : t = −2.984, $p = 0.005$) when compared with control groups.
Conclusion: Thus the study revealed the EFA deficit status in ADHD children could be possible high risk factor with their symptoms suggest the possible role of omega-3 fatty acid in controlling the behavior and brain functions. Further, the study urges to investigate the metabolic role of PUFA in between Mind–Body interface control.

Friday, 7 June 2013, 15.00–16.00

P-14 Genetics I

P-14-001 The stability of deficient emotional self-regulation symptoms in adolescence: The role of Tryptophan Hydroxylase 2 (TPH2) and of family structure

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Objective: Deficient emotional self-regulation (DESR) have been found to be a very heritable trait that increases susceptibility for later psychopathology, including severe mood problems and aggressive behaviour. A common single nucleotide polymorphism (SNP G-703T, rs 4570625) in the transcriptional control region of TPH2 has been reported to modulate amygdala responsiveness to affective stimuli, and has been found to be associated with emotional dysregulation. In this study we investigated the moderating role of a TPH2 (SNP G-703T, rs 4570625) polymorphism on the stability/instability of emotional dysregulation problems throughout adolescence, taking also into account the possible interaction with family structure.
Method: This is a five-years follow-up study of the genetic section of the PrISMA (Progetto Italiano Salute Mentale Adolescenti) project. The final study population included 287 subjects aged 15–19. To test for moderated mediation, we performed a path analysis using Mplus 6.11 (Muthén and Muthèn 1998–2010) and the bootstrapping procedure described by Preacher et al. (2007) to test conditional indirect effects.
Results: Family structure at time1 influenced DESR at time1 (B = 9.176, $p = .002$), this effect was moderated by TPH2 (B = −9.200, $p = .002$). DESR at time 1 influenced positively DESR at time 2 (B = .079, $p = .000$). Nonetheless, this effect was not moderated by TPH2 (B = −.008, $p = .651$). The indirect effect of family structure on DESR at time 2 was significant (95 % CI .249–1.218) only among participants with a GG TPH2's polymorphism. For adolescents with a GT-TT TPH2's polymorphism there were no indirect effect of family structure at time 1 on DESR at time 2.

Conclusion: In conclusion adolescents with a GG TPH2's polymorphism and with only one parent scored higher in DESR at time 2 than did participants with two parents. This effect is mediated through levels of DESR at time 1.

P-14-002 Association study of latrophilin 3 gene with attention-deficit hyperactivity disorder in Brazilian children and adolescents

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Objective: Recent findings associate latrophilin 3 (LPHN3) to ADHD pathogenesis. Our aim was to investigate the possible influence of six LPHN3 SNPs (rs10434219, rs6551665, rs1947275, rs6813183, rs1355368, rs734644) in ADHD susceptibility in Brazilian children and adolescents.
Method: The sample consisted on 516 trios with ADHD probands recruited at the ADHD Outpatient Clinics from Hospital de Clínicas de Porto Alegre. The polymorphisms were genotyped by allelic discrimination with Taqman 5′-nuclease assays according to the manufacturer's recommended protocol. LPHN3 possible effects on ADHD susceptibility were investigated using a family-based approach.
Results: Family-based analysis did not reveal significant association between ADHD and LPHN3 SNPs rs10434219, rs6551665, rs1947275, rs6813183, rs1355368 (p value ranging from 0.205 to 0.898).
Conclusion: Our preliminary results are not in agreement with previous findings. However, it is not possible to exclude a role for LPHN3 in ADHD susceptibility. More SNPs are being genotyped and haplotype analysis will be performed, as well as analysis with quantitative data. Possible effects of this gene on methylphenidate pharmacogenetics will also be investigated.

P-14-003 Interactions of MAOA, SYP and family environment in Attention Deficit Hyperactivity Disorder comorbid with oppositional defiant disorder in Chinese Han boys

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Objective: As candidate genes of ADHD, MAOA and SYP are both on the X chromosome, which have been suggested to be associated with aggressiveness and impulsive violence. The present study is to investigate the potential gene–gene interaction (G × G) and gene-environment interaction (G × E) among these two genes and family environment for ADHD comorbid with ODD (ADHD + ODD) in Chinese Han boys.
Method: The diagnosis of ADHD and its comorbidities were ascertained on the base of the diagnostic criteria of DSM-IV. For the family-based association study, 394 male ADHD + ODD trios were included. For the case–control study, 607 male ADHD + ODD probands and 493 male normal controls were recruited. Family environment scale-Chinese version (FES-CV) was used to evaluate the family environment. All SNPs were genotyped through TaqManTM real-time PCR genotyping technique. Pedigree-based generalized multifactor dimensionality reduction (PGMDR) was used to explore the interactions among 5 SNPs of MAOA and 3 SNPs of SYP for family-based association study and logistic regression for G × E for case–control study.
Results: In male ADHD + ODD trios, a two factors model consisted of the SNP rs3788862 of MAOA and the SNP rs3817678 of SYP achieved statistical significance ($P < 0.001$, CV Consistency = 9/10, Testing Balanced Accuracy = 78.39 %). G × E revealed that expressiveness, organization and conflicts of FES-CV increased the risk of ADHD comorbid with ODD in the presence of A allele of rs3788862 (OR = 0.684, 95 % CI [0.487–0.961]; OR = 0.61, 95 % CI [0.427–0.873]; OR = 2.056, 95 % CI [1.577–2.680]).
Conclusion: The interaction of MAOA and SYP may be involved in the genetic mechanism of ADHD comorbid with ODD. The adverse family environments might increase the risk of ADHD comorbid with ODD in the presence of risk allele.

P-14-004 Acetylcholine-metabolizing butyrylcholinesterase (BCHE) copy number and polymorphisms and their role in Adult Attention Deficit Hyperactivity Disorder

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Objective: A previous genome-wide screen for copy number variations (CNVs) in attention-deficit/hyperactivity disorder (ADHD) revealed a de novo chromosome 3q26.1 deletion in one of the patients. Candidate genes at this locus include the acetylcholine-metabolizing butyrylcholinesterase (BCHE) expressing gene (OMIM #177400).
Method: The present study investigates the hypothesis that the heterozygous deletion of the BCHE gene is associated with adult ADHD (aADHD). First we screened 348 aADHD patients and 352 controls for stretches of loss of heterozygosity (LOH) across the entire BCHE gene. Our second aim was to clarify whether BCHE single nucleotide polymorphisms (SNPs) influence the risk towards ADHD.
Results: 96 individuals displayed entirely homozygous genotype reads in all 12 examined SNPs, making them possible candidates to harbour a heterozygous BCHE deletion. DNA from these 96 probands was further analyzed by real-time PCR. However, no deletion was found. Of the 12 SNPs, rs4680612 and rs829508 were significantly associated with aADHD ($p = 0.018$ and $p = 0.039$, respectively). The risk variant rs4680612 is located in the transcriptional control region of the gene and predicted to disrupt a binding site for MYT-1, which has previously been associated with mental disorders. By looking up the deletion in three genome-wide screens for CNV in ADHD and combining it with the present study, it became apparent that 3 from a total of 1,030 ADHD patients, but none of 5,787 controls, featured a deletion of the BCHE promoter region including rs4680612 ($p = 0.00004$).
Conclusion: There are several lines of evidence suggesting an involvement of BCHE in the etiopathology of ADHD, as a rare hemizygous deletion as well as a common SNP in the same region are associated with disease. Both variations result in the disruption of the binding site of the transcription factor MYT-1 suggesting an epistatic effect of BCHE and MYT-1 in the pathogenesis of ADHD.

P-14-005 Association of norepinephrine transporter genotype (NET1) with externalizing behaviour problems: Findings from a longitudinal study from birth to 15 years of age

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Objective: Research into ADHD suggests a prominent role of the noradrenergic system, with the norepinephrine transporter (NET)

playing a key role. The aim of this study was to examine the association of NET1 polymorphisms with childhood ADHD, externalizing behavior problems and neurocognitive performance.
Method: Data were available from the Mannheim Study of Children at Risk, an ongoing epidemiological cohort study of the long-term outcome of early risk factors followed since birth. 327 participants (155 males, 172 females) were assessed for ADHD diagnosis and behavior problems from childhood to adolescence (CBCL, YSR). At age 15 years, participants performed a computerized A–X version of the continuous performance test (CPT) and were genotyped for two single nucleotide polymorphisms (SNPs rs3785157, rs2836840) of NET1 (SLC6A2). To examine the effect of NET1 genotypes on ADHD lifetime diagnosis, externalizing behavior problems and CPT performance, logistic regression analyses and analyses of covariance, respectively, were conducted. Post hoc tests were conducted where appropriate.
Results: Higher rates of ADHD were observed in homozygous carriers of the minor T allele of rs3785157 and lower rates of ADHD in carriers of the minor A allele of rs2836840 ($p = .020$ and $p = .035$, respectively). Moreover, carriers of the TT genotype of rs3785157 revealed the highest CBCL externalizing scores, while carriers of the CC genotype reported fewer YSR attention problems than those with the TC genotype. The lowest rates of omission errors were committed by adolescents carrying the heterozygous TC genotype, with this group exhibiting higher sensitivity than CC individuals.
Conclusion: Results obtained in the present study provide further evidence for the association of NET1 polymorphisms with ADHD, externalizing behavior problems and neurocognitive performance. Further investigations are needed to clarify the specific role of the norepinephrine transporter genotype in childhood externalizing problems and to elucidate the finding of a heterozygous effect.

P-14-006 A gene × gene interaction between COMT and DBH is associated with auditory attention deficit in boys with ADHD

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* Pusan, Republic of Korea

Objective: Genetic polymorphisms of biogenic amine metabolizing enzyme such as dopamine-beta-hydroxylase (DBH) and catechol-O-methyl transferase (COMT) have been reported to be associated with attention-deficit/hyperactivity disorder. In the present study, interaction of COMT and DBH were investigated for attention system in ADHD children.
Method: 66 ADHD boys (8.3 ± 2.0 years) were assessed with K-SASD-PL. Neuropsychological assessment was performed with continuous performance test. COMT rs4680 and DBH rs1611115 were genotyped.
Results: With respect to neuropsychological performance, main effect of COMT polymorphism was found with response time variability of auditory attention task ($p = 0.005$) Significant interaction effect was found of COMT and DBH polymorphism on response time and time variability of auditory attention performance ($p = 0.007$, $p = 0.002$, respectively).
Conclusion: Our findings provide preliminary evidence for the effect of COMT and DBH gene–gene interaction on attention system in boys of ADHD. Although these findings need future replications, our study may contribute to understanding of the genetic basis of ADHD.

P-14-007 The monoamine oxidase A gene promoter polymorphism, stressful life events, and impulsivity: Gene-environment interaction

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Objective: Low-activity alleles of the monoamine oxidase A gene (MAOA) VNTR are related to antisocial traits in subjects who have experienced maltreatment (Taylor and Kim-Cohen 2007. Dev Psychopathol 19:1029–1037). We have examined the effect of the MAOA VNTR and stressful life events on impulsivity and aggressiveness in a population representative sample.
Method: Data of the younger cohort of the longitudinal Estonian Children Personality Behaviour and Health Study were used (Harro et al. 2001. Prog. Neuro-Psychopharmacol. Biol. Psych. 25:1497–1511). Data were collected during the follow-ups in 2004 and 2007 when the subjects were 15 and 18 years old, respectively. Aggressive behaviour was reported by class teachers. Different facets of impulsivity were self-reported by using the Adaptive and Maladaptive Impulsivity Scale (Eensoo et al. 2007. J Adolesc Health 40:311–317). History of stressful life events was self-reported.
Results: MAOA VNTR polymorphism had no main effect on impulsivity or aggressiveness at age 15 or 18. The interaction effect of MAOA genotype and the number of negative life experiences on the scores of maladaptive impulsivity such as Disinhibition: ($F(3,242) = 4.75$, $p = 0.03$) and Thoughtlessness ($F(3,243) = 3.66$, $p = 0.05$) were found in 18 years old adolescents. Higher exposure to stressful life events was associated with increased score of Disinhibition and Thoughtlessness in adolescents with low MAOA activity alleles, while the number of life events had no effect on impulsiveness of high MAOA subjects. No interaction effect of stressful life events and MAOA genotype on adaptive aspects of impulsivity such as Excitement seeking and Fast decision making was observed. Also, low MAOA subjects with high number of stressful life events had significantly higher aggressiveness $F(3,122) = 4.41$, $p = 0.03$).
Conclusion: In a population representative sample of adolescents, MAOA VNTR genotype has expected interaction effects with environment on aggressiveness and maladaptive impulsivity.

P-14-008 Norepinephrine genes predict response time variability and methylphenidate-induced changes in neuropsychological function in Attention Deficit/Hyperactivity Disorder

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* Seoul, Republic of Korea

Objective: In order to determine if dysregulation of noradrenergic signaling confers risk to ADHD we examined the relationship between polymorphisms in the alpha-2A-adrenergic receptor (ADRA2A) and norepinephrine transporter (SLC6A2) genes and attentional performance in ADHD children pre- and post-pharmacological treatment.
Method: One hundred and two medication naïve ADHD children were administered MPH-OROS for 12 weeks and undertook a computerized comprehensive attention test (CAT) before and after medication. The CAT assesses visual/auditory selective attention, sustained attention and interference control and, allows response time variability.

Results: Increasing possession of an A allele at the G1287A polymorphism of SLC6A2 was significantly related to heightened response time variability at baseline in the sustained and auditory selective attention tasks. In addition, response time variability at baseline increased additively with possession of the A allele at the DraI polymorphism of the ADRA2A gene in the auditory selective attention task. After medication, increasing possession of a G allele at the MspI polymorphism of the ADRA2A gene was associated with increased MPH-related change in response time variability in the flanker task.
Conclusion: Allelic variations in the G1287A polymorphism of SLC6A2 and the DraI polymorphism of ADRA2A were associated with response time variability in medication naïve children with ADHD. Furthermore, medication-related changes in response time variability were strongly predicted by allelic variation in the MspI polymorphism of ADRA2A. Our results add to a growing body of evidence suggesting that response time variability is a viable endophenotype for ADHD and further suggest its utility as a surrogate endpoint for measuring stimulant response in pharmacogenetic studies.

P-14-009 Working memory and plasma brain-derived neurotrophic factor (BDNF) correlate with BDNF val66met in children with Attention Deficit Hyperactivity Disorder (ADHD) in Chinese Han subjects

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Objective: To investigate the association between a functional polymorphism val66met of BDNF and plasma BDNF level, working memory of ADHD in Chinese Han Subjects.
Method: A total of 2,364 medication-naive ADHD children, including 1,590 ADHD trios, and 1,013 normal controls were enrolled. All subjects completed the digit span test evaluating the working memory, and the SNP val66met of BDNF were genotyped using TaqManTM real-time PCR assays (ABI, USA). The plasma BDNF levels were measured using ELISA kits (Promega, USA) for 171 ADHD and 163 normal controls. Both family-based association test and case–control association study were conducted to investigate the association of val66met with ADHD using Haploview. We used analysis of covariance (ANCOVA), with gender and age as covariates, to compare plasma BDNF levels of ADHD and those of normal controls, and explore the association of val66met with working memory and plasma BDNF level of ADHD subjects.
Results: The Val allele was found over-transmitted in female pure ADHD trios (n = 83, $P = 0.029$), and showed higher frequency in female pure ADHD (n = 120) than controls ($P = 0.023$). ANCOVA showed that the mean plasma BDNF levels of ADHD were significantly higher than controls ($P = 0.001$). Additional gender-specific analysis showed similar results for males ($P = 0.003$) and females ($P = 0.076$). In female ADHD (n = 84), Met/Met genotype carriers had a tendency of higher plasma BDNF levels than Val allele carriers ($P = 0.071$). In addition, Met/Met genotype carriers (n = 384) performed worse working memory than Val allele carriers ($P = 0.047$).
Conclusion: Our results suggested that BDNF was associated with pure female ADHD with Val allele as the risk factor. There is an increase of plasma BDNF levels in medication-naive ADHD patients and Met allele of BDNF was associated with worse working memory impairment and increased plasma BDNF levels in female ADHD. However, further studies are required to elucidate the role of BDNF in ADHD.

Friday, 7 June 2013, 15.00–16.00

P-15 Genetics II

P-15-001 Association of dopaminergic gene variants with traits of ADHD: A study on Indian probands

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Objective: Dopamine (DA), the major neurotransmitter, is essential for attention, cognition and several other physiological activities which are mostly impaired in Attention Deficit Hyperactivity Disorder (ADHD) subjects. A number of investigators throughout the world have shown association of different dopaminergic genes, mainly receptors and transporters, with ADHD. The present study was designed to explore association of cognitive deficit and hyperactivity, two common traits of ADHD probands, with variants in the DA receptor 2 (DRD2), receptor 4 (DRD4) and transporter (DAT1) genes.
Method: ADHD probands (N = 128) and ethnically matched controls (N = 120) were recruited following the Diagnostic and Statistical Manual for Mental Disorders-IV. Conners parents/teachers rating scale was used to measure cognitive deficit and hyperactivity. Peripheral blood collected was used for isolation of genomic DNA after obtaining informed written consent. To analyze functionally significant gene variants in the DRD2 (rs6278 and rs1799732), DRD4 (rs1800955 and Ex 3 VNTR) and DAT1 (VNTR in the 3' UTR and INT 8) PCR-based analytic methods were performed. Data obtained was analyzed by UNPHASED for population-based studies. Multiple dimensionality reduction (MDR) software was used to find out association between genotypes and cognitive/hyperactivity traits.
Results: Both DRD4 and DAT1 sites exhibited statistically significant difference in allelic frequencies in ADHD cases as compared to controls ($P < 0.05$). DRD2, DRD4 and DAT1 sites also showed independent as well as interactive effects by MDR. Independent significant effect of cognitive/hyperactivity traits was also noticed.
Conclusion: We may infer from the present investigation that the studied gene variants have potential effect on the disorder. The studied sites may also affect cognitive/hyperactive traits.

P-15-002 Neurodevelopmental disorders in children: Clinical, genetic polymorphism and differential diagnosis

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Objective: Pervasive Developmental Disorders (PDD), Attention Deficit Hyperactivity Disorder (ADHD), Language Development Delay (LDD), Intellectual Retardation (IR) are among the neurodevelopmental disorders that affect the areas of social skills, behavior and communication. The main of this study is to identify variants of clinical and genetic polymorphism of these disorders.
Method: We evaluated a sample of 400 children 3–7 years old with polymorphic neurodevelopmental symptoms (22.1 % with Autism Disorders; 13.3 %—ASD, 64.6 %—LDD). For diagnostic screening we used ADI-R and ADHD-RS, for the psychiatric assessment—Family Questionnaire (FQ) and Semi-Structured Clinical Examination Form (SCEF) (were developed in our clinic), PEP-R, Ritw-Freeman and Vineland II Scales. Genotyping

of DNA samples was held by deCODE Genetics within the framework of the International Project Copy Number Variations Conferring Risk of of psychiatric disorders in children (This project is supported through Coordination Theme 1 (Health) of the European Community, Grant agreement number HEALTH-2007-2.2.1-10-223423).

Results: Clinical polymorphism of children, which we attributed to the different groups, based on an assessment with the help of Semi-Structured Clinical Examination Form (SCEF), is presented (Table 1). Using factor analysis were identified three factors: (1) Autism spectrum, (2) Disruptive behaviors spectrum, (3) Inattention and speech development problems spectrum, which defining the variety of clinical manifestations in randomized children. From the presented data can be seen that the symptoms attributed to various factors are overlapping (Table 2). We also found that there is a significant correlation between ADI-R and ADHD RS scores; ADI-R and Hyperactivity ADHD-RS scores. There is no significant correlation between ADI-R and Inattentive ADHD RS scores. Different variants of gene polymorphisms were described.

Conclusion: Clinical polymorphism of the neurodevelopmental symptoms are associated with to the genetic polymorphism a genes mutation of 13q31, 6p22, 4q1, 16p13 and other types of genetic variation, some CNVs.

P-15-003 Association of monoamine oxidase A gene variants with behavioural co-morbidities: Scenario in Indian ADHD probands

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Objective: Attention Deficit Hyperactivity Disorder (ADHD) is frequently associated with co-morbid conditions. Among others, conduct disorder (CD) and oppositional defiant disorder (ODD) have a higher prevalence in ADHD children throughout the world. These traits are thought to be controlled by neurotransmitters like serotonin and norepinephrine. Monoamine oxidase A (MAOA), a mitochondrial enzyme involved in the degradation of these amines, has been reported to be associated with aggression, impulsivity, depression, and mood changes. We hypothesized that MAOA can have a potential role in ADHD associated CD/ODD and analyzed MAOA gene variants in a group of Indo-Caucasoid subjects.

Method: ADHD probands (N = 150) and ethnically matched controls (N = 130) were recruited following the Diagnostic and

Table 1. Semi-Structured Clinical Examination Form (SCEF) item distributions of patients in each diagnosis group

Semi-structured clinical examination form (SCEF) items	Presence of the symptoms (percentages)			Overall significance (p value, source of significance)
	PDD-NOS	Autism	LDD with symptoms of ASD and ADHD	
Poor social interaction	53.2	87.8	6.4	<.001 ($p_{1/2}$; $p_{1/3}$; $p_{2/3}$)
Hyperactivity	55.8	81.4	28.7	<.001 ($p_{1/2}$; $p_{1/3}$)
Not speaking/language retardation	59.6	27.9	85.6	<.001 ($p_{1/2}$; $p_{1/3}$; $p_{2/3}$)
Aggressiveness	33.0	46.8	35.6	N.S.
Stubbornness	31.9	46.8	28.7	N.S.
Inattentiveness	66.0	91.5	30.9	<.001 ($p_{1/2}$; $p_{1/3}$; $p_{2/3}$)
Obsessions	29.8	27.7	14.9	N.S.
Not responsive to social stimuli	40.4	95.7	25.5	<.001 ($p_{1/2}$; $p_{2/3}$)
Stereotypes	24.5	59.6	6.4	<.001 ($p_{1/2}$; $p_{1/3}$; $p_{2/3}$)
Impatience and/or impulsiveness	77.6	47.8	25.6	<.001 ($p_{1/2}$; $p_{1/3}$; $p_{2/3}$)
Fastidiousness, choosiness	21.3	18.7	15.4	N.S.
Echolalia	20.8	17.6	19.3	N.S.
Highly interested in television	19.8	45.9	15.0	<.001 ($p_{1/2}$; $p_{2/3}$)
Conduct problems	40.9	38.7	15.6	<.001 ($p_{1/2}$; $p_{2/3}$)
Articulation and/or prosody problems	18.1	15.3	37.8	<.001 ($p_{1/2}$; $p_{2/3}$)
Lack of eye contact	14.9	59.6	5.2	<.001 ($p_{1/2}$; $p_{1/3;}$ $p_{2/3}$)
Multiple fears	13.9	7.4	15.9	N.S.
Sleep problems	14.6	9.9	18.6	N.S.
Tactile oversensitivity	20.3	25.5	28.4	N.S.
Confusing pronouns	10.5	14.9	32.4	<.001 ($p_{1/3}$; $p_{2/3}$)
Shyness	10.6	5.8	12.9	N.S.
Emotional lability	10.3	13.9	28.4	<.001 ($p_{1/3}$; $p_{2/3}$)
Tics	5.3	4.8	10.6	<.001 ($p_{1/3}$; $p_{2/3}$)
Poor appetite	22.6	26.3	17.4	N.S.
Inappropriate laughing	14.3	15.7	12.1	N.S.
Persistence with sameness	12.1	22.5	6.4	<.001 ($p_{1/2}$; $p_{1/3;}$ $p_{2/3}$)
Frequent startles	11.1	10.6	8.5	N.S.

Statistical Manual for Mental Disorders-IV criteria. Conduct problem and ODD was measured using appropriate scales. Peripheral blood was collected from study participants after obtaining informed written consent and genomic DNA was isolated. Twenty-two sites distributed over the MAOA gene were genotyped by PCR-based methods. Population-based analysis of data for individual markers and haplotypes were performed by the COCAPHASE program.
Results: Out of the twenty-two sites genotyped, only six were found to be polymorphic in the studied ethnic group. rs6323 "T" allele showed significantly lower frequency in ADHD probands as compared to control ($P = 0.018$). Genotypic analysis showed significant difference for rs6323 ($P = 0.04$), rs5906883 ($P = 0.009$) and U-VNTR ($P = 0.018$). rs6323 also showed significant difference in ADHD + CD. Haplotype analysis revealed statistically significant difference ($P < 0.02$, Odds ratio > 3) for five haplotypes in ADHD cases. Statistically significant difference was also noticed for these haplotypes in ADHD + CD and ADHD + ODD ($P < 0.01$, Odds ratio > 7).
Conclusion: We interpret from the result obtained that the MAOA gene variants may contribute to the etiology of ADHD as well as its associated co-morbidities like CD and ODD in this particular ethnic group.

P-15-004 Genetic variation in nicotinic acetylcholine receptors genes is associated with tobacco smoking susceptibility in patients with ADHD

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Objective: Candidate genes studies and GWAS have supported a role of nicotinic acetylcholine receptors genes in nicotine dependence. The aim of the present study is to investigate whether polymorphisms on CHRNA5-CHRNA3-CHRNB4 gene cluster may modulate tobacco smoking susceptibility among patients with ADHD.
Method: The sample comprises 491 Brazilians of European descent (209 smokers and 282 non-smokers) evaluated in the adult ADHD outpatient clinic of Hospital de Clínicas de Porto Alegre. The diagnosis of ADHD followed the DSM-IV criteria. The criterion for smoking was current or past daily use of tobacco for at least one month. Eight polymorphisms at CHRNA5-CHRNA3-CHRNB4 gene cluster (rs588765, rs16969968, rs514743, rs578776, rs1051730, rs3743078, rs8023462 and rs11634351) were analyzed. These SNPs were genotyped using the Taqman assay for allelic discrimination (Applied Biosystems). Using PLINK, we tested the association of the polymorphisms individually and in haplotypes with smoking by logistic regression. Gender and age were used as covariates.
Results: Our findings show five polymorphisms associated with tobacco smoking, the minor alleles of rs578776 and rs3743078 are risk factors and the minor alleles of rs588765, rs514743, rs11634351 are protective factors. Although only the SNPs rs578776 and rs3743078 remain significant after correction for multiple testing ($p = 0.008$ and $p = 0.001$ respectively). The haplotype analyzes identified the CGATGGTG haplotype conferring risk (OR = 1.8; $p < 0.001$) and the TGTCGCCG haplotype protection (OR = 0.66; $p < 0.001$) for smoking.
Conclusion: These results confirm, in patients with ADHD, the previous evidence for association between polymorphisms on CHRNA5-CHRNA3-CHRNB4 gene cluster and nicotine dependence. However, the variants which appear as risk factors in both analyzes for smoking in patients with ADHD, have previously been shown to be protective factors in general population. It might be hypothesized that different genetic mechanisms could be related to nicotine dependence in the general population or in a higher risk group such as patients with ADHD.

P-15-005 Contribution of folate system genes in Attention Deficit Hyperactivity Disorder

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Objective: Nutrients play a vital role in early morphogenesis as well as neuronal development. A study on hyperexcitable children showed low intra-erythrocytic magnesium (ERC-Mg) levels with normal serum magnesium values that was restored by magnesium/vitamin B6 supplementation, thus improving the children's abnormal behavior. In humans, adequate turnover of the folate cycle is necessary for maintenance of methylation, thus enabling proper gene expression and chromosome structure maintenance, steps critical for the developing embryo. Investigations including our own have shown that certain genetic variants, important in the folate metabolic pathway, can confer risk towards genetic disorders. However, the folate metabolic pathway has never been studied in detail in neurodevelopmentally challenged children. We hypothesized that hyperactivity in Attention Deficit Hyperactivity Disorder (ADHD) children could be contributed to some extent by abnormalities in the folate metabolic system.
Method: One of the easiest ways to look into function of a given protein is by evaluating functional genetic polymorphisms (fSNP).In the present study fSNPs in important candidates of the folate metabolic pathway, Methyl tetrahydrofolate dehydrogenase (MTHFD), Reduced folate carrier (RFC1), Methyl tetrahydrofolate reductase (MTHFR), were explored in ADHD (N = 125) and control (N = 125) children recruited following DSM-IV. Peripheral blood was collected after obtaining informed written consent. Genomic DNA isolated was subjected to PCR-based analysis of target sites. Data obtained was analyzed by COCAPHASE to find out association of gene variants with ADHD. Interaction between genes was analyzed by Multi Dimensionality Reduction software.
Results: Significant difference in genotypic frequencies ($P = 0.01$) was noticed for RFC1 rs1051266 in ADHD probands as compared to controls. While MTHFD and RFC1 showed strong independent effects, no interaction was noticed between the sites.
Conclusion: Data indicate potential role of RFC1 and MTHFD in ADHD which warrants further investigation in genomic as well as proteomic level.

P-15-006 Association study of CDH13 and CTNNA2 genes with Attention Deficit Hyperactivity Disorder in Brazilian children and adolescents

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Objective: Neurodevelopmental genes emerged as candidate genes from genome-wide association studies and replication studies are needed. The aim of this study was to test the association among Cadherin 13 (CDH13) and Catenin alpha 2 (CTNNA2) genes and attention-deficit hyperactivity disorder (ADHD) in a Brazilian sample of children and adolescents.

Method: Five hundred and sixteen trios with DSM-IV ADHD probands assessed at the ADHD Outpatient Clinics from Hospital de Clínicas de Porto Alegre were investigated. Two SNPs at CDH13 (rs6565113, rs11646411) and one SNP at CTNNA2 gene (rs13395022) were analyzed. These SNPs were genotyped by allelic discrimination with Taqman 5′-nuclease assays according to the manufacturer's recommended protocol. Quantitative analyses using Swanson, Nolan and Pelham Scale-version IV (SNAP-IV) scores as dependent variables and categorical family-based analyses were performed.
Results: Quantitative analysis did not detect significant differences in the SNAP-IV scores between the genotype groups. The family-based analyses did not show an over transmission of any allele to ADHD probands. However, CDH13 rs6565113 genotypes showed a significant decrease in IQ scores with increasing dosage of the T allele ($F = 4.707$; $p = 0.009$). Moreover, an association between the presence of conduct disorder in ADHD children and CDH13 rs11646411 genotypes was also detected (Chi square = 6.67; $p = 0.009$).
Conclusion: The findings from genome-wide approaches indicate a whole range of new and promising possibilities for ADHD molecular genetic studies and genes related to neurodevelopmental systems are suggested, such as CDH13 and CTNNA2. Our preliminary results did not show a significant association between those polymorphisms and ADHD susceptibility in the total sample. However, interesting results were observed between CDH13 SNPs, IQ and comorbidity. These results will be further explored in an independent sample from the same population in order to validate the present findings.

P-15-007 Single trial P3b parameters are associated with COMT rs4680 genotype

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Objective: Intra-subject variability in reaction times (ISV) is a promising endophenotype for a number of psychiatric conditions, most notably ADHD. However, its neural underpinnings are not yet established. Converging evidence from neuroimaging, molecular genetics, psychopharmacology, and computational neuroscience suggest that ISV could index catecholaminergic functioning. Electroencephalography is a useful approach for investigating ISV; however, standard average event-related potential (ERP) methods are not suitable because in averaging across trials, they destroy the trial-to-trial variability which is the neural analogue of ISV. Single trial methods, in contrast, offer a useful window onto trial-to-trial dynamics in electrocortical activity.
Method: Sixty-five channel direct-current electroencephalographic data from 13 Met/Met, 12 Val/Val, and 34 Val/Met healthy young adult carriers, performing 0-back, 1-back, and 2-back working memory tasks, were analysed using a recently developed method of infomax-denoised single trial analysis of the P3b component. Parameters measuring central tendency and variability of latency and amplitude were analysed using linear mixed effects models.
Results: Participants with Met/Met genotype showed less accurate, slower, and more intra-individually variable performance on the tasks, and lower amplitude and greater latency jitter in their single trial P3bs than Val/Val carriers. This was reflected by significant genetic effects in the mixed models.
Conclusion: These data shed light on the neural mechanisms of ISV, and suggest that single trial ERP methods are an important new approach in molecular genetics research. Considering our results in the light of the existing literature, it appears likely that COMT effects are highly pleiotropic across tasks, and that the association of COMT genotype with performance may be more complicated than previously believed. Such findings are relevant for understanding the interplay between ISV as an putative ADHD endophenotype, and its hypothesised dopaminergic neural underpinnings.

P-15-008 Clinical and cognitive differences in ADHD probands and adolescents siblings

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Objective: To determine the clinical and cognitive differences in adolescents probands with ADHD and their adolescents siblings.
Method: The study sample was obtained from 4 outpatient centers and was composed of 31 probands with ADHD and 31 adolescents siblings. The subjects were evaluated by clinicians with at least 5 years of experience and the diagnostic determination was made by clinical consensus with at least one expert with 15 years of clinical experience. The following instruments were applied by the clinicians, to parents or to the adolescents: a clinical interview based on DSM IV, Attention Deficit Hyperactivity Disorder Rating Scale (ADHD RS) IV, Behavior Rating Inventory of Executive Function (BRIEF) parent version, Strengths and Difficulties Questionnaire (SDQ) parent version and a sociodemographic and clinical data questionnaire.
Results: 63.6 % of Males (n = 21) were probands and 65.5 % of females (n = 19) were adolescent siblings (OR = 1.76, 95 % CI 1.25–2.9). 48.5 % (n = 15) of siblings had ADHD. 64.5 % of probands (n = 20) had ADHD combined subtype whereas 32.5 % (n = 10) of siblings had combined subtype (OR = 2.01 95 % CI 1.12–3.54). Parents report that probands versus siblings showed a poorer executive performance in all eight scales and two global indices of BRIEF (Behavioral regulation index, score T = 78.8571 vs. 56.2759, U = 48.5 $p = 0.0001$; Metacognitive Index, score T = 73.3868 vs. 53.6207, U = 39.5, $p = 0.0001$; probands vs. siblings respectively).
Conclusion: Considering the high heredability of ADHD, the clinical evaluation and study of probands′ siblings with ADHD is important to promote early detection and prognosis of these high-risk siblings, besides determining clinical differences that may help to create an index to predict the clinical outcome in subjects at high risk.

P-15-009 is ADHD restrictive subtype, which is specified by DSM-V a valid diagnosis? Holistic assessment with executive functions, genetic and multimodal brain imaging methods

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Objective: The aim of this study was to identify differences between ADHD subtypes and healthy controls using three different imaging techniques combined with genotyping scores of DAT-1 and DRD4 as well as neuropsychological performance based on a computerized test battery (CNC-VS). The three major contributions of this study to the field of ADHD are: (1) combining genetic, neuropsychological and imaging findings, (2) combining findings of DTI, fMRI, and ASL, (3) comparing DSM-V proposed ADHD Rest. subtype with other

subtypes and controls in terms of genetic, neuropsychological and imaging aspects.
Method: The study sample consisted of 201 ADHD patients (101 Comb., 50 PIA and 50 Rest.) and 100 controls, aged 8-15 years. The subjects meeting any psychiatric diagnosis in the K-SADS (except ODD) interview were excluded from the study. CBCL, TRF, ADHD-RS-IV were completed by the parents and teachers of the subjects. "Best estimate procedure" was used to determine final diagnoses. We planned to group the patients according to the presence of risk alleles at DRD4 (7-repeat allele) and DAT1 loci (homozygosity for the 10-repeat allele). 24 cases from each group (ADHD Comb, PIA, Rest., and Control) were asked to take part in the imaging study based on their genotyping scores. A total of 96 patients participated in the study.
Results: Our results revealed that Rest. subtypes had worse performance on psychomotor speed and reaction time. Weals found significantly more DRD4 7-repeat allele carriers in Rest. subtypes. Occipital activation difference was found in the Rest. group based on the fMRI and ASL examinations, and it was also partially supported by DTI results.
Conclusion: In conclusion, according to our results, one can claim that isolated attentional problems, which are represented as ADHD Rest. in the DSM V criteria, are related to occipital difference, leading to psychomotor speed and reaction time problems.

Friday, 7 June 2013, 15.00–16.00

P-16 Electrophysiology

P-16-001 Event related potentials in methylphenidate responder children with Attention Deficit Hyperactivity Disorder

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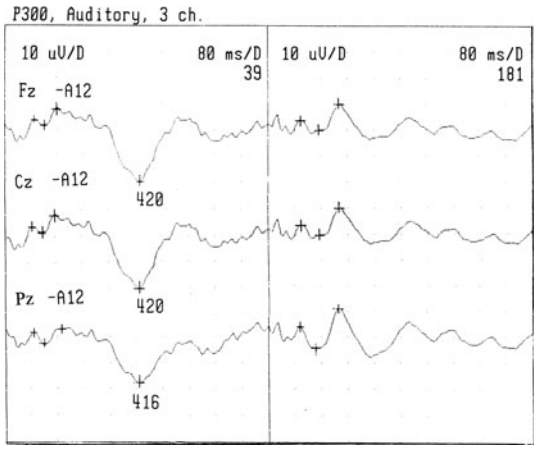
Objective: This study was designed to investigate event related potentials in a sample of methylphenidate responders (MPH) attention deficit hyperactivity disorder children.
Method: A case control design included 25 children with ADHD combined type according to DSM-IV criteria and diagnosis was confirmed by structured interview (Mini-Kid). The patients were MPH responders and their response were monitored clinically and by Conners' parent rating scale-revised (CPRS-R). Control group consisted of 25 normal children matched with patients for age and sex. Assessment of event related potentials was done to patients group twice, once after stoppage of MPH by at least 18–24 h and the other time 1 h after receiving the dose of MPH. Significant difference in P3 latency and amplitude in patients without MPH (with delayed latency and smaller amplitude) in comparison to control group .
Results: These changes showed also highly significant improvement with MPH, as shown by earlier latencies and larger amplitudes in P3 in comparison to state without medication. Other waves of ERPs (N1,P2,N2) showed no significant differences.
Conclusion: There is a dysfunction in the information processing in patients with ADHD which could be related to the structures involved in both the generation of auditory P3 and the pathophysiology of ADHD and improvement of this dysfunction with MPH. So, ERPs could be a useful tool in assessment of patients with ADHD pre and post medication for objective follow up.

Event related potentials of ADHD patient without MPH (Ritalin) showed delayed P3 latency



P-16-002 Different age effects on theta/beta ratio according to Attention Deficit Hyperactivity Disorder subtype

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Objective: Studies in resting electroencephalographic (EEG) activity commonly show an elevated theta/beta ratio (TBR) in individuals with ADHD compared to typically developing individuals, which is most pronounced in ADHD combined compared to inattentive subtype. Since EEG activity has been found to follow a developmental course, in this study, TBR was evaluated in children and adults with and without ADHD to investigate a maturational lag that has been hypothesized to underlie ADHD.
Method: One hundred twenty eight channel EEG was recorded in 64 children (30 without ADHD, 34 with ADHD) and 51 adults (25 without ADHD, 26 with ADHD) during a 3 min eyes closed resting condition. TBR was calculated at Fz, Cz and Pz by dividing the power of the theta band by the power of the beta band. Repeated measures analyses of variance were used to compare TBR in individuals with ADHD (inattentive and combined subtype) and typically developing individuals throughout the lifespan.
Results: TBR was found to decrease with maturation in both the control and ADHD group. Whereas TBR did not differ between children with and without ADHD, a significant group effect appeared for adults, indicating an increased TBR in adults with ADHD inattentive subtype compared to controls and adults with ADHD combined subtype.
Conclusion: Our finding of an elevated TBR in adults with ADHD inattentive subtype is not in line with reports of more prominent discrepancies in ADHD combined subtype. Given a general developmental decrease in TBR across individuals with and without ADHD and increasing differences between ADHD inattentive subtype and controls as well as individuals with ADHD combined subtype with maturation, a maturational delay in ADHD seems questionable. A developmental deviance may be a better explanation for our results regarding ADHD inattentive subtype.

P-16-003 Testing between competing models of reinforcement deficit in ADHD using the electrophysiological-Monetary Incentive Delay (e-MID) task: Deficient motivation versus hyposensitivity to incentives

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Objective: There are a number of competing hypotheses regarding altered reinforcement processing in the pathophysiology of Attention-Deficit/Hyperactivity Disorder (ADHD; Sonuga-Barke 2011). The motivation dysfunction hypothesis postulates that generalised deficits in information processing are corrected by the reinforcing effects of rewards and punishments. A second model has implicated hypo-sensitivity to incentives whereby they fail to improve performance because of cue or outcome-related deficits in reinforcement processing. This study aimed to test between these competing models.
Method: Twenty-five healthy children and 25 children with ADHD aged 10–15 years performed a new electrophysiological version of the Monetary-Incentive-Delay task (Broyd et al. 2012) which allows the decomposition of the underlying reinforcement-related neural processes including anticipation, target and feedback processing. Event-Related-Potential (ERP) components associated to cue, target and feedback stimuli were examined for group differences.
Results: Relative to controls children with ADHD displayed an attenuated Contingent Negative Variation (CNV) following neutral cues which was normalised on incentivised trials (i.e., monetary gain and loss). In addition, relative to healthy controls, children with ADHD showed larger target P3 amplitudes to monetary gain and loss compared to a feedback-only condition. There were no significant differences between the groups in the neural response to negative feedback in terms of a Feedback-related Negativity (FRN) component.
Conclusion: Current findings support the motivation deficit model: incentives appeared to normalise information processing deficits and their neural underpinnings, highlighting the value of using extrinsic rewards in ADHD to motivate performance.

P-16-004 Normalization of ADHD symptoms by motivation-induced increase of arousal levels in children with ADHD

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Objective: We wanted to investigate whether motivation can improve the symptom patterns inattentiveness, impulsiveness and hyperactivity of ADHD children during a cognitive test. In addition, we wanted to assess whether the underlying mechanism of this symptom improvement is a normalization of the assumed hypoarousal of these children.
Method: We examined 30 children with ADHD and 30 controls, half of them being motivated for their performance in a continuous performance test (CPT) presented within a virtual classroom environment. Inattentiveness was operationalized by errors of omission, impulsiveness by errors of commission in the CPT and hyperactivity by head-movements assessed with sensors at the children's head. Cortical arousal was measured by EEG frequency bands. Hyperactivity and EEG were measured during resting periods (before the beginning of the study and 3 times after instruction phases, for half of the children groups containing the information to win money). In addition, hyperactivity and EEG were assessed during the CPT.
Results: First analyses revealed more errors of commission and omission and a higher theta/beta ratio in ADHD children compared to controls during rest and during the task. In addition, hyperactivity was increased in children with ADHD during the task. Overall, motivation led to a normalization of these parameters in ADHD children comparably to the level of controls. During the CPT, controls with motivation tended to show the least hyperactivity and hypoarousal. The decrease of commission errors and hyperactivity was associated with an increase in EEG arousal levels in children with ADHD.
Conclusion: Results confirm the cognitive-energetic model of ADHD and indicate hypoarousal during rest and activation in children with ADHD. In addition, results suggest that motivation can decrease ADHD symptoms of inattentiveness, impulsivity and hyperactivity in ADHD children, presumably due to an elevation of the hypoarousal of these children.

P-16-005 The effect of methylphenidate on very low frequency electroencephalography oscillations in adult ADHD

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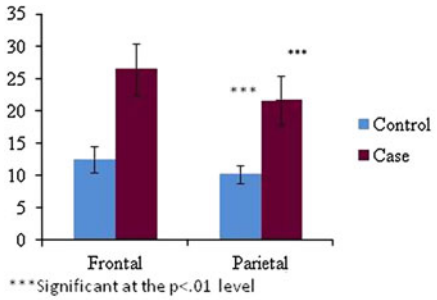
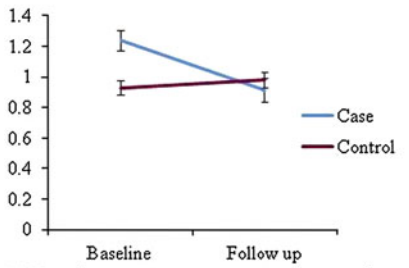
Objective: Altered very low-frequency electroencephalographic (VLF-EEG) activity may index processes on the causal path to ADHD and could be considered an intermediate phenotype. We investigated treatment response of VLF-EEG as an approach to distinguish between an associative versus causal role of VLF-EEG in ADHD.
Method: A longitudinal case–control study was conducted, examining the effects of methylphenidate (MPH) on VLF-EEG (.02–0.2 Hz) during a continuous performance task. 41 unmedicated adults with ADHD and 47 controls were assessed, 21 cases were followed up after treatment with MPH, with a similar follow-up duration for 38 controls (mean follow-up = 9.2 months). Case/control differences were examined using *t* tests, treatment effects, using repeated ANOVAs and relationships between variables using correlation and regression.
Results: Pre-treatment, participants with ADHD had enhanced frontal ($p = .001$) and parietal ($p = .01$) VLF-EEG activity (Figure 1) and increased omission errors ($p = .02$). In the whole sample, increased frontal VLF-EEG related to increased inattentive ($r = .26$) and hyperactive/impulsive ($r = .25$) symptoms; and greater parietal VLF-EEG to increased omission errors ($r = .30$). Post-treatment, a significant time x group interaction emerged; VLF-EEG ($p = .001$, Figure 2) and omission errors ($p = .03$) in cases reduced to the same level as controls, inattentive symptoms also declined in ADHD participants ($p = .03$). VLF-EEG reductions did not significantly relate to omission errors and symptom change. After controlling for subthreshold comorbidities, VLF-EEG case/control differences and treatment effects remained.
Conclusion: Reduced VLF-EEG activity following MPH treatment supports VLF-EEG as an ADHD-biomarker. Changes in VLF activity were unrelated to symptom and cognition change, suggesting treatments effects to be shared yet with no causal link between variable-change. This leaves open the question as to whether VLF-EEG reflects an intermediate phenotype of ADHD, or one of many pleiotropic genetic effects.

Figures 1 and 2



***Significant at the p<.01 level

Pre-treatment VLF-EEG activity by location (frontal and parietal) and group (case or control) with error bars representing standard error.



***Time by group interaction is significant at the p<.01 level

Treatment effects on frontal and parietal VLF-EEG activity from pre-treatment to post-treatment (using transformed scores). Error bars represent standard error.

P-16-006 The dysregulation of cortical activity in adult ADHD (aADHD): EEG aberrances of resting and cognitive activation states

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Objective: This study aimed to investigate the cortical activity patterns (CAPs) of adults with ADHD symptoms. It further investigated CAPs of resting and cognitive activation states, as opposed to the traditional single eyes-closed resting condition.
Method: The sample (N = 20, n = 10 with ADHD and n = 10 age- and gender-matched non-ADHD) was purposefully selected. Instruments utilised for participant selection included a clinical interview, Adult ADHD Self-Report Scale, Burke-Austin questionnaire and the Millon Clinical Multiaxial Inventory-III. Biopac MP Systems Hardware and Software was utilised to measure EEG CAPs. The investigation focused on three cortical sites: frontal; frontal midline; and parietal. CAPs were investigated during two recording conditions: resting (eyes-closed) and variant cognitive activation states (eyes-open task and beginning, middle and end segments of the CANTAB eclipse's Stop Signal Task). Within-subjects (comparisons between the conditions) and between-subjects analysis (ADHD versus non-ADHD) were completed. The analysis concerned two domains: power spectral and ratio coefficients. Non-parametric statistical procedures were applied. The Mann–Whitney was employed for the between-subjects investigation and the Wilcoxon Signed Rank Test was utilised for the within-subjects analysis.
Results: The aADHD EEG aberrances observed in this study were clustered according to four themes: (a) difficulty with arousal adjustment in rest-to-task attenuation with the presence of either over- or under- alpha attenuation; (b) fluctuations between a hyper- and hypo- aroused brain state; (c) deficiencies in the allocation of beta activity to comply with the demands of the changing experimental conditions; and (d) deficits in protecting the active brain from the intrusion of resting activity.
Conclusion: From the results obtained it was concluded that individuals with aADHD may be experiencing a general disorganisation and dysregulation of CAPs.

P-16-007 ADHD and first-episode schizophrenia display similar patterns of cortical hyper excitability: But they are distinctive

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Objective: To investigate the mechanisms leading to cortical hyper-excitability in ADHD and first-episode schizophrenia (FE-SZ). A common pathophysiological dopaminergic and GABAergic pathway is discussed.
Method: Twenty-eight ADHD patients were compared with 25 FE-Sz patients and 41 healthy controls (HC). Cortical excitability (inhibitory and facilitatory networks) was investigated with single- and paired pulse TMS to the left and right motor cortex.
Results: An impaired cortical inhibition over the left hemisphere was found in FE-SZ/ADHD patients compared to HC. Enhanced intracortical facilitation was similar in FE-SZ patients and ADHD patients.In comparison with HC, both patient groups presented a dysfunctional hemispheric pattern of cortical inhibition and facilitation.
Conclusion: A pattern of cortical disinhibition and abnormal hemispheric balance of intracortical excitability networks is seen both in ADHD and FE-Sz. This might be associated with an imbalance in GABAergic and dopaminergic transmission and might provide evidence for a common pathophysiological pathway of both diseases.

P-16-008 EEG anomalies in adult ADHD subjects performing a working memory tasks

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Objective: Attention deficit hyperactivity disorder (ADHD) is a condition emerging during childhood and often persisting into adulthood, characterized by distractibility, difficulties sustaining attention, impulsiveness, and hyperactivity. Adults diagnosed with ADHD (aADHD) commonly exhibit working memory (WM) dysfunctions. Impairments in verbal and, to a lesser extent, visuo-spatial WM tasks have been reported and contribute to the professional and social difficulties these subjects are confronted with. In electrophysiological studies, WM activation has been associated with significant changes in brain rhythm oscillations. WM load-related increase in frontal theta amplitude has been reported using task related power or time–frequency (TF) analysis. The present study aimed to explore the influence of attention deficit on working memory (WM) performances in aADHD patients. To address this issue, we performed an EEG activation study associated with TF analysis.
Method: Visual event-related potentials (ERPs) and frontal theta (4–7.5 Hz) and alpha (8–15 Hz) event-related desynchronization/synchronization (ERD/ERS) were assessed in 15 aADHD patients and 15 healthy individuals who successfully performed an adapted 2-back WM task including two visual N-back WM tasks as well as oddball detection and passive fixation tasks.

Results: Compared to controls, aADHD patients displayed lower amplitude of visual ERPs and phasic theta ERS culmination peak in all conditions. However, they also showed changes in the background oscillatory activity of attention-related neural generators as indicated by the decreased amplitude of alpha ERD (350–650 ms) in active tasks compared to controls.
Conclusion: Adults with ADHD showed early deficits in alpha and theta rhythm patterns, but preservation of late brain reactivity during WM activation. A failure to inhibit non-relevant cognitive operations could account for their distractibility and poor attention abilities. These subjects may need to implement compensatory mechanisms in order to successfully perform activities requiring focused attention and WM functioning.

P-16-009 The loudness dependence of the auditory evoked potential (LDAEP) and symptom severity in children with Attention Deficit Hyperactivity Disorder

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Objective: The loudness dependence of the auditory evoked potential (LDAEP) has been identified as being inversely associated with central serotonergic activity. Recent studies suggest that LDAEP is also influenced by dopaminergic transmission. Evidence shows that Attention deficit hyperactivity disorder (ADHD) symptoms are associated with dopamine dysfunction. The aim of the present study was to determine whether there is an association between the symptom severity and LDAEP in children with ADHD.
Method: A total of 32 school-aged children (6–12 years old, 29 males and 3 females) with ADHD were enrolled in this study. Severity of symptoms was assessed by using the ADHD rating scale (ARS). To evaluate the LDAEP, the auditory event-related potential was measured before beginning medication. Peak-to-peak N1/P2 amplitudes and current source densities were calculated at five stimulus intensities, and the LDAEP was calculated as the linear-regression slope.
Results: The mean age of subjects was 9.19 ± 1.78 years old and the LDAEP score was 0.80 ± 1.06 (-0.76–4.32). Total ARS score was 21.47 ± 10.35. LDAEP was found to be positively associated with ARS score, after adjusting for age and IQ($r = 0.451$, $p = 0.024$). LDAEP was related with score of inattentive symptoms ($r = 0.489$, $p = 0.013$). But LDAEP was not correlated with score of hyperactive-impulsive symptoms ($p = 0.072$).When linear regression analysis was carried, the relationship between LDAEP and severity of symptoms was also significant ($p = 0.013$). When reassessing LDAEP of 17 subjects after Methylphenidate treatment. 12 children (70.6 % of 17 children) showed that LDAEP was decreased after taking methylphenidate.
Conclusion: These findings suggest that the LDAEP may be associated with the symptom severity in children with ADHD. To the best of our knowledge, this is the first study of assessing LDAEP in children with ADHD.

P-16-010 Single trial P3b correlates of working memory impairments in Attention-Deficit Hyperactivity Disorder (ADHD)

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Objective: While impaired working memory is a candidate cognitive endophenotype for attention-deficit hyperactivity disorder (ADHD), little is known about the electro-cortical correlates of these impairments. P3b amplitude reduction with increasing working memory load seems a plausible neurophysiological marker for these impairments, but P3b amplitude could be confounded by P3b latency jitter differences between groups and tasks, which also artifactually reduces amplitude in average event-related potentials. The present study employs a single trial P3b analysis, which is robust to this confound, to explore P3b amplitude sensitivity to working memory load in ADHD patients and healthy controls.
Method: Data of $N = 27$ children with ADHD (all males, 9.9–12.5 years old) and $N = 26$ healthy controls (all males, 10.0–12.0 years old) carried out two N-back tasks (0-back, 1-back), while having 65 channel direct-current electroencephalographic recordings. Data were analysed using Infomax-denoised single trial analysis and measures of single trial jitter-free P3b amplitude were computed.
Results: Patients exhibited more omissions and fewer correct responses than controls during both tasks, but more so during the 1-back as compared to the 0-back task. In parallel, single trial P3b amplitude was significantly lower in ADHD patients than controls in the 1-back task, but not the 0-back task, reflected in a significant GROUP x TASK ($F = 6.587$, $p = 0.0138$) interaction term.
Conclusion: The present study finds impaired working memory processes in patients with ADHD behaviourally, and a neurophysiological marker of these deficits. The use of the single trial analysis allows us to dissociate this marker from other characteristics of ADHD performance (i.e., more variable response latencies) and thus represents an important methodological improvement on more widely used methods.

P-16-011 Modification of a recreational EEG technology for clinical application to ADHD and related disorders

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Objective: An inexpensive consumer-entertainment EEG product was modified to obtain and explore measurements of brain function for potential clinical application to diagnosis and management of attentional disorders.
Method: The product's claim to detect left frontal EEG activity through a single dry-lead electrode was appraised. It was then modified to collect 2 continuous real-time signals representing high frequency attention, and low frequency relaxation EEG waveforms. The device was tested for susceptibility to interference from motor, galvanic activity, or electromagnetic (EM) noise. Output was then observed during usage in 12 subjects aged 11 and 50, over 3 sessions. The sample included normal controls, treated and untreated ADHD and its comorbidities. Treated subjects were observed both on and off medication.
Results: Findings corroborate device validity as a measure of EEG, immunity to interference and lack of EM field production. Output from respective device attention and relaxation bands coincided with subject symptom reporting and observed performance. Normal and treated subjects achieved high relaxation and attention output readings on the device with ease. Those with attentional symptoms struggled to produce and could not maintain similar strength of attention signal. Those with diagnoses other than ADHD exhibited low relaxation output levels and unstable readings across bands. Performance deteriorated similarly in subjects retested off medication. Subjects universally reported improved symptom insight and a sense of benefit from use of the device.
Conclusion: This experiment confirms the feasibility and suggests further study into potential clinical application from modification of this common and inexpensive consumer EEG product. Limitiations to

this feasibility experiment include over-representation of a single neuroanatomic region, the incompletely accurate and simplified separation of high and low brainwave frequencies as distinct and independent attention and relaxation measures, individual and contextual variability, and confounding effects of common symptom pathways of comorbidities. Regardless of diagnostic utility, safety and potential benefit from this technology as a psychotherapeutic aid or biofeedback modality shows promise.

P-16-012 EEG dynamics during initiation, realization and termination of movement in adolescents and adults with ADHD

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Objective: Our studies showed that hyperactivity is the predominant symptom in adults with ADHD. It may be caused by disturbances in motor programs. However, its electrophysiological correlates are not clear. Purpose of the study was to analyze dynamics of EEG during movement in healthy and ADHD patients.
Method: EEG was recorded in the two groups: healthy (23) and ADHD (25) subjects during resting state and voluntary movement (adduction of right thumb). The Grand-average topographic maps of EEG spectrum power (EEGSP) and inter- and intra- hemispheric EEG spectrum power coherence (EEGCoh) in frequency band 4–60 Hz were compared in each group between the resting state and preparation, realization and termination of the movement by using one-way ANOVA.
Results: Preparation of the movement. The EEGSP and the EEGCoh in 4-8 Hz significantly increased in the right temporal and parietal areas in ADHD patients. These rates also increased in the central and parietal areas in 11–13 Hz and decreased all over the cortex in 48–60 Hz. Increasing of the EEGSP and the EEGCoh were detected in the frontal lobes in 8–10 and 14–24 Hz in healthy subjects. Realization of the movement. The EEGSP and the EEGCoh significantly increased in 48–60 Hz, decreased in 4-10 Hz predominantly in the parietal areas in ADHD patients. In contrast, increasing of the EEGSP and the EEGCoh were detected locally in the left frontal lobe (11–13 Hz) and left premotor and motor areas in healthy subjects. Termination of the movement. In ADHD patients the EEGSP and the EEGCoh significantly increased in 4-35 Hz; in healthy subjects—8–13 and 48–60 Hz.
Conclusion: Reduced cortex activity in the frontal lobes during the preparation of the movement and generalized increased activity in central cortex areas during its realization may be the cause of the symptoms of hyperactivity in ADHD patients.

Friday, 7 June 2013, 15.00–16.00

P-17 Imaging studies I

P-17-001 The Default Mode Network (DMN) in paediatric patients with ADHD

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Objective: ADHD is a neurological disorder in children with prevalence's circa 5 %. This illness is considered to be in an 80 % originated by genetic factors. Most work on magnetic resonance resting states has been performed in Asia, Europe and North America, but little work exists exclusively on the Latin genetic pool. Here we compared infant Latin ADHD patients with healthy ones. We discuss the differences with previous studies that used different genetic pools.
Methods: 30 volunteers (8.4 ± 2 years, both sexes) were divided in two groups, healthy (H) and ADHA (AD). Volunteers laid in an MR scanner in silence while 150 brain volumes covering the whole of the brain were acquired. Resting state analysis was performed using DPARSF software. Low frequencies under 0.08 Hz were kept. Regions of homogeneous variance (ReHo) and amplitude of the low frequencies (Alff) were calculated. Data was threshold at $p < 0.05$. Lateralization of activations was calculated as percentages counting numbers of activated voxels in each hemisphere and dividing them buy the total number of voxels.
Results: Figure 1a and b present the results of a comparison of between H and AD patients (H > AD in green and AD > H in red). H subjects presented strong left lateralization (80 vs. 20 % structures). AD patients presented a stronger right lateralization (55 vs. 45 %).
Conclusions: AD patients had a larger predominance of right hemisphere activations over left in contrast to healthy subjects. Previous work has reported strong involvement of the brain stem and the anterior cingulate gyrus for AD patients compared to H which we did not find. Never reported correlations with the frontal gyrus and the posterior cingulate cortex were found. Considering that similar analysis methods were followed as in previous studies, we believe that the differences shown arise by the different genetic origin of volunteers.

P-17-002 Diffusion tensor imaging of the cerebellum-prefrontal area in ADHD paediatric patients

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Objective: Valorate diffusivity in right prefrontal cortex and cerebellum brain regions assessed in vivo using diffusion tensor MRI.
Method: Twenty-three children (ages 7–12 years, 11 ADHD patients, 12 controls) were examined: all subjects were scanned. Images were acquired on a 1.5T imager (Philips Intera-Achieva), with a maximum gradient amplitude of 80 mT/m and a slew rate of 120 mT/m/ms. Diffusion Tensor Imaging (DTI) data were acquired using a SE-EPI sequence. Diffusion weighted gradients were applied along 15 non-collinear directions with a b-value = 800 s/mm2. High-resolution images were acquired using 3DT1 Gradient Sequence. DT was fitted with linear least-square after a preprocessing step correcting for head movements and eddy currents was applied by registering all volumes to the first b = 0 volume with a 12-parameter affine transformation (with FSL [3]). Finally, using MedINRIA, diffusion tensors were calculated pre- and post- motion correction to obtain Fractional Anisotropy (FA) with FA threshold of 0.2 and smoothness factor of 20 out of 100, and Mean Diffusivity (MD) values. Segmentation of the cerebellum CB was manually drawn on midline sagittal 3D-T1 images.
Results: Results: shows tract distribution in ADHD and healthy controls. We present preliminary results of white matter connectivity of tracts connected cerebellum-prefrontal area. There were no discernible ADHD-Control changes in ADC values along the connected white matter while generalized fractional anisotrophy is increased ($p = 0.08$), as it was reported in recent literature[1]. In summary, as the study progresses, MD, μ1, μ2, and μ3 will use in order to further examine frontal-cerebellum tracts in patients with ADHD.

Conclusion: This results can explain the differences between the inattentive subtype of ADHD and sluggish/tempo cognitivo lento.

P-17-003 Magnetic resonance spectroscopy in males with antisocial personality disorder: Effect of adult Attention Deficit Hyperactivity Disorder

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Objective: There are few studies which used Magnetic Resonance Spectroscopy (MRS) to evaluate subjects with Antisocial Personality Disorder (ASPD) and psychopathy. No study investigated the effect of adult Attention Deficit Hyperactivity Disorder (ADHD) symptoms on MRS variables.
Method: Sample included 23 male subjects with ASPD and 21 age and gender matched healthy controls. All subjects were evaluated with Psychopathy-Checklist-Revised (PCL-R), Adult ADHD Self Rating Scale (ASRS), Wender Utah Rating Scale (WURS) and Wisconsin Card Sorting Test (WCST). Bilateral anterior cingualte cortex (ACC), dorsolateral prefrontal cortex (DLPFC), and ventromedial prefrontal cortex (VMPFC) N-Acetyl-Aspartate (NAA)/Creatinine (Cre), Choline (Cho)/Cre ratios were calculated. Associations among symptom ratings, neuropsychological test scores and MRS variables were investigated.
Results: Results showed that, ASPD group had significantly higher PCL-R, ASRS and WURS scores (all $p < .001$) and lower WCST and Stroop performance ($p < .001$). ASPD subjects also had lower bilateral ACC Cho/Cre, bilateral DLPFC NAA/Cre and Cho/Cre and left VMPFC Cho/Cre ratios. On the other hand, ASPD subjects had higher bilateral VMPFC NAA/Cre. There were several significant associations between symptom ratings, neuropsychological tests and MRS variables. WURS, ASRS and PCL-R scores were negatively correlated with bilateral ACC Cho/Cre, right DLPFC NAA/Cre and left VMPFC Cho/Cre. Same measurements were positively correlated with WCST performance. Bilateral VMPFC NAA/Cre was only associated with PCL-R.
Conclusion: Results suggested that ASPD subjects showed differences in neuronal integrity, membrane turn-over and metabolism when compared with healthy controls. ACC and VMPFC Cho/Cre levels decreased with increasing adult ADHD symptoms while bilateral VMPFC NAA/Cre was associated with severity of psychopathy. Results suggested that, regarding the association of ADHD symptoms might have an important role in ASPD neurobiology and that VMPFC neuronal integrity might be more specifically associated with psychopathy.

P-17-004 Regional gray matter volumetric differences between adolescents with ADHD versus controls plus its correlation to attention-related test scores

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Objective: During the last decade, both structural and functional brain abnormalities were reported in adolescents with attention-deficit/hyperactivity disorder (ADHD).
Method: Here, we present new voxel-based morphometry (VBM) results, using an optimised data processing toolbox within SPM8. We could include 18 male adolescents (11–16 years of age) suffering from ADHD, as well as 18 age- and gender matched controls. As part of our analysis approach, we created a dedicated paediatric template (Wilke et al. 2008). Each subject's anatomical scan was initially segmented, using the priorless functionality available within VBM8 (Gaser 2013); thereafter, all subjects were deformed using a Diffeomorphic Anatomical Registration Through Exponentiated Lie algebra technique (DARTEL; Ashburner 2007). Using this final DARTEL-template, we generated smoothed (FWHM = 8 mm), Jacobian-scaled grey matter images in normalized space to statistically compare both groups (Controls > ADHD).
Results: Significance was assumed at a voxel-level $p = .001$, FDR-corrected on the cluster level at $p = .05$, and subject age as well as IQ were used as a covariate of no interest. VBM-results indicated significantly lower regional gray matter volume for ADHD-subjects in several brain regions including the cerebellum, occipital cortex, anterior cingulated cortex (ACC) and the hippocampus as well as the amygdala, bilaterally. Finally, a significant correlation was found between subject-specific diagnostic scores of the attention related d2-test (Brickenkamp and Zillmer 1998) and the extracted ACC-related individual gray matter volume showing significant volume differences between groups.
Conclusion: In summary our results are in line with previous studies investigating volumetric abnormalities in subjects with ADHD and extend these findings by showing that gray matter volume of ACC is directly associated with attention related performance.

P-17-005 The role of the cerebellum in Attention-Deficit/Hyperactivity Disorder: Structural and functional neuroimaging in ADHD

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Objective: The purpose of the study was to summarize recent publications pertaining to the role of the cerebellum in ADHD.
Method: This paper reviewed the latest publications describing the role of the cerebellum in ADHD. Both structural and functional MRI studies were considered.
Results: There was a correlation between the presence of ADHD and structural and functional features of the cerebellum, including smaller volume of the cerebellum, smaller volume of the vermis and its structures, and smaller volume of the cerebellum's lobules. Nearly 50 % of patients with ADHD suffered not only from behaviour disorder, but from minor motor abnormalities as well, which could have arised from cerebellum disfunction. The role of the cerebellum in patophysiology of ADHD, typically associated with its motor functions, could be linked to a cognitive role as well. This relation was clear after analyzing connections between cerebellum and cerebrum cortex. Abnormalities in functioning of the cerebellum could be connected to the difficulties in predicting consequences of actions and events, and perceiving timing. Some studies point that Cerebellum's activity could be brought down to normal level through proper treatment involving both cognitive training and medication.
Conclusion: Neuroimaging studies have confirmed the role that the cerebellum plays in ADHD. The correlation between presence of ADHD and volume of the cerebellum's structures was described.

P-17-007 Hemodynamic response of children with ADHD to happy and angry facial expressions

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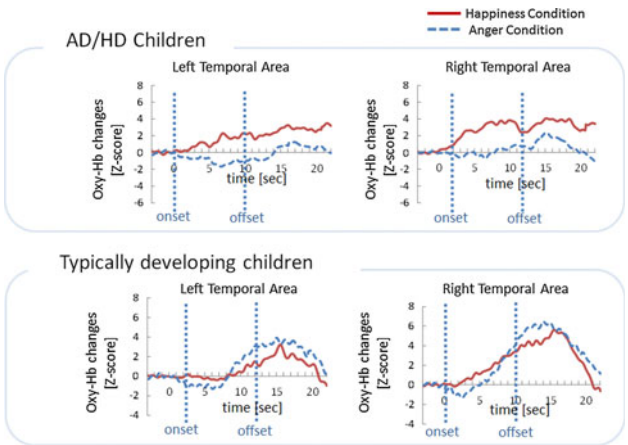
Objective: Recent studies reported that children with ADHD have difficulties in social cognition. The ability of emotion recognition of facial expressions is less accurate than typically developing children (TD) (Williams et al. 2008). Especially several studies demonstrated that recognition of angry expression is impaired in children with ADHD (Pelc et al. 2006, Williams et al. 2008; Cadesky et al. 2000). In the present study, to investigate the neural basis of facial expression recognition in ADHD children, we measured the hemodynamic activity of ADHD children and TD while they viewed the happy expression and anger expression using NIRS (near-infrared spectroscopy).
Method: Thirteen ADHD children and thirteen TD participated in the experiment. Children viewed a happy expression and an anger expression of unknown females presented on the computer screen. The hemodynamic responses to facial expressions were compared against the baseline hemodynamic activation during the presentation of fixation points. The duration of presentation of facial expression was 10 s. Happy and angry expressions were presented alternatively and repeated 5 times.
Results: We calculated the mean concentration of oxy-Hb for 5–15 s after the stimulus onset, respectively in the right and left hemisphere. We found that the presentation of happy expression significantly increased the oxy-Hb concentration in ADHD children, but that of anger expression did not. On the other hand, TD's hemodynamic response was not differed between happy and angry expression and localized to the right temporal area.
Conclusion: Increased brain activity of ADHD children during happy expression presentation could reflect their difficulty in recognition of anger expression. Moreover, ADHD children did not showed laterality in processing facial expression, which was observed in TD groups. These results indicate the atypical processing of facial expression in ADHD children.

Figure. The time-course of the averaged change in Oxy-Hb



P-17-008 Prefrontal dysfunction in adults with ADHD investigated with multi-channel near-infrared spectroscopy

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Objective: Dysfunction of the prefrontal cortex has been previously reported in individuals with ADHD. Multi-channel near-infrared spectroscopy (NIRS), a recently developed functional neuroimaging technology, enables the non-invasive detection of spatiotemporal characteristics of brain function near the brain surface. NIRS has enabled bedside measurement of the concentrations of oxygenated ([oxy- Hb]) and deoxygenated hemoglobin ([deoxy-Hb]) in capillary blood vessels. In the present study, we used NIRS to detect changes in the oxygenated hemoglobin concentration ([oxy-Hb]) during two verbal fluency tasks.
Method: The present study was approved by the ethics committee of Faculty of Medicine of Showa University. Subjects of this study were 15 outpatients with ADHD of Showa University Hospital. The diagnosis was made according to the criteria of DSM-IV. The normal control group is comprised 15 adults. The relative [oxy-Hb] in the prefrontal cortex was measured during the category and letter fluency tasks, using multi-channel near-infrared spectroscopy (NIRS). Fifty-two channel NIRS (ETG-4000, Hitachi Medical) measures relative changes of [oxy-Hb] and [deoxy-Hb] using two wave lengths (695 nm and 830 nm) of infrared light based on the modified Beer–Lambert law.
Results: The two groups did not differ significantly in the numbers of correct responses on the tasks. Also, the mean total [oxy-Hb] during the category fluency task did not differ significantly between the groups; however, during the letter fluency task, the mean [oxy-Hb] in persons with ADHD was significantly lower than that in controls.
Conclusion: These results suggested task-relevant or task-specific prefrontal dysfunction in persons with ADHD.

Friday, 7 June 2013, 15.00–16.00

P-18 Imaging studies II

P-18-001 Abnormal frontal white matter diffusivity in preschool children with ADHD

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Objective: ADHD is the most common form of psychopathology in preschoolers; however, few studies have employed neuroimaging methods to examine brain development in these children. Recent studies using diffusion tensor imaging (DTI) in school-age children and adolescents with ADHD have identified both frontostriatal and temporal-occipital white matter anomalies. Examination of white matter development in preschoolers can help clarify early neurodevelopmental pathways that lead to behavioral dysfunction, and ultimately the diagnosis of ADHD.
Method: DTI data were collected in 46 preschool children ages 4–5 years (20 with ADHD [11 male; 16 right-handed], 23 controls [12 males, 20 right-handed]. DTI images were normalized by linear affine registration of the mean diffusion-weighted (MDW) image to the template MDW of the JHU MNI-space atlas. Voxel-wise analyses of

group differences examining normalized fractional anisotropy (FA) and mean diffusivity (MD) images were performed using the FSL software package ('randomise' program) which employs nonparametric permutation tests to assess significance. Analyses were restricted to voxels in which mean FA across all participants was greater than 0.20.
Results: Statistical tests for group differences in FA did not reach significance. Conversely, when comparing MD images, a test of suprathreshold cluster extent (initial cluster-forming threshold of $t = 2.5$) reached significance at $p = 0.0488$, yielding a large cluster spanning medial frontal white matter (subcortical to medial prefrontal, premotor and motor cortex) for which MD was significantly reduced in children with ADHD. Reduced MD in this cluster significantly predicted spatial working memory performance in the ADHD group ($p = .015$).
Conclusion: Decreased MD in this region suggests that there may be reduced neuronal branching in medial frontal radiate white matter, which affects development of neural systems supporting working memory. To our knowledge, this is the first study to employ DTI to examine the neural basis of ADHD in children as young as 4 years. Further investigations will include atlas-based ROI analysis.
Figure 1

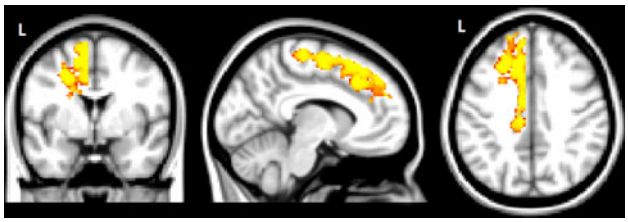

Fig. 1 Cluster of significantly reduced mean diffusivity (MD) in left medical prefrontal region in preschools with ADHD ($p < .05$) viewed as a maximum intensity-projection overlaid on selected slices of the MNI atlas T1 image

P-18-002 Modulation by methylphenidate of neurofunctional networks involved in working memory in children with ADHD

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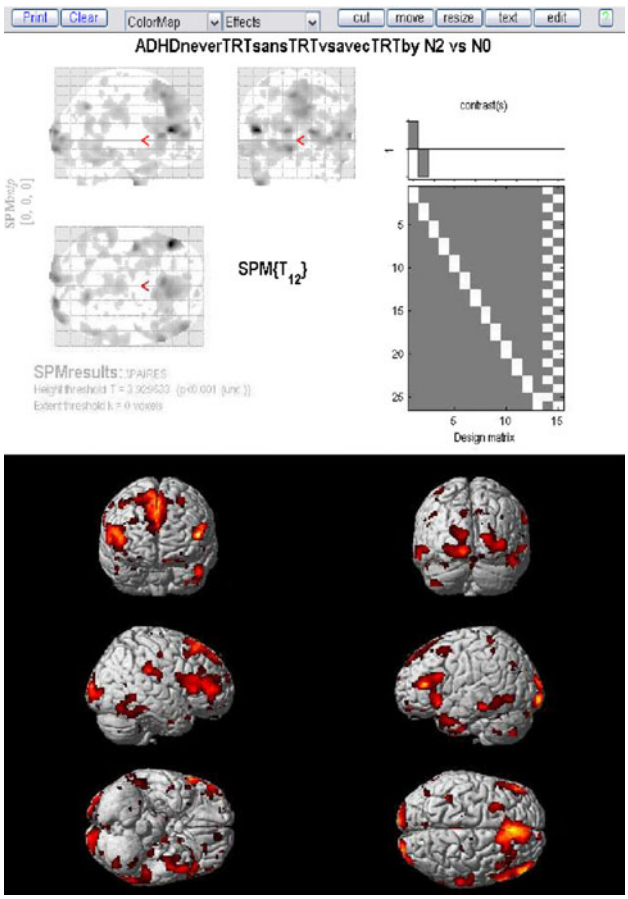
Objective: Little is known about neurofunctional networks changes induced by Methylphenidate, first-choice pharmacological intervention for the treatment of Attention Deficit/Hyperactivity Disorder (ADHD). Our objectives was to investigate the effect of MPH on working Memory (WM)-related cerebral activity in children with ADHD.
Method: We used functional magnetic resonance imaging, (fMRI) to test the effects of MPH in never medicated subjects with ADHD on the activation of WM networks. 13 right-handed children with ADHD combined-type (8–12 years old) without any psychiatric comorbidity, were scaned twice, while they performed a N-back task: under either no treatment (never treated condition) or after an acute usual dose of MPH at least after 12 weeks period of treatment.
Results: We didn't find significant differences in performance levels. Conjunction analyses reported that right superior parietal lobule, middle frontal gyrus, precentral gyrus and bilateral crus 1 cerebellum were commonly activated in both conditions (normalization). The whole brain analysis showed different brain activation patterns in bilateral inferior frontal gyrus, left superior medial gyrus, right cuneus and superior occipital gyrus (PFWE-corr < 0.05), the WM 2-back condition showing more activation (deactivation less pronounced) in medicated children. Moreover, regions of interest (selected from our previous investigation comparing never medicated children with ADHD and controls) suggested significant effect of MPH on WM-related brain activity in bilateral occipital regions (PFWE-corr < 0.05) enhancing activation in N2 and N0 conditions when children had taken medication.
Conclusion: Functional data indicate that, after exclusion of potential confounds (level of performances, psychiatric comorbidity, long history of stimulant treatment), MPH administration may modulate specific neural changes related to WM paradigm.In particular, we evidenced for the first time the involvement of occipital region in MPH related processes. Normalization or more complex changes in neuronal patterns induced by MPH provide new insights into the mechanisms underlying the brain effect of short-term treatment.

WM-related activations (N2. N0) in ADHD never treated versus ADHD treated



P-18-003 Neuroimaging and neuropsychological analyses in a sample of children with ADHD: Inattentive subtype

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Objective: This study aimed to examine the distinctiveness of the ADHD-inattentive type with respect to cerebral white and grey matter volume differences, neuropsychological and behavioral characteristics. For this purpose, we conducted analyses of voxel-based morphometry, quantitative morphology, neuropsychological performance and behavioural characteristics.
Method: Twelve 6–14 year-olds male children diagnosed with ADHD-inattentive subtype and age matched control subjects were submitted to structural MRI and neuropsychological assessment. Informed consent was obtained from all parents. We compared groups in regard to quantitative morphology (using region of interest approach), voxel-based morphometry (VBM), neuropsychological performance and behavioral characteristics. Neuropsychological included Continuous Performance Test (CPT), forwards and backwards digit span, Corsi block test, semantic and phonological verbal fluency, and the Complex Figure of Rey test. The Child Behavioral Checklist (CBCL) was used for behavioral assessment. Analysis of group differences was based on the magnitude of the effect according to Cliff model.
Results: Voxel-based analysis of ADHD-i sample revealed a reduced volume of left medial frontal gyri ($Z = 3.43$, $pFDR < 0.05$), left anterior cingulate ($Z = 3.74$, $pFDR < 0.05$), left caudate ($Z = 3.47$, $pFDR < 0.05$), left thalamus ($Z = 3.65$, $pFDR < 0.05$) and right postcentral gyrus grey matter concentration ($Z = 3.72$, $pFDR < 0.05$) in comparison to controls. As expected, ADHD-i subjetcs showed worse performance on neuropsychological measures (verbal fluency, digit span and corsi span), greater number of omission errors and slower reaction time in CPT. They also showed a higher frequency of internalizing (anxiety, withdrawal) and externalizing (rule-breaking behaviour, aggressive behaviour) symptoms.
Conclusion: Our findings revealed that morphometric differences related to ADHD-inattentive subtype may be identified using more refined method such as VBM. They suggest in this way specific neuroanatomical as well as neuropsychological differences, strengthening the importance of the distinctiveness of subtypes of ADHD for research and clinical purposes on this disease.

P-18-004 Altered white matter microstructure in children with the inattentive subtype of Attention Deficit/Hyperactivity Disorder

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Objective: Compare white matter integrity in children with the predominantly inattentive (IS) or combined subtype (CS) of ADHD and age-matched healthy controls (HC).
Method: A diffusion tensor imaging study was conducted in male, right-handed, medication-naive children (mean age 11.7 years SD 2.6), 21 meeting DSM-IV criteria for the combined subtype of ADHD, 12 meeting IS criteria and 11 HC. All scored above 80 on the WISC-IV and didn't have any comorbid axis I or II disorder. Fractional anisotropy (FA), mean diffusivity (MD) and radial diffusivity (RD) maps were generated using FSL. New segmentation of GM and WM were employed to calculate the flow fields using DARTEL that were applied to DTI maps to normalise to MNI space. Voxel Base Analysis was done using SPM8. Age and total brain volumes were used as a covariate and statistical threshold criteria was $p < 0.05$ Family Wise Corrected at cluster.
Results: IS patients had significantly lower FA in a left hemispheric cluster of the parietal lobe and cerebellum and higher MD in two clusters, one including left cerebellum, inferior temporal lobe and supramarginal gyrus and a right hemispheric cluster involving cerebellum and inferior parietal lobe. A trend towards increased RD was found in these areas. CS patients had also higher MD in a left hemispheric cluster of the parietal lobe and cerebellum. No differences in FA or RD were found between CS and HC, nor between IS and CS in any measures.
Conclusion: Abnormal FA and MD in parietal lobe and cerebellum in IS relative to HC suggest microstructural white matter changes in areas involved in attention processes. These changes are thought to result from increased freedom of cross-fibre diffusion and likely represent decreased myelination. Although deficits were more pronounced between IS and HC, they may be shared between IS and CS given no direct group differences.

P-18-005 Adult ADHD a disease of failed neural timing?

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Objective: Attention-Deficit/Hyperactivity Disorder is characterized by inhibitory and attentional deficits. Recent studies hint at impaired impulse control in ADHD patients being linked to deficits in timing functions (Noreika, V., Falter, C.M., Rubia, K., 2013. Timing deficits in attention-deficit/hyperactivity disorder (ADHD): Evidence from neurocognitive and neuroimaging studies. Neuropsychologia 51, 235–266). fMRI may not resolve neural activity linked to different phases of task execution in rapid succession whereas electrophysiological components belonging to these different phases can be clearly separated. We therefore conducted single-trial EEG/fMRI analysis to assess group differences in spatiotemporal dynamics of the neural impulse control network.
Method: A visual Go/Nogo task during simultaneous EEG/fMRI was used. EEG data were analyzed using independent component analysis selecting electrophysiological components which are reliably Nogo-related within certain time frames before or around median response times. Single-trial amplitude values of these EEG components were included in the fMRI data analysis. Eleven adult ADHD patients and 16 healthy controls showing reliably Nogo-components were analyzed.
Results: ADHD patients were characterized by increased error rates. Classical fMRI analysis revealed only a hypoactivation of caudate in ADHD patients during inhibition trials. Single-trial EEG/fMRI analysis showed a wide fronto-striatal inhibition network was significantly hypoactivated before but not around response time in ADHD patients.
Conclusion: Combined EEG/fMRI revealed hypoactivation in fronto-striatal regions only present in early stages of response inhibition. This suggests that ADHD patients may rather be impaired in timing inhibition than in the recruitment of the neural inhibitory network itself. This suggest that ADHD is a disease of failed neural timing.

P-18-006 The default mode network response to rest cues and state-transitions in adults with Attention Deficit Hyperactivity Disorder

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Objective: The Default Mode Network (DMN), which in healthy individuals is consistently attenuated following the transitions from rest to attention-demanding tasks, has been implicated in the pathophysiology of Attention Deficit Hyperactivity Disorder (ADHD). Two alterations of the DMN in ADHD are reported: (1) deviant functional connectivity during rest (Castellanos et al. 2008; Fair et al. 2010); (2) insufficient DMN attenuation during tasks (Fassbender et al. 2009; Liddle et al. 2011; Sonuga-Barke and Castellanos 2007). The current study investigated brain activity during switching between rest and task periods in healthy controls and adults with ADHD.
Method: Nine adults with ADHD and 13 healthy controls performed a cued-state-switching paradigm, with cues signaling rest, task1, or task2 trials, while behavioural and functional magnetic resonance imaging (fMRI) data were collected. Repeated measures analyses of variance were performed on the bahavioural data. Single-subject fMRI data was analyzed using general linear model. Group analyses were run using single-subject contrast (switch-trial > repeat-trial) images as input.
Results: Behavioural data revealed a significant increase in switch costs in ADHD during rest-to-task-switch, but not during task-to-task switch trials. Brain activation did not differ between groups comparing task-to-task-switch with task-repeat trials. However, a significant group difference was found comparing rest-to-task-switch to task-to-task switch trials, with controls exhibiting more activation in ACC, PCC/precuneus and insula.
Conclusion: Current data suggests a specific state-switching deficit in ADHD, reflected in increased switch costs during rest-to-task-switch trials and between-group brain activation differences during between-state transition trials, which were not apparent for between-task switch trials.

P-18-007 Working memory-related cerebral activity differences between good and bad performers in drug-naive children with ADHD

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Objective: To compare working memory (WM)-related cerebral activity between good and bad performers in prepubertal children with Attention Deficit/Hyperactivity Disorder (ADHD), selected with stringent criteria minimizing potential confounds. Cerebral substrates of WM deficits in ADHD remain poorly understood in children.
Method: WM performance and underlying cerebral activity were measured using fMRI and a visual N-back task in 30 right-handed, never medicated children fulfilling DSM-IV criteria for the ADHD combined type. In the vigilant/control 0-back condition, subjects had to detect the presence of the digit "2" in a series of digits. In the WM 2-back condition, subjects had to press a button when the displayed digit was identical to the one presented two trials before. Performance was the accuracy difference between 2-back and 0-back conditions, residualized to control for age differences. Brain activity of best performers (33 % of the sample, n = 10) was compared to those of worst performers (33 %, n = 10). Functional MRI data were analysed using SPM8b. The same "good versus bad performers" analysis was also conducted in 27 typically developing children (TDC).
Results: In the ADHD group, bad performers exhibited decreased, below baseline WM-related activation levels in the cerebellum (32–40–28; $p < .001$). Regions of interest (previously identified as differentiating ADHD and TDC at the same level of performance) analyses disclosed decreased activation in bad versus good performers in the right cerebellum (Crus 1, 30, −86, −28; $p = .001$, pcorr = .074) and right occipital cortex (30, −86, −4; $p < .001$, pcorr = 0.013) (Figure 1). No difference was observed in TDC.

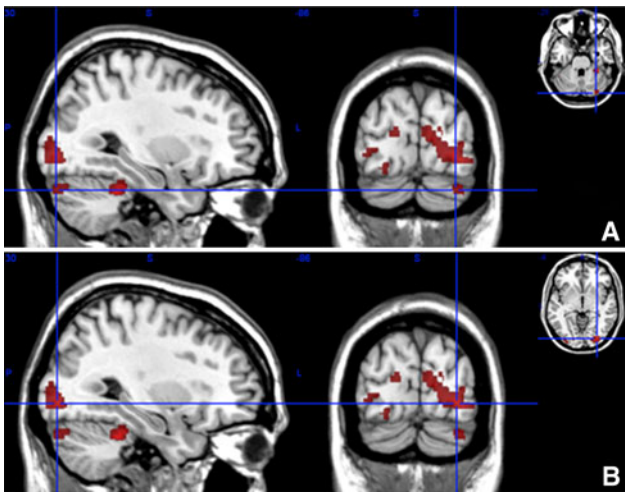

Fig. 1 Higher working memory-related neural activity (N2 > N0) in ADHD children with good than with bad performance in **a** the right cerebellum (Crus 1, 30, −86, −28 mm in MNI space) and **b** the right occipital cortex (30, −86, −4 mm)

Conclusion: Differences in WM-related brain activity between good and bad performers in ADHD children suggest that modified activity in cerebellum and occipital regions might contribute to the severity of cognitive difficulties, which is not observed in TDC.

P-18-008 Representation of stimulus novelty in children and adolescents with ADHD

J. Tegelbeckers*, N. Bunzeck, B. Bonath, H.-H. Flechtner, K. Krauel

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Objective: The automatic orienting response caused by novel or unexpected stimuli is supposed to increase the readiness to act and facilitate learning processes, consequently enabling adaptive behaviour in a changing environment. Patients with attention deficit hyperactivity disorder (ADHD) have difficulties in regulating their behaviour according to situational demands. However, it is not known whether these problems relate to altered neuronal processing of novelty.
Method: We aimed to investigate differences in the neuronal representation of novelty between children and adolescents with ADHD and a healthy control group (19 male participants between 11 and 16 years each) using functional magnetic resonance imaging (fMRI, 3T). The subjects performed a visual oddball task, composed of four stimulus categories: a frequent standard picture (62.5 %), a task relevant target picture (12.5 %), a task irrelevant repeated rare picture (12.5 %) and unique novel pictures (12.5 %).
Results: The analysis revealed a considerable overlap in the activated novelty networks in both groups consisting of bilateral temporal and occipital regions, parahippocampal gyrus, posterior cingulate and right thalamus. Patients with ADHD showed more activation in the left superior temporal gyrus and inferior frontal gyrus. Interestingly, the activation elicited by the rare but repeated picture differed

significantly between groups. In contrast to healthy participants, patients with ADHD engaged wide parts of the novelty network to process the familiar stimulus.
Conclusion: The results suggest an analogue representation of stimulus novelty in children and adolescents with and without ADHD. However, the familiarisation with a rare, task irrelevant stimulus seems to be altered, which could lead to inefficient utilization of resources and/or increased distractibility by allegedly new stimuli.

Friday, 7 June 2013, 15.00–16.00

P-19 Pathophysiology: Children and adolescents I

P-19-001 Cognitive and neuropsychological assessment in a Portuguese sample of children with Attention Deficit-Hyperactivity Disorder (ADHD)

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Objective: To assess the cognitive and neuropsychological profile of children diagnosed with ADHD.
Method: We evaluated 100 children (79 boys, 21 girls), aged between 6 and 9 years, diagnosed with ADHD (79 ADHD-combined type, 17 ADHD-inattentive type, 4 ADHD- hyperactive—impulsive type) with the Battery for Neuropsychological Assessment of Coimbra, developed by the Faculty of Psychology, University of Coimbra (BANC; Simões et al. 2007), covering the following functions: Memory, Attention, Executive functions, Language and Fine Motor Skills. Cognitive abilities were evaluated by WISC-III. We compared our sample with 100 normally children that were all matched on age, gender, geographic area and mother's education.
Results: Although the mean results on the WISC-III (FSIQ = 95.87; sd = 13.51), children with ADHD perform significantly bellow the controls in the follow neuropsychological functions: verbal and visual memory (immediate and recall); phonemic verbal fluency; sustained, divided and selective attention. No significant differences were found for category verbal fluency, faces memory, instructions comprehension, colors rapid naming (time) and the task of recognition of the Stories Memory test.
Conclusion: Our ADHD sample is predominantly composed by ADHD combined subtype with an average intelligence level (FSIQ, WISC-III). Nevertheless, ADHD is associated with neuropsychological dysfunction involving memory, attention, executive functioning, language and fine motor skills. This findings show that ADHD is more than a complex behavioral problem. This study also shows the importance of systematic assessment of neuropsychological variables of ADHD children, and how useful it might be, for planning interventions.

P-19-002 The influence of auditory novelty on the attentional performance in children with ADHD

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* Magdeburg, Germany

Objective: Task-irrelevant novel stimuli involuntarily capture attention and can lead to distraction from an ongoing task. Especially children with ADHD are prone to be easily distracted by stimuli in their environment. However, there is evidence that the presentation of new or interesting sounds can also have a facilitating effect on the performance of children with ADHD under certain conditions.
Method: Our study aimed to investigate the influence of auditory novels on the performance of 20 children with ADHD and 20 control children aged 8–13 years. Task-irrelevant auditory stimuli were presented while children were doing a visual Flanker Task. The sound was either a standard (repeatedly presented throughout the experiment) or a novel sound (unique presentation), randomly intermixed with a baseline condition without any auditory stimulation. In order to separate novelty effects from effects of salience and rarity, all sounds were meaningful environmental sounds and presented at equal frequency. Furthermore, the task had two levels of difficulty in order to examine possible differential effects of novelty for different attentional task demands.
Results: Our results showed that novel sounds reduced the error rate of children with ADHD compared to standard sounds regardless of task demands, whereas they did not influence the performance of control children. In contrast to previous studies, reaction times were not slowed down after the presentation of novel sounds.
Conclusion: The results suggest that novel sounds can be beneficial for children with ADHD, possibly by increasing their alertness to focus on the task.

P-19-003 Executive function deficits: Distinguishing sluggish cognitive tempo from ADHD predominantly inattentive type

E. Araujo*, M. C. Jané, A. Bonillo

* Culiacán, Sinaloa, Mexico

Objective: To observe the Executive Function (EF) deficits associated to Sluggish Cognitive Tempo (SCT) and ADHD predominantly inattentive type.
Method: 76 subjects (6–17 years old) were evaluated using a diagnostic interview to confirm the presence of inattentive symptomatology and SCT; an instrument was use for assess the EF. The analyses were hierarchical linear regression models to observe whether the presence of inattention symptomatology influences the relationship of SCT and the EF; and to determine whether there are deficits in EF that are unique to the inattention symptomatology of SCT.
Results: The ADHD predominantly inattentive type results statistically significant association with inhibition, emotional control, working memory, plan, organize and initiative deficits. SCT results associated with emotional control, working memory, plan, organize and monitoring deficits.
Conclusion: The presence of inattentive symptomatology involves more executive deficits than SCT. However, both symptomatologies are associated with EF deficits in a different way. Inhibition and initiative deficits are unique to inattention. These results can help the better comprehension about the SCT and it association with ADHD predominantly inattentive type. To know the executive functioning can help professionals and teachers to implement new tools to support academic, social and family difficulties.

P-19-004 Association of ADHD symptoms and emotion regulation in a non-clinical sample

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Objective: Dysfunctions in emotion processing and regulation (ER) are considered to be one core dysfunction in ADHD. In assuming that

ER deficits might be an endophenotype of ADHD we investigated whether these dysfunctions correlate with the degree of self-reported ADHD symptomatology in a non-clinical sample.
Method: We collected data of subjective emotional valence and arousal, electromyogram (EMG) and the modulation of Late Positive Potentials (LLP) via EEG from a sample of 41 (ratings and EMG data) respectively 33 (EEG data) students varying in their scores on the ADHS-SB, a German self-report scale for ADHD symptoms. Participants had to not regulate, up- and down-regulate their emotions elicited by pleasant and unpleasant IAPS pictures without the instruction to use specific ER strategies. Additionally, neutral pictures should simply be regarded.
Results: Emotional pictures induced more intense valence and arousal ratings, EMG and LPP amplitudes than neutral ones. For ratings and EMG amplitudes, those reactions were intensified through up-regulation and attenuated through down-regulation. LPP amplitudes were amplified through up- and down-regulation. Ratings and EMG modulations did not correlate with ADHD symptomatology reported in three self-report questionnaires and verified in a clinical interview based on DSM-IV criteria. However, inattentiveness correlated significantly with the increasing of LPP amplitudes through the up- and down-regulation of positive emotions.
Conclusion: Our assumption of ER deficits as an endophenotype for ADHD was not confirmed. But we could show that those deficits are associated with inattentiveness, rather than with hyperactivity and impulsivity. Moreover, our study provides a precious contribution to ER and LPP research, showing that healthy subjects are able to regulate emotions in a free-choice paradigm. Probably, LPP modulations should rather be interpreted as indicators of attentional processes required by the ER task, not only of emotional arousal, as has long been assumed.

P-19-005 Sluggish cognitive tempo: Prevalence and clinical characteristics in a Spanish paediatric general population

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Objective: (1) To determine the prevalence of SCT symptoms in a pediatric general population (2) To define which psychiatric symptoms are more related to SCT.
Method: Participants: 426 three schools in Catalonia (Spain) and children who attended the outpatient pediatric health center (ABS Ramón Turró, Barcelona) Instrument: Achenbach's Child Behavior Checklist (CBCL). Using 4 items: (SCT-scale): 13 ("confused or seems to be in a fog") 17 ("daydreams or gets lost in his/her thoughts") 80 ("stares blankly") 102 ("underactive, slow moving, or lacks energy"). Cutt-of: 4. Data analysis: cross sectional study. And descriptive study of the two groups (SCT, No SCT) by comparison of means with t test for independent samples. Calculating the prevalence of SCT.
Results: Of the 426 children, 24 has symptoms SCT, means a prevalence of 5.6 %. Subjects with SCT symptoms have higher scores on all the dimensions of the Achenbach's CBCL, and this difference was statistically significative.
Conclusion: (1) Prevalence obtained in this pediatric sample are similar to those obtained in other epidemiological studies performed in adult general population, concluding that the SCT is a feature that is maintained over time. (2) Subjects with SCT have more internalizing and externalizing problems and anxiety/depression behavior and attention.

P-19-006 ADHD–related symptoms and the perception of emotion regulation difficulties in children

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* Chieti, Italy

Objective: The present study aimed to investigate the relationship between difficulty in executive functions (EF), defficits in emotion modulation and the presence of differents ADHD subtypes in children. Possible gender differences were examined.
Method: The EF assessments are still in controversy. It is still unclear whether the everyday implementation of EF can be assessed under laboratory condition. In our study the children EFs were evaluated using the Brown ADD Rating Scales for Children (8–12 years) in clinical structured interview. The sample was represented by 141 children, aged 8–12 years.
Results: The data were analyzed using specific statistical methods (SPSS 15) correlations, analysis of variance. The results proved the existence of a significant relationship between emotion regulation difficulties and both ADHD probability and predominant ADHD type. The respondents were classified in three groups: ADHD higly probable, ADHD probable but not certain and ADHD not probable. In the first group the most children have the combined type. The presence of ADHD syptoms in boys is higher then in girls.
Conclusion: The results verified a significant relation between emotion regulation and diagnosis markers (action/hyperactivity, total disattention and total combined). In clinical group is no correlation between difficulties in emotion regulation and total disattention, while in preclinical group is no correlation between difficulties in emotion regulation and total combined. The most affected EF resulted attention-concentration.

P-19-007 An integrated model of executive functioning is helpful to understand Attention Deficit/Hyperactivity Disorder (ADHD) and associated disorders

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* Bosisio Parini (lc), Italy

Objective: The aim of this study is to investigate the discriminative capacity of new Executive Function (EF) tasks to better define the cognitive functioning of children with Attention Deficit/Hyperactivity Disorder (ADHD) and associated disorders, in particular with Reading Disorder (RD) or with Oppositional Defiant Disorder (ODD); a second purpose of this study is to test the model proposed by Burgess et al. (2000) using ecological neuropsychological tasks and an EF questionnaire for parents.
Method: Four groups of participants (11 ADHD-only, 12 ADHD + ODD, 13 ADHD + RD and 68 typically developing children) were presented with a battery of new EF tasks inspired by neuropsychological models (Burgess et al. 2000; Zelazo and Frye 1998), moreover parents rated daily EF skills of their children using the EF Questionnaire (EFQ). Five cognitive factors (Speed of Processing, Inhibition, Planning, Execution, and Memory) were extracted from EF tasks, and two cognitive factors (Metacognition and Inhibitory Control) were extracted from EFQ. Comparisons between groups were carried out on the five factors of the EF battery and two factors of the EF Questionnaire. Correlation analysis was performed between the EFQ subscales and factors of the EF tasks to examine the ecological validity of the EF battery.
Results: All children with ADHD were impaired on Execution (a measure to describe the capacity to achieve the goal). ADHD-only children were specifically impaired on Planning, ADHD + RD children were impaired on Speed of Processing and Memory, but children with ADHD + ODD did not show impairment of any other EF domains. EF processes of the neuropsychological tasks correlated with the two sub-scales of the EF Questionnaire.

Conclusion: The present study accurately separates and describes different cognitive profiles in children with ADHD with or without comorbid disorders using new neuropsychological EF measures. These tests show good ecological validity, significantly correlating with parent ratings of EF in everyday activities.

P-19-008 Verbal fluency in boys with ADHD

M. Dabkowska*, M. Wilkosc, W. Chytra-Gedek, M. Mitros, J. Nowak

* Bydgoszcz, Poland

Objective: Verbal fluency abnormalities partly result from online activities related to working memory, which impair the speed of activating words based on designed criteria. The study evaluated verbal fluency (formal reaction criterion) in ADHD diagnosed children in relation to anxiety disorder diagnosed children and compare to control healthy children in the same age.
Method: The examined group was composed of 30 boys with ADHD; the diagnosis of the combined subtype ADHD was the most frequent. The same cognitive functions in ADHD diagnosed children were compared to results of FAS tests in 30 anxiety disorder diagnosed boys and to results of FAS tests in 33 healthy boys from control group. Neuropsychological evaluation—Verbal Fluency Test (FAS) The test measures the creation and fluency of verbal expression according to a provided criterion. The letter version of the FAS was used (formal reaction criterion). Patients were given 60 s each to generate words beginning with a specified letter (FAS), excluding proper nouns, numbers, and multiple forms of the same word. The dependent variable was the number of correct responses summed across the 3 letters. ADHD was diagnosed in agreement with the DSM IV TR research criteria. The ADHD Rating Scale questionnaire—IV version for parents was used.
Results: Children with attention deficit hyperactivity disorder retrieve fewer words on verbal fluency tasks than age-matched control children. Selective cognitive functions (verbal fluency) significantly distinguish between boys with ADHD and boys from control group. The results did not reveal significant differences in selected neuropsychological tests' performance between the boys with ADHD diagnoses and boys with anxiety disorder diagnoses.
Conclusion: In the research on children with ADHD the use of tests and neuropsychological trials designer for evaluation of executive functions is justifiable.

P-19-009 Information processing and perception abilities of children with Attention-Deficit/Hyperactivity Disorder

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* Sao Paulo, Brazil

Objective: This study aims to evaluate information processing and perception abilities of children diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD) using the Rorschach Method, in accordance with Exner Comprehensive System.
Method: Eleven male kids and four female kids between the ages of 7 and 15 years old participated in the study. 40 % of them presented ADHD- Predominately Inattentive Type; 7 % presented ADHD-Predominately Hyperactive-Impulsive Type and 53 % presented ADHD-Combined Type. After the neuropsychological evaluation carried out at the Center for Child Neuropsychological Care of São Paulo Federal University (Núcleo de Atendimento Neuropsicológico Infantil da Universidade Federal de São Paulo), the Rorschach Method was applied. The variables of the Information Processing Module were selected for interpretation of results.
Results: (a) Perception abilities 67 % of the participants had mistaken interpretation of events, people and significance of their actions; 33 % presented good abilities to form impressions of themselves and others correctly. (b) Attention capacity: 80 % presented difficulties to concentrate precisely and summarize aspects of their experience; 20 % presented good capacity to do so. (c) Inputs and organization of information 67 % tend to incorporate more information than they can organize; 33 % presented good capacity to do so. (d) Ability to relate events to preexistent data 67 % presented the ability to organize their thoughts and associate ideas coherently; 20 % were excessively meticulous in analyzing information; 13 % presented hasted judgments with little discrimination.
Conclusion: Children with ADHD present difficulties in adequately perceiving events and the significance of people's actions, which makes it difficult to recognize the boundaries of their behavior and their decision-making process. They incorporate more information than they can organize, which raises difficulties to discriminate what is essential. The study of processing information in ADHD contributes to the comprehension of the complexity of symptoms.

Friday, 07 June 2013, 15.00–16.00

P-20 Pathophysiology: Children and adolescents II

P-20-001 Analysis of emotional self-regulation using the child behaviour checklist (CBCL) and behaviour-rating inventory of executive function (BRIEF) in children with ADHD

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* São Paulo, Brazil

Objective: Previous studies have shown deficient emotional self-regulation in ADHD children using the CBCL. The aim of this study was to examine whether the Behavioral Regulation Index (BRI) from BRIEF can identify in the same way a sample of children with ADHD. We analyzed also the correlations between emotional variables and measures of attention and working memory.
Method: The sample was composed by 67 children with ADHD (mean age 9.5 ± 1.8). According to previous works, the CBCL-Deficient Emotional Self-Regulation (DESR) was defined as positive by a score of $\geq$180 but $\leq$210 on AAA scales (sum of attention problems; aggressive behavior, anxious/depressed scales) and CBCL-Severe Dysregulation $\geq$210 (2 SDs). For the BRI-BRIEF (sum of inhibit, shift, emotional control scales) the deficiencies was defined by scores $\geq$60 and $\leq$70 (1 SD), and $\geq$70 (2SD). Spearman's rho coefficient was used to analyze the correlations between emotional measures and scores on the Conners' CPT: omission, commission, reaction time and perveration, and working memory scale from BRIEF.
Results: In our sample 37.3 % of children with ADHD had a positive CBCL-Deficient profile and 50.7 % had CBCL-Severe Dysregulation. In the BRI parent-form 33.5 % children showed score between 60–70 and 41.8 % $>$ 70; In the BRI teacher-form this scores were 22.4 and 40.3 %, respectively. There were significant correlations between CBCL-DESR profile and BRI and working memory but only for parent form. Significant correlations were not found between CCPT measures and emotional variables.

Conclusion: In this study children were discriminated with deficient emotional regulation using CBCL AAA profile and measures of the BRIEF, a tool to assess the everyday executive functions. These results mean that an ADHD child with a positive profile on the CBCL may present difficulties in the academic setting and everyday world rather than in isolation on clinic-based performance tests.

P-20-002 Impaired oculomotor response inhibition in children with ADHD symptoms

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* Warsaw, Poland

Objective: The aim of the project was to determine whether children with ADHD symptoms are impaired at performing oculomotor response inhibition tasks.
Method: Two types of antisaccade task (gap/overlap) were administered to ADHD symptoms children and control participants ranging in age from 4 to 5 year. All participants included in this research were diagnosed using CEC—Behavioral Short Scale and BRIEF-P. All children participated in Raven test. Additionally parents filled in information of development of their children, family, mothers and fathers. ADHD children were diagnosed during an interview with a psychiatrist using DSM-IV TR criteria, summarized information from teachers, parents and ratings scales.
Results: Children with ADHD symptoms exhibited significantly a higher rate of prosaccade errors $F(1,24) = 174.83$, $p = 0.032$, ($M = 6.5$) in antisaccade tasks to compare with control group ($M = 4.59$). There were significant differences between anti-gap and anti-overlap $F(1,24) = 6.93$, $p = 0.015$. There was a significant interaction variables gap/overlap and direction $F(1,24) = 34.13$, $p < 0.001$. The anti-gap right caused more errors occur (anti-gap left $M = 5.35$, anti-overlap left $M = 5.58$; anti-gap right $M = 6.81$; anti-overlap right $M = 4.15$). Additionally, children with ADHD symptoms committed more errors in the first saccade. Correlation between the number of directional errors (reflecting inhibitory problem) and BRIEF-P Inhibit Scale was 0.32, $p < 0.01$.
Conclusion: The results are in line with Barkley's theory that inhibition deficit is the primary dysfunction in individuals with ADHD, who have difficulty in suppressing inappropriate behavioral responses. There is a need to continue oculomotor studies in order to: (1) confirm the validity of results in older children, (2) distinguish the level of inhibition deficits, and (3) to measure other cognitive deficits (memory and attention) associated with ADHD.

P-20-003 Assessment and reassessment four years later of the stress response in Brazilian children and adolescents with attention deficit disorder and hyperactivity: Do their symptoms persist?

S. M. Palma*, H. Calil, A. C. Natale

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Objective: This study consisted of two phases to evaluate the function of the hypothalamic–pituitary–adrenal (HPA) axis during stress response through the measurement of salivary cortisol, twice and to assess the persistence of symptoms.
Method: We study 38 children with ADHD, paired with 38 healthy controls. The cortisol samples were taken in four different timepoints: 15 min before exposure to a cognitive stressor—Continuous Performance Test (CPT), and 20, 40 and 60 min after the test. The HPA axis function was reassessed, 4 years later, using the same procedure in 37 adolescents with ADHD and 22 healthy controls out of the initial group. We also evaluated the persistence of symptoms, development of comorbidities and medication use in the ADHD group.
Results: The basal cortisol levels in Phase I were similar in both groups. The average values of cortisol in the four time intervals were not different among the three ADHD subtypes (inattentive, impulsive and combined-hyperactive). Thus, the experimental group was treated as a single group. Following the stressor test, the ADHD group showed values of salivary cortisol greater than the control group at the time intervals of 20 and 40 min, whereas in the latter group exposure to CPT did not increase cortisol. Cortisol concentrations in Phase II for the experimental group were lower than in the control group. Twenty-eight of 37 patients (75 %) fulfilled at least one of the persistence definitions.
Conclusion: The persistence of symptoms was associated with a higher number of other mental disorders symptoms, higher levels of educational and interpersonal deficiencies than in the control group. These results suggest that increased levels of cortisol in the ADHD group in Phase I might have occurred by the absence of comorbidities, and the impaired response to stress could be a marker for the most persistent type of this disorder, associated with comorbidities.

P-20-004 Is ADHD associated with risk seeking?

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* Israel, Israel

Objective: The present research aimed to examine whether differences in risk attitude underlie the tendency of individuals with ADHD toward risky behavior.
Method: In a series of studies, adolescents with and without ADHD performed several gambling tasks, in which they had to choose between safe and risky options. Notably, as in many studies risky behavior is confounded with less favorable outcomes, poorer learning of contingencies and the difficulty to avoid delay, the tasks in the current study were designed to minimize such confounding by equaling the expected utility of the options, and refraining from delay and complex contingency learning.
Results: Adolescents with and without ADHD did not choose the risky options more often than control subjects. Furthermore, in descriptive conditions that included trial-by-trial feedback, subjects with ADHD tended to prefer the safe options.
Conclusion: These findings challenge the notion that ADHD is associated with risk seeking and suggest that other factors underlie ADHD-associated risk taking. The current study also suggests that differences in feedback processing underlie some of the atypical decision making that characterizes ADHD.

P-20-005 The role of emotional distress and ADHD in predicting institutional behavioural disturbance and recidivism among offenders

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* London, United Kingdom

Objective: Adult attention deficit hyperactivity disorder (ADHD) has been associated with behavioural disturbance in prison. The aim of this study was to examine the role of emotional distress, as well as ADHD symptomatology in explaining (1) recidivism and (2) incidents that are more likely to be reactive (e.g., impulsive) such as behavioural disturbances in prison, and to violent and non-violent offending.
Method: 196 male prisoners from Aberdeen prison completed the Symptom Checklist- 90 (SCL-90), which examines various clinical symptoms and emotional distress. Current adult symptoms were assessed by the DSM-IV criteria for ADHD.
Results: ADHD symptomatic participants displayed greater psychopathology on all SCL- 90 subscales, with mostly large effect sizes. Both emotional distress and ADHD explained the variance in prison records of behavioural disturbance above and beyond antisocial personality (ASP) traits, however much of the effect of emotional distress was mediated by ADHD symptoms. Only ADHD symptoms were significantly associated to history of violent offending, mediating the role of distress. Conversely, ASP traits and age mostly explained the variance for non-violent offences and overall recidivism.
Conclusion: Our results provide support for the conceptual association between ADHD and its related emotional dimension with behavioural disturbances in prison, reactive and violent offending. These are innovative findings that provide evidence of a specific pathway of offending associated with ADHD.

P-20-006 Risky decision-making on gambling tasks in ADHD: A systematic literature review

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Objective: Attention deficit hyperactivity disorder (ADHD) is a risk factor for engagement in risky behavior and is associated with aberrant reward and punishment sensitivity. The aim of this systematic literature review was to gain insight into the relationship between ADHD and risky decision-making on gambling tasks and to identify confounding factors.
Method: Twenty-five studies were included in the review that compared individuals with ADHD to normal controls (NCs) concerning their performance on a gambling task.
Results: The majority of studies found evidence that children/adolescents with ADHD make more risky decisions on gambling tasks than NCs, whereas a minority of studies reported aberrant risky decision-making in adults with ADHD. This outcome pattern did not differ between studies applying an implicit or explicit gambling task. A number of studies demonstrated that comorbid oppositional defiant disorder (ODD) and conduct disorder (CD) enhance risky decisions in ADHD. Limited and/or inconsistent evidence was found for confounding effects of comorbid internalizing disorders (IDs), ADHD subtype, and use of methylphenidate (MPH). Most studies controlled for group differences in age, sex, and intelligence.
Conclusion: The evidence for more risky decisions on gambling tasks is stronger for children/adolescents with ADHD than for adults with ADHD, which may point to developmental changes in reward and/or punishment sensitivity. Increased risky decision-making in children/adolescents with ADHD, suggests that children/adolescents with ADHD favor less probable large rewards over more probable smaller rewards, and risk higher punishments for those rewards. The literature suggests that comorbid ODD/CD is a risk factor in ADHD for enhanced risky decision-making. Comorbid IDs, ADHD subtype, and MPH use may also affect risky decision-making, but these factors have to be further examined.

P-20-007 Everyday memory in children with Attention Deficit Hyperactivity Disorder

C.-C. Kao*, P.-L. Tsai, I.-C. Chen

* Taiwan

Objective: Studies have shown that children with Attention Deficit Hyperactivity Disorder (ADHD) have deficits in working memory based on laboratory work, but little is known about the memory performance of these children in a real-life environment. The aims of this current study were to investigate the everyday memory function in children with ADHD, and to explore the specific profile of everyday memory across different domains.
Method: A total of 20 children with ADHD and 20 children with typical development (TD) were recruited to participate in this study. Their everyday memory performance was evaluated using the Rivermead Behavioural Memory Test for Children (RBMT-C).
Results: χ^2 tests indicated that the range distributions of the two groups were significantly different ($p = .017$). Five (25.0 %) ADHD-group children and none TD-group child had everyday memory deficits. Although the total everyday memory scores of the ADHD group were not significantly lower than those of the controls ($p = .072$), the effect sizes were medium (d = .59). ADHD-group children generally had lower scores across domains except the spatial memory domain. Individual *t* test showed that ADHD-group children scored significantly lower than TD-group children primarily on the verbal memory domain ($p = .044$, d = .78).
Conclusion: We provide evidence that there is an increased risk of everyday memory difficulties in children with ADHD, particularly in the verbal memory domain. The clinical implications of these findings and recommendations for future research are discussed.

P-20-008 Do children with ADHD have poor motor function compared to normal control?

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* Yangsan, Republic of Korea

Objective: The purpose of this study was to compare motor function between children with ADHD and children without ADHD, using Korean version of Bruininks-Oseretsky Test, 2nd edition (BOT-2).
Method: Medication-naïve children with ADHD (N = 27; 22 males, 5 females; 7- to 10-year-old) who visit 2 hospitals were recruited. K-SADS-PL were used for diagnosis. Korean version of ADHD Rating Scale-IV(K-ARS-IV), Conner's Abbreviated Parent Rating Scale (CAPRS), and ADHD Diagnostic System (ADS) were administered to screen ADHD. Subjects who have comorbid transient tic disorder were included. Healthy children (N = 45; 27 males, 18 females; 7- to 10-year-old) who have no history of DSM-IV Axis I disorders were recruited as control group. K-SADS-PL, K-ARS-IV and CAPRS were administered to screen the healthy control group. The Bruininks-Oseretsky Test of Motor Proficiency, 2nd edition (BOT-2) is an individually administered test that uses engaging, goal-directed activities to measure a wide array of motor skills in individuals aged 4 through 21.
Results: No demographic difference was found between two groups. Medication-naïve children with ADHD have poorer motor function compared to children without ADHD in fine motor integration, manual dexterity, bilateral coordination, balance, running speed, upper-limb coordination, and stength.

Conclusion: To our knowledge, this is the first study of motor function in the children with ADHD using the BOT-2.Our results suggest that ADHD is a kind of disorder which is characterized by poor motor coordination, poor fine motor function, and poor body balance. And BOT-2 could be considered as a good assessment tool for discriminating between children with ADHD and children without ADHD. To confirm the results of this study, further study with larger number of subjects is needed.

Saturday, 8 June 2013, 15.00–16.00

P-21 Pathophysiology: Children and adolescents III

P-21-001 The influence of executive function of children with Attention Deficit Hyperactive Disorder on their outcome in the early adulthood

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Objective: This historical cohort study is to explore whether executive function (EF) of children with Attention Deficit Hyperactive Disorder (ADHD) will influence their outcome when they come into early adulthood or not.
Method: Children who met DSM-IV ADHD criteria in our baseline data were followed up when they grew into early adulthood. During the baseline interview, they were administered four performance-based tests capturing inhibition, working memory, shifting and planning components of EF. During the follow-up interview, their outcome were assessed by Conner's Adult ADHD Diagnostic Interview, Structured Clinical Interview for DSM-IV-TR Axis I and II Disorders, and locally developed scale of social function. For the diagnostic outcome, Logistic regression was run with the four EF indexes, comorbidities, ADHD subtype, and systemic medications as the covariates and the diagnosis of adult ADHD as the dependent variable. For the functional outcome, Logistic regression was run with the same covariates as those for the diagnostic outcome and the need of home tutor as the dependent variable.
Results: We followed up 71 (31 by telephone) out of 169 patients when they grew into early adulthood. Their age ranged from 7 to 15 years old in the childhood and from 18 to 19 in the early adulthood. Among them, 16 were female and 31 completed systemic medications. The shifting component of EF and co-occurring Conduct Disorder (CD) in the childhood were found to be the independent factors of the functional outcome in the early adulthood. That was, the poorer the shifting ability ($P = 0.01$, OR = 1.1), the more co-occurring CD ($P = 0.04$, OR = 5.4), the more need of home tutor. However, no positive result was found for the diagnostic outcome.
Conclusion: This study indicated that the poorer the shifting ability in the childhood of children with ADHD, the poorer functional outcome in their adulthood.

P-21-002 Development of hot and cold executive functions in girls and boys with ADHD: A two-year longitudinal study

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* Lillehammer, Norway

Objective: One central source of the disability associated with ADHD is impaired executive functions (EF). However, many subjects with ADHD perform normal on EF tests. According to the dual-pathway model, EF impairments more often appear in everyday situations where emotional and motivational processes interact with EF processes (Sonuga-Barke 2005). To date longitudinal studies dealing with emotional regulation and EF in naturalistic settings have been largely absent. The aim of the present study was to investigate the longitudinal course of executive processes with pronounced (hot EF) and less pronounced (cold EF) emotional salience after 2 years in children and adolescents with ADHD. Potential gender effects was also examined.
Method: Eighty-two children with ADHD (11.6 years at baseline; 45 males), and 50 healthy controls (HC) (11.6 years at baseline; 32 males) were assessed with laboratory tests (traditional neuropsychological tests, hot decision-making task) and inventory based scales (BRIEF) assessing hot and cold EF at baseline (see Skogli et al. 2013) and after 2 years. Linear mixed models were used to estimate the effect of time on EF performance and whether this effect differed by gender.
Results: At follow-up the ADHD group showed impaired performance on all cold EF tests, and on all BRIEF scales. There were no between-group differences on the hot decision-making task. Both groups improved performance on all cold EF tests across time. There was no effect of time on hot decision-making performance in any of the groups. Only the ADHD group improved on the BRIEF. There was an effect of group X gender interaction on the hot decision-making task, with girls in the ADHD group showing deteriorating performance relative to girls in the HC group.
Conclusion: Results indicate different developmental trajectories in hot and cold EF, with gender specific effects on the hot decision-making task.

P-21-003 The Cambridge gambling task in children with ADHD: Problems with delay aversion more than risky behaviour causing impulsive decisions

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Objective: The Cambridge Gambling Task (CGT) can be applied to examine sub-optimal decision-making in children with ADHD (DeVito et al. 2008). This is because it allows different cognitive and motivational indices to be dissociated; including delay aversion (the motivation to escape/avoid delay) and risk proneness (the willingness to take risks). Our primary aim was to examine the independent role of delay aversion and risk proneness in impulsive decisions in ADHD. We predicted that children with ADHD would make less rational decisions because of primary problems with delay aversion rather than due to high-risk choices. Our second aim was to examine how anxiety altered these response patterns. We expected that children with high levels of anxiety would have increased tolerance for delay of reward that would then lead to more optimal decision-making.
Method: Children with ADHD (n = 34) and typical developing children (n = 32) performed the CGT, and filled out the Spielberg State Anxiety Scale. We run a factor analysis of the CGT measures and included the factors then as outcome variables in between-group ANCOVAs.
Results: We detected two orthogonal CGT factors both implicating the delay aversion score: Factor 1 (Delay Aversion) in which high Delay Aversion scores were correlated with Sub-optimal Decision Making. Factor 2 (Risk Proneness) in which high risk taking

correlated with delay tolerance, Children with ADHD had significantly higher scores on the "Delay Aversion" Factor compared to the control children, indicating that problems with delay aversion led to more impulsive decision-makings. Anxiety correlated only positively with the "Risk Proneness" Factor—suggesting that the more anxious children took more risks.
Conclusion: We found no evidence that ADHD children were prone to more risky decisions. Delay aversion was the main factor constraining decision-making in ADHD. At the same time higher levels of anxiety led to a delay tolerance, which allowed for more risky decisions.

P-21-004 The moderating role of parental education in the relation between ADHD symptoms and executive functions

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Objective: Contemporary views on ADHD etiology emphasize that not all children with this condition show poor executive functioning (EF; e.g., Nigg et al. 2005), implicating the potential for moderating variables. The present study investigated the moderating role of socioeconomic status (SES) as indexed by parental education in the relation between ADHD-symptoms and executive functioning (EF) in a normal sample of 9-year old children. The hypothesis was that the relation between ADHD symptoms and EF would be stronger in higher than lower SES groups. This hypothesis was based on the idea that ADHD share biological influences with EF (e.g., Doyle et al. 2005), in combination with the notion that ADHD-symptoms occurring in high-SES contexts are more likely to be biologically based, whereas the larger variety of environmental risks in low-SES contexts could potentially cloud the importance of biologically based factors.
Method: 163 children performed a comprehensive set of EF tasks assessing working memory, inhibition, and shifting. ADHD symptoms were assessed by aggregating ratings (DSM-IV criteria) from parents and teachers. Parents also reported their own educational attainment.
Results: Table 1 shows that whereas working memory was similarly related to ADHD symptoms in both the lower and higher educational group, the relations of inhibition and shifting with ADHD symptoms were generally stronger in the higher educational group, with two interactions with group being significant ($\beta = .19$, $p < .05$) or near-significant ($\beta = .14$, $p = .08$).
Conclusion: We received partial support for our hypothesis by showing that SES as indexed by parental education moderated the relation between ADHD symptoms and two of three EFs. This indicates that the ADHD symptom-EF link may not be as robust as previously suggested (e.g., Barkley 1997). Results are also discussed in relation to multiple pathway models of ADHD (Castellanos et al. 2006).

Table 1 Correlations between ADHD symptoms and executive functions as a function of parent educational group

	Inattention	Hyperactivity/ impulsivity
Lower educational group		
Working memory	−.28**	−26*
Inhibition	−.10[a]	−.03
Mental set-shifting	−.24*	−.15[b]
Higher educational group		
Working memory	−.33**	−.26*
Inhibition	−.30*[a]	−.31**
Mental set-shifting	−.41***	−.47***

[a] Difference between groups indicated by a significant interaction

[b] Difference between groups indicated by a near-significant interaction

* $p < .05$

** $p < .01$

*** $p < .001$

P-21-005 Executive function impairments in ADHD

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Objective: Executive Function (EF) is a psychological construct that is composed of multiple interrelated high-level cognitive skills. Various theoretical models of Executive Function have been developed, and these models have influenced research and clinical practices. Cognitive skills commonly ascribed to this domain are: "Cold" executive for example strategic planning, organization, goal setting, behavior monitoring, problem solving, inhibition, working memory, cognitive flexibility and "Hot" executive such as empathy, theory of mind, emotional regulation, affective decision making. Cold and Hot EFs are considered intimately connected and are almost always utilized in combination for daily functions. Several authors have proposed that symptoms of attention-deficit/hyperactivity disorder arise from a primary deficit in specific EF domain such as response inhibition or working memory or a more general weakness in executive control. The purpose of current research is to evaluate the executive functioning in children with ADHD and to identify developmental trajectories in this clinical population.
Method: 1,030 subjects took part in this research, 980 control subjects and 50 children diagnosed with ADHD. All subjects aged between 8 and 13 years and had IQ bigger than or equal to 85 and the presence of ADHD was tested using Conners' Scale. The subjects were administered a new neuropsychological battery including: Daily Planning task, Battersea multitasking Paradigm Task, Brixton Task, Gambling Task. Parents and Teachers were asked to complete the questionnaire for evaluation of EF.
Results: The performance of ADHD are lower and qualitatively different than those of controls in all tests. In ADHD children we also note age-dependent changes in memory, planning and organizational skills.
Conclusion: Consist with literature children with ADHD exhibited executive function deficits on both neuropsychological tests and questionnaires completed by parents and teachers.

P-21-006 Interference of emotional information on task performance in children and adolescents with Attention Deficit/ Hyperactivity Disorder

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* Ghent, Belgium

Objective: There is a growing interest in emotion regulation in ADHD (Martel 2009). This study investigates the hypothesis of emotional dysregulation by measuring the interference of emotional information on task performance in an E-n-back task (Ladouceur

et al. 2005). Children with ADHD are expected to show more interference with their task performance.
Method: The study included 34 typically developing participants and 22 diagnosed with ADHD, both subdivided in two age groups, children (8–12 years old) and adolescents (13–15 years old). The participants had to react to letters presented on top of either a black screen or a positive, negative, or neutral picture in two different working memory load conditions. Speed and accuracy of responses were analyzed with repeated measures analyses with load and background as within-subjects variables.
Results: Slower reaction times were observed when there was a picture as background compared to a black screen, independent of diagnose or age group. In the youngest age group reactions were slower with a positive or negative picture as background compared to a neutral picture. In addition, independent of diagnose or age group, accuracy was lower for trials with a neutral or positive picture compared to trials with a black screen and for trials with a negative picture compared to trials with a positive picture. Furthermore, participants with ADHD were overall less accurate than typically developing participants, across age groups. Children were overall slower and less accurate than adolescents. However, the hypothesized interaction-effect between background and diagnose was not found.
Conclusion: Emotional information did interfere with task performance. Nevertheless, this interference was similar for participants with ADHD and typically developing participants. Therefore, the current study could not provide evidence for emotion dysregulation in ADHD. Future studies should investigate the inconsistencies across studies as a function of the method used to evaluate emotion regulation.

P-21-007 Assessment for attention: Neuropsychological values describing cognitive attentional functioning in ADHD

L. J. Weiler*, A. Schuch-Brendel, A. Mikula, U. Leiss

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Objective: ADHD is more commonly associated with hyperactivity and behavioral problems than with impaired cognitive functioning. In past research though, predictive values for attention deficits in ADHD were proved in Go/Nogo tasks, increased reaction time variability and errors in divided attention. With regard to these findings neuropsychological assessment for attention was described rather indistinct and has often been neglected in ADHD guidelines. The study aimed to describe the functioning of attention very detailed, to prove the necessity of neuropsychological assessment in ADHD.
Method: Children with ADHD ($N = 54$) and peers without ADHD ($N = 54$) between 7 and 15 years (average 11;3) were assessed for the following attentional constructs: Alertness, sustained attention, processing speed, orienting, perception, focused attention, distractability and divided attention. Each construct was assessed through chosen subtests of neuropsychological tests (KITAP—Zimmerman 2003, HAWIK-IV—Petermann 2007 and D-KEFS—Delis 2001). Further factors as medical treatment, parental ratings, observation and school performance were considered. For evaluating differences in the parallelized groups ANOVA and Welch-Test were conducted.
Results: Children with ADHD show more anticipations, a significant slowing in and higher variability of reaction in Alertness. Furthermore ADHD children have overall difficulties in sustained attention. Concerning processing speed, there could be shown a significant slowing in the ADHD group. No differences were shown in parameters of perception and orienting. The results in focused attention confirm that children with ADHD solve fewer tasks in the same time as peers and with significantly more errors. In distractibility and divided attention ADHD children show a significant higher variability in reaction and a higher amount of errors and omissions.
Conclusion: The neuropsychological results highlight the difference of attentional functioning between children with and without ADHD. Due to these findings it makes it even more important to supplement available guidelines with a specific assessment for attention.

P-21-008 Comparison of attention function between children and adolescents with ADHD: Preliminary study

Y. Younghui*, E.-J. Park

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Objective: It is known that children with ADHD are different from adolescents with ADHD in some clinical characteristics. So we investigated attention function between these two groups.
Method: We gathered clinical characteristics and continuous performance test (CPT) results of subjects with ADHD through a retrospective chart review. Parent of subject conducted two self-reports, the ADHD Rating Scale, Korean version (K-ARS) and Child Behavior Checklist (CBCL). The higher scores in K-ARS and CBCL mean more severe symptoms. The diagnosis was based on DSM-IV-TR. There were 34 children (aged 6–9) and 20 adolescents (aged 12–15). All subjects have an IQ more than 70. We analyzed the data using an independent t test at p value of <0.05.
Results: The mean age of children and adolescents were 7.5 (SD 0.99) years old and 13.5 (SD 1.19) years old, respectively. There were no significant differences between children and adolescents in gender distribution and IQ. The mean of total scores, inattention scores and hyperactivity/impulsivity scores of children in K-ARS were 24.7 (SD 11.15), 12.8 (SD 6.09) and 11.8 (SD 5.87), whereas those of adolescents were 21.6 (SD 12.05), 13.5 (SD 7.00) and 8.16 (SD 5.73), respectively. The mean of hyperactivity/impulsivity scores of children in K-ARS was significantly higher than that of adolescent group ($p = 0.03$). In CBCL scores, adolescent with ADHD showed significantly higher mean T-score in anxious/depressed ($p = 0.009$), social problems ($p = 0.008$), attention problems ($p = 0.034$), and rule-breaking behavior ($p = 0.04$). In CPT test, adolescent with ADHD showed significantly higher mean omission error score than that of children with ADHD.
Conclusion: Although adolescents with ADHD showed less hyperactive symptoms and more favorable results in attention test than children with ADHD, they might suffer more complex and severe symptoms.

P-21-009 Are choices between short and long-term rewards mediated by time perception in children with Attention Deficit/Hyperactivity Disorder (ADHD): Delay aversion or state regulatory deficit?

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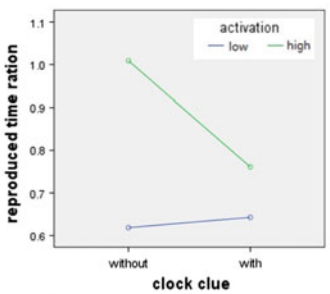
Objective: Children with ADHD are tend to choose small short-term rewards (SS) over larger long-term rewards (LL). When extra environmental stimulations are presented during waiting period, they could choose as many LL as typical development children. According to Delay Aversion (DAvs) and State Regulatory Deficit (SRD), subjective time perception (STP) and activation mediate the effect of environmental stimulations on ADHD's choice preference

respectively. Those two factors were mixed in previous studies as activation level was always associated with STP. The current research examined their impact on choice preference of ADHD.
Method: Clock clue was innovatively used to divert attention to time process to lengthen STP while maintaining stable activation level. Firstly, reproduce time task was used to verify whether clock clue could dissociate STP form activation. This was a 2*2 (activation level *clock clue) repeated measurement design. Secondly, Maudsley Index of Childhood Delay Aversion (MIDA) was finished under the same four conditions.
Results: Main effect of activation ($F(1,11) = 11.84$, $p < 0.01$, $\eta^2 = 0.52$, $1\text{-}\beta = 0.88$) and interaction ($F(1,11) = 18.43$, $p = 0.001$, $\eta^2 = 0.63$, $1\text{-}\beta = 0.97$) on mean reproduced time ration (MRTR) was statistically significant. MRTR was significantly longer without clock clue on low activation level ($F(1,11) = 8.89$, $p = 0.01$, $\eta^2 = 0.45$, $1\text{-}\beta = 0.75$). In MIDA, only main effect of arousal level on choices was observed ($F\ (1,\ 11) = 4.46$, $p = 0.05$, $\eta^2 = 0.29$, $1\text{-}\beta = 0.49$).Children chose fewer SS in high activation level.
Conclusion: Clock clue significantly altered STP but did not show effect on choice preference. It suggested that STP may not be the mediated variable. However, the effect of clock clue on STP was contradictory to our hypothesis which needed cautions to interpret the results. Activation level was observed to be the factor that affected choice preference. Our results supported SRD not DAvs.

statistics on two tasks

Table. 1 Choice ration on ss in MIDA task

	with clock clue(M±SD)	without clock clue(M±SD)
high activation	0.431±0.349	0.438±0.363
low activation	0.514±0.372	0.555±0.320



Graph1 reproduced time ration in four conditions

P-21-010 Executive functions profile in children and adolescents with or without ADHD: By using performance-based measures and homework and work habits (HWH) questionnaire

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Objective: The first purpose of this study was to compare executive functions in children and adolescents with and without Attention Deficit/Hyperactivity Disorder (ADHD) using performance-based measures. The second aim was to demonstrate how daily functions of the children and adolescents with ADHD are impaired using the developed questionnaire about Homework and Work Habits (HWH). The final aim was to investigate the relationship between HWH ratings and performance-based measures of executive functions.
Method: A group of children between the age of 7–17 who met the DSM-IV criteria for the first time for ADHD ($n = 60$) as the patient group and 7–17 age children and adolescents ($n = 60$) as the healty control group were included in this study sample. Parents and teachers of the participations were asked to fill up a form of HWH ratings to evaluate performance based executive functions. Participants completed the Wisconsin Card Sorting, Stroop Color and Word and Trail Making (B) tasks. In addition, HWH questionnaire was given to the children and adolescence and their intelligence level was evaluated with Wechsler Intelligence Scale for Children-Revised.
Results: ADHD group participants displayed lower performance in all of the performance-based executive functions measures and lower HWH scores compared to the controls.
Conclusion: The low scores in HWH questionnaire were found to be significantly related with performance based executive function tests.

Saturday, 8 June 2013, 15.00–16.00

P-22 Pathophysiology: Adults

P-22-001 The effects of methylphenidate on decision making in an adult ADHD sample: A pilot study

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Objective: Decision making (DM) is known to be impaired in ADHD. However, it is unclear precisely how it is impaired and how methylphenidate (MPH) helps to improve DM. The objective of this pilot study was to disentangle the effects of MPH in ADHD patients on cognitive mechanisms underlying value-based DM by analyzing choices with the drift diffusion model (DDM).
Method: Nineteen adults diagnosed with ADHD and 13 healthy control (HC) participants performed a cost/benefit DM (CBDM) task, which involved choosing to accept or reject choice options based on comparisons of costs and benefits. The results were analyzed with the DDM, a model of two-alternative forced choice decisions with free parameters that represent sub-processes of decision making, like processing speed and response caution. We used a hierarchical Bayesian fitting procedure to find, for each group, the best fitting parameters, which minimize the difference between observed and modeled reaction time and accuracy data.
Results: Average accuracy for ADHD groups was higher on medication than off (82.2 vs. 75.7 %, HC: 82.0 %), while average RT did not differ (2.0 vs. 2.01 s, HC: 1.94 s). The DDM-analysis (Figure 1) indicated that medication increased accuracy through an increase of processing speed (drift rate) and through greater response cautiousness (boundary separation). The HC group had a higher drift rate and larger boundary separation than both ADHD-groups.
Conclusion: Our pilot data suggest that MPH increases processing speed and response caution in adult ADHD patients during a CBDM task. Higher processing speed is indicative of an increased signal to noise ratio for evidence accumulation. The decreased decision boundary in the withdrawal condition could be caused by decreased motivation for accuracy. Interestingly, signal to noise ratio and the

ability to set decision boundaries that maximize accuracy are known to rely on cortical and subcortical dopamine.

P-22-002 Access to long-term memory is impaired in adult patients with Attention Deficit Hyperactivity Disorder

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Objective: To evaluate performance on tests of different executive domains of adults with Attention Deficit Hyperactivity Disorder (ADHD) and to investigate the role of chronic treatment with methylphenidate in these effects.
Method: We compared the performance in 6 different executive domains of 48 adult ADHD patients aged 18–40 years diagnosed using DSM-IV criteria and a healthy control group (n = 20) matched according to age, education, gender, and non-verbal intelligence quotient. Twenty patients were on stable doses of methylphenidate but did not take the medication on the testing day and the remaining were non-medicated patients. The cognitive domains assessed were executive shifting, updating, inhibition of prepotent responses, dual task performance, planning, and access to long-term memory. We also assessed symptoms of inattention and hyperactivity/impulsivity using the Adult ADHD Self-Report Scale, anxiety (with State-Trait Anxiety Inventory) and depression (with Beck Depression Inventory).
Results: Patients under treatment with methylphenidate had equivalent performance and symptoms of ADHD, anxiety and depression to that of non-medicated patients when they were not under acute effects of methylphenidate (one way General Linear Models; *ps* > 0.20). Compared to controls, patients (irrespective of medication status) were impaired in the shifting cost measure and phonemic fluency (measure of access to long-term memory). Only phonemic fluency impairment persisted after controlling for depression and anxiety symptoms which differed between patients and controls.
Conclusion: Chronic treatment with methylphenidate does not influence executive performance of ADHD patients when acute effects of the drug are eliminated. ADHD selectively impairs access to long term memory, which may alter performance in a wide range of daily tasks.

P-22-003 Complex prospective memory in adults with Attention Deficit Hyperactivity Disorder

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* Groningen, The Netherlands

Objective: Neuropsychological functions have been studied widely in patients with attention deficit hyperactivity disorder (ADHD). Adults with ADHD were found to be primarily impaired in domains of attention and executive functions, whereas smaller effects were shown in aspects of retrospective memory. However, little is known about the effects of ADHD on prospective memory. Prospective memory refers to the execution of delayed intentions in the future and is of high relevance for our social and occupational functioning.
Method: A paradigm of complex prospective memory was applied which distinguished between four phases in prospective remembering, such as task planning, plan recall, self-initiation and execution. 45 adult patients with ADHD not treated with stimulant medication were assessed and were compared to 45 matched healthy individuals. Additional aspects of cognition were assessed in order to identify potential mediators of impaired prospective memory.
Results: Patients with ADHD were found to be primarily impaired in task planning abilities as indicated by a large-scaled effect. Only negligible to small effects were observed for plan recall, self-initiation and execution. Inhibition was identified as a mediator of impairments in prospective memory.
Conclusion: The present findings suggest that four cognitive components contribute to the performance of prospective memory. Impairments of prospective memory mainly emerged from deficient planning abilities in adults with ADHD. Implications on behavioral based intervention strategies are discussed. In clinical settings, agreements and intentions for behavioral changes need to be carefully planned and prepared and external help might be necessary for patients to achieve this (e.g., by a therapist).

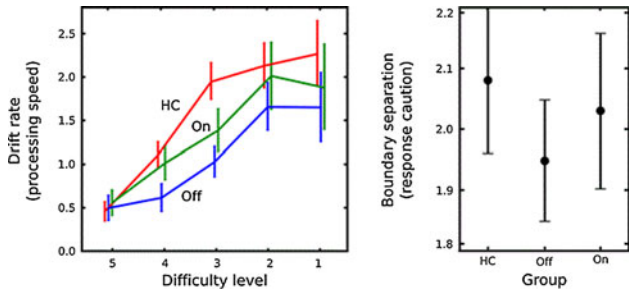

Fig. 1 Average drift rate across groups for each difficulty level (*left*), and average boundary separation across groups (*right*) on the CBDM. *Error bars* indicate 95 % confidence intervals

P-22-004 Neuropsychological characteristics in adults with ADHD

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Objective: Neurobiological causes play an important role in ADHD. Impaired executive control and decreased attention are often characteristic clinical features of ADHD. However, compared to the high number of studies in children, a little is known about the executive functions performance, attention, and working memory in adults with ADHD. This study examines neuropsychological functions in a clinical sample of adults with and without a high result in the Brown-ADD-scales (BADDS).
Method: The present study was carried out at the therapy and counselling center of the Georg-August-University Goettingen (TBZ). All patients (N = 1,029) completed a standardized diagnostic procedure (e.g., DIA-X). Those with a suspected ADHD (N = 287)

answered the Brown-ADD-scales (BADDS) and completed special performance tests (FAKT, CPT, WCST, working memory section of the WIT). The results of the BADDS were divided in four quartiles. 88 patients did belong to the highest quartile, 57 to the lowest. The results of both extreme groups in the performance tests were compared (ANOVA).
Results: In a first analysis 15 variables were examined. Patients with a greater degree of ADHD-symptoms showed significantly more mistakes (CPT, $p < 0.05$), lower test scores (all performance tests $p < 0.1$; WIT: $p < 0.05$), and less right solutions (all performance tests, CPT: $p < 0.05$). However, we could not find significant differences in the results of the WCST.
Conclusion: ADHD seems to impair working memory and attention in adult patients, but not executive functions. Further analyses (e.g., regarding gender differences, comorbidity) are needed to better understand the etiology and possible implications of these results.

P-22-005 A follow-up study of Spanish young adults with ADHD: II. Correlates with functional impairment

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Objective: Follow-up studies of ADHD support the idea that in adulthood there is an age-related lessening of symptoms. However, the decline in the core symptomatology of the disorder is often accompanied by a persistent impairment that impacts on various clinically-relevant domains of functioning (Biederman et al. 2006; Sibley et al. 2012). Objective. The aim of this study was to examine the relationship between the persistence of attention deficit hyperactivity disorder (ADHD) in young adults and functional impairment.
Method: Fifty-two adults (19–14 years), 25 with a childhood diagnosis of ADHD-combined subtype and 27 non-ADHD controls participated in this study. The instruments used in the follow-up were the CAARS (observer and self-report versions; Conners et al. 1999), to evaluate the ADHD symptomatology, and the Weiss Functional Impairment Rating Scale Self-Report (WFIRS-S; http://www.caddra.ca/cms4/pdfs/caddraGuidelines2011WFIRS_S.pdf).
Results: Participants with persistent ADHD at follow-up had more impairments in the areas evaluated by the WFIRS-S, especially those dealing with family and life skills, related, for example, to problems with getting to bed, nutrition, sex, sleeping or managing money.
Conclusion: The results of the eight-year follow-up study suggest that many children with ADHD experience the persistence not only of the symptoms, but also of the functional impairment, when they reach adulthood. The greater risk of impairment, especially in the family setting and daily life in this Spanish sample, argues in favor of using a broader range of clinical intervention strategies directly oriented toward these areas of functioning.

P-22-006 The influence of methylphenidate medication on reinforcement learning in adults with ADHD

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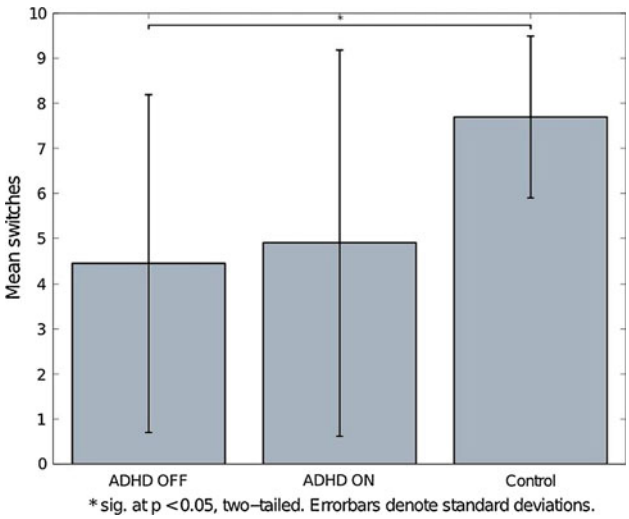
Objective: Neurobiological theories of ADHD assume that a deficient dopaminergic system is a key cause of ADHD symptoms. Impaired reinforcement learning (RL) is one such symptom and relies on dopaminergic signalling of prediction errors. Methylphenidate treatment alleviates ADHD symptoms by manipulating the dopaminergic system, and should thus also improve RL. The purpose of this pilot study was to compare RL in adult ADHD patients and healthy controls, and to test whether methylphenidate treatment influences RL.
Method: Nineteen adults diagnosed with ADHD and 13 healthy controls completed a reversal-learning task, where only one of four card decks had at any given time the best average pay-off. When the best deck had been chosen 10 out of 15 times, the payoff schedule was reversed and another deck became the best. The number of reversals achieved indicates learning success. The task was performed in a case–control design with two ADHD groups (on medication [n = 9] and off medication [n = 10]) and healthy controls. A one-way ANOVA was run on group and number of reversals followed by post hoc t-tests for pair-wise group-comparisons.
Results: The controls achieved 7.69 reversals on average, while the ADHD patients on and off medication achieved 4.90 and 4.40 mean reversals, respectively. Groups differed in their performance ($p = .053$, Cohen's $f = .47$). The post hoc t-test revealed significant difference between ADHD patients off medication and controls ($p = .031$, Cohen's $d = 1.18$), but not between ADHD patients on medication and controls ($p = .054$, $d = .92$), nor between ADHD groups ($p = .766$, $d = .12$).
Conclusion: These results support the hypothesis that RL is impaired in ADHD compared to healthy controls. Contrary to our expectation, methylphenidate did not improve RL. The observed effect sizes are larger than those observed in other decision-making experiments with ADHD patients. A study with a larger sample size should test the reliability of the current results.

Mean switches by group



P-22-007 ADHD traits and distractibility

M. Panagiotidi*, T. Stafford, P. Overton

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Objective: Distractibility is often described as the main symptom of ADHD. Although reports from teachers and parents suggest that children with ADHD have difficulties paying attention to one task without getting distracted by external events, the nature of this distractability has not been fully characterised by laboratory tests of attention, nor has a neural basis for this distractability been confirmed. Recent evidence from animal studies suggests that the superior colliculus (SC), a midbrain structure that belongs to a distributed network of areas mediating saccadic eye movements and shifts of attention, might be abnormally sensitive in individuals with ADHD (Overton 2008). Developmental disorders such as ADHD exist on a continuum, thus allowing us to use sub-clinical populations to study the clinical condition. This approach has been very common in the case of Autism Spectrum Disorder (Baron-Cohen et al. 2001). The main aim of this study was to examine the performance of a sub-clinical subject sample on a new distractibility paradigm and correlate it with the level of ADHD symptoms.
Method: We tested a number of healthy adults with low, mild, and high ADHD traits assessed on the World Health Organization Adult ADHD Self-Report Scale (ASRS, Kessler et al. 2005) on two modified versions of the Sustained Attention to Response Task (SART, Robertson et al. 1997) with and without external distractors sensitive to the SC. Reaction times, accuracy, and the effect of the distractors on performance were correlated with ADHD symptoms.
Results: Different patterns in behavioural and eye tracking data were found in participants with high hyperactivity and inattention scores.
Conclusion: Possible implications of our findings for the collicular hypersensitivity theory of ADHD will be discussed.

P-22-008 Neuropsychological deficits in adults with ADHD: Are they clinically relevant?

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Objective: Past studies have shown that the cognitive deficits observed in adults with ADHD are heterogeneous. One possibility is that such a cognitive variability is exacerbated by methodological biases with sample and measure selection. In addition to group differences, researchers should also consider the clinical significance and individual patterns when making sense of their results. Thus, the aim of the present study is to assess the neuropsychological profile of adults with ADHD, with emphasis on the clinical relevance of the results.
Method: Clinical measures and cognitive tests that proved to be of the highest sensitivity in meta-analyses were administered to 32 adults with ADHD and 32 matched healthy controls. Multivariate analyses of variance were used to compare groups on standard scores derived from normative data of clinical measures and 16 neuropsychological variables. Moreover, the pattern of deficits in individual cognitive profiles was compared between groups with Chi square tests. Scores at 1.5 standard deviations below the mean performance from the test norms indicated a deficit.
Results: On all clinical measures, the ADHD group showed a significantly higher intensity of symptoms compared to healthy controls. For neuropsychological measures, performance of adults with ADHD differed statistically ($p < 0.01$) from healthy controls for only 3 variables out of 16. In addition, the mean performances of the two groups were in the normative range on all 16 measures. At the individual level, the Chi square analysis revealed that the distributions of cognitive deficits differed significantly between the two groups ($p < 0.05$), although 22 % of adults with ADHD showed no deficit, as did 47 % of healthy controls.
Conclusion: Despite significant symptom intensity, the ADHD group showed no clinically relevant dysfunction on classic neuropsychological measures. Notably, a small proportion of individuals with ADHD have no cognitive deficit. The importance of these data for clinical neuropsychologists will be outlined.

P-22-009 Cortisol awakening response (CAR) in adults with Attention Deficit Hyperactivity Disorder (ADHD): Differences by subtype and gender

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Objective: Attention deficit hyperactivity disorder (ADHD) is associated with a significant impairment in many life activities increasing the risk of chronic stress in everyday life. Cortisol awakening response (CAR) can be used as an index of the adrenocortical activity that relates to stress. The aim of the present research is to explore differences between ADHD subtypes including gender influence on CAR in adults with ADHD.
Method: Patients were recruited from the Program for adults with ADHD in the Department of Psychiatry of the University Hospital Vall d'Hebron. The clinical sample included 62 adults, age between 18 and 51 years old (mean 36.73 ± 8.68) fulfilling full current diagnostic for ADHD (DSM-IV criteria); psychiatric and organic comorbid disorders were excluded. The clinical ADHD diagnosis included the Conners' ADHD Rating Scale (CAARS); the Hamilton Rating Scale for Depression (HRSD) and the Hamilton anxiety scale (HAM-A) were used to evaluate current symptoms of depression and anxiety, respectively. To assess CAR, four salivary cortisol samples were collected at 0, 30, 45 and 60 min after awakening.
Results: T-test comparisons showed no significant gender differences in CAR for the whole group of patients or the subgroup of inattentive adults with ADHD. Nevertheless, in the combine subtype, a tend towards a lower CAR responses in men than in women was observed ($t = 1.87$; $p = 0.076$.)
Conclusion: Despite these results are still preliminary, they suggest some differences between ADHD subtypes in adults that are mediated by gender, with lower CAR responses in men than in women in the combine subtype.

P-22-010 ADHD is associated with slow finger movement

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Objective: Children diagnosed with ADHD exhibit problems with moving in time to a beat. However, it is not known if the problem is associated with impaired movement or the coupling of movement to an external cue. The effect of medication, such psychostimulants, is also not known. Thus, the aim of our study was to investigate movement speed and rhythmicity in children diagnosed with ADHD, with and without a history of psychostimulant use. We hypothesised that a) children with ADHD exhibit slower and more irregular

movement compared to children without ADHD and b) movement speed and rhythmicity will differ between children with ADHD, with and without a history of psychostimulant use.
Method: The study involved 18 ADHD-diagnosed children with a history of psychostimulant use ('ADHDmed'; 12 ± 3 years; 16 M, 2F), 6 ADHD diagnosed children with no history of psychostimulant use ('ADHDunmed'; 10 ± 3 years; 5 M, 1F), and 13 children without ADHD ('control'; 11 ± 3 years; 10 M, 3F). Children were instructed to tap their index finger on a strain gauge as fast as possible for 5 s. Medicated ADHD children were tested OFF medication (>14 h).
Results: The number of taps performed in 5 s significantly differed between groups ($P = 0.047$). Children in the ADHDunmed group performed significantly fewer taps (27 ± 3) than controls (32 ± 4; $P = 0.037$) and tended to perform fewer taps than the ADHDmed group (31 ± 5; $P = 0.063$). There was no significant difference between the ADHDmed group and controls. Movement rhythmicity did not significantly differ between groups.
Conclusion: ADHD is associated with slower speed of finger movement but the impairment is absent in ADHD children with a history of psychostimulant use. The results suggest that psychostimulant medication may have long-lasting effects on brain regions that control movement.

P-22-011 Assessment of executive functions in adults: Validation of the Spanish-language Barkley deficits in executive functioning scale (BDEFS)

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Objective: ADHD is characterized by deficits in executive functioning (EF). Research suggests ADHD symptoms arise from a primary deficit in EF, defined as "neurocognitive processes that maintain an appropriate problem-solving set to attain a later goal" (Willcutt et al. 2005). EF includes frontal lobe actions such as attention, self-control, impulsivity, self-regulation, self-management and self-motivation. This study aims to validate a Spanish-language version of a self-report measure of EF, the Barkley Deficits in Executive Functioning Scale (BDEFS; Barkley 2011).
Method: 177 Puerto Rican Spanish-speaking adults (68.2 % female) completed the BDEFS and the Adult ADHD Self-Report Scale (ASRS; Adler et al. 2006). The BDEFS is a theoretically and empirically derived 89-item self-report measure evaluating dimensions of adult EF in daily life. Subscales assess time management, organization, problem solving, self-restraint, self-motivation, and self-regulation of emotions. We translated and adapted into Spanish using standard procedures to preserve semantic and content equivalence. The ASRS includes 18 questions about DSM-IV ADHD symptoms. An EFA using PCA and Varimax rotations was conducted on the 89 BDEFS items. Pearson correlations were obtained between the BDEFS and the ASRS total and subscale scores.
Results: Preliminary data (n = 177) show that the Spanish BDEFS has the same factor structure reported by Barkley (2011) for the original English-language version. A 5-factor structure was obtained, identical to the 5 factors reported by Barkley. 83 % of items loaded on the expected factors. All BDEFS subscales correlated significantly with the ASRS (full score and clusters), correlations ranged from .72 to .27, and were mostly in the moderate range. Reliability indexes range from .96 to .88. Data collection is ongoing and n = 500 will be reported in the final analyses.
Conclusion: The Spanish-language BDEFS developed by the authors seems to be a valid measure of EF with strong psychometric properties. Clinical implications are discussed.

P-22-012 Emotional dysregulation and the severity of the ADHD symptomatology in adults

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Objective: Attention-deficit/hyperactivity disorder (ADHD) is defined by the core symptoms inattention, hyperactivity and impulsivity. The ADHD concept of Wender (1995) additionally suggested another feature of the disorder: emotional dysregulation (ED), defined by three subscales of the Wender-Reimherr Adult Attention Deficit Disorder Scale (WRAADDS): temper, affective lability and emotional overreactivity. Previous studies attested ED sufficient reliability and validity (cf. Retz et al. 2012). ADHD patients with ED seem to show more severe and more complex ADHD symptoms (Reimherr et al. 2010) and contribute to more impairment in major life activities (Barkly and Murphy 2009). The aim of this study is to describe and analyse the symptomology of ADHD patients without and with ED and to evaluate the potential differences of the ADHD symptoms in these two groups.
Method: 253 outpatients with a mean of 33.1 years old, who met the DSM-IV criteria for ADHD were integrated in the study. These patients came for a clarification of the diagnosis of adult ADHD to the ADHD consultation of the Outpatient Department of the Psychiatric University Clinic of Basel (Switzerland). The Emotional Dysregulation Scale (EDS) derived from the WRAADDS measured the severity of ED and categorized the patients in two different groups: ADHD and ADHD + ED. Other clinical scales were used to quantify the symptoms of the disorder: ADHD Self-Rating Behaviour Questionnaire (ADHS-SR), Conners' Adult ADHD Rating Scales Investigator and Observer Version (CAARS-I and CAARS-O) and Wender Utah Rating Scale (WURS).
Results: The findings of the study will be presented and discussed at the Congress. First results showed significant differences in the severity and complexity of the patients with ADHD + ED.
Conclusion: Finally, the study aims to contribute to the scientific discussion whether ED is a further important symptom of adult ADHD.

Saturday, 8 June 2013, 15.00–16.00

P-23 Pharmacological treatment: Children and adolescents I

P-23-001 Attention Deficit/Hyperactivity Disorder treatment effects: A systematic review of long-term outcomes

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Objective: To perform a comprehensive literature analysis to evaluate the effects of attention deficit/hyperactivity disorder (ADHD) treatment on long-term outcomes, including different treatment modalities, treatment-initiation age, treatment duration, time to follow-up measures, and age at follow-up.

Method: A systematic search of 12 literature databases using Cochrane's guidelines yielded 404 English-language peer-reviewed, primary studies of long-term outcomes (≥ 2 years) published from 1-1-1980 to 12-31-2011. Treatment modality classifications were: pharmacological, non-pharmacological, or combination. Only statistically significant differences were counted in this analysis. Nine outcome domains were identified: academic; antisocial behavior; driving; non-medicinal drug use/addictive behavior; obesity; occupation; services use; self-esteem; social function.
Results: Without treatment, 74 % of outcomes were poorer for individuals with than without ADHD. With treatment, 60 % of outcomes improved compared with pre-treatment or individuals with untreated ADHD (57 % in 5 studies with randomized treatment arms, 66 % in all prospective studies, 43 % in retrospective studies, and 33 % in cross-sectional studies—studies were not mutually exclusive). Outcomes frequently associated with treatment benefit included driving, social function, self-esteem, and academic outcomes, with evidence of improvement with all treatment modalities. Within each treatment modality, the majority of outcomes improved: 50 % (pharmacological), 65 % (non-pharmacological), and 83 % (combination treatment). Mean Cohen's d effect sizes for improvement versus pre-treatment ranged from medium to large: d = 0.6 for non-pharmacological, d = 0.8 for pharmacological, and d = 1.2 for combination treatment. The majority of outcomes improved independent of age of treatment initiation (60–75 %), age of follow-up (53–65 %), follow-up interval (58–87 %), or treatment duration (62–72 %).
Conclusion: Untreated ADHD resulted in poorer long-term outcomes compared with non-ADHD controls. With all treatment modalities, the majority of treated outcomes were reported to be associated with improvement. The highest proportion of improved outcomes and the largest effect sizes versus pre-treatment were reported for combination treatment.

P-23-002 Post hoc comparison of the efficacy of lisdexamfetamine dimesylate and osmotic-release oral system methylphenidate in children and adolescents with Attention Deficit Hyperactivity Disorder

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Objective: In a 7-week, European, phase 3 study (SPD489-325), both lisdexamfetamine dimesylate (LDX) and osmotic-release oral system methylphenidate (OROS¬_MPH) were more effective than placebo in improving core symptoms in children and adolescents with ADHD. SPD489-325 included OROS_MPH as a reference arm but did not prespecify a formal statistical comparison between the two active treatment arms. We now compare post hoc the efficacy of LDX and OROS-MPH in study SPD489-325.
Method: This randomized, double-blind, parallel-group, dose-optimized, placebo-controlled study enrolled patients aged 6–17 years with ADHD of at least moderate severity. Patients were randomized (1:1:1) to receive a once-daily dose of LDX (30, 50, 70 mg/day), OROS_MPH (18, 36, 54 mg/day) or placebo. Efficacy was assessed using the ADHD Rating Scale version IV (ADHD-RS-IV), analysed using an analysis of covariance model, and the Clinical Global Impression-Improvement (CGI-I) scale, analysed using a Cochran–Mantel–Haenszel test. Endpoint was defined as the last on-therapy visit with a valid assessment.
Results: The full analysis set comprised 317 patients (LDX, n = 104; placebo, n = 106; OROS_MPH, n = 107). The least squares mean change from baseline to endpoint (95 % confidence interval [CI]) in ADHD-RS-IV total score was significantly greater for LDX compared with OROS_MPH (–24.3 [−26.6, −22.0] vs. −18.7 [−21.0, −16.5]; $p < 0.001$; effect size, 0.541). The percentage of patients (95 % CI) with a CGI-I score of 1 (very much improved) or 2 (much improved) at endpoint was also significantly greater for LDX compared with OROS_MPH (78.0 % [69.9, 86.1 %] vs. 60.6 % [51.2, 70.0 %]; $p < 0.05$). The safety profiles of LDX and OROS_MPH were consistent with the known effects of stimulant medications.
Conclusion: This post hoc analysis indicated that LDX is significantly more effective than OROS_MPH in improving core symptoms and global functioning in children and adolescents with ADHD.

P-23-003 Therapy Combination: A prevalent pattern among children and adolescents with Attention Deficit/ Hyperactivity Disorder (ADHD) treated with stimulants in the Canadian province of Quebec

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Objective: To assess the 1-year period prevalence of therapy combination with stimulants among ADHD children/adolescents in Quebec.
Method: Patients aged 6–17 years with ≥2 documented ADHD diagnoses and ≥30 days of stimulant supply during their most recent 12-months observation period were identified in Quebec's medical claims database, the Regie de l'assurance maladie du Québec from 03/2007 to 02/2012. Therapy combination was defined as ≥30 consecutive days of concomitant use of multiple stimulants with different active ingredients or a stimulant with atomoxetine (ATX), clonidine, atypical (AAP) and typical antipsychotics, bupropion, serotonin-norepinephrine and selective serotonin reuptake inhibitors, and tricyclic antidepressants. The 1-year period prevalence of therapy combination was calculated among all patients and among those with and without psychiatric/neurologic comorbidities.
Results: A total of 9,431 children/adolescents with ADHD met the inclusion criteria (24 % with comorbidities and 76 % without) with 28 % female and average age of 11.3 years. The two most prevalent comorbidities were learning disability (2.7 %), and adjustment reaction (2.6 %). The 1-year period prevalence of therapy combination was 19.8 % among all patients, with AAP (10.8 %), ATX (5.5 %), and clonidine (5.3 %) being the most commonly observed combination medication categories. Over the 1-year period, 5.8 % of patients combined a stimulant with ≥2 medication categories. The 1-year period prevalence of therapy combination was significantly higher for patients with comorbidities compared to those without, both overall (35.9 vs. 14.8 %; $p < 0.01$) and for each individual medication category (all $p < 0.01$) with the exception of combination with another stimulant (1.1 vs. 0.9 %; $p = 0.42$). AAP was also the most common combination medication category among patients with (20.9 %) and without comorbidities (7.7 %).
Conclusion: Therapy combination is prevalent in children/adolescents with ADHD receiving stimulants, particularly in those with comorbidities. Further research is warranted to evaluate clinical outcomes associated with therapy combination.

P-23-004 CPT measuring selective effects of methylphenidate among children with ADHD

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Objective: The continuous performance test (CPT) is one of the most popular tools used to assess methylphenidate (MPH) effects on attention-deficit/hyperactivity disorder (ADHD) symptoms. However, many studies have questioned the ability of the CPT to consistently and reliably monitor response to MPH. The objective of this study was to determine the effects of short term MPH administration on single and multiple parameters of attention in previously drug naïve children with ADHD, employing the MOXO-CPT.
Method: The study included 265 children aged 6–12 years, diagnosed with ADHD. All participants performed the CPT twice. Participants were randomly divided into a study group (N = 245) which received MPH treatment before the second test, and a control group (N = 20) which did not receive any intervention.
Results: Participants in the study group demonstrated improvement in all CPT parameters, while the control group showed worsened performance. These differences were significant for the timing and attention parameters. Results showed that the sensitivity of the CPT to MPH effects increased as more CPT parameters were used for evaluation.
Conclusion: The MOXO-CPT was proven to be highly effective in detecting the influence and selective effects of MPH administration in children with ADHD. Results indicated that MPH efficacy should be assessed by a combination of CPT parameters, instead of separate indices of attention. The study suggests an accurate and objective technique for the assessment of MPH efficacy in ADHD.

P-23-005 Using family preference to determine the best medication (stimulant or non-stimulant) for treatment of a child with ADHD

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Objective: To determine which of the first-line medications provides the best treatment for an individual child with ADHD.
Method: Fifty children from a private paediatric practice who had been treated with optimum doses of stimulant medication for periods of 2–72 months entered a study to assess which class of medication was preferable, in the family's view, after a further course of treatment with atomoxetine. Four children dropped out without trying the "new drug". Assessment through chart review, and after parents had the ability to compare both classes of medication, was carried out at 6 months and again at 24 months.
Results: At 6 months, almost 50 % preferred stimulant, almost 50 % preffered atomoxetine with the remainder finding that the combination of the two was far superior to either one alone. The experience witrh the combination was based on observations during the fourth week of the switch from stimulant to non-stimulant. Similiar findings were identified after 24 months of family experience (3 more children were lost to follow-up because, at 18 years of age, they were no longer in the practice). The majority of the children who did best on the combination of medications were also diagnosed with mild Autism Spectrum Disorder. Many of the parents of this latter group also volunteered the observation that their child's social skills improved markedly on the two drugs.
Conclusion: This small study suggests that there is a significant role for atomoxetine intreatment of ADHD and, as far as is possible, all children and their families should be given the opportunity to compare the treatment with both stimulant and non-stimulant to be able to make the "best" decision. It also suggests that atomoxetine may be a "foot-in-the-door" in the search for a more specific treatment fo Autism Spectrum Disorder. More studies are indicated.

P-23-006 Atomoxetine in severe comorbid adolescents with antisocial behaviour: Clinical in-patient data and review of the literature

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Objective: ADHD in adolescents can occur in comorbidity with several other psychiatric disorders such as PTSD, bipolar disorder, addiction problems or antisocial and delinquent behaviour. As anxiety, PTSD and ADHD can combine with antisocial impulsivity as presenting symptom, these high-risk patients need a sustainable multimodal therapy including 24 h ADHD symptom reduction.
Method: Using a medline-research and other data ressources in connection with the preparing of the german S3-guidelines on addiction we found very little evidence in these field at all. Therefore clinical guidelines as well as expert opinions had to be used. We re-examined the consecutive cases of 3/2010–3/2013 of the SOMOSA juvenile correction and psychotherapy center in Winterthur, Switzerland, where this multimorbid population is treated in a long-term in-patient setting.
Results: There is no systematic evidence of the use of Atomoxetine in particular adolescent high-risk groups. Clinical guidelines, expert opinions and the own clinical experince support the impression that Atomoxetine could be useful in high-risk groups of ADHD-patients suffering from anxiety-triggered impulsivity and depression-related aggressivity and not in « psychopathic » or antisocial personalities.
Conclusion: Considering multimorbidity as well as the adequate dosage (high proportion of rapid-metabolizers) and the overall multisystemic treatment concept atomoxetine may be a useful treatment opportunity. As this high-risk group needs intensive care and ressources the whole adult life when not treated properly in adolescence, further systematic research is needed to evaluate pharmacological strategies for these patients.

P-23-007 Effectiveness and safety of a long-acting methylphenidate formulation in the treatment of Attention Deficit Hyperactivity Disorder (ADHD) under daily practice conditions

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Objective: Methylphenidat (MPH) is a mainstay in drug therapy of ADHD. Long-acting, modified-release preparations allow for once-daily intake, however, pharmacokinetics may vary and depend on food intake.

Method: This prospective, multi-centre, observational, non-interventional study aimed at evaluating effectiveness and safety of a two-phase release MPH formulation [Ritalin® LA] under daily practice conditions in Germany. Patient eligibility and dosing were determined by the physician based on the drug label. Outcomes included changes over 3 months of treatment in assessments of effect duration, clinical global impression (CGI), and quality of life (QoL).
Results: In total, 262 patients, 197 boys and 63 girls (mean age 10.9 years), were enrolled in 101 sites. 50 patients have been treated for the first time; 212 switched to Ritalin® LA. Of these, 123 patients (46.9 %) switched medication due to poor response. After 3 months, CGI improved in 59.4 % of patients, and well-being overall was rated as good by 61.0 % of parents and 63.7 % of children. The percentage of parents and children suffering from strong disease burden decreased from 44.3 to 19.9 % and from 40.7 to 15.1 %, respectively. Insufficient responders to previous treatment perceived a significantly prolonged effect duration with the new-onset long-acting MPH as compared to the remaining population. This prolongation was most evident for previous long-acting methylphenidate users ([Medikinet retard®] from 6.1 ± 1.6 to 7.6 ± 1.3 h; $p = 0.001$). A total of 63 AEs were reported in 36 (13.7 %) patients. Overall incidence rates of potentially MPH-related AEs and SAEs were 10.3 and 0.4 %, respectively.
Conclusion: Long-acting methylphenidate [Ritalin® LA] provides significant benefit in newly treated and switched patients, in line with clinical trial data.

P-23-008 Continuous Performance Test (CPT) as a useful instrument for everyday clinical practice

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Objective: CPT is a useful instrument to assess sustained attention deficits and the benefits of metilphenidate (MPH) in improving attention in children with ADHD. Our objective is to assess the usefulness of CPT as a quick instrument to monitor MPH treatment effectiveness in a clinical setting.
Method: A 100 children and adolescents have been included in the study. The age range for admission was 6-18 years. Diagnostic assessments included structured interviews based upon the criteria of DSM IV, Conners and Achenbach questionnaires and the Wescheler Inteligence Scale for Children (WISC III).As far as IQ is concerned, the average was around 96–98, but the full scale IQ had to be 80 or over. All children had an ADHD index on Conners questionnaires above 1 SD, and other neurological or psychiatric disorders were exclusion criteria. All children were assessed with the Conners Continuous Performance Test (CPT II) Version 5.2 for Windows® before and after treatment with MPH.
Results: Children and adolescents with ADHD performed significantly better on MPH in all measures of CPT test and this difference is statistically significant in the majority of them. As a goup, greater improvements were observed in measures of attention. Impulsivity and vigilance seems to have a smaller benefit.
Conclusion: CPT II is a practical, informative and not time consuming instrument very useful to easily demonstrate the response to MPH in children and adolescents with ADHD.

P-23-009 A head-to-head, double-blind, randomized, phase 3b trial comparing the efficacy of lisdexamfetamine dimesylate with atomoxetine on core symptoms in children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: The efficacy and safety of the prodrug stimulant lisdexamfetamine dimesylate (LDX) and the non-stimulant atomoxetine were compared in a phase 3b trial in children and adolescents with ADHD. Here we report ADHD Rating Scale version IV (ADHD-RS-IV) secondary outcomes from this head-to-head study.
Method: This 9-week, randomized, double-blind, active-controlled study enrolled patients (aged 6–17 years) with at least moderately symptomatic ADHD and an inadequate response to methylphenidate. Patients were randomized (1:1) to an optimized daily-dose of LDX (30, 50 or 70 mg) or atomoxetine (patients < 70 kg, 0.5–1.2 mg/kg, total ≤1.4 mg/kg; ≥70 kg, 40, 80 or 100 mg). The change from baseline in ADHD-RS-IV total score, and inattentiveness and hyperactivity/impulsivity subscale scores, were evaluated at each study visit using the last observation carried forward approach.
Results: Of 267 patients randomized (LDX, n = 133; atomoxetine, n = 134), 200 (74.9 %) completed the study. Baseline ADHD-RS-IV total scores and subscale scores were similar between treatment groups. By week 9, the difference between LDX and atomoxetine in least squares mean change from baseline was statistically significant ($p < 0.001$), in favour of LDX, for ADHD-RS-IV total scores (−6.5 [95 % confidence intervals, −9.3, −3.6]; effect size 0.56), inattentiveness (−3.4 [−4.9, −1.8]; effect size 0.53) and hyperactivity/impulsivity subscale scores (−3.2 [−4.6, −1.7]; effect size 0.53). In addition, LDX was consistently associated with greater reductions from baseline than atomoxetine in ADHD-RS-IV total and subscale scores, with statistical significance ($p \leq 0.001$) achieved at each of Visits 1–9.
Conclusion: In children and adolescents with at least moderately symptomatic ADHD and an inadequate response to methylphenidate therapy, LDX was significantly more effective than atomoxetine in reducing core symptoms, as assessed using ADHD-RS-IV total and subscale scores.

P-23-010 Historical trends in comorbid bipolar disorder and ADHD

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Objective: Our objective is to review historical trends in the diagnosis of comorbid Bipolar Disorder and Attention Deficit/Hyperactivity Disorder.
Method: This study is a retrospective chart review of adult psychiatric outpatients treated at the New York State Psychiatric Institute Lithium Clinic and two affiliate lithium clinics of Columbia University Medical Center and the Foundation for Mood Disorders. The chart review included patient demographic information, diagnosis, treatment information, and any reported medical complications. We

reviewed 743 records of patients seen in an outpatient mood disorder clinic during the period April 1967 through Jan., 1998.
Results: A total of 3.02 % of all patient within this sample were identified as receiving some sort of amphetamine: 10 patients were receiving methylphenidate, and eight were receiving an amphetamine medication (Dexedrine, Benzedrine or Dexamyl). These patients were stratified by diagnosis: 1.7 % of the sample diagnosed with BP I were taking either methylphenidate or an amphetamine; 2.38 % of the sample diagnosed with BP II were taking either methylphenidate or an amphetamine; 2.08 % of the sample diagnosed with BP Other were taking either methylphenidate or an amphetamine; 5.21 % of the sample diagnosed with Major Depression were taking either methylphenidate or an amphetamine; 8.3 % of the sample diagnosed with Depressive Personality Disorder were taking methylphenidate or an amphetamine. No patients diagnosed with Unipolar Disorder Other or with Cyclothymic Personality Disorder were taking either methylphenidate or an amphetamine. These differences in the use of amphetamine medications among different mood disorders did not attain statistical significance (Chi squared lambda $= 5.158$, $p = 0.82$).
Conclusion: This historical review demonstrates a) the treatment of Attention Deficit Disorder in patients with comorbid mood disorders was much less common in previous decades, and b) the co-occurrence of Attention Deficit Disorder and mood disorders can vary widely with the subtype of mood disorder.

P-023-011 A head-to-head, double-blind, randomized, phase 3b trial comparing the efficacy and safety of lisdexamfetamine dimesylate with atomoxetine for the treatment of children and adolescents with attention-deficit/hyperactivity disorder

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Objective: To compare directly the efficacy and safety of the stimulant, lisdexamfetamine dimesylate (LDX), with the non-stimulant, atomoxetine, for the treatment of children and adolescents with ADHD.
Method: This 9-week, head-to-head, randomized, double-blind, active-controlled study enrolled patients (aged 6–17 years) with ADHD of at least moderate severity and an inadequate response to methylphenidate therapy. Patients were randomized (1:1) and optimized to a daily-dose of LDX (30, 50, or 70mg) or atomoxetine (patients <70kg, 0.5–1.2mg/kg, total ≤1.4mg/kg; ≥70kg, 40, 80, or 100mg). Clinical Response was defined as a Clinical Global Impressions-Improvement score of 1 (very much improved) or 2 (much improved). Treatment emergent adverse events (TEAEs), vital signs and electrocardiograms (ECGs) were assessed.
Results: Of 267 patients randomized (LDX, n=133; atomoxetine, n=134), 200 (74.9 %) completed the study. The primary outcome, median time to response [days (95 % confidence interval)], was significantly shorter for patients receiving LDX [12.0 days (8.0, 16.0)] compared with those receiving atomoxetine [21.0 days (15.0, 23.0); $p = 0.001$]. At each weekly visit, the difference between treatments in the proportions of responders was significant in favour of LDX ($p < 0.01$). By week 9, 81.7 % and 63.6 % of patients receiving LDX and atomoxetine, respectively, were classified as responders. TEAEs were reported by 71.9 % and 70.9 % of patients receiving LDX and atomoxetine, respectively. The three most common TEAEs were decreased appetite (25.8 %), decreased weight (21.9 %) and headache (13.3 %) for LDX, and headache (16.4 %), nausea (15.7 %) and somnolence (11.9 %) for atomoxetine.
Conclusion: In children and adolescents with at least moderately symptomatic ADHD and an inadequate response to previous methylphenidate therapy, LDX was associated with a significantly faster clinical response, and a significantly greater proportion of clinical responders, compared with atomoxetine. Safety profiles of LDX and atomoxetine were consistent with findings from previous clinical trials.
Conflict of interest: Supported by funding from Shire Development LLC.

Saturday, 8 June 2013, 15.00–16.00

P-24 Pharmacological treatment: Children and adolescents II

P-24-001 Methylphenidate improves handwriting of children with ADHD; a systematic review of controlled clinical trials

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Objective: While many studies compared handwriting ability of children with ADHD and those children without ADHD, contribution of medications on handwriting in children with attention deficit hyperactivity disorder (ADHD) has been sparse. No systematic review examined the role of stimulants in this regard.
Method: Literature was searched according to a planned search strategy using the electronic databases PubMed and Google scholar. Inclusion criteria were interventional studies investigating the effects of stimulants on handwriting quality in children and adolescents diagnosed with ADHD. Those articles without the intervention were excluded.
Results: Only nine out of 64 retrieved articles met inclusion criteria. The assessments used for handwriting was very heterogeneous to perform a pooled data analysis. Five articles reported double blind control clinical trials. All the controlled and non-controlled clinical trials administered methylphenidate. These trials reported that methylphenidate improved handwriting quality.
Conclusion: Current evidence supports that the use of methylphenidate is an effective option for the treatment of handwriting in children and adolescents with ADHD. Recommendations for future studies considering current literature limitations are provided.

P-24-002 Explaining ethnic differences in the use of stimulant medications for ADHD: A whole-population study

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Objective: To explain ethnic differences in the use of stimulant medications among Western Australian (WA) children and adolescents.
Method: We analyzed WA Stimulant Notification and Dispense records from 2003 to 2007 linked to whole-population birth, midwives, hospital and death data between 1980 and 2007. Using de-identified linked records and logistic regression, we examined the differences in stimulant usage for ADHD by age, parental country of birth, socioeconomic status and geographical remoteness.
Results: Major significant findings were: (1) Children and adolescents who had parents born in traditionally non-English speaking countries were less likely to be treated with stimulant compared with children and adolescents of parents born in Australia, Europe and North America. (2) Children and adolescents with parents born in non-English speaking

countries tended to delay in stimulant use for the treatment of ADHD. (3) Father's country of birth was an influential predictor for a decreased likelihood of using stimulant. (4) The Socio-economic disadvantage and geographical remoteness were associated with using stimulant.
Conclusion: It is important to identify factors underlying ethnic disparities in the use of stimulant medications for ADHD treatment. Improving knowledge of cultural aspects within certain ethnic groups may better facilitate the diagnosis of ADHD, improve the relationship between patients and clinicians, and provide avenues for alternative therapeutic approaches.

P-24-003 A caregiver perspective of symptom burden among children and adolescents with ADHD in the UK

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* Sheffield, United Kingdom

Objective: To understand the symptom burden of ADHD assessed by the ADHD-RS-IV both on and off medication among UK children/adolescents as reported by caregivers.
Method: The web-based Caregiver Perspective of Pediatric ADHD (CAPPA) Survey was fielded in the UK to identify areas of unmet need for children/adolescents with ADHD and their caregivers. As part of the survey, caregivers were asked to complete the ADHD-Rating Scale-IV on the frequency of their children's symptoms for two time periods to recall—when the child was on, and when the child was off medications for ADHD. Only caregivers that reported their child had been off medication, at some point, in the past 6 months answered "off medication" questions. Descriptive statistics were examined and comparisons of outcomes were made between on and off medication using the Wilcoxon signed-rank test.
Results: 832 UK caregivers representing 694 male (83.4 %) and 138 female (16.6 %) children aged 6–17 years (mean 11.7 ± 3.4) completed the CAPPA Survey. 668 children (80.3 %) were currently on ADHD medication; the remaining children had been on medication within 6 months. All ADHD-RS-IV symptoms were significantly less frequent on medication versus off medication ($p < 0.001$). Nonetheless, each of the symptoms was reported by caregivers to occur "often" or "very often" by 13.7 % (for "leaves seat at wrong time") to 28.8 % (for "easily distracted") even on medication. Symptoms most frequently reported to be the same or worse "on medication" vs. "off medication" were "loses things" (39.2 %), "forgetful" (37.7 %), "talks excessively" (35.5 %) and "blurts out" (33.7 %).
Conclusion: Currently available ADHD medications in the UK are effective at reducing ADHD symptoms. However, caregivers frequently reported that even when on medication, their children/adolescents exhibited some symptoms that were the same or worse than off medication. Thus, there still exists a need for improved symptom control among ADHD children/adolescents in the UK.

P-24-004 Resource utilization and costs of newly diagnosed ADHD-patients in Germany: A comparison of drug treatment-persistent, drug treatment-nonpersistent, and nondrug-treated patients

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Objective: To analyse resource utilization and costs of treatment in patients (6–17 years) with newly diagnosed attention-deficit/hyperactivity disorder (ADHD), using data from a major German sickness fund, and to quantify how resource utilization is associated with treatment type and persistence on drug therapy.
Method: Utilizing the second largest German sickness fund, complete claims data for all newly diagnosed ADHD patients (de-identified) meeting eligibility criteria for 2007 and 2008 were extracted and analysed. Patients were categorized as: drug treatment-persistent (having at least one prescription every 3 months over 12 months following their first ADHD prescription), drug treatment-nonpersistent, or nondrug treatment groups (i.e., behavioural therapy). Unadjusted mean differences (2007/2008 costs) were analysed using paired and unpaired 2-sample Wilcoxon tests (significance: $P < 0.05$).
Results: Of 3,407 ADHD patients, 1,105 (32 %) received a (regulatory) approved ADHD drug following diagnosis and 2,302 (68 %) received nondrug treatment. Twelve-month follow-up data were available for 786 (71 %) methylphenidate-treated patients and 1,779 (77 %) patients receiving nondrug treatment, respectively. Of the methylphenidate-treated patients, 503 (64 %) comprised the drug treatment-persistent group. Outpatient visits and number of drug prescriptions and associated costs were highest in the drug treatment-persistent group (19.8 and 22.1, respectively; $P = 0.000$); however, the number of hospital admissions (0.1) and hospital stays (0.8) were lowest in this group. Lower mean total costs (€187/year) ($P = 0.000$) were seen for the drug treatment-persistent group compared with the drug treatment-nonpersistent group. When compared with nondrug-treated patients, mean cost savings were €739 and €552 for the drug treatment-persistent group and drug treatment-nonpersistent group, respectively; differences were driven by higher behavioural therapy costs in the nondrug treatment group ($P = 0.000$).
Conclusion: Approximately 1/3 patients received drugs; the majority were treated with methylphenidate and were persistent. Cost savings were observed compared with nondrug-treated patients. Further analysis is required to verify these initial findings.

P-24-005 Patient characteristics associated with treatment initiation among paediatric patients with Attention Deficit/Hyperactivity Disorder (ADHD) symptoms in Central Europe and Eastern Asia

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Objective: To compare demographic and clinical characteristics of newly diagnosed paediatric patients with Attention Deficit/Hyperactivity Disorder (ADHD) symptoms who did and did not initiate treatment, and to examine whether any differences between them vary by region (Central Europe and Eastern Asia).
Method: Data were taken from a 1-year prospective, observational study that included a total of 1,068 newly diagnosed paediatric patients with ADHD symptoms in Central Europe and Eastern Asia. Patients were prescribed (1) psychotherapy and/or pharmacotherapy ('treatment') or (2) other treatments (e.g., education)/no treatment at baseline ('no treatment'). Clinical severity was measured using the Clinical Global Impression (CGI) scale and the Child Symptom Inventory-4 (CSI-4) Checklist. Logistic regression was employed to explore patient characteristics associated with treatment initiation at baseline. This analysis was repeated for each region.
Results: Of the 1,068 patients analysed, 74 % initiated treatment at baseline (78 % in Central Europe and 70 % in Asia, $p = 0.002$). Logistic regression results showed that patients who initiated treatment at baseline tended to be older, have had birth problems and higher CGI and CSI-4 scores, while those who did not initiate treatment tended to have been involved in bullying (a bully) and have a working mother. In Asia,

being older, being male, and having higher CGI scores were associated with treatment initiation. In Central Europe, parental emotional problems, having higher CSI-4 scores, and not being involved in bullying were associated with treatment initiation.
Conclusion: Treatment initiation was influenced by a number of patient characteristics in the treatment of newly diagnosed paediatric patients with ADHD symptoms, indicating systematic differences between patients who did and did not initiate treatment at study baseline in characteristics such as clinical severity. Factors associated with treatment initiation also differed to some extent between Central Europe and Eastern Asia.

P-24-006 Association between six-week response and subsequent remission in the treatment of paediatric patients with Attention Deficit/Hyperactivity Disorder (ADHD) symptoms in Central Europe and Eastern Asia

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Objective: To examine the impact of 6-week response on remission and to assess factors associated with 6-week response in the treatment of paediatric patients with Attention Deficit/Hyperactivity Disorder (ADHD) symptoms in Central Europe and Eastern Asia.
Method: Data were taken from a 1-year prospective, observational study that included a total of 1,068 newly diagnosed paediatric patients with ADHD symptoms in Central Europe and Eastern Asia. This post hoc analysis included 615 patients who initiated medication at baseline and stayed in the study for at least 6 weeks. 6-week response was defined as a decrease of at least 1 point in the Clinical Global Impression (CGI) score by 6 weeks. Remission was defined as achieving a CGI score of ≤ 2 during follow-up. Cox-regression was employed to examine the impact of 6-week response on remission during follow-up, adjusting for baseline patient characteristics, among patients with a CGI score of > 2 at baseline (i.e., not in remission, $n = 602$). Logistic regression was used to assess factors associated with 6-week response ($n = 615$).
Results: Approximately one in three paediatric patients (36 %) achieved response by 6 weeks in the treatment of ADHD. Of these patients, 60 % achieved remission during follow-up. This was significantly higher than that for patients who did not achieve response by 6 weeks (22 %, $p < 0.01$). The impact of 6-week response on remission remained significant after adjusting for patient characteristics (Hazard Ratio: 3.97, 95 % CI 2.76, 5.73). Factors associated with 6-week response were a higher score of CGI at baseline, having other children living at home, and medication adherence prior to response.
Conclusion: Treatment response by 6 weeks was a strong predictor of subsequent remission in the treatment of paediatric ADHD patients in Central Europe and Eastern Asia. Clinical severity at baseline, having other children living at home, and medication adherence were associated with 6-week response.

P-24-007 Children medicated for ADHD exhibit impaired motor performance

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Objective: Children diagnosed with ADHD have a higher incidence of coordination disorders. It is not known if the movement problems are associated with ADHD itself or are a comorbidity with Developmental Coordination Disorder (DCD). Furthermore, the effect of psychostimulant medication on coordination in these children is not known. Thus, the objective of our study was to investigate movement coordination in children diagnosed with ADHD, with and without a history of psychostimulant use. We hypothesised that a) children with ADHD will exhibit poorer performance on tests of both fine and gross motor performance compared to children without ADHD, and b) performance will differ between ADHD-diagnosed children, with and without a history of psychostimulant use.
Method: The study involved 18 ADHD-diagnosed children with a history of psychostimulant use ('ADHDmed'; 12 ± 3 years; 17 M, 1F), 6 ADHD-diagnosed children with no history of psychostimulant use ('ADHDunmed'; 10 ± 3 years; 5 M, 1F), and 12 children without ADHD ('control'; 11 ± 3 years; 11 M, 1F). Children were tested with the Movement Assessment Battery for Children (MABC). The three categories of interest were manual dexterity, aiming and catching, and balance. Medicated ADHD children were tested "OFF" medication (>14 h).
Results: The overall MABC score was significantly lower (poorer performance) in the ADHDmed group (8 ± 2) than in the ADHDunmed (10 ± 1; $P = 0.014$) and control (11 ± 2; $P = 0.002$) groups. Of the subcategories, there was a significant between-group difference in dexterity but not in aiming and catching or balance. The dexterity score for the ADHDmed group (6 ± 2) was significantly lower than in the ADHDunmed (8 ± 3; $P = 0.029$) and control (9 ± 2; $P = 0.006$) groups.
Conclusion: Children who have ADHD and a history of psychostimulant use exhibit lower general motor performance and particularly in the area of dexterity. The results suggest that psychostimulant medication may have long-lasting effects on brain regions that control movement.

P-24-008 Differences in the maintenance of stimulants: One-year follow-up study

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Objective: The aim of the current study was to investigate the differences in the maintenance of medication among three different formulation of methylphenidate.
Method: 189 children and adolescents (153 boys and 36 girls), aged 7–18 years who newly received three different formulation of methylphenidate including Concerta, Metadate CD, and methylphenidate-immediate releasing form were recruited.
Results: We followed up 1 year after the day when 189 subjects received newly prescribed stimulants. During Follow-up, 122 Concerta using subjects Concerta had 200.3 ± 142.4 days of mean medication maintenance, while 37 Metadate CD using subjects had 131.0 ± 124.3 days and 30 methylphenidate-immediate releasing form using subjects had 134.7 ± 124.5 days, respectively (ANOVA: $F = 5.328$, $p = .006$). In addition, Concerta using subjects had lower medication changes compared to 2 other formulations.
Conclusion: We suggest that the days of medication maintenance can be improved using stimulants with extended action time.

P-24-009 OROS MPH in treatment of ADHD in children and adolescents with comorbid chronic motor tic disorder

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Objective: The treatment of children and adolescents with ADHD and comorbid motor tic disorder has been shown to be challenging

since OROS MPH (OROS Methylphenidate) (only approved medication for ADHD in Serbia) has been reported to worsen the tic disorder. Therefore, the aim of this study was to verify the outcome, and evaluate the treatment of the children and adolescents with ADHD and comorbid chronic motor tic disorder with OROS MPH.
Method: We have analyzed a group of twenty children and adolescents with ADHD and comorbid chronic motor tic disorder. The group consisted of 17 males and 3 females, of the age between seven and seventeen. Diagnoses were made according to the ICD-10 criteria. All of the patients have been treated with OROS MPH 18 or 36 mg per day.
Results: As demonstrated by the clinical observation as well as SNAP IV scale, OROS MPH has significantly reduced symptoms of ADHD at all of the patients. However, in one of the patients (5 %; a boy), motor tics were more frequent than prior to the treatment with OROS MPH. Also, two patients had problems with decrease appetite and two patients had problem with initial insomnia. Nevertheless, these side effects were transient.
Conclusion: OROS MPH is effective for children and adolescents with ADHD and comorbid chronic motor tic disorder (reduction of the symptoms of ADHD). Our study is not in agreement with the previous findings that OROS MPH worsens tic in children and adolescents with ADHD and chronic motor tic disorder.

P-24-010 Therapeutic response of methylphenidate in ADHD core symptoms depending on dose: Low, medium and high

S. Batlle Vila*, M. Aceña Diaz, E. Camprodon Rosanas, X. Estrada Prat, M. Marrón Cordón, A. Petrizan Aleman, E. Baeza Tena, L. M. Martín-López, L. Duñó Ambrós

* Barcelona, Spain

Objective: This poster aims to evaluate the efficacy of methylphenidate (MPH) in treating ADHD patients treated at our Unit of Child and Adolescent Psychiatry in a Spanish Mental Health Service, and evaluate the effect of three different doses of MPH (low, medium and high) and if the dose–response is linear or not.
Method: Pre and post treatment neuropsychological assessment in 24 naïve ADHD patients (11.03 ± 2.58). Grouped according to the dose of MPH: low (n = 6, mean = 0.40 mg/kg), medium (n = 9, mean = 0.65 mg/kg) and high (n = 9, mean = 0.93 mg/kg).The following tests were selected: Selective and Sustained Attentional Test (TASS), Continuous Performance Test (CPT) and Conners Parent Rating Scale (CPRS-48). Mean comparison is made with related samples t test groups before and after treatment. It is estimated the effect size (d') of the variables that have been significant (grouped factors: Performance, Attention, Impulsivity/Hyperactivity Disorder, and Emotional).
Results: (a) The performance of work presents a inverse linear relation with treatment dosage, with less improvement for higher MPH dose. (b) Attention improves linearly with increasing doses. (c) In Impulsivity and Hyperactivity there isn't a linear effect in which lower and higher doses get better results than medium dose. (d) The size of the effect of emotional variables reveals that higher doses are more somatization, more anxiety and behavioural problems associated with irritability.
Conclusion: (1) Neuropsychological measures and behavioural assessment are useful for monitoring psychostimulant medication for ADHD. (2) Linear or not linear MPH dose–response would be related to the areas of assessment and constructs assessed. (3) The data should be reinterpreted in terms of knowledge about the underlying neurobiological mechanisms to assess the possibility of a more selective drug dosage based on the symptoms being treated.

P-24-011 Is MPR (Medication Possession Ratio) critical for ADHD treatment?

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Objective: Although long term pharmacological therapy of ADHD patients has been emphasized, only a small portion of the patients continue treatment in actual clinical practices. Numerous studies were performed to analyze factors affecting long term treatment and to measure and improve the compliance and adherence. This study aims to examine the appropriateness of MPR (Medication Possession Ratio) to measure adherence and compliance for ADHD patients.
Method: MPR was measured by summing the days supply and dividing by lengh of follow up days. We used total of 200 MPR records and compared average MPR between two groups, early drop-outs (116) and long term follow-ups (84).
Results: Average MPR had no significant positive correlation with the follow up length ($r = -0.012$, $p = 0.865$). Average MPR of early drop-outs (within 6 months) and long term follow-ups (over 36 months) showed no significant difference. MPR distribution of 116 early drop-outs were 0.7(2), 0.8(10), 0.9(7), 1.0(97), and that of the 84 long term follow-ups were 0.4(1), 0.6(1), 0.7(3), 0.8(12), 0.9(25), 1.0(42).
Conclusion: The MPR value ranging from 0.67 to 0.8 is often used as the inclusion or exclusion criteria in ADHD clinical researches. Further studies and discussions are required for deciding whether or not to maintain the current MPR cutoff value.

Saturday, 8 June 2013, 15.00–16.00

P-25 Pharmacological treatment: Children and adolescents III

P-25-001 Influences of stimulant therapy on K-WISC-III in Korean boys with ADHD

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Objective: Stimulants are drug of choice for attention deficit/hyperactivity disorder (ADHD) symptoms; but their influence on cognitive functioning have not been sufficiently understood yet. We studied retrospectively the effects of stimulants on cognitive function of ADHD by comparing K-WISC-III subtests.
Method: The subjects included retrospectively 147 Korean boys (6–15 year) completed ADS (ADHD Diagnostic System) and K-WISC-III. All subjects have IQ above 70 and not taken stimulants before ADS. Subjects is consisted of stimulant group (N = 100) who were taking stimulants and stimulant-naïve group (N = 47) who were not taking stimulants during K-WISC-III. And we compare all K-WISC-III subtests between stimulant and stimulant-naive group ADS score as covariates.
Results: There were no statistical differences between the 2 groups in VIQ, PIQ, FsIQ. Coding ($p < 0.05$), Symbol search ($p < 0.05$), Block design ($p < 0.05$) and Processing speed index score ($p < 0.01$) of stimulant group were higher than stimulant-naive group with ADS score as covariate.
Conclusion: We suggest that stimulant medication may enhance the processing speed of cognitive functions in boys with ADHD.

P-25-002 Parental perception of ADHD following treatment at a child psychiatric clinic in Singapore

C. G. Lim*

* Singapore, Singapore

Objective: We aim to examine the treatment experience of parents of a group of children and adolescents who were diagnosed and treated for ADHD at the Child Guidance Clinic, Institute of Mental Health, Singapore.
Method: We invited all new patients diagnosed with ADHD at our clinic in the year 2002 to participate in this study. A face-to-face survey with the patients' parents either at our hospital or at their place of residence, according to their preference.
Results: Forty-one (57.7 %) of the 71 study participants had persistent ADHD symptoms and still met the criteria for ADHD. Many parents attributed any improvement in their children's ADHD symptoms to advancing age and preferred receiving individual counseling for their children. Parents also opined the need to train school-teachers or even change the education system. Apart from medication, parents have also tried other methods: 29.6 % restricted their children's sugar intake and 13.0 % avoided giving their children food with artificial colourings. One-third of patients gave their children various supplements including multivitamins and various types of fatty acid supplements. Only 13.0 % of interviewed parents joined a support group, either one in their children's school or the local parents' support group.
Conclusion: It is important to explore with parents about complementary treatment options and to educate them about ADHD support groups.

P-25-003 Atomoxetine and central nervous system stimulants treatment pattern in medicaid youths

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Objective: In the last decade new pharmacotherapies have been approved and new safety concerns have emerged. This study analyzed resulting treatment patterns of atomoxetine and stimulants in general practice.
Method: For this population-based retrospective cohort study, we analyzed youths eligible for 26 state Medicaid programs from 1999 to 2006. Youths age 5–18 entered the cohort at the first prescription for atomoxetine/stimulants, following $\geq$6 months continuous eligibility with $\geq$1 diagnosis of a mental disorder commonly treated with atomoxetine/stimulants (new user cohort). Subjects starting atomoxetine therapy after initial stimulant treatment were matched on time since index date to subjects on stimulants (subsequent user cohort). We analyzed treatment initiation, substitution and addition over time.
Results: 279,303 subjects initiated treatment with either atomoxetine (56,012, 20 %, mean age 9.8) or stimulants (223,303, 80 %, mean age 9) with a total of 428,272 years of follow-up. In addition to their initial therapy, 24,998 (47 %) filled $\geq$1 prescriptions for stimulants and 28,659 (13 %) filled $\geq$1 atomoxetine prescriptions. However, only 7 and 2.3 % of atomoxetine and stimulant exposed time were dual therapy. 56,948 patients (mean age 9.9) subsequently initiated atomoxetine, matched to 163,267 stimulant exposed patients (mean age 10.1). In addition to their therapy at the time of matching, 36,472 (64 %) filled $\geq$1 prescriptions for stimulants compared to 24,031 (15 %) with $\geq$1 atomoxetine prescriptions. 26 % of the observed atomoxetine exposed time was dual therapy.
Conclusion: Patients initially treated with atomoxetine often initiated stimulants within a year (45 %), but mostly switched therapy and dual therapy was relatively scarce (7 %). In contrast, patients subsequently treated with atomoxetine were more likely to be also treated with stimulants (65 %) within 6 months and dual therapy was more common (26 %).

P-25-004 São Paulo (Brazil) public ADHD drug distribution program: Review after five years of deployment

S. M. Palma*

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Objective: Evaluate public policies for children and adolescents with ADHD in a major Brazilian city (São Paulo) after five years of implementation.
Method: We analyzed the data from our databases, the number of children treated, the number of trained doctors and amount of drugs distributed.
Results: The project has trained 212 doctors from public service and deployed 26 units of drug distribution, providing an average of 42,000 pills per month. However, we maintained a low drug coverage for children and adolescents in these 5 years.
Conclusion: Although we have doubled the number of doctors prescribing methylphenidate and the number of places distributing the drug, our data bases suggest a significant problem with the undertreatment of ADHD.

P-25-005 Lisdexanfetamine dimesylate effect in central auditory processing of children with ADHD

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Objective: Central Auditory Processing (CAP) is the nervous system efficacy of processing auditory information and its neurobiological activity, including neurophysiology and cognitive functions. Due to CAP complexity, its results could be susceptible to multiple interferences. On the other hand, auditory sense problems could be part of a wide manifestation of ADHD. However, ADHD and CAPD (central auditory processing disorder) are related and share abilities as attention and executive functions. In the presence of both comorbidities became necessary understanding the extension of difficulties to the proposal of rehabilitation process. To evaluate performance of 6–10 year old children with CAPD and diagnosed having type inattention ADHD by SSW and DD tests after the administration of Lisdexanfetamine dimesylate (LDX) 30 mg/day.
Method: Ten children have participated of this study, all of then with CAPD and diagnosed having type inattention ADHD. They had no record of school failure, epilepsy or cognitive damage. Statistic t test was performed to evaluate auditory test results before and after medication.
Results: Significant improvement was showed at auditory test results, at atentional and executive resources under Lisdexanfetamine Dimesylate administration, specially at SSW test—where executive performance and mnemonic processes are involved.
Conclusion: Results shown suggests CAP tests performance are dependent to the integrity of executive and attentional capabilities. Those data allow to interrogate about how much losses at this neuropsychological domains can show false-positive difficulties, unless

another diagnoses that share same symptoms, as ADHD. Attentional performance improvement can attenuate possible difficulties in CAP.

P-25-006 Revisiting the side effects of methylphenidate in children with Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: The use of stimulant medications for the treatment of ADHD is limited by the occurrence of side effects. They are generally assessed using specific scales and can be grouped into five categories: Neurovegetative (sleep, appetite, somatic), Interactiveness, Psychomotor Agitation and Retardation, Mood/Anxiety. Using a strength-based instrument (SWAN) allows for a non-skewed distribution of scores in the assessment of ADHD. We developed on the same basis the Strength-based ADHD Monitoring (SAM) questionnaire that includes both ADHD symptoms like the SWAN and side-effects, using the same metric.
Method: The sample comprised 23 children ranging from 7 to 15 years (10.7 $\pm$ 2.3 years), 16 boys/7 girls; they all were diagnoses with ADHD and 70 % had at least one comorbid disorder (learning disability, ODD, etc., excluding a mood/anxiety disorder). All families participated in a triple-blind placebo controlled cross-over design used to determine the optimal dose of methylphenidate. Over the course of 4 weeks, a placebo, low, medium and high dose of medication were tested; parents and teachers completed the SAM daily. Multilevel modeling was used to describe the dose–response curve.
Results: Generally, ratings were worse ADHD symptoms than for side effects, and worse at school than at home. In teacher's rating all side effect factors (except neurovegetative) linearly improved with the dose of methylphenidate, with the worst level reported on placebo. In parents' ratings the improvement with methylphenidate doses was significant for the psychomotor retardation and mood/anxiety factors.
Conclusion: The notion of side effects has to be revisited, as they generally improved with stimulant medication, except for the neurovegetative symptoms. "Side effect" symptoms may be an integral part of the ADHD syndrome, but generally less severe. The dose–response may show an inverted-U curve, generally improving with the usual doses, but worsening after a tipping point, which may vary between individuals.

P-25-007 Atomoxetine improves executive functions performance in children with Attention Deficit/Hyperactivity Disorder

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Objective: Attention Deficit Hyperactivity Disorder (ADHD) shows deficits in executive functions performance. Atomoxetine (ATX, Strattera®) has proven effective reducing ADHD core symptoms. The objective is to study whether ATX increases executive performance in children with ADHD and whether beneficial effects of the drug are maintained over time.
Method: 10 naïve ADHD subjects (mean age = 10.5, SD = 4.23), 4 girls and 6 boys with normal IQ were evaluated. Repeated-measures study design was implemented. Neuropsychological battery consisted in five tests from the Cambridge Neuropsychological Testing Automated Battery (CANTAB) to measure executive function and decision-making: Intra-Extra Dimensional Shift September (IED), One Touch Stocking of Cambridge (OTS), Spatial Span (SSP), Spatial Working Memory (SWM), and Cambridge Gambling Task (CGT); Memory Test Sentences of Siegel and Ryan for verbal working memory the and K-BIT test to evaluate IQ. All tests were run three times except the K-BIT test: before medication (pre-test), after 3 months (postest-1) and after 6 months (postest-2) of effective ATX dose .
Results: ADHD patients showed significant improvements in all tests after 3 months of continued ATX administration. Moreover, benefits were maintained after 6 months of ATX intake, finding significant differences ($p < 0.05$) with both the pre-test and the postest-1.
Conclusion: Our results show that ATX exhibits a therapeutic effect that goes beyond reducing the core symptoms of ADHD. Specifically, we have shown significant improvements in executive functioning and decision-making. From a neurobiological point of view in ADHD, these results are not surprising considering that attentional control, motor activity, behavioural inhibition and executive functioning are regulated by the prefrontal cortex and fronto-basal connections. This cortical region is the anatomical network in which ATX seems to exert its action. Further studies are needed to assess the potential value of this drug in the improvement of neuropsychological performance in ADHD.

P-25-008 Measuring functioning in adolescents with ADHD. Do existing tools reflect the adolescents' perspective?

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Objective: Tools used to evaluate treatment benefit in clinical trials should reflect the perspectives of the target population. This study explored whether ADHD outcome tools evaluating the impact of ADHD on function reflect the perspective of ADHD patients and their parents.
Method: An initial literature review and clinician and teacher interviews were used to build a preliminary measurement framework. Interview guides were developed based on this framework to explore functional outcomes in adolescent ADHD. Semi-structured interviews were conducted with 60 ADHD adolescent-parent dyads, recruited from clinic sites in the US. Data was analyzed to refine the measurement framework. Qualitative analysis of adolescent ADHD tools, identified from an additional focused review of the literature, was conducted to assess the extent of coverage of concepts uncovered from the semi-structured interviews.
Results: Results from interviews with 60 ADHD adolescents (67 % male) aged 13–17 years and their parents suggested difficulties with performing tasks in various contexts at school, home, and leisure time. Difficulties related to interactions with family, friends, and people in authority also emerged. Stress related to performing tasks, and interpersonal interactions were also reported. The literature review identified 34 instruments that were used to measure functional outcomes in Adolescent ADHD. Three tools—AIM-C, WFIRS-S, and CHIP-CE—appeared to cover some of the concepts elicited from the interviews. However, none of these tools comprehensively covered all concepts identified from the interviews, and none meet the content validity standard required by FDA to support label claims (FDA 2009).
Conclusion: Existing tools neither cover all concepts that were relevant to ADHD adolescents nor do they meet FDA standard for content validity. There is a need to develop new tools to evaluate functional outcomes in ADHD comprehensively from the

adolescents' perspective and to ensure that they meet FDA standards to support label claims.

P-25-009 Treatment patterns among children and adolescents having Attention-Deficit/Hyperactivity Disorder (ADHD) with or without psychiatric or neurologic comorbidities in Sweden

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Objective: To understand the impact of comorbidities on pharmacotherapy patterns in ADHD patients with and without psychiatric/neurologic comorbidities.
Method: A retrospective cohort analysis was conducted using electronic medical records in Sweden (CEBRxA). Patients included were aged 6–17 with ≥1 prescription for an ADHD medication from July 2007 through June 2009, were continuously active in the database for ≥12 months before and after their index date (first ADHD prescription) and had ≥2 documented ADHD diagnoses. Based on the presence of psychiatric/neurologic diagnoses within 12 months preceding their index date ('pre-index'), patients were categorized as 'non-comorbid' or 'comorbid' ADHD. Augmentation (new medication added to index therapy with ≥30 days overlap), was measured for 12 months following their index date ('post-index'). Unadjusted between-group differences were analyzed using Chi square, Wilcoxon rank-sum, or t-tests.
Results: Of 1,794 patients, 1,083 had non-comorbid and 711 had comorbid ADHD. During pre-index, those with comorbid ADHD compared to non-comorbid had significantly ($P < 0.05$) greater proportions of: 13–17 year olds (54 vs. 47 %), females (28 vs. 20 %), and ≥1 hospitalization (10.4 vs. 5.6 %); along with significantly ($P < 0.05$) higher average number of annual physician visits (15.8 vs. 9.6) and medications (8.7 vs. 5.7). Post-index, 21.7 % of all patients augmented, and unadjusted proportions between the non-comorbid and comorbid ADHD cohorts were similar (20.5 vs. 24.4 %, $P = 0.233$). Augmentation frequency with non-comorbid patients compared to comorbid was comparable with ADHD label-indicated products (13.9 vs. 10.9 %, $P = 0.264$) while significantly less with non-ADHD medications (6.6 vs. 13.9 %, $P = 0.001$).
Conclusion: Post-index augmentation of ADHD therapy was prevalent among children/adolescents with ADHD, even among patients without documented pre-index psychiatric/neurologic comorbidities. Significant differences were found in unadjusted patient characteristics and pre-index healthcare utilization between cohorts.

P-25-010 A dose adaptation approach of methylphenidate (MPH) for children with Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: Frequent administrations of immediate release (IR) stimulant can cause serious problems concerning patient compliance and privacy. Therefore, extended release (ER) forms are being proposed, aiming at reproducing the ideal pharmacokinetic (PK) properties obtained in proof of concept studies. Thus, it is primordial to determine the IR PK profiles that may give rise to the best drug effect. Using a Population pharmacokinetic (Pop-PK) approach, we propose here a computational strategy to identify the most efficient IR PK profile for BID and TID regimens.

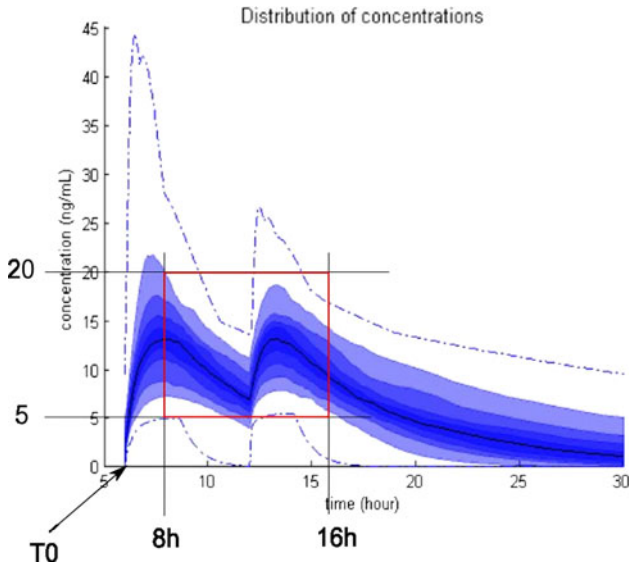

Fig. 1 .

Method: To investigate the use of PK as an effect surrogate, we based our work on a reported MPH Pop-PK model (Shader et al. 1999) along with available pediatric clinical data for doses and effect scales. Conditional on a favorable time window for efficacy defined by the child's daily schedule and a minimum concentration checkpoint before sleep, we were able to determine the best first administration time and dosing regimen using our developed methodology. The combined use of favorable time window and therapeutic window (hypothetic here) can lead to the selection of dosing regimen as depicted in Fig. 1.
Results: Without recourse to blood samplings, the best drug regimens in terms of efficacy are delineated. In our case, the best regimen for the favorable efficacy window of 8:00am to 4:00 pm and therapeutic window of 5 to 20 ng/mL has been found to be the doses of 25 mg (6:00 am) and 15 mg (12:00 pm). Figure 1: Optimal regimen (TDD = 40 mg) with concentration (here 5–20 ng/mL) and time window (between 8:00 am and 4:00 pm). T0 = 6:00 am.
Conclusion: The developed methodology can be used for new drug design. It is also an educational tool for clinicians and patients to improve the prescription of the time and dosing of combined administration of IR and ER MPH.

Saturday, 8 June 2013, 15.00–16.00

P-26 Pharmacological treatment: Children and adolescents IV

P-26-001 Effects of methylphenidate treatment on antioxidative capacity and ROS formation in the blood of children with ADHD

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Objective: There is evidence for increased oxidative stress level in patients with ADHD. Oxidative stress is a synonym for enhanced reactive oxygen species (ROS). Cellular oxidative stress indicators are leucocyte, especially macrophages, formed from precursor monocytes and polymorphonuclear leucocyte (PMN). Aim of our study was to analyze plasma glutathione for the antioxidative capacity

and the formation of ROS in the whole blood in the presence of acute oral applicated methylphenidate (MPH).
Method: Plasma glutathione for antioxidative capacity was made using a Glutathione assay kit (BioAssay Sytems). Blood was analyzed in 12 drug-naiv ADHD patients and 9 ADHD patients treated with MPH (between 6 and 12 years old). The first blood sample was taken before the attitude on the medication, the second after the attitude. Blood sampling started at 10 am (2 h after MPH intake) followed by measuring the formation of ROS in the whole blood and in isolated PMN and monocyte/lymphocyte fraction obtained after Ficoll density gradients centrifugation. ROS detection was carried out by electron spin resonance spectroscopy using the spin label CMH (1-hydroxy-3-methoxycarbonyl-2,2,5,5-tetra methylpyrrolidine). The responsiveness of ROS formation in leucocyte was analyzed by stimulation with phorbol12-myristate13-acetate and inhibited by Cu–Zn superoxide dismutase.
Results: Plasma glutathione is for about 20 % after MPH-treatment. The mean MPH oral dose was 0.96 mg/kg. ROS formation in whole blood decreased significantly in MPH-treated patients. Similar changes were observed in PMN leucocyte. Monocyte/lymphocyte ROS decreased from 14 ± 3 nmoles O2/min/106 cells to 3 ± 0.2 nmoles O2/min/106 cells.
Conclusion: MPH reduces oxidative stress by a diminished formation of ROS. As a consequence a reduced consumption of glutathione could be observed. Also in PMN leucocytes a reduced production of ROS could be observed. The consequence could be a reduced immune reaction against infectious agents.

P-26-002 Psychostimulant enhances cognitive controls through STROOP test in children with ADHD

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Objective: Neuropsychological models of Attention-Deficit Hyperactivity Disorders (ADHD) implicate impaired cognitive control as contributing to disorder characteristic such as behavioral deficiencies and excesses. This study included the Stroop test for investigating the cognitive functions in ADHD and psychostimulant effects on the functions.
Method: Participants were 16 children with a DSM-IV diagnosis of ADHD through the K-SADS interview, taking OROS methylphenidate for 12 weeks. Participants completed the Stroop test as well as the ADHD Diagnostic System (ADS), a computerized attention test. Clinicians rated all participants using the Clinical Global Impression (CGI), ADHD-rating scale, and IOWA Conners Rating Scale. Each evaluation was administered at the time of pre- and post-medication treatment state.
Results: ADHD patients at post-medication treatment state demonstrated significantly increased scores on clinical improvement and decreased scores on inattention, impulsivity, and hyperactivity. In the ADS test, some subdomains demonstrated significantly decreased levels at the post-treatment state.
Conclusion: Psychostimulant treatment may induce significant changes in the Stroop test, attention tests, and clinician's ratings in ADHD group. There are probable significant correlations among improved cognitive executive function such as Stoop test and attention test in ADHD group.

P-26-003 Health and social costs of Attention Deficit/Hyperactivity Disorder (ADHD) among patients who respond (RD) to drug therapy versus non-responders (NRD) in Spain (preliminary results)

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Objective: To compare the costs of responders versus non-responders to drug treatment and describe the direct, indirect and total social cost (direct and indirect) of ADHD in Spain.
Method: A cross-sectional and descriptive study of ADHD costs, obtaining data concurrently and retrospectively. The health system perspective (considering only direct costs) and societal perspective (considering direct and indirect costs) were used. The time horizon was 1-year. Patients from 15 sites were included consecutively. RD presents an ADHD-RS score less than 18 for at least 3 months. Standardized questionnaires were used to capture these variables: demographics, social, working, disease (DSM-IV-TR, CGI, CGA, and ADHD IV), services utilization, drug and non pharmacologic treatments, quality of life (EuroQoL-5D) and work productivity (WPAI). Direct costs were medical (services utilization, drug and non pharmacologic treatments) and non-medical (transportation). Indirect costs were based on lost working hours for medical visits from patients' parents/guardians and caregiver costs. Study approved by Spanish Health Authorities and Ethic Committees.
Results: 39 RD (age: (mean ± SD) 13.2 ± 2.4 years, male: 77 %) and 31 NRD (age: 12.4 ± 2.8 years, male: 81 %) patients were included. The mean ADHD-RS-IV score was 15.6 ± 6.9 for RD and 28.1 ± 9.9 for NRD ($p < 0.001$) and the EQ-5D visual analog scale, 86.1 ± 14.2 and 68.1 ± 30.1, respectively ($p = 0.001$). Direct, indirect, and total social costs were €2,913 ± 1,764, €967 ± 1,441, and €3,880 ± 2,460 for RD; and €4,280 ± 3,885 ($p = 0.077$), €1,956 ± 3,203 ($p = 0.442$), and €6,236 ± 5,855 ($p = 0.042$) for NRD.
Conclusion: The total management cost of responder ADHD patients is lower than the cost of non-responders patients in Spain.

P-26-004 Atomoxetine-induced life-threatening long QT syndrome

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Objective: There are few reports of cardiovascular adverse effects of atomoxetine (ATM). ATM was labeled with cardiac risk warnings, but only when administered in excess of therapeutic doses, having generally no effect on cardiac repolarization, as measured by the QTc interval. Among patients with congenital long QT interval, each 10 ms increase in the rate-corrected QT (QTc) interval corresponds with a 5–7 % exponential risk increase for torsades de pointes, and a QTc of over 500 ms is associated with a 2- to 3-fold increase in torsades de pointes risk. The article describes a case of prolonged QTc in a 17-year-old Slovenian female patient with ADHD treated with ATM.

Method: Case report and review of published literature. A 12-lead electrocardiogram (ECG)was used to measure of QT interval.
Results: She had no known childhood health problems and reported no previous syncope, palpitations, dyspnea, or seizures. A 12-lead ECG showed a normal QT interval (QTc) of 388 ms, as well as a normal heart rate and blood pressure before ATM 60 mg daily was introduced.Electrolyte and metabolic abnormalities were excluded. After 2 months of treatment, palpitations and a loss of consciousness were reported with increased heart rate (115 and 75 bpm the day after ATM discontinuation), sinus arrhythmia and a prolonged QT (QTc = 540 ms) interval. Therapy with ATM was abruptly discontinued; cardiovascular status quickly normalized. ADHD symptoms worsened again.No other medication dosage regime was changed at this time. Typical short-long-short sequences or record non-sustained ventricular arrhythmias were not noted.
Conclusion: Our case demonstrates the potential risk of developing toxic cardiovascular changes during treatment with ATM. Therefore, a cautious trial of methylphenidate could be considered for this patient. Special attention is needed when prescribing ATM to patients with cardiovascular abnormalities in particular, as they are at an elevated risk of cardiovascular adverse effects before treatment with ATM.

P-26-005 A comparison of the long-term adherence patterns of OROS methylphenidate and atomoxetine in children with Attention Deficit Hyperactivity Disorder

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Objective: To examine the similarities and differences between the adherence rate (defined as the fraction of patients still taking medication at the time t) of osmotic release oral system methylphenidate (OROS MPH) and atomoxetine (ATX) in children with attention deficit hyperactivity disorder (ADHD) during the 1-year measurement period; to compare the temporal change of adherence determinants between two medicines by a randomized controlled trial.
Method: 237 patients (aged 6–16 years) diagnosed with ADHD were randomly assigned to receive OROS MPH (N = 119) or ATX (N = 118). The doses were titrated to achieve optimal response and then maintained for 4–6 week (acute therapy).This comparison assessed the adherence to medication during the acute therapy, 3 months, 6 months and one year, and followed-up the reasons of stop taking medication by telephone.
Results: Both the adherence rate of OROS MPH (73.1, 50.4, 38.7 and 20.0 %, respectively) and ATX (52.5, 33.9, 12.7 and 3.8 %, respectively)** exhibited an initial significant decrease, and the latter decreases faster than the former over time (P's < 0.05). In both medicines, adverse events and lack of efficacy were the determinants of the poor adherence, accounting for 46.2 and 17.6 % in OROS MPH and 45.6 and 26.6 % in ATX on average. Further, the adverse events showed a decreasing effect whereas lack of efficacy exhibited an increasing effect over time, and this pattern was more prominent in OROS MPH.
Conclusion: The adherence of OROS MPH is better than that of ATX over time, but both of them lose a significant adherence due to adverse events in the initial stage of taking medication. To improve adherence, the treatment should first focus on reducing adverse events in early stage, and then adjust to enhance efficacy in the latter stage, especially for OROS MPH.

P-26-006 Predictors of pharmacological treatment outcomes in patients with Attention-Deficit/Hyperactivity Disorder from Non-Western countries

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Objective: The unavailability of data from non-Western countries limits our ability to understand attention-deficit/hyperactivity disorder (ADHD) treatment outcomes, specifically, adherence and persistence of ADHD in children and adolescents. This analysis assessed predictors of treatment outcomes in a non-Western cohort of patients with ADHD treated with atomoxetine (ATX) or methylphenidate (MPH).
Method: Data from a 12-month, prospective, observational study in outpatients aged 6–17 years treated with ATX or MPH were analyzed post hoc to determine potential predictors of treatment outcomes. Participating countries included China, Egypt, Lebanon, Russian Federation, Taiwan, and United Arab Emirates (UAE) (ATX, N = 234; MPH, N = 221). Factors associated with persistence and remission were analyzed with stepwise multiple logistic regression (MLR) as well as classification and regression trees (CART). Cox proportional hazards (CPH) models with propensity score adjustment were utilized to assess differences in ATX persistence among initial-dose cohorts.
Results: Medication persistence was satisfactory and occurred in 63.2 % patients treated with ATX and 60.6 % patients treated with MPH. Among patients treated with ATX who had available dosing information (n = 134), CPH revealed that lower (<0.5 mg/kg) initial dose was significantly associated with shorter medication persistence ($p < 0.01$). MLR revealed greater rates of remission for patients treated with ATX were associated with age (older), country (UAE), and gender (female) (all $p < 0.05$). CART analysis confirmed that older age and lack of specific phobias were associated with greater remission rates. For MPH, greater baseline weight (highly correlated to the age factor found for ATX) and prior ATX use were associated with greater remission rates.
Conclusion: Low (<0.5 mg/kg) initial ATX dose was associated with shorter medication persistence. Age, country, gender, and lack of specific phobias were potential predictors of ATX remission. These findings may help clinicians assess factors upon initiation of ADHD treatment to improve course prediction, proper dosing, and treatment adherence and persistence.

P-26-007 The effect of OROS-MPH and gonadotropin releasing hormon analogue in a male patient with ADHD and precocious puberty associated with hypothalamic hamartoma

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Objective: Most patients with hypothalamic hamartoma (HH) present with central precocious puberty (CPP) and/or seizures. They develop cognitive deterioration and behavioral disturbance as the seizures recur. We experienced a male patient who manifested CPP associated with HH, attention deficit hyperactivity disorder (ADHD), and

conduct disorder despite he had no seizures. We try to elucidate the effect of OROS-methylphenidate (MPH) and GnRH analogue on ADHD symptoms and sexual urge in this patient.
Method: A male patient with HH manifested CPP at 4 years of age. The GnRH analogue treatment was started at 6 years of age and his pubertal signs were suppressed. He had been emotionally unstable, aggressive and antisocial and was diagnosed as ADHD and conduct disorder at 9 years of age. He never had an evidence of seizure activity. The OROS-MPH was started.
Results: The OROS-MPH markedly improved his behavioral problems. Because of his mother's disease, GnRH analogue and MPH treatment were discontinued for more than half a year. During this period, his behavioral problems worsened, and the sexual urge was observed. As soon as OROS-MPH treatment was restarted, his behavioral problems were reduced, however sexual urge was not suppressed until 3 months after GnRH analogue treatment was restarted.
Conclusion: This patient was unique because his behavioral problems were striking in spite of his HH type (parahypothalamic) and absence of seizures. The GnRH analogue was effective for CPP including his sexual urge and OROS-MPH treatment was effective for his behavioral problems.

P-26-008 The clinical profile of children with ADHD that require a OROS-methylphenidate combined with shorter acting formulations

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Objective: Characterize ADHD patients for whom a combination of a once daily lower dose of OROS-methylphenidate (OROS-MPH) together with a shorter acting methylphenidate (MPH) is better tolerated than a single moderate dose of OROS-MPH.
Method: 128 children (age 7–17 years) were treated with OROS-MPH for ADHD. Children with autism spectrum disorder or intellectual disabilities were excluded. 47 patients (36.7 %) required a lower dose of OROS-MPH combined with short acting MPH formulations (Group I). The remaining 81 (63.3 %) continued with the standard single moderate dose of OROS-MPH (Group II). The mean daily doses of MPH were: 0.83 ± 0.21 mg/kg for Group I and 1.06 ± 0.29 mg/kg for Group II.
Results: There were no significant differences in the prevalence of learning disorders, tic disorders, epilepsy and conduct disorders between these 2 groups. 74.5 % of Group I patients had psychiatric comorbidities versus 48.1 % in group II ($p < 0.01$); Anxiety and depression were more prevalent in Group I (46.8 and 9.7 %) than in Group II (27.2 and 1.2 %) ($p < 0.05$). Adverse effects of MPH therapy were much more common in group I (95.7 %) than in group II (53.1 %) ($p < 0.01$). These were mainly: loss of appetite or abdominal pains (40.4 vs. 21.0 %), delayed sleep (51.1 vs. 8.6 %), headache (31.9 vs. 13.6 %), increased anxiety (25.5 vs. 9.9 %), mood changes (23.4 vs. 2.5 %). 36.2 % of the patients in Group I received psychotherapy versus 16.0 % in Group II ($p < 0.01$).
Conclusion: Many ADHD patients will easily tolerate a single dose of OROS-MPH, but approximately a third of them will better tolerate a combination of OROS-MPH with shorter acting formulations. These patients tend to have more psychiatric comorbidities and adverse drug effects and more commonly required psychotherapy.

P-26-009 Clinical efficacy of lisdexamfetamine dimesylate in children and adolescents with Attention Deficit Hyperactivity Disorder: A post hoc analysis

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Objective: Lisdexamfetamine dimesylate (LDX) is the first long-acting prodrug stimulant, and is an effective treatment for children and adolescents with ADHD. This post hoc analysis assessed the proportion of children and adolescents with ADHD who responded to LDX in a European, phase 3, double-blind, parallel-group, dose-optimized clinical trial.
Method: Patients (6–17 years) were randomized to LDX (30, 50 or 70 mg), placebo or osmotic-release oral system methylphenidate (OROS_MPH; 18, 36 or 54 mg; reference arm) over 7 weeks. ADHD Rating Scale version IV (ADHD_RS_IV) total scores were assessed weekly with reference to baseline. In this post hoc analysis, clinical response was predefined as a $\geq$25 or $\geq$50 % reduction from baseline in ADHD_RS_IV total score. Endpoint was the last on-treatment, post-randomization visit at which a valid ADHD_RS_IV total score was observed.
Results: Of 336 patients randomized, 196 completed the study. At baseline, mean ADHD_RS_IV total scores were similar across treatment groups. At endpoint, differences between LDX and placebo in the proportion of patients (95 % confidence interval [CI]) with $\geq$25 or $\geq$50 % reductions in ADHD_RS_IV total score from baseline were 62.0 % (51.6, 72.4; $p < 0.001$) and 55.9 % (44.7, 67.2; $p < 0.001$), respectively. At endpoint, differences between OROS_MPH and placebo in the proportion of patients (95 % CI) with $\geq$25 or $\geq$50 % reductions in ADHD_RS_IV total score from baseline were 44.9 % (32.8, 57.1; $p < 0.001$) and 38.0 % (26.3, 49.7; $p < 0.001$), respectively.
Conclusion: LDX is more effective than placebo in improving core symptoms of ADHD in children and adolescents, as indicated by the statistically significantly greater proportions of patients with $\geq$25 % and even $\geq$50 % reductions from baseline in ADHD_RS_IV total scores. Improvements were also observed for OROS_MPH. This responder analysis may facilitate clinical interpretation of the observed improvements in ADHD_RS_IV total scores.

P-26-010 Efficacy and safety extrapolation analyses for atomoxetine in young children with Attention Deficit/Hyperactivity Disorder

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Objective: This extrapolation analysis qualitatively compared the efficacy and safety profile of atomoxetine from Lilly clinical trial data in 6–7 year old patients with attention-deficit/hyperactivity disorder (ADHD) to that of published external data in 4–5 year old patients with ADHD (2 open-label [4–5 year olds], and 1 placebo-controlled study [5 years olds]).
Method: Main efficacy analyses included placebo-controlled Lilly data and only the placebo-controlled external study (5 year olds). The primary

efficacy variables used in these studies were the ADHD Rating Scale-IV Parent Version, Investigator Administered (ADHDRS-IV-Parent:Inv) total score or the Swanson Nolan and Pelham scale score. Safety analyses included treatment-emergent adverse events (TEAEs) and vital signs. Descriptive statistics (means, percentages) are presented.
Results: Acute atomoxetine treatment improved core ADHD symptoms in both 6–7 years old (N = 565) and 5 year old (N = 37) groups (treatment effect: −10.16 vs. −7.42). In analysis of placebo-controlled groups, mean duration of exposure to atomoxetine was approximately 7 weeks for 6–7 years olds and 9 weeks for 5 year olds. Decreased appetite was the most common TEAE in atomoxetine-treated patients (incidence: 36.8 % in 5 year olds, 21.6 % in 6- to 7 years olds). Other TEAEs observed at a higher rate in 5 year olds versus 6–7 years olds were irritability (36.8 vs. 3.6 %) and other mood-related events (6.9 vs. <3.0 %). Similar increases in vital signs and decreases in weight were observed in 4–5 years olds and 6–7 years olds.
Conclusion: Although limited by the small sample size of the external studies, these analyses suggest that in 5 year old patients with ADHD, atomoxetine may improve ADHD symptoms, but perhaps to a lesser extent than in older children, with some adverse events occurring at a higher rate in 5 year old patients.

Saturday, 8 June 2013, 15.00–16.00

P-27 Pharmacological treatment: Adults I

P-27-001 Lisdexamfetamine Dimesylate (LD) in adult Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: LD is a unique prodrug stimulant. After oral administration, LD is rapidly absorbed from the gastrointestinal tract and converted by hydrolytic activity of red blood cells to dextroamphetamine, which is responsible for its activity. LD was approved initially for the treatment of ADHD in children under the age of 12 up to 70 mg/day. Later, LD was approved for adults with ADHD at the same dose as for children. Our center would like to report about adult patients with ADHD needing above the recommend dose approved by United States of America Food and Drug Administration (FDA).
Method: Twenty Adult out-patients ages 30–60; 12 women and 8 men, were diagnosed with ADHD using the ADHD- IV scale and were treated with LD at initial dose of 70 mg/day. Due to the lack of response; this dose was increased up to 280 mg/day which is above the recommended dosage. Patients were closely monitored during their monthly visit for weight, blood pressure and pulse.
Results: There was a marked improvement in the core of symptoms of ADHD when pre-treatment ratings were compared to post-treatment. There were no changes in vital signs. Some patients did lose some weight initially.
Conclusion: LD in adults with ADHD was well tolerated above the recommended dose of 70 mg/day with positive improvement in ADHD. The use of LD above 70 mg is not approved by USA-FDA. This study is supported in part by the Minnesota Medical Foundation and Clinical Psychopharmacology funds.

P-27-002 Response rates of adults with ADHD in multicentre placebo controlled trials of atomoxetine: An integrated analysis

P. Asherson*, C. Bushe, K. Saylor, Y. Tanaka, W. Deberdt, H. Upadhyaya

* London, United Kingdom

Objective: A number of clinical trials of atomoxetine (ATX) in adults with ADHD have been reported subsequent to NICE guidelines issued in 2008. This integrated analysis of all randomized placebo controlled studies with ATX in adults with ADHD completed as of May 2012 evaluates recent evidence on efficacy.
Method: This integrated analysis pooled individual patient data from all short-term (10–16 week) and longer-term (6 month) randomized, double-blind studies of ATX in adults (all sponsored by Eli-Lilly). Stringent clinically meaningful definitions of response were chosen to include core symptoms and functional improvements.
Results: This integrated efficacy analysis comprised 6 short-term studies with 1,961 patients, and 3 longerterm studies with 1,413 patients. In the shortterm pooled analysis, ATX patients achieved a significantly greater mean reduction in ADHD symptoms than placebo patients (−12.2 vs. −8.1; CAARS-Inv:SV Total score; $p < 0.001$). For the longer-term pooled analysis, the respective improvements after 6 months were (−13.2 vs. −9.7, $p < 0.001$). Response rates at study endpoints, based on (a) CAARS-Inv:SV total-score improvement ≥30 % and CGI-ADHD-S ≤3 were 34.8 % ATX, 22.3 % placebo in the short-term and 43.4 % ATX, 28.0 % placebo after 6 months, and (b) CAARS-Inv:SV total-score improvement ≥40 % were 41.3 % ATX, 25.3 % placebo in the short-term and 44.0 % ATX 31.4 % placebo after 6 months (all $p < 0.001$).
Conclusion: ATX has a clinically significant effect in adults with ADHD, with reductions in core symptoms and clinically meaningful responder rates which are maintained over 6 months. The low abuse and diversion potential of ATX, possibility of once-daily dosing with enduring efficacy, stable effect throughout the day, and evidence of ADHD efficacy in patients with comorbid social anxiety and alcohol use disorders, make ATX an important medication to consider when treating adult patients with ADHD.

P-27-003 Efficacy of OROS-methylphenidate on specific EF deficits in adults with ADHD. A randomized, double blind, placebo-controlled crossover study

A. Bron*, D. Bijlenga, A. M. Boonstra, M. Breuk, W. Pardoen, A. T. F. Kooij

* The Hague, The Netherlands

Objective: Attention deficit/hyperactivity disorder (ADHD) is linked to impaired executive functioning (EF) of the brain. Although stimulant medication improves neurocognitive skills in children as well as adults with ADHD on fMRI scans, self-reports of medication effects remain ambiguous. Objective measures may be more conclusive.
Method: Twenty-two adults diagnosed with ADHD using the Diagnostic Interview on Adult ADHD (DIVA 2.0) participated in a 6-weeks study examining the effect of OROS-methylphenidate on continuous performance tests (CPTs; objective measures), and on the self-reported ADHD-rating scale (subjective measure) using a randomized, double-blind, placebo-controlled cross-over design.
Results: Reaction time variability, commission errors and d-prime significantly improved after OROS-methylphenidate as compared to baseline measurements, and effect sizes were moderate (Cohen's $d > 0.50$). Moreover, results were influenced by placebo effects and CPT learning effects. More severe baseline EF scores on reaction time variability significantly interacted with improvement after OROS-mph (beta = −7.456, t = −1.896, $p = .065$). Also, patients having multiple EF deficits had significantly more benefit on hit reaction time

(F = 3.708, $p = .033$), d-prime (F = 3.751, $p = .032$) and omission errors (F = 3.729, $p = .033$).
Conclusion: The effect of OROS-mph was detected on specific measures of EF deficits, of which reaction time variability, d-prime and commission errors showed the largest discriminative ability between responders and non-responders, especially in patients having multiple EF deficits.

P-27-004 Cardiovascular and metabolic risks in adult ADHD patients before and after treatment with stimulants and non-stimulants: Preliminary findings

A. Gabriel*

* Calgary, Canada

Objective: To examine cardiovascular metabolic risks (COM), including cholesterol profile, blood glucose, in adult ADHD patients, before and after treatment by stimulant or non-stimulant medication. To examine claims in previous literature findings, that stimulants may result in a favorable lipid profile changes.
Method: This is an ongoing 12 weeks follow up study, employing a sample of consenting consecutive outpatients. Male and female adult patients are included. Excluded from the study, those who suffer from endocrinopathies, those with liver, renal illnesses or who suffered from eating disorder. Clinical outcome measures included; the adult ADHD self report scale (ASRS-v1.1) symptom checklist (Adler et al.2006), and the Clinical Global Impression (CGI). COM included; pulse, blood pressure, BMI, fasting glucose, and lipid profile measures. ASRS-v1.1 and CGI were completed at baseline, at 4 and at 12 weeks of treatment. COM, were taken before and 12 weeks after treatment.
Results: Completed this ongoing study (n = 20) non smoker patients. The repeated measures analysis of variance (ANOVA), was utilized to examine the changes in the ASRS-vi.i, and CGI over time, and paired t test, was utilized to examine changes in cardiovascular dependent variables (pulse, blood pressure, BMI, lipid profile, HB A1c, and fasting blood glucose), at 12 weeks of treatment. There was significant ($p < .001$) improvement of ADHD symptoms over time, and there were significant changes in pulse, BP, weight and in BMI. However there were no significant changes in any of lipid and the fasting glucose parameters.
Conclusion: medications used in adults with ADHD are associated with minor, but statistically significant changes in heart rate and blood pressure. Findings in the current study are consistent with findings in previous research. The current practice guidelines recommend a careful medical evaluation of all patients prior to starting stimulant treatment.

P-27-005 Methylphenidate Hydrochloride Modified Release (MPH–LA) in adults with Attention Deficit Hyperactivity Disorder (ADHD): Self–rated, observer–rated and physician–rated assessments show consistently significant improvement compared to placebo

Y. Ginsberg*, M. Huss, T. Tvedten, T. Arngrim, D. Gruener, A. Philipsen, K. Carter, C.-W. Chen, P. Gandhi, V. Kumar

* Stockholm, Sweden

Objective: Recent epidemiological studies have reported a prevalence of adult ADHD of approximately 4 %, however approved treatments are limited. To confirm the clinically effective and safe dosage range of MPH–LA in adults with ADHD.
Method: The study consisted of three treatment periods (TP). In the 9-week double-blind, parallel-group TP1, 725 patients were randomized (1:1:1:1) to MPH–LA 40, 60, or 80 mg/day or placebo once daily (3-week titration, 6-week fixed dose). Improvement in Clinical Global Impression-Severity scale (CGI-S), Conners' Adult ADHD Rating Scale (CAARS-O:S) and Adult Self-Report Scale (ASRS) at the end of TP1 were secondary efficacy endpoints of the trial. The proportion of patients with clinical improvement on the CGI-S scale was analyzed using a logistic regression model. CAARS-O:S and ASRS were evaluated by ANCOVA model.
Results: 725 of 863 screened patients were randomized to 40 (N = 181) 60 (N = 182), or 80 mg (N = 181) MPH–LA or placebo (N = 181). 584 (80.6 %) patients completed TP1. Patient self-rated (ASRS), observer-rated (CAARS-O:S), and physician-rated (CGI-S) assessments showed significantly greater improvements from baseline with all MPH-LA doses versus placebo at the end of the 9-week TP1 (Table).
Conclusion: Results from this large multicenter double–blind placebo controlled study indicate consistent outcome, with respect to the better efficacy of MPH–LA compared to placebo in adult ADHD patients, at doses ranging from 40 to 80 mg/day, as measured by patient-, observer- and physician-rated scales.

Table: Improvement from bsaline 1 to end of period 1

CAARS-O:S total score	MPH-LA 40 mg N = 136	MPH-LA 60 mg N = 135	MPH-LA 80 mg N = 137	Placebo N = 147
LS means	9.45	9.20	10.12	4.50
LS means difference from placebo (95 % CI)	4.95 (2.08, 7.81)	4.69 (1.83, 7.56)	5.61 (2.79, 8.44)	–
p value	0.0008	0.0014	0.0001	–

ASRS total score	MPH-LA 40 mg N = 154	MPH-LA 60 mg N = 150	MPH-LA 80 mg N = 151	Placebo N = 159
LS means	13.76	13.11	15.87	6.81
LS means difference from placebo (95 % CI)	6.95 (4.04, 9.85)	6.30 (3.39, 9.21)	9.05 (6.17, 11.94)	–

ASRS total score	MPH-LA 40 mg N = 154	MPH-LA 60 mg N = 150	MPH-LA 80 mg N = 151	Placebo N = 159
p value	<0.0001	<0.0001	<0.0001	–

GGI-S	MPH-LA 40 mg N = 174	MPH-LA 60 mg N = 175	MPH-LA 80 mg N = 179	Placebo N = 172
n/evaluable patients (%)	112/157 (71.3)	112/152 (73.7)	112/151 (74.2)	77/159 (48.4)
Odds-ratio (95 % CI)	2.79 (1.73, 4.48)	3.20 (1.97, 5.22)	3.24 (1.98, 5.28)	–
p value	<0.0001	<0.0001	<0.0001	–

P-27-006 Health state utilities associated with adult ADHD

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* Memphis, USA

Objective: With growing awareness of the importance of adult ADHD treatment, cost-effectiveness analyses are needed to compare the value of treatment options. A cost-utility model is a type of cost-effectiveness analysis requiring utilities, which are values representing the strength of preferences for various health states. Although utilities have been reported for childhood ADHD, no previous studies have identified utilities representing adult ADHD. Therefore, the purpose of this study was to estimate utilities associated with adult ADHD.
Method: Health state vignettes representing adult ADHD were drafted based on literature review, interviews with four clinicians, and clinical trial data. The health states were revised based on a pilot study with 26 participants. Final health states were rated in time trade-off interviews (TTO) with general population respondents in London and Edinburgh.
Results: A total of 158 participants completed the interview (mean age = 47.0 years; 49.4 % female; Edinburgh = 80 participants). Mean (SD) utilities were 0.82 (0.17), 0.68 (0.28), and 0.67 (0.28) for health states describing treatment responders (health state A), nonresponders (B), and untreated patients (C). In the TTO interviews, most participants rated health state A as preferable to B (n = 92; 58.2 %) and C (n = 97; 61.4 %). The majority rated B and C as equal (n = 125; 79.1 %). T-tests comparing mean utilities found that A was significantly more preferable than B ($t = 10.0$; $p < 0.0001$) or C ($t = 10.2$; $p < 0.0001$). There were no significant differences in utility scores between Edinburgh and London.
Conclusion: The current study is the first to provide utilities that may be used in cost-utility models of treatment for adult ADHD. Results reflected clear differences between health states representing treatment responders and nonresponders/untreated patients. Current utilities were comparable to those previously reported for childhood ADHD.

P-27-007 Course of pharmacological treatment of adult ADHD

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* Liverpool, United Kingdom

Objective: The chronic nature of ADHD means that 30–50 % of patients diagnosed with the condition in childhood continue to experience impairment into adulthood. Methylphenidate is the first line treatment recommended by NICE and is consequently prescribed by most doctors in England. Non-stimulant options include atomoxetine but at the time of writing neither atomoxetine nor methyphenidate are licenced for initiation in adults with ADHD. Very few studies have been carried out on the course of treatment of ADHD and long terms effects of treatment are also unknown. We aimed to investigate the course of treatment for patients attending our adult ADHD clinic.
Method: Information was gathered on a sample of 55 patients who are receiving medication for ADHD in our Adult ADHD clinic. The NICE guidelines outlining the management of ADHD in England were used to compare clinical practice to guidelines. Data was collated on patients prescribed methylphenidate hydrochloride modified release preparations, immediate release preparations of methylphenidate, dexamphetamine and atomoxetine. This was analysed to look for trends in the length of time patients were taking their medication, the effects on their symptoms and any side effects or problems encountered on physical health monitoring.
Results: 27 % of patients were using medication for more than 18 months. 33 % reported a worsening of symptoms, 60 % reported no change, and 7 % reported an improvement. 20 % required an increase in the dose of methylphenidate. In one case Concerta had to be stopped and changed to atomoxetine due to worsening of panic attacks. None of the cases required a reduction or change in medication due to blood pressure changes or tachycardia.
Conclusion: The use of stimulant medication in adult patients with ADHD remains a relatively new area and our experience thus far would indicate that it is a relatively safe practice provided that regular monitoring is carried out.

P-27-008 Lamotrigine for Attention Deficit/Hyperactivity Disorder comorbid with mood disorders: Case series

B. Oncu*, O. Er, B. Colak

* Ankara, Turkey

Objective: Attention-de_cit/hyperactivity disorder (ADHD) is frequently comorbid with mood disorders in both children and adults. Lamotrigine, an anticonvulsant indicated for the maintenance treatment for bipolar depression was also reported to be effective in adult ADHD comorbid with bipolar II disorder. This study aimed to present patients with ADHD and comorbid mood disorders treated by lamotrigine.
Method: Forty patients (17 women, 42.5 %) with adult ADHD who were on lamotrigine were identi_ed by retrospective chart review. Treatment response was evaluated by Clinical Global Impression - Severity (CGI-S) and Clinical Global Impression -Improvement (CGI-I) scores.
Results: Twenty (50 %) patients had bipolar II and 20 had recurrent depression. Mean age was 22.9 ± 8.1 (16–55) when lamotrigine treatment was started. ADHD diagnoses were based on clinical interview and information from at least one relative. Most patients (95 %) were on various forms of methylphenidate. Mean CGI-S score was 5.5 ± 0.9. Thirty-one patients (77.5 %) improved with lamotrigine, there was no change in 7 patients (17.5 %) and 2 patients got worse (mean CGI-I score: 5.3 ± 1.1). Mean dose of lamotrigine was 125.6 ± 47.8 (25–250 mg) and mean treatment duration was 11.9 ± 10.9 months (1-48 months). In some patients, improvement with lamotrigine started even after one moth of treatment. Side effects were skin rash which resolved after treatment cessation (n = 1), weight gain (n = 3), weight loss (n = 3), and sleep disturbance (n = 1).
Conclusion: Although naturalistic and retrospective this study showed that lamotrigine might be an eand safe treatment option for adult ADHD and comorbid with bipolar II and recurrent depression. Prospective and controlled studies are needed to support our _ndings.

Saturday, 8 June 2013, 15.00–16.00

P-28 Pharmacological treatment: Adults II

P-28-001 Investigating the best treatment for the Delayed Sleep Phase Syndrome in adults with Attention-Deficit/Hyperactivity Disorder and its effect on health and appetite

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Objective: About 80 % of adults with Attention-Deficit/Hyperactivity Disorder (ADHD) have chronic sleep-onset problems and the majority of them has a Delayed Sleep Phase Syndrome (DSPS). This study investigates the best treatment of DSPS, and will determine whether patients with ADHD and DSPS have suboptimal biomarkers of chronic diseases like diabetes and cardiovascular disease.
Method: Fifty-one adults with ADHD and DSPS will be recruited from the PsyQ outpatient clinic, Program Adult ADHD, in The Hague, the Netherlands. Patients will be randomized for sleep education, plus: (1) 0.5 mg dd Melatonin, (2) 0.5 mg dd placebo, or (3) 0.5 mg dd Melatonin, plus 30 min of light therapy in the morning between 7 and 8 AM. Each treatment takes 3 weeks; the Melatonin intake will be 3 h before the patient's individually determined Dim-Light Melatonin Onset (DLMO), and will be advanced during the treatment period.
Results: We aim to finish the study by April, 2014. The primary endpoint is the phase shift of the sleep/wake cycle as evaluated by the time of DLMO directly after treatment. Secondary endpoints are the extension of sleep length, shortening of sleep onset delay, advancement of the time of wake-up, reduction of sleepiness and fatigue at daytime, appetite, food intake, ADHD symptoms, improvement of the appetite hormone profiles (leptin and ghrelin), insulin resistance, biomarker profiles, blood pressure, heart rate variability, quality of life, and treatment satisfaction. All outcomes will be measured directly and 3 weeks after treatment.
Conclusion: The results will give insight into the association between DSPS, ADHD, and chronic conditions such as obesity, diabetes, hypertension and cardiovascular diseases, and may serve as a model for the increase in obesity and metabolic syndrome in the general population, in which sleep loss is common due to the extended use of artificial light at night.

P-28-002 Methylphenidate treatment of adult long-term prison inmates with ADHD: A randomised double-blind placebo-controlled trial with open-label extension

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* Stockholm, Sweden

Objective: Despite an estimated 10-times increase of ADHD in prison inmates, and the serious consequences of untreated ADHD for the individual and for society, medication for ADHD was not previously evaluated in a prison setting. We evaluated the efficacy and long-term effectiveness of osmotic-release oral system methylphenidate (OROS-methylphenidate) in adult male long-term inmates with ADHD of a Swedish high-security prison facility.
Method: A 5-week randomised, double-blind, placebo-controlled, fixed-dose (72 mg/d) trial (RCT) was conducted in 30 prison inmates that were severely symptomatic and impaired from ADHD and coexisting disorders. In a subsequent 47-week open-label, flexible-dosing extension phase, all 30 participants received optimally titrated OROS-methylphenidate alongside regularly provided cognitive treatment programs within a prison setting. The primary outcome measure was change in observer-rated ADHD symptoms over the initial 5-week RCT (CAARS: O-SV scale). Secondary outcome measures included self-reported ADHD symptoms, global severity, global functioning, cognition, motor activity, institutional behaviour and quality of life, over the entire 52-week study period.
Results: Treatment with OROS-methylphenidate was highly effective and overall safe, both in the short-term as compared to placebo (effect size of Cohen's d = 2.17; Numbers needed to treat (NNT) = 1.1), and in the long-term when combined with cognitive programs in a multimodal treatment approach. Over the total 52-week study period, ADHD symptoms, global functioning, motor activity, cognition, quality of life and behaviour control continued to improve. There was no drug misuse reported. A majority of participants completed treatment programs, school activities and vocational training, aiming at reducing substance misuse and criminality after served conviction, thus increasing the chances of re-integration into society.
Conclusion: OROS-methylphenidate effectively improved symptoms and functional impairments of prison inmates with ADHD. Results suggest that ADHD medication provided under strictly controlled conditions could be a useful part of multimodal treatment within a prison setting.

P-28-003 Severity but not comorbidities predicts response to methylphenidate in adults with ADHD: Results from a naturalistic study

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* Porto Alegre, Brazil

Objective: Assess predictors of clinical response to immediate–release methylphenidate (IR-MPH) in a naturalistic setting by analyzing the influence of demographic factors, severity and a wide range of comorbid psychiatric disorders.
Method: Two hundred and fifty adult patients with ADHD were evaluated and completed a short-term treatment with IR-MPH protocol. Mental health diagnoses were based on DSM-IV criteria through the use of standard structured interviews. The SNAP-IV scale adapted to adults was used to assess the severity of ADHD.
Results: In the linear regression model, only higher severity of ADHD was associated to a better IR-MPH response (b = 0.770; $P < 0.001$; Cohen's $f^2 = 0.945$). Treatment of comorbidities in a subsample (n = 62) did not modify this pattern.
Conclusion: Our findings suggest that in clinical settings patients with more severe ADHD symptomatology have a good response to treatment, independently from the presence of several mild or stabilized comorbidities and their treatments. ADHD treatment response is opposite to other common psychiatric disorders where severity is associated with worse outcomes.

P-28-004 40–week, randomized, double–blind, placebo–controlled, multi-centre, efficacy and safety study of Methylphenidate Hydrochloride Modified Release (MPH–LA) in adults with Attention Deficit Hyperactivity Disorder (ADHD)

M. Huss*, Y. Ginsberg, T. Tvedten, T. Arngrim, D. Gruener, A. Philipsen, K. Carter, J. Steiert, C.-W. Chen, V. Kumar

* Mainz, Germany

Objective: Recent epidemiological studies have reported the prevalence of adult ADHD to be approximately 4 %, however approved

treatments are limited. Primary objectives were to confirm the clinically effective and safe dosage range of MPH–LA in adults.
Method: During the initial dose confirmation treatment period (TP1), patients were randomized to double–blind placebo, MPH-LA 40, 60, or 80 mg/day for 9–weeks (3–weeks titration, 6-weeks fixed–dose). Co–primary endpoints during TP1 were to evaluate the improvement in ADHD symptoms by Attention-Deficit/Hyperactivity Disorder rating scale (DSM-IV ADHD RS) and improvement of functional impairment by Sheehan Disability Scale (SDS) total score, by an analysis of covariance (ANCOVA) model. The key secondary endpoint was proportion of patients with clinical improvement on Clinical Global Impression-Improvement scale (CGI-I) at end of TP1 using a logistic regression model. The significance levels were determined by a gate-keeping procedure based on the graphical approach to sequentially rejective multiple test procedures.
Results: 725 out of 863 screened patients were randomized to 40 (N = 181), 60 (N = 182), or 80 mg (N = 181) MPH–LA or placebo (N = 181). 584 (80.6 %) patients completed TP1. Improvement from baseline in DSM-IV ADHD RS, SDS and CGI-I was significantly greater than placebo for all MPH–LA dose levels (Table). The safety results were consistent with the established safety profile for MPH–LA.
Conclusion: MPH–LA administered at doses of 40, 60 and 80 mg/day demonstrated superior ADHD symptom control, reduction in functional impairment and clinical improvement compared to placebo at the end of the 9–week study period. No unexpected adverse events were observed.

Primary efficacy:

Table: Improvement from baseline to end of TP1 in DSM-IV ADHD, SDS and CGI

	MPH-LA (40 mg)	MPH-LA (60 mg)	MPH-LA (80 mg)	Placebo
DSM-IV ADHD RS (N)	160	155	156	161
LS Mean	15.45	14.71	16.36	9.35
LS mean difference from placebo (95 % CI)	6.10 (3.68, 8.53)	5.36 (2.92, 7.79)	7.01 (4.59, 9.42)	
p value	$p < 0.0001$	$p < 0.0001$	$p < 0.0001$	
Significance level (gate-keeping procedure)	0.0167	0.0208	0.0313	
SDS (N)	151	146	148	152
LS Mean	5.89	4.90	6.47	3.03
LS mean difference from placebo (95 % CI)	2.86 (1.33, 4.39)	1.87 (0.33, 3.41)	3.44 (1.91, 4.97)	
p value	0.0003	0.0176	<0.0001	
Significance level (gate-keeping procedure)	0.0167	0.0208	0.0313	
CGI-I(N)	174	175	179	172
n/evaluable patients (%)	90/160 (56.3)	85/155 (54.8)	89/156 (57.1)	51/161 (31.7)
Odds-ratio	2.44	2.25	2.51	
95 % CI for odds-ratio	(1.52, 3.93)	(1.40, 3.64)	(1.56, 4.05)	
p value	0.0002	0.0009	0.0002	
Significance level	0.0167	0.0250	0.0500	

P-28-005 Mathematical modelling of CPT performance discriminates methylphenidate medication persisters from non-persisters in adult ADHD

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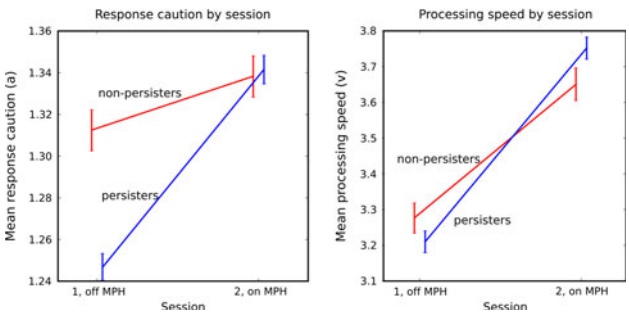
* Oslo, Norway

Objective: Discontinuation of methylphenidate (MPH) medication for adults with ADHD is found to be high. Using mathematical modelling of data from the Continuous Performance Task (CPT), we investigated whether long-term medication persisters differed from non-persisters on baseline cognitive characteristics and drug response.
Method: 250 adults (17–58 years) newly diagnosed with ADHD (all subtypes) were recruited from their treatment clinic. All performed a CPT before and 6 weeks after start-up of methylphenidate medication and were subsequently followed for one year. Using a Bayesian estimation of Drift Diffusion Model parameters, we compared response caution (boundary separation, a) and processing speed (drift rate, v) at baseline and at first follow-up of the group persisting with and the group not persisting with medication after a year respectively.
Results: At baseline, the persisters had a lower response caution (mean a = 1.247; 95 % CI 1.240–1.253) than the non-persisters (mean a = 1.313; 1.303–1.322), and processing speed was also lower for persisters (mean v = 3.210; 3.180–3.240) than for non-persister (mean v = 3.277; 3.234–3.318). The effect of medication on the two groups was marked by interaction effects: After 6 weeks, persisters had a greater effect of medication, both on response caution (a = 1.342; 1.335–1.348) and processing speed (v = 3.752; 3.721–3.783) compared to non-persisters (a = 1.338; 1.328–1.348 and v = 3.650; 3.606–3.696), such that on medication persisters and non-persisters had similar processing speed and response caution.
Conclusion: Modelling results show that persisters and non-persisters of MPH treatment differ already at baseline in the cognitive mechanisms underlying CPT performance: responders are more impulsive and have a somewhat lower processing speed. Further MPH treatment improved performance in persisters more so than in non-persisters, by reducing impulsivity and increasing processing speed. Our results also support mathematical modelling of task performance as a tool for assessing medication effect and for predicting response to medication.

Response caution and processing speed by session



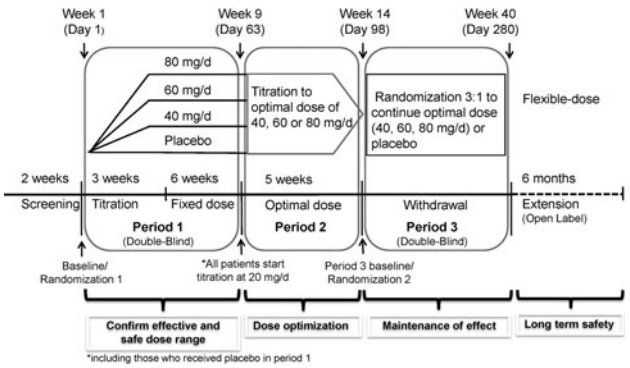
P-28-006 A 40–week, double–blind, placebo–controlled, efficacy and safety study of Methylphenidate Hydrochloride Modified Release (MPH–LA) in adult ADHD: Study design

V. Kumar*, Y. Ginsberg, T. Tvedten, T. Arngrim, D. Gruener, A. Philipsen, K. Carter, C.-W. Chen, M. Huss

* New Jersey, USA

Objective: Primary objectives were to confirm the clinically effective and safe dosage range of MPH–LA in adults with Attention Deficit Hyperactivity Disorder (ADHD) and evaluate the maintenance of effect over 6 months following the new EMA guidelines for assessing efficacy in ADHD.
Method: The study enrolled patients aged 18–60 years with ADHD and DSM-IV ADHD rating scale total score > 30. The study consisted of 3 treatment periods (TP): In TP1, patients were randomized (1:1:1:1) to double–blind placebo, MPH–LA 40, 60, or 80 mg/day for 9–weeks (3–week titration from MPH–LA 20 mg/day, followed by 6-week fixed–dose). Co–primary endpoints during TP1 were improvements in DSM-IV ADHD RS and functional impairment, measured by Sheehan Disability Scale total score, to end of TP1. Secondary endpoints were proportion of patients with improvement on Clinical Global Impression-Improvement/Severity scale, Conner's Adult Attention-Deficit/Hyperactivity Disorder Rating Scale, and Adult-Self-Report Scale. During TP2 (5–weeks), all patients including those initially randomized to placebo, were started at MPH–LA 20 mg/day and titrated to their individual clinically optimal dose. In TP3, patients were re–randomized (1:3) to either double–blind placebo or optimal dose, as determined in TP2, and followed for 6 months to evaluate maintenance of optimal dose effect, measured by percentage of treatment failures (figure).
Results: 863 patients were screened and 725 eligible patients from 66 investigative sites were randomized into the study and followed up between November 2010 and August 2012.
Conclusion: The innovative study design includes, for the first time, both, functional and symptomatic scales as co–primary end points to evaluate treatment effect in adult ADHD, in compliance with the recent EMA Guideline. The results will inform physicians managing adult patients with ADHD. An additional 6–month, flexible–dose, open–label extension will provide long–term efficacy and safety data on MPH–LA in this population.

Study design



P-28-007 Methylphenidate Hydrochloride Modified Release (MPH–LA) safety profile in adults with Attention Deficit Hyperactivity Disorder (ADHD): Results of a 40–week, randomized, double–blind, placebo–controlled, multi-centre, efficacy and safety study

V. Kumar*, Y. Ginsberg, T. Tvedten, T. Arngrim, A. Philipsen, P. Gandhi, C.-W. Chen, M. Huss

* New Jersey, USA

Objective: To confirm tolerability profile of MPH–LA for the treatment of adults with Attention Deficit Hyperactivity Disorder (ADHD).
Method: A 40–week, randomized, double–blind, placebo–controlled, multicenter study in adult patients diagnosed with ADHD. The study design included: a 9–weeks confirmation of efficacy period (period 1) wherein 725 patients were randomized to MPH–LA 40, 60, 80 mg/day or placebo, a 5–weeks dose optimization period (period 2) and a 6–month maintenance of efficacy period (period 3). Investigators reported all adverse events (AEs) and serious adverse events (SAEs) during the study. Cardiac safety parameters (blood pressure, heart rate, notable ECG intervals) were closely monitored.
Results: Overall, the MPH–LA group had approximately 5 times greater exposure to study drug than the placebo group (95,449 vs. 20,992 days, respectively). No deaths occurred during the course of the study. Adverse events were more frequently observed in each of the MPH–LA treated groups during Period 1 and Period 2 (Table). During Period 1, new–onset adverse events were most frequently gastrointestinal, psychiatric or nervous system disorders. In comparison to placebo, the most common adverse events observed in Period 1 for all three MPH–LA (40, 60 and, 80 mg) dose groups were decreased appetite, headache and dry mouth. During the dose–optimization period (Period 2), the MPH–LA adverse event profile was similar to that observed during Period 1. The overall incidence of adverse events was lower during Period 3 compared to Period 1. No clinically meaningful differences were observed between treatment groups with respect to laboratory findings, vital signs or ECGs. None of the patients had a QT, QTcB, or QTcF $\geq$500 ms during the study.
Conclusion: MPH–LA is well tolerated in adults with a similar safety profile as in children; no new unexpected signs or symptoms were reported in adult patients with ADHD.

Patient safety profile

Table: Percentage (%) of patients with SAEs, AEs and AEs leading to discontinuation

	MPH-LA (40 mg)	MPH-LA (60 mg)	MPH-LA (80 mg)	All MPH-LA	Placebo
Period 1					
SAEs	1 (0.6)	2 (1.1)	1 (0.6)	4 (0.7)	2 (1.1)
AEs	131 (72.8)	134 (74.0)	136 (75.1)	401	(74.0)
108 (60.0)					
AEs leading to discontinuation	12 (6.7)	21 (11.6)	28 (15.5)	61	(11.3)
4 (2.2)					
Period 2					
SAEs		–		2 (0.3)	
AEs		–		378	(65.2)
AEs leading to discontinuation		–		22 (3.8)	
Period 3					
SAEs	0 (0.0)	0 (0.0)	3 (2.5)	3 (0.8)	2 (1.7)
AEs	64 (56.6)	75 (57.7)	58 (49.2)	197	(54.6)
44 (36.4)					
AEs leading to discontinuation	3 (2.7)	9 (6.9)	6 (5.1)	18 (5.0)	4 (3.3)

P-28-008 Efficacy and safety of atomoxetine hydrochloride in a placebo-controlled randomized withdrawal study in adults with Attention-Deficit/Hyperactivity Disorder

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* Bellaire, USA

Objective: This double-blind, placebo-controlled randomized withdrawal trial examined maintenance of efficacy and safety of atomoxetine (80 or 100 mg/day) in adults with attention deficit/hyperactivity disorder (ADHD).
Method: Patients 18–50 years old currently and historically (childhood) diagnosed with ADHD (152 outpatient sites; 18 countries) received ≤12 weeks of open-label atomoxetine (40–100 mg/day) followed by 12 weeks of double-blind maintenance (80 or 100 mg/day). Responders were randomized to atomoxetine (N = 266) or placebo (N = 258; 25-week randomized withdrawal phase). Primary efficacy measure: Percentage of patients who maintained a satisfactory response during the randomized withdrawal phase as determined by the Conners' Adult Attention-Deficit/Hyperactivity Disorder Rating Scale (CAARS) Investigator-Rated: Screening Version (CAARS-Inv:SV) and the Clinical Global Impression Attention-Deficit/Hyperactivity Disorder scale (CGI-ADHD-S). All statistical tests were conducted at $p < .05$.
Results: A significantly greater proportion of atomoxetine- than placebo-treated patients maintained satisfactory response (64.3 vs. 50.0 %; $p < .001$). Atomoxetine maintained changes in ADHD symptom reduction compared with placebo as measured by CAARS-Inv:SV (0.9 vs. 4.8; $p < .001$) and CGI-ADHD-S (0.0 vs. 0.5; $p < .001$). The incidence of serious adverse events (2.6 vs. 1.6 %; $p = .545$) and discontinuation due to adverse events (3.4 vs. 1.9 %; $p = .418$) was not significantly different between atomoxetine and placebo. The percentage of patients experiencing ≥1 treatment-emergent adverse event(s) (TEAE) was significantly higher for atomoxetine than placebo (47.0 vs. 37.6 %; $p = .034$), but the treatment-group differences were not significant for any individual TEAE. Statistically significant but relatively small differences were observed between atomoxetine and placebo in diastolic blood pressure (0.1 vs. 2.3 mmHg; $p < .001$), pulse (1.4 vs. 5.3 bpm; $p < .001$), body mass index (0.1 vs. 0.4 kg/m^2; $p < .001$), and weight (0.2 vs. 1.1 kg; $p < .001$).
Conclusion: Atomoxetine was superior to placebo in maintaining a satisfactory response and confirmed the safety profile for up to 1 year of treatment.

Saturday, 8 June 2013, 15.00–16.00

P-29 Pharmacogenetics

P-29-001 Adverse reactions to methylphenidate in twins: A report on three pairs

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* Oporto, Portugal

Objective: To report on clinical cases of 3 pairs of twins diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), revealing different reactions to Methylphenidate—one of the individuals in each pair had adverse reactions to the introduction, switch or increase in dosage of the drug.
Method: Retrospective study through analysis of the clinical processes, and revision of the literature on this matter. The report refers to 2 pairs of dizygotic and a pair of monozygotic twins, aged between 6 and 13 years old at the time of occurrence of the adverse reactions.
Results: In the first pair of dizygotic twins (7 years old), both individuals revealed emotional lability and behavioral isolation to the intermediate-acting formulation; 2 years later, a short-acting formulation was reintroduced and well tolerated, as well as the switch to the long-acting one, although there were adverse reactions (irritability and agitation)in one of the twins, as the dosage was increased. In the second pair of dizygotic twins (6 years old), one of the brothers showed tics, emotional lability, insomnia and isolation when the short-acting formulation dose was increased, 2 months after the introduction of the drug. In the monozygotic pair (6 years old), one of the children reacted adversely to the introduction of the short-acting formulation with irritability, aggressive and stereotypic behaviors.
Conclusion: There is evidence of genetic basis for ADHD, supported by the study of twins that demonstrate up to 92 % concordance in monozygotic twins and 33 % in dizygotic twins. Although some genes have already been identified as playing a role in the etiology of ADHD, little is known about the influence of these or other genetic factors on the clinical response to the most widely used psychoactive drug. These reports show unpredictability of the performance profile of methylphenidate and its side effects even in individuals with higher concordant genetic background than the general population.

P-29-002 Altered response with methylphenidate to ADHD-like symptoms in pervasive developmental disorder: Does CES-1 enzyme gene polymorphism play a role?

E. S. Ercan*, U. Akyol Ardic, D. Yuce, E. Ercan, D. Aygunes, B. Kosova

* Izmir, Turkey

Objective: Pervasive Developmental Disorders (PDDs) and Attention Deficit Hyperactivity Disorder (ADHD) are two common psychiatric diseases of childhood that co-exists frequently. Classical clinical approach to treatment of this special entity of co-existence is using methylphenidate (MPH), which generally results with poor outcomes, and increased adverse effects.
Method: We postulated that a genetic variation that affects the metabolism of MPH may lie in the etiology of disrupted drug response. For clarifying this we searched for four polymorphisms (p.Arg199His [rs2307243], p.Ser75Asn [rs2307240], p.Ile49Val [rs3826193] and p.Gly143Glu [rs71647871]) in carboxylesterase-1 gene (CES1) in the saliva of patients diagnosed with PDD + ADHD. Also, we assessed the clinical response by dimensional approach using the Attention Deficit Hyperactivity Disorder Rating Scale IV and Clinical Global Impression-Improvement scale.
Results: Our result showed that patients with PDD + ADHD had p.Arg199His polymorphism more frequently, and clinically responded poorer—and even worsened- to the MPH treatment.
Conclusion: This is the first study that defines an association between Arg199/His polymorphism in CES1 and altered treatment response to MPH in patients with PDD that presents with symptoms of ADHD.

P-29-003 Norepinephrine transporter gene polymorphism and side effect of OROS methylphenidate in Attention-Deficit/Hyperactivity Disorder

H. Kang*, K.-H. Yook, J. Song, H. J. Hong

* Goyang, Republic of Korea

Objective: The object of our study was to investigate the relationship of Norepinephrine transporter (NET) gene polymorphism with side effect of OROS methylphenidate (MPH) in children with Attention-deficit/hyperactivity disorder (ADHD).
Method: Children with ADHD were recruited from 3 child and adolescent psychiatry clinics in South Korea. Diagnosis was conducted by 3 trained child and adolescent pscyhiatrists with Kiddie-Schedule for Affective Disorders and Schizophrenia for School-age Children-Present and Lifetime Version-Korean version. We obtained DNA from blood of subjects. Barkely's side effect rating scale (SERS) was used to assess the stimulant side effect. Parents completed it after 8 weeks of OROS MPH treatment. Each item of side effect was coded as binary outcome. That is, if the score of SERS was $\geqq 1$, side effect was regarded as "present". If it was 0, side effect was regarded as "absent". We conducted Fisher's exact test or χ^2 test to compare side effect according to rs3785143 polymorphism of NET gene.
Results: 110 children and adolescent of ADHD (male was 87.3 %, mean age was 9.9 $\pm$ 2.7) were enrolled. There were significant differences in some side effects among 3 genotype of rs3785143 polymorphism. Those were Talks less with others ($p = 0.026$), Irritable ($p = 0.028$), Headaches ($p = 0.023$), and Drowsiness ($p = 0.005$). When we dichotomize genotype with rare alle T or without T, there was a significant difference in irritability between two groups ($p = 0.011$).
Conclusion: Our result suggested the significant association between specific side effect of OROS methylphenidate and rs3785143 polymorphism of NET gene.

Table 1 Association of side effect of OROS methylphenidate and rs3785143 polymorphism of NET gene:

Side effect	Genotype of polymorphism(% of each genotye)			p
	CC(n=72)	TC(n=31)	TT(n=7)	
Insomnia or trouble sleeping	24(33.3)	8(25.8)	3(42.9)	0.555 [1)]
Nightmares	3(4.2)	3(9.7)	1(14.3)	0.297 [1)]
Stares a lot or daydreams	4(5.6)	3(9.7)	1(14.3)	0.364 [1)]
Talks less with others	5(6.9)	3(9.7)	3(42.9)	0.026 [1)]
Uninterested in others	6(8.8)	2(7.1)	0(0)	1.000 [1)]
Decreased appetite	34(47.2)	13(41.9)	5(71.4)	0.372 [1)]
Irritable	24(33.3)	4(12.9)	0(0)	0.028 [2)]
Stomachaches	8(11.1)	3(9.7)	1(14.3)	0.891 [1)]
Headaches	11(15.3)	1(3.2)	3(42.9)	0.023 [1)]
Drowsiness	8(11.1)	0(0)	3(42.9)	0.005 [1)]
Sad/unhappy	9(12.5)	4(12.9)	2(28.6)	0.410 [1)]
Prone to crying	13(18.1)	6(19.4)	2(28.6)	0.776 [2)]
Anxious	6(8.3)	1(3.2)	0(0)	0.796 [1)]
Bites fingernails	10(13.9)	5(16.1)	3(42.9)	0.143 [2)]
Euphoric/unusually happy	9(12.5)	2(6.5)	2(28.6)	0.226 [1)]
Dizziness	7(9.7)	2(6.5)	2(28.6)	0.173 [1)]
Tics or nervous movements	5(6.9)	3(9.7)	0(0)	0.823 [1)]

[1)]Datadetermined using Fisher's exact test. [2)] Data determined using χ^2 test.

P-29-004 Role of gene-dose interaction between SLC6A2 polymorphism and methylphenidate to treatment outcome in Korean ADHD children

J. Kang*, E. J. Park, J. Y. Lee, B. Kim

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Objective: Vast majority of genetic studies have focused on catecholamine system genes to identify etiology in ADHD, and growing evidences revealed that interaction of several genes may affect disease outcome by synergistically or antagonistically. In the present study, interaction of alpha-2 adrenergic receptor (ADRA2A) and its transporter (SLC6A2) were investigated for affecting ADHD etiology and treatment outcome.
Method: 83 ADHD children (8.3 $\pm$ 2.0, 72 boys and 11 girls) were assessed with K-SASD-PL, ADHD rating scale-IV (ARS), CGI-I and CGI-S. Methylphenidate was titrated based on CGI-I and CGI-S through 8 weeks. We assessed two polymorphisms with ADRA2A rs553668 and SLC6A2 rs998424 in association with disease outcome.
Results: In mixed model analysis, sex and age were not significant as covariates for an ARS outcome. And MPH dose was a positive predictor ($p < 0.001$). SLC6A2 GG genotype showed significant main effect on ARS total score ($F\ (1,295) = 4.144$. $p = 0.043$), which revealed that GG had higher symptoms reduction than GA or AA genotype ($p = 0.049$). Interaction effects between MPH dose and SLC6A2 rs998424 polymorphism on ARS total score ($F\ (4,294) = 3.317$, $p = 0.011$). As we identified the treatment efficacy according to CGI-S, SLC6A2 GG genotype had a good response on MPH administration ($\chi 2\ (1) = 5.794$, $p = 0.02$). ADRA2A polymorphism and ADRA2A $\times$ SLC6A2 interaction did not show any significant findings with clinical outcome measures.
Conclusion: Our findings provide preliminary evidence for the effect of ADR2A and SLC6A2 gene–gene interaction on treatment response in ADHD. Although these findings need future replications, our study may contribute to understanding of the genetic basis of ADHD.

Saturday, 8 June 2013, 15.00–16.00

P-30 Non pharmacological treatment I

P-30-001 Cognitive training in drug-naïve children with Attention Deficit/Hyperactivity Disorder (ADHD)

A. Bikic*, J. Leckman, J. Lindschou Hansen, T. Østergaard Christensen, S. Dalsgaard

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Objective: Many patients with ADHD continue to have difficulties with cognitive functions despite medical treatment. Additionally, 20–30 % of patients do not respond to medical treatment and compliance and long-term results are not convincing. It is necessary to explore non-pharmacological treatments for ADHD. There is emerging evidence that cognitive computer programs can reduce severity of symptoms and enhance cognitive functions. This randomized clinical trial aims to determine the effect of computer program C8 compared to treatment as usual in newly diagnosed, drug naïve children with ADHD with regard to specific cognitive

functions, symptoms and functional outcome. In addition, the trial investigates if younger children benefit more from cognitive training than older children.
Method: In a single blind design 92 children with ADHD aged 6–12 years will be randomized to either an intervention or a control group. The intervention group uses C8, a computer program, which targets different cognitive functions. Training will be conducted at home 40 min a day, 6 days a week for 8 weeks. Participants' cognitive functions are assessed with the Cambridge Neurocognitive Automated Battery (CANTAB) as well as symptom and behavioral measures before and after the 8 weeks of training including a 12 and 24 weeks follow up. Both the intervention and control group will be receiving treatment as usual. Participants are recruited from 3 different sites.
Results: The poster is presenting study methodology of a ongoing study.
Conclusion: Cognitive training has the potential to reduce cognitive dysfunctions and to become a new treatment option, which can promote a more normal neural development in young children with ADHD and thus reduce cognitive dysfunctions and symptoms.

P-30-002 Different perception of attention and social problems between parents and teachers of children with ADHD

P. Brambilla*, F. Fabbro

* Udine, Italy

Objective: Attention deficit-hyperactivity disorder (ADHD) is a severe disease which causes high personal and family distress. It is one of the most prevalent and common psychiatric disease in children and adolescent, but it is often underestimated (Faraone et al. 2003). Here we analyzed the perception of behavioural problems in parents and teachers of ADHD children (Biederman et al. 2005).
Method: Children with ADHD attending the Scientific Institute IRCCS 'E. Medea', Pasian di Prato, Udine, were studied. They had no other AXIS I psychiatric comorbidity. Diagnoses were made according to the DSM IV and by consensus meeting including a child neuropsychiatrist, a child psychologist and a psychiatrist. Perception on ADHD symptoms and behavioural problems of mothers, fathers and teachers were evaluated by the Child Behavior Checklist (CBCL) and the Scale for the evaluation of explosive behaviours (SCOD).
Results: Twenty-three children with ADHD were investigated (mean age $\pm$ S.D. $= 6.77 \pm 1.72$ years; 19 males, 4 females; mean IQ $\pm$ S.D. $= 105.00 \pm 11.79$). Parents scored significantly lower compared to teachers for social and attention problems at the CBCL ($p < 0.05$), whereas no significant differences were found between mothers and fathers. Also, similar SCOD-scores were found amongst the three groups ($p > 0.05$).
Conclusion: This study suggests that parents of children with ADHD underestimate social and attention problems in respect to teachers. Therefore, it is crucial that parents, schools and children institutions have a strict collaboration in order to early detect such symptoms. Moreover, once kids with ADHD are treated by children mental health services, structured parent-training treatments should be provided to parents as well.

P-30-003 The effect of physical exercise on cognition and behaviour in children with ADHD: A systematic literature review

A. Den Heijer*, Y. Groen, L. Tucha, A. Fuermaier, J. Koerts, K. Lange, O. Tucha

* Haren (Groningen), The Netherlands

Objective: With Attention Deficit Hyperactivity Disorder (ADHD) being one of the most frequently diagnosed developmental disorders in childhood, effective yet safe treatment options are of high importance. Recent research demonstrated that physical exercise is a potential treatment option, in particular for children with ADHD. The purpose of this review was to systematically analyze the potential acute and chronic effects of both cardio and non-cardio exercise on a broad range of functions in children with ADHD.
Method: Literature was reviewed with regard to several types of physical exercise and outcome measures in children with ADHD. Categorizations were made for exercise type (cardio versus non-cardio), effect type (acute versus chronic) and outcome measure (cognitive/neuropsychological, behavioral/socio-emotional and other), which allowed for a systematic review of the published research. Furthermore, potential underlying mechanisms were addressed.
Results: Cardio exercise seems to be beneficial on an acute base regarding various executive functions, impulsivity, response time and a variety of physical measures. Beneficial chronic effects of cardio exercise have been found with regard to a variety of functions as well, entailing attention, executive functions and behavior. Acute effects of non-cardio exercise are thought to be mainly attributable to third variables (e.g., environment and reinforcement) and chronic effects of non-cardio exercise have been found to remain questionable.
Conclusion: Research provides evidence that the deployment of physical exercise in children with ADHD seems promising. Both acute and chronic beneficial effects of especially cardio exercise were reported with regard to a wide variety of cognitive, behavioral and socio-emotional functions. Physical exercise may therefore represent an effective treatment option which could be combined with other approaches to the treatment of ADHD.

P-30-004 Moving from efficacy to effectiveness research for psychosocial treatments for preschool ADHD: Challenges in the translation to different cultures

A.-M. Lange*, D. Daley, C. Laver-Bradbury, C. Rask, E. Sonuga-Barke, M. Thompson, P. H. Thomsen

* Risskov, Denmark

Objective: Evidence-based psycho-social treatments for preschool ADHD are recommended as first line treatment in a number of international treatment guidelines. The majority of psychosocial treatment outcome studies constitute efficacy research and originate from Anglo-American contexts. However, there is no guarantee that empirically supported treatments are efficacious in

any clinical, national or cultural setting. The adaptation and translation of empirically supported psychosocial treatments have largely been left unexplored in the ADHD literature. There is a need to extend outcome research to different populations and cultures and develop optimal strategies for effectiveness trials that can support the implementation of empirically supported psychosocial interventions for children with ADHD and their families in different countries.
Method: This poster offers suggestions and strategies for adapting and extending empirically supported treatment research, in order to advance the science on the implementable, clinical and practical use of a psychosocial intervention for preschool ADHD: The New Forest Parenting Parenting Programme (Sonuga-Barke et al. 2001) in Denmark. Examples from a current randomized controlled trial of the New Forest Parenting Programme in a clinical sample of Danish children are used to identify approaches for developing, testing, and enhancing strategies to roll-out effective treatment practices in real-world settings.
Results: A number of important adaptations and research developments need addressing in the development of empirically sound effectiveness research that can ensure the successful implementation of parent training for young children with ADHD in different countries.
Conclusion: The adaptation and translation of psychosocial interventions to different countries and cultures have to be carefully planned to optimise the potential of an efficacious treatment. Empirically sound effectiveness trials must be conducted to evaluate programmes translated into and adapted to different cultures in order to enhance the feasibility, acceptability, replicability and sustainability of psychosocial treatments for ADHD and thus improve outcome for a broader population of children with ADHD and their families.

P-30-005 A preliminary investigation of aggression in children with ADHD following a brain-computer interface intervention

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* Singapore, Singapore

Objective: Neurofeedback treatment has been established as an effective alternative treatment for ADHD; however the use of Brain-Computer Interface (BCI) as a novel form of neurotherapy has only recently been examined. Despite strong evidence supporting neurotherapy as a treatment method, few studies have looked at the relationship with improvements in attention and its impact on other co-occurring behavioural problems such as aggression. To date, only 2 case studies with ADHD and anger problems reported a reduction in aggression following a neurofeedback treatment. Following previous reports of improving aggression with neurotherapy, we hypothesize that the BCI intervention may reduce aggressive behaviour, in addition to attention problems, in our ADHD sample.
Method: Twenty medication-naïve ADHD participants (mean age = 7.80, SD = 1.40) underwent 27 sessions of BCI intervention over 20 weeks. The game-based BCI treatment is a feed-forward system in which electrical activity in the prefrontal cortex is conveyed to the child in order to elicit an optimal brain wave pattern. The Child Behaviour Checklist (CBCL), a parent-reported questionnaire, was used as a primary measure. Paired sample t-tests were performed to compare changes in CBCL scores from week 0 to week 20 in the syndrome scales which includes aggressive behaviour and attention problems.
Results: As hypothesized, scores on aggressive behaviour showed significant improvements over time, $t(16) = 2.29$, $p = 0.036$. Additionally, consistent with previous reports, scores on attention problems also improved significantly over time, $t(16) = 3.09$, $p = 0.007$. Interestingly, scores on thought problems such as obsessing over certain thoughts, or repeating certain acts also showed an improvement following BCI treatment, $t(16) = 2.45$, $p = 0.026$.
Conclusion: The results provide preliminary evidence that this treatment may be associated with reduction in aggression, which could guide future treatment in this area. Moreover, it also confirms previous findings that support BCI as an effective treatment for improving attention in ADHD.

P-30-006 Experience of autoregulation training and assisted therapy with dog for children with ADHD

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* Firenze, Italy

Objective: To present the experience of an Autoregulation Training and Assisted Therapy with a dog structured on a small group with ADHD, with the aim of improving the self-esteem and sense of self-efficacy, increase the awareness and management of emotional states, the ability to implement self control and self monitoring and enhance sustained attention.
Method: Experience with qualitative evaluation of the sample before and after treatment. The sample is composed of four primary school children diagnosed of ADHD comorbid with ODD. The pre-treatment included a neuropsychological and cognitive assessment: WISC-R,test for the assessment of academic learning, test for the assessment of neuropsychological higher functions (attention, memory, executive functions)and was supported by the compilation by parents and teachers of the standars SDAG-SDAI. The treatment lasted a total of 6 months, divided into a first part in which the sample has been proposed autoregulation training group (4 months), which was followed by an educational activity (2 months) in the group with a dog. Subsequently,it was possible to perform a neuropsychological assessment post-treatment of the sample.
Results: It was possible to identify a greater ability to control behavior for all subjects examined. Children have also been shown to perceive a better self-image and be able to manage and differentiate between various emotions.
Conclusion: Altough it is based on limited sampling, the data collected through qualitative analysis, let us assume that this treatment of children with ADHD, can have a positive effect on some aspects of emotional behavioral of Attention Deficit Hyperactivity Disorder.

P-30-007 Development of an intervention program on executive functions for children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD)

B. Trevisan*, A. Menezes, A. Seabra

* São Paulo, Brazil

Objective: To develop an intervention program on executive functions for children and adolescents with ADHD, based on a rehabilitation program that was firstly developed for preschoolers (Dias and Seabra 2012). The program aims to enhance the performance of children with ADHD on different executive skills, such as inhibition, regulation of thoughts and emotions, difficulty to pay attention, organization, administration of time, and accomplishment of goals. Furthermore, the

activities seek to improve the primary symptoms of ADHD, such as inattention, hyperactivity and impulsivity.
Method: Adaptation process of the program was divided into six steps: Step 1 (Theoretical background)—Broadening and deepening the theoretical constructs related to the program as well as the intervention program activities. Step 2 (Empirical Support)- Searching for similar existent programs of cognitive interventions for ADHD and study all the activities employed by them. Step 3—Selection, adaptation of the activities that will compose the new intervention program. Step 4- Revision and adaptation of the language. Step 5- To test the new program in a group of eight children and adolescents with ADHD with the purpose to investigate the applicability of the tasks. Step 6: Review of activities from the previous step.
Results: Ten base activities with systematic demands of planning skills, flexibility, working memory, inhibitory control, selective attention and self-regulation was yielded. Qualitative analysis of program implementation showed very appropriate applicability to the group with ADHD.
Conclusion: The study resulted in a new intervention for executive functions for children and adolescents with ADHD with adequate applicability. Future studies should verify its effectiveness. Reference: DIAS, N. M. SEABRA and A. G. How to promote executive functions in children? Development of an intervention program and preliminary results in Brazilian children. In: Adams; Silva; Franco. Second International Seminar Contributions of Psychology in Educational Contexts. 1ed. Braga, 2012.

P-30-008 Dance movement therapy (DMT) and methylphenidate, combined treatment may be a better option for managing ADHD children

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* Kolkata, India

Objective: To compare the effectiveness of combined intervention with DMT and Methylphenidate versus Methylphenidate alone in 10 ADHD cases.
Method: Study Design Observational mode Study Period 01.09.2012 to 30.11.2012 Study domain ADHD Participants—Inclusion criteria 10 ADHD children in a private clinic in Kolkata, India (1) Age: 8–10 Years 2. All male children 3. ADHD (Combined type) diagnosed by a team comprising of a child psychiatrist, a child psychotherapist and a peadiatrician. Participants—Exclusion criteria 1. Other Psychiatric/neurological disease. (2) Blindness (3) Deafness (4) Mental Retardation (5) ODD, PDD 6. History of Seizure or any other medical/cardiological comorbidity. Interventions 10 already diagnosed ADHD children were randomly divided into 2 groups. While one group (Group A) of 5 children received Methylphenidate alone, the other group (Group B) containing the same number received both DMT and Methylphenidate. For all 10 children the dosage of Methylphenidate SR tablet was started as 18 mg/day and titrated up to a maximum of 54 mg per day over 8 weeks.DMT was instituted by trained personnels with twice weekly session, each session lasting for an hour. The outcomes were measured at 0, 6 weeks and then at 3 months from the commencement of the study. Evaluation: Change from baseline to endpoint in parent ADHD Rating Scale Total Score (ADHD-RS-IV).
Results: Assessment: There was a statistically Significant Difference in change in ADHD-RS parent total score from baseline between groups. Group B participants showed remarkable reductions in ADHD symptoms.
Conclusion: That Methylphenidate is a fairly established drug for symptom reduction in ADHD is well known. But probably, as the present study suggests, further behavioral improvement over and above the benefits of Methylphenidate might be possible if combined intervention with DMT could be instituted.

P-30-009 Cognitive training effects in children with reading difficulties: A pilot study

N. Pereira*, A. Costa, M. Guerreiro

* Lisbon, Portugal

Objective: Attention deficit hyperactivity disorder (ADHD) is a frequent disorder like dyslexia in both of which co-occur reading disabilities. This study investigates the efficacy of cognitive training in reducing reading difficulties in children with reading disabilities, characterizing them in terms of neuropsychological patterns.
Method: 42 children, with ages between 5 and 11 years, divided into three groups: a control group of 8 children, a group of 15 children with dyslexia and another of 19 children with ADHD. All participants were submitted to a neuropsychological evaluation to assess cognitive functions such as attention, executive function, memory, working memory and visuo-perceptive functioning. Reading performance was measured by the number of errors done while reading, number of correct words read within a minute and reading velocity. These measures were then correlated with cognitive measures. After the first psychological evaluation all children were submitted to cognitive training during 6 months to improve higher brain functions. At the end of this phase they were reevaluated to determine the efficacy of the cognitive training on reading performance.
Results: Statistically significant differences were observed between groups for episodic memory ($p < 0.05$), verbal abstract reasoning ($p < 0.001$), semantic memory ($p < 0.05$), verbal comprehension ($p < 0.05$), sustained attention ($p < 0.05$), visual memory ($p < 0.05$), executive functioning ($p < 0.05$), visuo-perceptual functioning ($p < 0.05$), number of correct words read in a minute ($p < 0.05$) and reading velocity ($p < 0.05$). Significant differences were also demonstrated before and after cognitive training for verbal abstract thinking ($p < 0.05$), visuo-perceptive functioning ($p < 0.05$), delayed visual memory ($p < 0.05$), number of correct words read in a minute ($p < 0.05$) and reading velocity ($p < 0.05$). Reading performance correlates significantly with improvements in executive function, verbal memory, episodic memory, working memory and visuo-perception function.
Conclusion: Cognitive function enhancement improves reading performance in children with reading disabilities.

Saturday, 8 June 2013, 15.00–16.00

P-31 Non pharmacological treatment II

P-31-001 ADHD symptoms in preschoolers: A follow-up study on the effectiveness of a parent-training programme

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Objective: Given the chronic nature of AD/HD and the possibility that early symptoms manifest themselves in the preschool period, evaluating the long-term benefits of early parent training could contribute to support this kind of intervention as an effective psychosocial treatment option in the early years. Objective: To measure the long-term effects of a parent-based intervention in children and mothers' outcomes in a Portuguese sample of preschoolers displaying early AD/HD behaviours.
Method: Fifty-two children (between three and 6 years-old) with early symptoms of AD/HD, whose mothers have received a parenting

training intervention programme were followed from baseline and at six and at 12-month follow-ups. Reported measures of children's (AD/HD symptoms) and parents' (e.g., parenting practices) characteristics were used and data analysis included the General Linear Model (GLM) for repeated measures analyses of variance (ANOVAs).
Results: Long-term effects were found in reported children AD/HD behaviours at home. Large effect sizes were also found in mothers' variables: decrease of self-reported dysfunctional parenting practices and improved sense of competence. No significant differences were found between 6 and 12 months follow-ups, with small effect sizes indicating that the significant post-intervention changes in child and parenting measures were maintained. At 12-month follow-up 59 % of children had clinically improved in the primary outcome measure, showing a reduction over 30 % on AD/HD behaviours.
Conclusion: The found sustained effects in children and parents' behaviours after a parent-based intervention are suggestive of the IY long-term benefits. Therefore, efforts should be made by Portuguese policy makers and professionals in order to deliver IY as an early preventive intervention for children at-risk for AD/HD.

P-31-003 The token economy technique to forecast consequences for management to postpone the reward for ADHD

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Objective: Numerous behavioral techniques are used in clinical context for the treatment of ADHD, including the Token Economy technique which rewards appropriate behavioral responses or withdraws the award due to inappropriate behavior. This exercises some difficulties in relation to executive functions in ADHD. The aim of this study was to verify the efficacy of the technique of Token Economy with and without foresight of consequences in a sample of children with ADHD.
Method: We conducted a cognitive behavioral therapy program (CBT) in groups with 14 participants (age $\pm$ 9.4) in a total of 20 sessions. The use of Token Economy technique was performed in 15 sessions, starting at stage 1 (5th–15th session) which had not forecast result. Since stage 2, introduces the technique to forecast economic consequence. This technique listed behaviors, and targets parents wrote down every inappropriate behavior which the participant performed daily. In Stage 2 it was predicted a consequence for each behavior. In both stages the children received tokens for appropriate behavior that could redeem for prizes at the end of each stage. During treatment the patients were using 20 mg Methylphenidate LA.
Results: It was compared the first week to the last week using the Wilcoxon test. There was a decrease in the frequency of negative behaviors in all the stages with implementation of the Token Economy technique. Stage 1 ($M1 = 10.07$, $M2 = 4.07$, $p = 0.002$), Stage 2 ($M1 = 3.07$, $M2 = 1.07$, $p = 0.047$).
Conclusion: We noticed significant improvement in relation to inappropriate behavior and acceptance of the postponement of reward with patients treated using two types of art. Moreover, you can discuss and reshape the attitudes of caregivers about the consequences of inadequate responses applied on children to assist the training of postponing the reward.

P-31-004 The effect of a computerized executive function training system in children with Attention Deficit and Hyperactive Disorder

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Objective: To explore the effect of a computerized executive function training system on symptom, social function and executive function in children with ADHD by an open self-controlled study.
Method: Eight children (aged 8.0 $\pm$ 0.8) who met DSM-IV ADHD criteria were enrolled. They were treated by the computerized executive function training system 5 times weekly for 12 weeks. Such training system which takes 15–20 min to complete includes five games focusing on training of attention, inhibition, working memory and shifting. Before and after the training, their parents were asked to fill in ADHD Rating Scale IV (ADHD-RS-IV), Weiss Function Impairment Rating Scale (WFIRS) and Behavior Rating Inventory of Executive Function (BRIEF). And the children themselves were asked to complete four performance-based tests (Stroop Color-Word Test, Trail-Making Test, Digit span test, and Tower of Hanoi (ToH)).
Results: The computerized executive function training system significantly improved scores in inattentive and hyperactive-impulsive subscales of ADHD-RS-IV; learning-school, life skills and social activities subscales of WFIRS; all subscales but shifting and emotion control subscales of BRIEF ($P < 0.05$). The reduction rates were 37.3–39.1 % for ADHD-RS-IV, 33.8–61.8 % for WFIRS and 14.0–23.6 % for BRIEF, whereas no significant improvement was found in the four performance-based tests.
Conclusion: The current study indicated that the computerized executive function training system has the potential to improve the symptom, social function and executive function in children with ADHD.

P-31-005 Efficacy of a behavioural sleep intervention in children with ADHD: A randomised controlled trial

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Objective: Behavioural sleep problems are common in children with Attention-Deficit/Hyperactivity Disorder (ADHD) and are associated with poorer child and parent functioning. We aimed to examine whether treating problems in children with ADHD improves their symptom severity, sleep and other aspects of child and parent functioning.
Method: Setting: 50 paediatric practices across Victoria, Australia. Subjects: Children with ADHD (5–13 years) were eligible if they had a parent-reported moderate/severe sleep problem and met criteria for a behavioural sleep problem defined by American Academy of Sleep Medicine criteria. 244 families enrolled in the trial (72 % response rate). Outcomes: Primary outcome, ADHD symptom severity (ADHD Rating Scale IV); Secondary outcomes, parent reported sleep problem severity (CSHQ), behaviour (SDQ), quality of life (PedsQL), directly assessed sleep (actigraphy), working memory (WMTB-C), and parent mental health (DASS). Intervention: Children were randomised to 2–3 behavioural sleep consultations, delivered by trained

Table 1 Outcomes at 3 and 6 months post-randomisation

Adjusted outcome	3 Months (intervention-usual care)			6 Months (intervention-usual care)		
	M (95 % CI)	ES	p	M (95 % CI)	ES	p
Parent report						
ADHD symptoms	−3.5 (−5.9, −1.0)	−.4	0.07	−3.7 (−6.1, −1.4)	−.4	0.002
Sleep problem severity	−6.4 (−8.4, −4.5)	−.9	<0.001	−3.5 (−5.3, −1.7)	−.6	<0.001
Behaviour	−2.9 (−4.2, −1.6)	−.7	<0.001	−1.9 (−3.3, −0.5)	−.4	0.006
Psychosocial QoL	8.9 (5.2, 12.6)	.7	<0.001	6.2 (2.5, 9.9)	.5	0.001
Parent depression	−3.0 (−5.2, −0.7)	−.4	0.01	−1.2 (−3.4, 1.0)	−.2	0.29
Parent anxiety	−1.0 (−3.1, 1.2)	−.1	0.38	−0.7 (−2.5, 1.1)	−.1	0.47
Parent stress	−2.6 (−5.1, −0.2)	−.4	0.04	−0.1 (−2.4, 2.2)	−.01	0.93
Teacher-report[a]						
ADHD symptoms	−2.4 (−5.3, .5)	−.2	0.10	−2.7 (−6.0, .7)	.2	0.12
Behaviour	−1.9 (−3.6, −.3)	−.3	0.02	−2.6 (−4.5, .7)	−.4	0.007
Child direct assessment						
Digit recall backwards[b]	–	–	–	5.2 (.03, 10.4)	.3	0.05

Analysis of directly assessed sleep (actigraphy) outcomes is in progress

[a] Mean score at 3 and 6 months adjusted for baseline and confounders

[b] Mean score at 6 months adjusted for confounders

psychologists or paediatric trainees, versus usual care. Analyses: Mean differences in change scores between intervention and control arms were estimated using linear regression adjusted for confounders identified a priori (child age, gender, medication use, comorbidity, and family socio-demographic factors).
Results: At 3 and 6 months, children in the intervention group had improved outcomes across multiple domains including parent-reported ADHD symptom severity (see Table 1). At 6 months, there was a trend for intervention children to have improved working memory (Effect Size (ES): 0.3).
Conclusion: A behavioural sleep intervention improves parent-reported ADHD symptom severity and a range of functional outcomes at 3 and 6 months post-randomisation. Future research should examine the longer-term benefits of this intervention. Clinicians working with children with ADHD should routinely ask about and manage behavioural sleep problems.

P-31-006 The effects of group social skill training for ADHD children with social skill deficit

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Objective: The purpose of this study was to evaluate the effect of structured group social skill training for ADHD children with poor social skill.
Method: Among the children who were treated with medication under the impression of ADHD in Seoul National University Children's Hospital, six children were enrolled for the study (age ranged 7–9). Social skill training was composed of weekly based 12 structured sessions. Each session had 60 min skill training and 30 min parent education. For evaluating the treatment effect of the program children's parent were asked for completing a Peer Relational Skills Scale (PRSS) before and after the program. The PRSS was composed of 2 factors, 'initiative' and 'cooperation/empathy'. A paired *t* test was conducted for data analysis.
Results: Our study showed that the PRSS total score was significantly improved after the training ($t = -3.11$, $p = .027$). On the analysis of sub factors, cooperation/empathy factor was significantly improved ($t = -5.33$, $p = .003$). However, on the initiative factor score, there was no difference pre and post training ($t = -1.79$. $p = .134$).
Conclusion: This study shows the effectiveness of group social skill training on ADHD children with social skill deficit. Group social skill training seems to enhance cooperative attitude and empathy in the peer relationship for ADHD children.

P-31-007 The cortisol awakening response is restored after summer treatment program in children with ADHD

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Objective: Cortisol are low in the night but rise in the early hours before waking. After awakening in the morning, most people show a further rise, the concentration peaking 20–30 min later. This phenomenon is termed as the cortisol awakening response (CAR). The CAR is associated with stress and health in potentially significant ways. The aim of this study was to examine the CAR in children with attention deficit hyperactivity disorder (ADHD) before and after 2 weeks intensive summer treatment program (STP).
Method: The subjects were 17 children aged 7–12 years old who participated in STP, 2009. Saliva samples for cortisol measurement were collected twice at awakening in the morning and 30 min later, before and after STP. ADHD Rating Scale-IV(RS-IV) and Kid-KINDLR questionnaire were evaluated by parents at the same time.
Results: CAR was not observed in children with ADHD before STP, but it was obvious after STP ($p = 0.01$). In addition, the level of cortisol of 30 min after awakening was significantly higher after STP

than that of before STP ($p = 0.01$). The improvement of subscales of hyperactivity/impulsivity score and Inattention score on ADHD RS-IV were correlated with the changes in CAR (r = 0.59, $p = 0.013$ and r = 0.68, $p = 0.003$, respectively). The change of CAR after STP was positively correlated with the improvement of total score (r = 0.66, $p = 0.006$), self-esteem (r = 0.56, $p = 0.025$), friends (r = 0.53, $p = 0.034$), emotional well-being (r = 0.44, $p = 0.086$) and school (r = 0.043, $p = 0.089$) in Kid-KINDLR questionnaire.
Conclusion: Significant improvement of CAR after STP might suggest reduced stress or better hypothalamic-pituitary-adrenocortical (HPA) function after STP.

P-31-008 The impact of EEG biofeedback for voluntary and involuntary movement of children with ADHD

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Objective: We assumed that applying EEG biofeedback therapy will strengthen the control of impulsivity and attention and among other manifestation of treatment will include improvement in motor and coordination skills.
Method: Material consists of 60 children with mild central movement disorders in combination with ADHD. Whole material was divided into two groups: 1stgroup—30 children, mean age 8.9 years, underwent 30 EEG biofeedback procedures; 2ndgroup—30 children, mean age 8.5 years, underwent intensive classical rehabilitation 2–3 times a week. The length of one procedure was 30–45 min in both groups. All children were tested using PANESS test before and after procedures and test for assessment of impulsivity and attention. Achieved total time in repetitive and pattern movements was also evaluated.
Results: Significant improvement in total score of all variables of PANESS test: before (M = 58.57) and after (M = 25.87) biofeedback rehabilitation was documented ($p = 0.000$). Sum of achieved time of repetitive and pattern movements was (Mdn = 101.60) versus (Mdn = 88.95, $p = 0.000$) after procedures. In the second group of children with classic rehabilitation, the total score was (M = 41.90) before and after (M = 45.83). Achieved time: (Mdn = 137.06) versus (Mdn = 107.85, $p = 0.000$) was significantly shorter but less marked. We have compared the differences in input and output score of PANESS test and attention and found statistically significant correlation, where the correlation coefficient is (rs = 0.511), ($p < 0.01$) improvement in motor skill correlated with improvement of attention.
Conclusion: EEG biofeedback neurorehabilitation significantly improved not only ADHD parameters but also motor skills. Comparing results of both groups showed significantly better results in motor skills in the 1st group and similar significant results in total time of repetitive and pattern movements in the 2nd group. Supported by EU grant ITMS2622022009.

P-31-009 Self-reported hyperactivity and conduct problems of adolescents in Prizren region, Kosovo

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Objective: To estimate the presence of hyperactivity and conduct problems of adolescents which were referred to the Mental Health clinic for children and adolescents in Prizren and including the community sample.
Method: The sample of adolescents at the schools and the sample of adolescents referred to mental health clinic fill out Strengths and Difficulties Questionnaire -self report version. All data has been analyzed by using SPSS (Statistical Package for the Social Sciences) 14.0.
Results: Sample consisted of 5,446 adolescents (clinic 173, community 5,273); mean of age was 13, 49; based on gender (male—50.8 % vs. female—49.2 %); based on residence (urban—56.5 vs. rural 43.5 %). We found that 12.6 % of cases (27.7 %-clinic vs. 12.1 %-community) have resulted with abnormal level of hyperactivity and also 28.3 % of cases (38.7 % in clinic vs. 28 % community) have resulted with abnormal level of conduct problems. Based on Mann–Whitney U test the clinical sample (Md = 3, n = 173) showed significantly higher level of hyperactivity compared to community sample (Md = 3, n = 5,243) U = 369,727, 500, z = −4, 2, $p = .00$, r = −0.057. Effect size was small. Based on Mann–Whitney U test the clinical sample (Md = 5, n = 173) showed significantly higher level of conduct problems compared to community sample (Md = 4, n = 5,238) U = 385,793, 000, z = −4, 2, $p = .01$, r = −0.046. Effect size was small.
Conclusion: We found higher levels of hyperactivity and conduct problems in the community and clinic sample. Clinical cases have significantly higher level of hyperactivity and conduct problems than community cases. Hyperactivity and conduct problems are significantly positive correlated especially in our clinical sample.

Saturday, 8 June 2013, 15.00–16.00

P-32 Non pharmacological treatment III

P-32-001 Can ADHD and externalizing disorders be helped in communities with no access to mental health care?

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Objective: Task shifting involves the redistribution of available community resources. ADHD and Externalizing Disorders are very common problems with known burden on families.This study describes the dissemination of an evidence-based intervention in communities with no access to mental health care.
Method: The Strengths and Difficulties Questionnaire (SDQ) was completed by mothers to screen for children with ADHD and externalizing problems and was repeated at the end of the intervention. Pre- and post-tests of parenting attitudes were administered to mothers. Lay social and health workers with no background in mental health were trained. Each worker in turn trained mothers of children with behavioral problems under supervision utilizing the Treatment Manual for Externalizing Disorders "Helping Challenging Children" developed by the Integrated Services Taskforce of the WPA Child Mental Health Presidential Programme and IACAPAP.
Results: A total of 20 workers and 87 mothers were trained. The proportion of children who obtained an SDQ total difficulties score in the abnormal range decreased from 54.4 to 19.7 % after the training. The Hyperactivity score decreased from 6.0 to 4.5 ($p < 0.001$) and the Conduct score decreased from 3.7 to 2.7 ($p < 0.001$). Whereas 40.2 % of mothers used severe corporal punishment with their children before the intervention, this decreased to 6.1 % post-intervention. Three-fourths of mothers related that the program helped them develop new parenting skills.
Conclusion: This pilot project demonstrated the feasibility of task shifting and dissemination of a manual based intervention by training of workers who have little background in mental health to offer effective services to families in impoverished communities who

otherwise would not have received them. Successful replication in other developing countries would pave the way to incorporating such programs in national policies given their potential sustainability and cost-effectiveness.

P-32-002 The efficacy of computerized working memory training on reducing comorbid psychiatric symptoms among prison inmates with Attention Deficit/Hyperactivity Disorder

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Objective: Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common psychiatric disorders that often persist into adulthood. Studies suggest that ADHD is common among prison populations. Moreover, ADHD is associated with a high percentage of comorbid psychiatric disorders, mainly anxiety and depression, personality disorder, and substance abuse. The aim of the present study was to explore the effects of a computerized working memory training on reducing comorbid psychiatric symptoms among prison inmates with attention deficit/hyperactivity disorder.
Method: Through randomized sampling method, 20 adult male prison inmates (22–41 years old) in Gorgan State Prison (North of Iran) who had formerly received ADHD diagnosis were recruited on a voluntary basis. Participants were randomly assigned to experimental group who received a computerized working memory training program for 25 sessions through 5 weeks, and passive control group. To measure the severity of comorbid psychiatric symptoms from before to after the training, the participants completed Beck Anxiety Inventory (BAI), Beck Depression Inventory-2 (BDI-II) and Millon Clinical Multiaxial Inventory (MCMI-III).
Results: The experimental participants reported significant change ($p < 0.05$) on BAI, BDI, PTSD, and bipolar disorder symptoms. But no significant change was reported on personality disorders symptoms ($p > 0.05$).
Conclusion: The results suggest that working memory training can be an effective intervention for reducing some comorbid psychiatric symptoms in male prison inmates with ADHD. In addition, the data supports the feasibility of offering working memory training in a correctional setting.

P-32-003 Group Cognitive Behaviour Therapy (CBT) for adolescents and adults with Attention Deficit Hyperactivity Disorder (ADHD)

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Objective: The purpose of the studies described were to determine the efficacy of group CBT for adolescents and adults with ADHD.
Method: The adolescent study involved 18 adolescents who were randomly assigned to CBT (14 sessions) or waitlist control group. The waitlist controls subsequently received the group intervention. Each adolescent also received individual coaching 3 times per week. ADHD, mood, self-esteem and functioning were evaluated by the adolescent, parents, teachers, and blind clinical observers. Sixty-six adults with ADHD were randomly assigned to 12 weeks of CBT treatment alone or medication (stimulants) plus CBT treatment. ADHD, self-esteem, mood, relationships, organizational skills, and functioning were evaluated.
Results: Adolescents with ADHD showed improvement in ADHD symptoms, mood, self-esteem, and functioning by all evaluators when baseline and post treatment measures were compared and these improvements were maintained at 3 month follow-up. For adults with ADHD both CBT and CBT + medication resulted in significant improvements in ADHD symptoms, organization, functioning, and psychiatric symptoms. However, the CBT + Medication group outperformed CBT alone in reducing ADHD symptoms and improving organization.
Conclusion: Group CBT is effective for adolescents and adults with ADHD in improving ADHD symptoms, self-esteem, as well as organization, mood and functioning. Medication added to CBT further increases this improvement.

P-32-004 Dialectical behaviour therapy-based skills training in groups for adults with ADHD

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* Stockholm, Sweden

Objective: In this series of studies we evaluate feasibility, efficacy and effectiveness of Dialectical Behavioural Therapy (DBT) -based skills training group (Hesslinger et al. 2004) for adults with AD/HD in a Swedish outpatient psychiatric context, as well as for adults with AD/HD and substance abuse disorder (SUD) in compulsory care.
Method: In study one, participants were randomized to a structured skills training program ($n = 26$) or a loosely structured discussion group ($n = 24$). Feasibility was estimated on the basis of (1) proportion of individuals with AD/HD considered to be potential candidates for the treatment; (2) treatment completion; and (3) session attendance. Treatment acceptability and efficacy were assessed using self-rating scales. Studies two and three are on-going uncontrolled effectiveness studies in open trial design using same treatment manual and outcome measures as study one. Study two is performed in a psychiatric outpatient context (at the moment $n = 80$ included participants), while study three is performed in compulsory care for adults with AD/HD and substance abuse and the treatment is modified to this group (at the moment $n = 23$ included participants).
Results: In study one, feasibility was good and skills training was perceived as more logical and effective for AD/HD-related problems as compared to the discussion group/control. The per protocol analyses (individuals stable on medication status $n = 19$ in skills training; $n = 18$ in control group) showed a significant reduction in AD/HD symptoms in the skills training group, but not in the control group. Study two and three are on-going, and preliminary results show promising effectiveness in psychiatric outpatient context with stable treatment effects at 2 months follow-up, as well as good feasibility for adults with AD/HD and SUD in compulsory care.
Conclusion: Group-therapy based on DBT can be a feasible, effective and well tolerated treatment of AD/HD in adults.

P-32-005 Psychoeducative groups increases ADHD-knowledge and improves relationship quality in adults with ADHD and their significant others: An open feasibility study

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* Stockholm, Sweden

Objective: Information on ADHD and treatment options is important after established diagnosis at adult age. Information should be

directed to both the affected individuals and their closest network. There is a general lack of interventions that include significant others. The aim of the current pilot study was to evaluate feasibility and preliminary efficacy of a new psychoeducative intervention for adults with ADHD and their significant others in a psychiatric outpatient context.
Method: At three outpatient psychiatric clinics, adults with ADHD and their significant others took part of a psychoeducational programme based on theories from cognitive behavioural therapy and neuropsychology. In total, 110 adults were allocated to treatment (51 with ADHD and their 59 significant others). Feasibility was evaluated regarding suitability of the intervention at a psychiatric outpatient clinic and treatment completion. In this open trial using within-group design, treatment satisfaction and efficacy were assessed with self-report instruments pre- and post-intervention as well as at 6 months follow-up.
Results: The intervention was judged a suitable treatment option for 94.5 % of the individuals with ADHD as primary neurodevelopmental diagnosis at the outpatient psychiatric clinic. The drop-out rate was acceptable for both individuals with ADHD and their significant others. Both individuals with AD/HD and their significant others reporter good treatment satisfaction regarding the entire intervention as well as regarding each of the eight sessions. Knowledge about ADHD increased and relationship quality improved from baseline to post-intervention. The significant others reported a reduction in subjective burden of care such as worry and guilt. These results remained stable or improved at 6 months follow-up.
Conclusion: Findings endorse the value of psychoeducation for adults with ADHD and their significant others as a feasible and effective intervention. We are currently performing a randomized controlled multicenter trial to further corroborate and broaden the evidence-basis of the current program.

P-32-006 Core exercise to decrease classroom off task behaviour for university students

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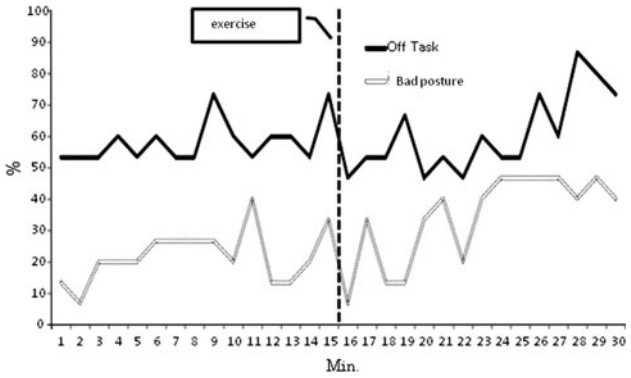
Objective: Classroom chaos may caused by student's hyperactivity. We developed a core exercise to increase on task behavior in collaboration with a trainer. Purpose of this study was to test the effectiveness of our core exercise.
Method: We made behavioral observations on university students in the class. From the start of a class, we observed and counted the off task behavior by time sampling record sheet for 15 min. And, we also checked the bad posture. After that, we made students the 3 min core exercise. And then, we observed classroom behavior again for 15 min.
Results: According to the behavior observations, the off task behavior and bad posture was decreased after the exercise than before. But these behaviors rate was returned as before 10 min later.
Conclusion: We can reduce hyperactivity and off task behavior of students by activation of posture keeping muscles. Our finding will contribute to comfortable classroom.

behavior observation



P-32-007 Cognitive behavioural therapy in medication and non-medication treated adults with Attention Deficit Hyperactivity Disorder: A systematic review

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Objective: To assess the efficacy of Cognitive Behavioral Therapy (CBT) in medication and non-medication treated Adults patients with Attention deficit hyperactivity disorder (ADHD).
Method: We included randomized controlled trials comparing CBT for adults with ADHD in medication and non-medication treated adults with Attention Deficit Hyperactivity Disorder. We will considered self-reported measures, or completed by an independent rater or relative. The studies about the efficacy of CBT for adult ADHD are growing. Some of these compare CBT and pharmacological treatment versus pharmacological treatment, because this last modality is considered the usual treatment. However there are researches that compare CBT versus control group, where include patients with and without medication. We are interested to compare if there are significant differences in the effect sizes of both types of designs, to evaluate differentially the efficacy of CBT for this population. For this purpose, we consider individual and group treatments of CBT in any of its variants. The electronic search included: (1) Cochrane Central Register of Controlled Studies (CENTRAL), part of The Cochrane Library (2) MEDLINE (3) EMBASE (4) PsycINFO.
Results: We found 8 studies which met criteria and reported an improvement of the core symptoms of ADHD. All studies suggested a significant reduction of symptoms of ADHD.
Conclusion: The CBT has an important empirical support about its efficacy to reduce the core symptoms of ADHD in medicated and non-medicated adults.

P-32-008 Neurofeedback of slow cortical potentials as a treatment for Adult Attention-Deficit/Hyperactivity Disorder (ADHD)

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* Tübingen, Germany

Objective: Neurofeedback has been applied effectively in the treatment of children with Attention-Deficit/Hyperactivity Disorder (ADHD). They learn to self-regulate e.g., Slow Cortical Potentials (SCP). SCP in the electroencephalogram (EEG) represent threshold regulation mechanisms of activation and inhibition of cortical networks. This study is designed to assess whether adults with ADHD are able to learn self-regulation of brain activity with SCP feedback and whether this is correlated to changes in symptomatology and neurophysiology.
Method: Participants received 30 sessions of SCP neurofeedback in which they had to regulate the feedback object in the cued direction; up for activation (negativation of SCPs) and down for deactivation (positivation of SCPs). For analysis, the training performance was assessed by the amount of differentiation between activation and deactivation trials. Self-assessed symptom questionnaires were administered before, after 15 sessions, and post training. Furthermore, the contingent negative variation (CNV) was assessed in EEG measurements at the three assessment points. Symptom outcome and CNV were correlated with training performance.
Results: This investigation is in progress. Training data and correlations between training performance and symptom reduction will be presented at the time of the conference.
Conclusion: SCP feedback has not been conducted for adult ADHD and may yield valuable findings as an alternative treatment. Treatment implications, study limitations, and future directions in research will be discussed.

P-32-009 Do adults with ADHD exhibit specific (maladaptive) schemas?

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* Basel, Switzerland

Objective: From a very early age on individuals with ADHD are often exposed to a multiplicity of adverse life outcomes, negative feedback, and suffer from underachievement due to their neuropsychological impairment. Commonly individuals with ADHD struggle with interpersonal, academic, and vocational difficulties. As a consequence, this history of negative experiences brings forth the development of so called (maladaptive) schemas. Schemas are deeply enrooted "core beliefs" about oneself and one's relationship with others and have a dysfunctional character. They emanate from recurring negative experiences (and central emotional needs that were left unmet) during childhood or early adolescence and are considered by the person as absolutely true and unchangeable. The purpose of this study is to shed light on 18 schemas (according to Young et al. 2003) such as defectiveness ("I am basically inadequate"), failure ("I have not fulfilled my potential") and insufficient self-control ("I cannot rely on myself to do what I need to") in adults with ADHD in comparison with a healthy control group. The authors intend to pinpoint possible differences between the groups with respect to the magnitude of the schemas and to schemas specific in adult ADHD.
Method: 50 adults who met DSM-IV criteria for ADHD in adulthood (outpatient sample) were matched with a non-clinical sample in terms of age and gender. All participants (N = 100) were assessed with self-ratings: Young Schema Questionnaire (YSQ-S2), Symptom Checklist (SCL-90-R), Rosenberg Self-Esteem Scale, General Perceived Self-Efficacy Scale, and (only for the control group) the WHO-Screener (ASRS-v1.1).
Results: Preliminary results will be presented at the conference.
Conclusion: Future cognitive behavioural therapy programs for adult ADHD could benefit from detailed knowledge about (maladaptive) schemas.

Saturday, 8 June 2013, 15.00–16.00

P-33 Life quality children and adults

P-33-001 Hyperactivity problems and peer victimisation among Nigerian school children

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* Lagos, Nigeria

Objective: Peer victimisation, also referred to as bullying, is a common problem among school children, with associated negative consequences on school attendance, academic performance and the mental health of the victimised children. Deficits in social skills, emotional regulation and disruptive behaviour may make Children with attention-deficit/hyperactivity disorder (ADHD) targets of peer victimisation. There is limited information on the relationship between ADHD and peer victimisation among school children in Nigeria. Therefore, this study determined whether Nigerian school children with 'hyperactivity problems' were more likely to experience peer victimisation when compared with other children.
Method: A cross-sectional study conducted on 220 randomly selected secondary school students in Lagos, Nigeria. History of peer victimisation was assessed with the Violence and Injury module of the Global School-based Health Survey Questionnaire, while the presence of 'Hyperactivity problems' was determined with the Hyperactivity scale of the Strength and Difficulties Questionnaire.
Results: The majority of the participants were males (58.7 %) with a mean age of 15.9 ($\pm$ 1.3) years. In the past year, 56.4 and 56.7 % of the sample reported physical victimisation and psychological peer victimisation respectively. School children with 'hyperactivity problems' were more likely to experience physical peer victimisation ($p = 0.015$) and psychological peer victimisation ($p = 0.016$) when compared with children without 'hyperactivity problems'.
Conclusion: Nigerian school Children with 'hyperactivity problems' are more vulnerable to peer victimisation in comparison to other school children. This finding highlights the need to develop and implement interventions targeted at reducing the victimisation of hyperactive school children in Nigeria.

P-33-002 The burden on caregivers of children with Attention-Deficit Hyperactivity Disorder: The impact of psychiatric co-morbidity

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Objective: Attention-deficit hyperactivity Disorder (ADHD), a common neuropsychiatric disorder among children, frequently co-occurs with oppositional defiant disorder (ODD), conduct disorder (CD), learning disability (LD), anxiety and depression. The emotional, financial and physical demands of caring for a child with ADHD are enormous, and may overwhelm the caregiver. Previous studies have shown high levels of burden among caregivers of children with ADHD, but the relationship between caregiver burden and the presence of co-morbidities in the care receiver awaits further clarification. This study assessed the impact of co-morbid disorders on caregiver burden in ADHD.
Method: A cross-sectional study which consecutively recruited 69 children with ADHD, attending the Child and Adolescent clinic of the

Federal Neuro-Psychiatric Hospital, Yaba, Lagos Nigeria. Caregivers of children with ADHD completed the Zarit Burden Interview and the Vanderbilt ADHD Diagnostic Parent Rating Scale. Clinical diagnoses were ascertained with the Schedule for Affective disorders and Schizophrenia for School aged Children (Kiddie-SADS).
Results: The patients were predominantly males (71.9 %) with a mean age of 8.2 (± 3.8) years. More than half of the sample had co-morbid ODD (58.1 %) and LD (55.1 %) while 24.2 and 35.7 % had conduct disorders and anxiety or depression respectively. Caregivers of patients with co-morbid LD (OR = 3.49, 95 % CI 1.18–10.32, $p = 0.02$) and ODD (OR = 2.01, 95 % CI 1.07–5.68, $p = 0.04$) were more likely to experience higher levels of burden than caregivers of patients without co-morbidities. The presence of the other co-morbid disorders did not increase the risk for caregiver burden.
Conclusion: The co-occurrence of LD or ODD with ADHD significantly increases the likelihood of caregiver burden. Interventions targeted at alleviating caregiver burden must address these co-morbidities in children with ADHD.

P-33-003 A comparison of sexually abused children with and without ADHD in South Korea

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Objective: Due to the characteristics of the disorder and their interaction difficulties with other people, children with ADHD are known to have higher risks to other psychiatric conditions and hazardous social situations than non-ADHD children, in particular, sexual abuse. There is sharp increasing interest to child sexual abuse in Korea, which led to the foundation of government funded support center for child victims, so called 'sunflower center'. This study was aimed to investigate the relationship between abuse and ADHD, who visited the support center.
Method: 238 sexually abused children (6–13 years old) who visited the Incheon sunflower center from January 2010 to December 2012 were included in the study. They were offered to get proper treatment program or legal services after assessments by child psychiatrist and psychological evaluation.
Results: 205 subjects who agreed to participate were enrolled in this study. 25 (11 boys) subjects were diagnosed as ADHD. Two groups (ADHD vs. non-ADHD group) were similar in age at incident, intelligence, type of family, economic status and type of sexual abuse (Table 1). Subjects with ADHD, especially boys, showed higher abuse rate than non-AHDH subjects. They also showed greater risk of sexual abuse by unknown offenders (Table 2). They also showed higher drop-off rate and lower rate of using treatment program and legal services (Table 3).

Table 1 Sociodemographic variables of subjects

	ADHD n = 25 (%)	Non-ADHD n = 180 (%)	*p*
Sex			
Male	11 (44.0)	42 (23.3)	<.05
Age of abuse (years ± SD)	8.5 ± 2.5	9.2 ± 2.9	NS
Family (primary caregiver)			
Two biological parents	21 (84)	162 (90.0)	
Sible parents or no biological patent (other caregiver)	4 (16)	18 (10.0)	
Family income ($ per month, mean ± SD)	305.6 ± 92.1	294 ± 98.35	NS
IQ (full scale, mean ± SD)	99.0 ± 13.8	101.2 ± 12.3	NS

Table 2 Type of prepetrators

	ADHD n (%)	Non-ADHD n (%)	*p*
Relationship to child			
Known	15 (60)	148 (82.2)	
Family member	3	52	
Relative	3	28	
Neighbor	2	24	
Teacher	1	4	
Friend	3	21	
Unknown	10 (40.0)	32 (17.8)	<.05

Table 3 Drop-off rate of medical or legal services

	ADHD n (%)	Non-ADHD n (%)	*p*
Do not use services	12 (40)	44 (24.4)	<.05
Refuse to use	4	11	
Early drop-out (less than 3 visit)	4	27	
Any other reasons	2	6	

Conclusion: Inattentive and impulsive characteristics of ADHD exposed the children with this disorder to greater risk of sexual abuse by the unknown offenders than children without this disorder. Male ADHD subjects had higher abuse rate than other abused children. In addition, poor parent–child relationship in ADHD group could affect in delaying proper treatment and legal services. In order to prevent these problems, in-depth sex education should start earlier in children with ADHD, especially boys, and collaborative care system should be developed to treat sexually abused children with ADHD.

P-33-004 Missed ADHD amongst looked after children: Does management in later stages help?

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Objective: To determine if the prevalence of ADHD was higher amongst this subgroup of looked after children and if optimal management led to better outcomes.
Method: Case histories studied for IHAs between Jan 2009 to Nov 2011.
Results: · A total of 452 initial health assessments were carried out for looked after children · 78 children were taken into care because parents/carers had difficulties coping up with the behaviour of their children · 52 children had been seen by health professionals (Paediatricians/CAMHS) in the past. · 2 children had a diagnosis of ASD one with ADHD as well. · 10 children had been given out a diagnosis of ADHD in the past and only 3 children were currently taking medication for it (all 3 in suboptimal doses) · 19 more children were given a diagnosis of ADHD. · 1 child received a diagnosis of ASD, not previously diagnosed. · 40 children were labelled with behavioural difficulties, but not ADHD/ASD · Dosages were changed in the

3 children on sub-optimal doses. · Out of the 26 children with ADHD (old and new), it was recommended in 25. · 16 accepted the medication and out of them 11 were re-united with their families. · Out of the other 10 children only 2 were re-united with the family · Children were a diagnosis of ADHD was not made, were not followed up.
Conclusion: (1) Children with Undiagnosed/suboptimally managed ADHD have a higher chance of showing challenging behaviour leading to family chaos and children going into care. (2) Optimisation of Management of was associated with better outcome (3) Various medications were not compared against each other. (4) Many Health professionals are still not optimally initiating/managing pharmacological management of ADHD.

P-33-005 ADHD symptoms predict early math skills in preschool children

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Objective: ADHD is strongly related to academic failure (e.g., Fried et al. 2013). In the current study we investigated whether associations between ADHD symptoms and academic achievement (i.e., early math skills) were already present when assessed before entering school.
Method: Seventy-seven parents and their children (Mage = 5.31, SD = 0.46) participated in our study. To assess ADHD symptoms, parents filled out the German ADHD symptom-checklist for kindergarten and preschool children (Breuer and Döpfner 2008). To assess early math skills, children solved two tasks measuring basic numerical skills and three tasks capturing higher-order numerical skills.
Results: The relation between parental ADHD symptom ratings and early math skills were analyzed using Bayesian estimation. ADHD symptoms significantly predicted early math skills, standardized $\beta = -.29$, 95 % Bayesian Credibility Interval (BCI) −0.493–0.055. When looking at basic and higher-order numerical skills separately, ADHD symptoms only predicted higher-order skills, standardized $\beta = -.39$, BCI −0.576–0.162.
Conclusion: Extending previous research (e.g., Clark et al. 2010), the current research demonstrates that already at very young age (i.e., in preschool), children with higher ADHD symptoms show decreased academic performance. This finding has important implications, as academic problems seem to emerge even before a formal ADHD diagnosis is possible. Note. The results presented in this abstract are also part of the following manuscript: Gawrilow, C., Fäsche, A., Guderjahn, L., Gunzenhauser, C., Merkt, J., & von Suchodoletz, A. (2012). The Interrelation of Self-Regulation and Mathematical Performance in Preschool Children. Manuscript submitted for publication.

P-33-006 In their own words: Characterizing the unmet needs of caregivers of children and adolescents with ADHD in Europe

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Objective: To identify unmet needs of caregivers of children/adolescents with ADHD in Europe.
Method: One-on-one interviews with caregivers across eight European countries were conducted (in the native language) as part of concept elicitation phase for a large survey study. Trained interviewers followed an interview guide designed to elicit unmet needs of caregivers related to their child's/adolescent's ADHD. Interviews were audio-recorded and transcribed in English. A thematic analysis was performed, which involved coding of key themes identified in the transcripts related to unmet needs of caregivers.
Results: Thirty-eight caregivers participated in interviews, representing 38 children and adolescents aged 6–17 (mean age 11.9 + 3.7); 25 (66 %) of the children were male and 33 (87 %) were currently on medication. The following themes were identified: treatment concerns, effort/time, worry/stress, accommodations/sacrifices, relationship impacts, and amount of community support. Caregivers reported concerns about side effects of medication and some would allow their child to take medication breaks. Over 70 % reported spending substantial time and effort to care for their child, including providing constant supervision and frequent reminders. Some worried about their child's safety and future due to ADHD-related behaviors. Over 70 % reported making personal sacrifices, attending fewer social events and/or having strained relationships with family and/or friends due to their child's ADHD. Over 50 % of caregivers expressed a need for better health services, (e.g., counseling), and some indicated needs related to educational support (60 %) and financial assistance (10 %).
Conclusion: EU caregivers of ADHD patients identified several unmet needs that range from treatment concerns to lack of community support for patients and their families. Further research will be conducted to quantify the extent of the unmet needs in different countries in the hope that this information will raise awareness and lead to the development of programs to address both caregiver and patient needs.

P-33-007 Korean elementary school teachers' perception and belief regarding children with ADHD: From a cultural psychological perspective

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Objective: The purpose of this study was to understand Korean elementary school teachers' perceptions and beliefs regarding children with ADHD from a cultural psychological perspective in Korean contexts.
Method: Two open-ended statements were adapted from a study conducted by Whitworth, Fossler, and Harbin (1997). A content-analysis was used to analyze a total of 282 responses from 217 Korean elementary school teachers who had previously taught a student with ADHD. Responses were thoroughly reviewed and coded. Triangulation method was used for validity and the differently classified responses were re-evaluated and appropriately modified.
Results: The results of this study are as follows: First, teachers find the most difficult thing about teaching children with ADHD to be (a) behavior management of children with ADHD (52.2 %), (b) teacher's self-improvement (16.8 %), (c) teacher's time, attention and energy (12.4 %). Second, teachers believe that they would be more successful teaching children with ADHD if they had (a) more knowledge and experience (30.6 %), (b) time, energy and patience (20.7 %), (c) ADHD-related training (16.5 %).
Conclusion: These findings suggest that ADHD Management Manual should be developed based on specific cultural context in Korea. It could help Korean elementary school teachers not only to understand children with ADHD but also to establish the confidence to manage children with ADHD. Additional research for prospective teachers also needs to be explored in order to establish successful management of children with ADHD when they become an elementary school teacher.

P-33-008 Parenting of children with ADHD in South Korea: The role of socio-emotional development of children with ADHD

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Objective: Many studies have reported parenting variables such as parenting attitude and sense of competence have been suggested as significant determinants of socio-emotional development of children with ADHD. In Korean society, the traditional culture of Confucianism is a strong influence on parenting practices and children's behavior. However, there have been few studies that examined the relative significance of the parenting and other associated factors for self-esteem and social competence in children with attention deficit hyperactivity disorder in Korea living in a strict parenting environment. The aim was to investigate the factors affecting the self-esteem and social competence of children with ADHD.
Method: This study was designed as a cross-sectional and descriptive survey. The subjects were 124 pairs of mothers and their children with attention deficit hyperactivity disorder, recruited from local Child psychiatric clinics in South Korea. Data collection was conducted through the use of questionnaires.
Results: Affectionate parenting attitude and co-morbid condition of the child were the most important predictors of selfesteem. Rejecting parenting attitude was the most important predictor of social competence.
Conclusion: Higher levels of affectionate parenting attitude of mothers and non-co-morbid status of children both contributed unique variance to the overall prediction of higher self-esteem of children. Higher levels of rejecting parenting attitude of mothers contributed unique variance to the overall prediction of lower social competence in children with ADHD.

P-33-009 The relationship between parenting practices and child behaviour and executive functions in children with ADHD

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Objective: This study examined the relationship between parenting practices and behavioural and executive functions in families with children with ADHD.
Method: Fifteen children with ADHD were matched for age, gender, and IQ to typically developing children (mean age = 8 years) and compared on parent instruments and child behavioural and cognitive measures. Correlations between parent and child factors were conducted. Parents of all children completed the Alabama Parenting Questionnaire and the Written Analogue Scale. Teachers completed the Strengths and Difficulties Questionnaire. Children completed executive function tasks of inhibitory control, working memory, attention set-shifting and planning.
Results: Parents of ADHD children reported higher levels of discipline practices (e.g., timeout) and lower levels of involvement (e.g., playing games) than typical children. Parents of ADHD children did not differ from parents of typically developing children in levels of positive parenting and use of corporal punishment. Teachers of children with ADHD rated them as having more emotional, and conduct problems than their peers showing poorer peer relationships and lower levels of pro-social behaviour. Differential correlations between parenting practices and child functioning were observed between the groups. ADHD parenting discipline practices were related to executive functioning of the child (poorer inhibitory control to a higher level of disciplinary practices) while the typically developing group showed significant correlations between parental involvement and children's emotional functioning (poorer emotional functioning related to lower parent involvement).
Conclusion: The interplay between parent practices and children's social and cognitive functioning may differ between children with ADHD and their peers.

P-33-010 A community-based study of six-eight year old children with ADHD: Baseline data from the children's attention project

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* Melbourne, Australia

Objective: Little is known about the functioning of young children with ADHD identified through community settings. We aimed to compare the academic and mental health functioning of a community-based sample of children with and without ADHD. Within the ADHD group, we also investigated differences in functioning by gender and ADHD subtype.
Method: Children (6–8 years) were recruited through 43 metropolitan schools, using a two-stage process consisting of screening (parent and teacher Conners' 3 ADHD index) and case confirmation (DISC-IV). We examined differences in academic functioning (WRAT 4) using analysis of variance and linear regression and compared the prevalence of externalising and internalising disorders (DISC-IV) using Chi-squared tests and logistic regression.
Results: 178 children with ADHD (69 % male) and 211 non-ADHD controls (64 % male) were recruited. Children with ADHD had poorer math computation (mean difference (MD): −12.8, 95 % CI −15.6 to −10.0, $p < .001$) and word reading (MD: −14.8, 95 % CI −18.0 to −11.7, $p < .001$) than controls. Children with ADHD had higher rates of externalising (OR: 13.4, 95 % CI 7.5–23.8, $p < .001$) and internalising (OR: 7.2, 95 % CI 3.5–14.7, $p < .001$) disorders. Only 30 children in the ADHD group had a prior diagnosis of ADHD, with prior diagnosis being more frequent in boys (22 vs. 5 %, $p = .007$) despite there being no gender differences on any outcome examined. Internalising (34 vs. 14 %, $p = .02$) and externalising (66 vs. 36 %, $p = .001$) disorders were more common in the Combined (n = 93) than Inattentive (n = 64) group, with prior ADHD diagnosis being more common in the Combined group.
Conclusion: Although 6–8 year old children identified to have ADHD were already demonstrating poorer functioning than controls, very few of these children had received a diagnosis of ADHD. Early diagnosis and treatment of ADHD has the potential to improve the outcomes for these children.

P-33-011 Symptoms of inattention and hyperactivity/impulsivity in children in relation to parenting practices and parental self-efficacy

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* Warszawa, Poland

Objective: Criterial symptoms of ADHD could be described dimensionally as individual traits that characterise children and as we assume could influence parents in their parental roles. Important aspects of parenting are parental practices and parents' self-efficacy beliefs. The first aim of the study was to investigate relationship between the intensity of inattention and hyperactivity/impulsivity symptoms rated by mothers of children from population group and the characteristic of

mothers' parental practices. The second objective was to examine if the mothers' self-efficacy beliefs modified this relationship.
Method: Participants were 330 mothers of 7–13 aged children, who answered positively for research advertisement published in primary schools. Mothers were asked to assess intensity of child's symptoms of inattention and hyperactivity/impulsivity on the Rating Scale for Parents (SOR) by M. Święcicka. They completed also the Alabama Parenting Questionnaire (APQ) (polish translation) and parental self-efficacy questionnaire based on Bandura's guide for constructing self-efficacy scales (Bandura 2006). We performed correlation and regression analysis of obtained data.
Results: There was negative correlation between intensity of inattention and hyperactivity/impulsivity symptoms and positive parenting practices, while undertaking negative parenting practices correlated positively with intensity of symptoms. Regression analysis indicated that inconsistent discipline was predictable from children's hyperactivity/impulsivity symptoms and mothers' self-efficacy in emotional regulation. However the best explanatory factors for poor monitoring were mothers' self-efficacy beliefs concerning control over child's behavior and intensity of children's hyperactivity/impulsivity symptoms. The best predictor of corporal punishment was mothers' self-efficacy beliefs in emotional regulation.
Conclusion: Outcomes indicated that the intensity of children's hyperactivity/impulsivity symptoms rated by mothers influenced mothers' negative parenting practices, while inattention symptoms when hyperactivity/impulsivity were statistically controlled, didn't affect undertaking negative parental practices. Our results show also that parents' self-efficacy beliefs should be taken into account when explaining negative parenting practices.

Saturday, 8 June 2013, 15.00–16.00

P-34 Life quality: Adults I

P-34-001 Functional impairments and risky behaviour among adults with ADHD in in Europe, Japan, Australia and the United States

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Objective: This study investigates impairments and propensities for risky behaviors among adults diagnosed with attention-deficit/hyperactivity disorder (ADHD) across selected countries worldwide.
Method: Data were from a web-based survey of adults from Japan, Australia, the US and Europe (Germany, the UK, the Netherlands, and Sweden) conducted during October-December 2012. Participants were asked questions regarding social, family, educational and work-related impairments and risky personal behaviors previously shown to be common among adults with ADHD. Data were descriptively analyzed.
Results: 300 adults from Europe (EU) and 100 each from Japan (Jp), Australia (Au) and the US reporting an ADHD diagnosis from a healthcare professional completed the online survey. Between 60 % (EU) and 70 % (Jp) of respondents agreed that ADHD had negatively impacted their ability to achieve career or job success; between 44 % (US) and 62 % (EU, Jp) of married respondents reported a negative impact on their spousal relationships. Between a quarter (US) and nearly one-half (Au) reported having received a suspension some time during their school years. Between 7 % (US) and 14 % (Jp) reported 3 or more automobile accidents during the past three years. While only 11 % of Japanese study participants reported illegal drug use recently or in the past, over 40 % in each of the other geographies did so. Between 9 % (US) and 15 % (EU, Au) reported having received one or more citations for driving under the influence of alcohol or drugs, and approximately 10 % in each geography reported having served time in prison. Concern about exposure to a sexually transmitted disease ranged between 33 % in the US and Japan to around 45 % in Europe and Australia.
Conclusion: Adults from Europe, Japan, Australia and the US report various impairments and risky behaviors associated with ADHD. The extent of impairment varied across the geographical areas studied, depending upon the particular impairment being measured.

P-34-002 ADHD among adults in select countries from Europe: An analysis of online survey data

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Objective: This study compares socio-demographic characteristics, comorbidity profiles, health care utilization and work productivity impairments in adults diagnosed with attention-deficit/hyperactivity disorder (ADHD) to their non-ADHD counterparts in select global geographies.
Method: Data are from the National Health and Wellness Survey (NHWS), conducted online annually by Kantar Health1. Initial data reported in this study were gathered between September and December 2011 in Germany, the UK, France, Spain, and Italy. T-tests of means and Chi square tests of proportions were used to assess significant differences between adults with diagnosed ADHD and a non-ADHD control group from the NHWS sample. All differences reported below were significant at the $p < 0.05$ level.
Results: A total of 235 study participants reported having received a diagnosis for ADHD from a physician. Diagnosed ADHD respondents were more frequently male (59 vs. 49 %) and less likely married (38 vs. 50 %) than non-ADHD controls. Diagnosed ADHD respondents were more likely to report sleep difficulties (67 vs. 25 %), anxiety (61 vs. 16 %), depression (59 vs. 12 %), or headaches (57 vs. 39 %). The likelihood of an emergency room visit (34 vs. 11 %) or a hospitalization (32 vs. 8 %) within the past 6 months was greater among diagnosed ADHD respondents than non-ADHD controls. Diagnosed ADHD respondents were also more likely to report health-related work productivity loss (55 vs. 20 %). Additional surveys are being collected to increase diagnosed ADHD sample sizes and the geographic scope of the study to include Denmark, Sweden, the Netherlands, Japan, Australia, and the U.S.
Conclusion: Adults from five European nations with self-reported diagnoses of ADHD reported higher rates of comorbidity with a variety of mental or physical disorders, higher rates of health resource utilization, and higher rates of health-related work productivity impairment than adults without ADHD.

P-34-003 Sleepiness and driving performance in adults with ADHD

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* Bordeaux, France

Objective: The objectives of this study were to quantify objective sleepiness and its impact on driving performance in adult with ADHD.

Method: 36 subjects with ADHD (mean age = 36.3) and 18 control subjects (mean age = 31.2) were included. Nocturnal polysomnography was performed to identify potential sleep disorder and patients were submitted to a Maintenance Wakefulness Test (MWT) to examine their level of daytime sleepiness. A driving test of one hour was carried out on a simulator to evaluate driving performance.
Results: ADHD subjects were divided into 2 groups according to their level of sleepiness at the MWT: the "sleepy" group consisted of 20 subjects (mean sleep latency (SL) = 23.9 ± 1.3 min) and the "alert" group included 16 subjects (LE = 37.3 ± 1 min) ($p = 0.001$). More than half of the ADHD subjects exhibited a sleep disorder: 31 % among the alert ADHD subjects and 65 % among sleepy ADHD subjects. But 35 % of the sleepy ADHD subjects did not presented a sleep disorder. About driving performance, there were significant differences between driving performance (observed by the number of lines crossing) between the control group and the alert ADHD group ($p = 0.05$) and the control group and the sleepy ADHD group ($p = 0.02$).
Conclusion: This study supports the hypothesis that there is a sub group of ADHD patients that present pathological sleepiness. ADHD impacts on driving performances, but it is not possible today to clearly explain them: attention deficit and/or sleepiness? But it is important to focus on this question to provide therapeutic strategy modulated by the clinic.

P-34-004 Managing ADHD in adulthood

M. Bjerrum*, P. Larsen, P. U. Pedersen

* Aarhus C, Denmark

Objective: to synthesise the existing literature to investigate how adults experience ADHD symptoms affect the management of daily life skills and factors supportive for their ability to manage the symptoms and manage life with ADHD in order to identify protective factors supporting them to live with the symptoms.
Method: A meta-synthesis including studies derived from PubMed, CINAHL, Embase and PsychINFO, using the keywords: Attention Deficit Hyperactive Disorder, Quality of Life, family, social support, adaption, psychological, educational, education, daily life skills, manage to live, life impairment, social life skills, attitude, coping behaviour, academic functioning, social adjustment, interpersonal relation, family health, social support, adult 19–44 years, middle aged 45–64 years.
Results: Four themes emerged from the included studies: 'Being different from others'; 'gaining insight into ADHD and thereby self-awareness'; 'personal support to navigate in daily life' and being organised to prevent chaos'.
Conclusion: Adults with ADHD want to be accepted as equals in their communities, but they often feel different and misinterpreted. Relatives and professionals can assist by advising and coaching them and not least by standing up for them.

P-34-005 Combining qualitative and quantitative data to support the enduring development of executive function skills in students receiving supplementary special education funding

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Objective: The objective of this study was to investigate if by combining a student's input with quantified data obtained through standardized assessments a more complete and accurate picture of the student's executive functioning over time would emerge.
Method: A single-subject, multiple baseline study was used to assess the functional relationship between the implementation of interventions designed to improve executive function skills and Oral Reading Fluency rate of a student with a vision impairment and attention challenges. An ABAB design was adopted longitudinally to assess if a participant's oral reading fluency scores in one-minute assessments are affected by the implementation and withdrawal of a treatment package designed to maximize her visual and executive functioning. In addition, the participant was asked at regular intervals about her experiences with regard to the assessments and intervention procedures. Her responses to this process were recorded and analyzed.
Results: Major quantitative findings reveal that the student's baseline data are generally stable with oral reading fluency rates at moderate to low levels due to environmental conditions that exacerbate the effects of her visual impairment and attention challenges. In the intervention phase, the data for oral reading fluency rates showed dramatically increased fluency levels, reflecting the positive effects of the intervention. Contrastingly, the withdrawal of the intervention resulted in an abrupt reduction in fluency levels. Qualitative data collected after the assessments showed the participant initially experienced negative feelings toward implementation of the treatment package; however, over time she became increasingly aware that the intervention helped improve her academic performance and her ability to sustain attention. Based on these findings, a multi-dimensional approach was developed to optimize the participant's functioning.
Conclusion: The findings emphasize the value of single subject research and anecdotal/qualitative data to ensure the acquisition of executive functioning skills in individuals with attention-related challenges.

P-34-006 Community workshops on ADHD improve ADHD knowledge and help-seeking behaviour

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Objective: The results reported here are those from a survey given to ADHDWindsor workshop attendees in October 2012 about their knowledge, attitude, help-seeking behaviour, and patient service delivery preference.
Method: Survey.
Results: The survey was filled out by 44 % of attendees and is felt to be an accurate representation of the group. The findings are in tandem with the growing body of evidence that supports psychoeducation and health literacy, as means of improving knowledge, attitudes and behaviour with regard to mental health. 100 % of responders strongly agreed or agreed that the workshops improved their understanding of ADHD. 97 % of responders strongly agreed or agreed that there is stigma associated with ADHD. 100 % of responders agreed or strongly agreed that they felt more comfortable accessing ADHD services as a result of the workshops. 90 % of responders strongly agreed or agreed with having ADHD services delivered at a school-based multidisciplinary clinic; 96 % for physician's office; 92 % for community health clinic; 88 % for mental health agency and Internet. 100 % of survey responders strongly agreed or agreed that they would attend another workshop on ADHD.
Conclusion: Community workshops can improve knowledge and affect ADHD help-seeking behaviour. Responders preferred to receive ADHD health services in a variety of settings- 90 % and more for School- based Clinics; Physician's Office; Community Health Centers and 88 % for Mental Health Agencies and the Internet. In an era where patient-centered care is the new standard, we have to move

away from old models of care delivery to ones which have at their center the patient and family. At the very least new funding models and partnerships for physicians and other health providers need to be supported, so that children can receive comprehensive ADHD services from physician's offices to School- based Clinics and Community Health Centers.Further research and funding of Community Workshops on ADHD is needed to fully understand the health impact on this population.

P-34-007 The relationship between attention and creativity in a cross-section of British adults

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* Edinburgh, United Kingdom

Objective: It has been proposed that distractibility, a key diagnostic criterion of Attention Deficit Hyperactivity Disorder (ADHD), may be associated with higher creativity levels in some individuals (e.g., White and Shah 2011). However, the existing literature in this area is inconsistent. The few studies addressing this issue typically used only one or two measures of attention and creativity, yet it is unclear which measures are most appropriate. The current study aims to determine in which ways performance on a range of attention and creativity tests may be related in adults with and without ADHD.
Method: 100 adults (18–80 years, mean age = 26.93, SD = 11.45) were tested in a quiet laboratory at Edinburgh Napier University. Each participant completed seven attention tasks (assessing focussed, sustained, selective and divided attention) and six creativity tasks (measuring creative achievement, verbal and figural divergent thinking, and creative production). Correlational analyses were used to explore relationships between these 13 variables. The same testing procedure is currently underway with adults with ADHD.
Results: Each attention measure produced the expected effect. However no relationships were found between any attention variables, implying that each task measured a different aspect of attention ($r = -.189$–$.189$, $p > .05$). The two self-report ($r = .267$, $p < .01$) and the four creative performance variables ($r = .261$–$.981$, $p < .01$) were unrelated, indicating that individuals' own opinions of their abilities were unlinked to their scores. Only odd relationships were found between the measures of creativity and attention, although comparisons are yet to be made with the ADHD group.
Conclusion: The results highlight a flaw in studies that use only one measure of attention and/or creativity to explore this relationship. Further ADHD analysis is required but if a relationship is found, it is hoped that learning difficulties experienced by ADHD sufferers could be lessened by developing strategies that utilise creativity to aid concentration and productivity.

P-34-008 WHAAM: Web health application for ADHD monitoring

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Objective: WHAAM is a project funded by EU Lifelong Learning Programme (Measure KA3) in which five European countries are involved: Italy, Portugal, Greece, Ireland, and UK. This project is aimed at sustaining the learning processes of all actors (teachers, parents, health personnel) involved in the treatment of pupils and young adults (age 7–18) with ADHD disorder. The diffusion of protocols based on the multimodal paradigm, in the context of the cognitive—behavioural (CB) treatment puts on evidence the relevance of the monitoring phase. This phase requires a specific training but can produce notable improvements in the outcomes of the intervention. The project idea emerged considering that literature has often highlighted the lack of skilled educators, able to apply the CB approach in everyday life contexts. In order to address this issue, the WHAAM project will use the ICTs according to two main objectives. Firstly, in providing learning and training paths, addressed principally to teachers and parents, for updating their knowledge and competences about ADHD monitoring; secondly, in supporting the monitoring process thanks to the development of a specific web application. Teachers and parents will use this application to gather data during the monitoring phase; the gathered data could be shared, categorized, and compared. The application will be used also in the everyday life contexts, thanks to a mobile interface. To realize an effective application the project has to define a theoretical framework in which all the design of application could be situated. Moreover, an e-Learning module will be designed and delivered, at higher education level, to illustrate methodological and technological approaches useful for supporting the inclusion of ADHD students. The project website will gather information and experiences on the monitoring process in ADHD treatment, and permit collaboration and sharing between educators and institutions, interested on this topic.

P-34-009 A comparison between life quality and weight-height measurements of patients, under stimulant and non-stimulant treatment due to Attention-Deficit and Hyperactivity Disorder and healthy population

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* Kayseri, Turkey

Objective: In our study, compared the effect of long acting methylphenidate for and/or atomoxetine usage due to ADHD, weight-height measurements, and comparison of life quality between children and adolescents, and healthy population was aimed.
Method: This study was conducted in the period from September 2011 to May 2012. Study population consists of 61 patients with ADHD based on DSM-IV and these patients were pharmacologically treated for at least 12 months. Control group was selected randomly between patients of social pediatric clinical and specified as 25 healthy children in physical and psychological way.
Results: 42 of patients (68.9 %) were under long acting methylphenidate (OROS-MPH) therapy and 19 (31.1 %) were under atomoxetine therapy.In conclusion, there is no significant difference between weight and height when comparing between control groups of OROS-MPH and atomexetine. There is significantly difference in all sub-fields of life quality scale between control group and under ADHD treatment. When comparing all sub-fields of life quality scale, there is no significant differencebetween atomexetine and OROS-MPH users.
Conclusion: Investigators and practioners supposed that important deterioration in psychosocial fields associated with ADHD based on basic symptoms of ADHD. Children and adolescent with ADHD are at increased risk of academic failure, dropping out of school or college, teenage pregnancy, alcohol and substance use and criminal behaviour. The emotional impairments of children and adolescents with ADHD may include poor self-regulation of emotion, greater excessive emotional expression, especially anger and aggression, greater problems coping with frustration, reduced empathy, and decreased arousal to

stimulation. Numerous studies have shown significant recovery in life quality with medication use in case of ADHD. Also, it is suggested that recovery attempts for children with ADHD diagnosis should include all fields of life. In line with previous studies, our study showed that there is significantly difference in all sub-fields of life quality scale between control group and under ADHD treatment.

P-34-010 Anxiety comorbidity in ADHD and its influence on quality of life

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* Ankara, Turkey

Objective: In this study, we aimed to determine the frequency of comorbid anxiety disorders in clinically referred children and adolescents with ADHD (Attention Deficit Hyperactivity Disorder) and to examine the association between quality of life (QoL) and severity of comorbid anxiety symptoms. We hypothesized that comorbid anxiety symptoms may further worsen the QoL in addition to ADHD symptoms.
Method: This study was conducted with 74 treatment naïve children and adolescents with ADHD, aged 8–16, who referred to a university hospital. Diagnoses of ADHD and anxiety disorders were made based on DSM-IV by using Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime version. Parents and teachers were asked to fill in Strengths and Difficulties Questionnaire and Conners Rating Scales. Quality-of-Life Scales were completed by parents and children. Anxiety severity in children was assessed by The Screen for Child Anxiety Related Emotional Disorders (SCARED). Chi square tests, correlation analyses and t tests were used to evaluate the data.
Results: DSM-IV criteria for an anxiety disorder was met in 43.2 % (n = 32) of the cases. The most frequent diagnoses were Separation Anxiety Disorder and Generalized Anxiety Disorder (29.7 %, n = 22). There was no relation between the anxiety disorder frequency and ADHD subtypes ($p = 0.05$). Neither anxiety symptom scores nor QoL scores were different between children who have comorbid anxiety disorder and those with pure ADHD ($p = 0.05$). However, there were significant negative correlations between anxiety scores and QoL. Additionally, some of the QoL scores of children whose SCARED total scores above cut-off point were significantly lower than the others ($p = 0.05$).
Conclusion: High rate of anxiety disorders were detected in this clinical sample of ADHD. Children and adolescent who tend to be more anxious had worse QoL. These results suggest a deteriorating impact of anxiety on QoL in children and adolescents with ADHD.

Saturday, 8 June 2013, 15.00–16.00

P-35 Life quality: Adults II

P-35-001 Childhood abuse and neglect in adult ADHD

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Objective: Although it has been suggested that Attention Deficit Hyperactivity Disorder (ADHD) is common in children who were abused and that ADHD can be a risk factor for abuse itself, there are very few studies which investigated whether adultADHD is associated with childhood abuse and neglect.
Method: 70 adults with ADHD and 70 healthy control subjects were included in the study. ADHD diagnosis were made according to DSM-IV criteria. We used Adult ADHD Self Rating Scale (ASRS) and Wender Utah Rating Scale (WURS) to support the diagnosis. We used the Childhood Trauma Questionnaire (CTQ) to evaluate physical and emotional abuse and neglect and the Adverse Childhood Experiences (ACE). Post Traumatic Stress Disorder Checklist (PCL), Dissociative Experiences Scale (DES) were also used.
Results: ADHD subjects had higher ASRS inattentiveness, hyperactivity/impulsivity, WURS scores. ADHD group also had higher PCL ($F(1,139) = 27.0$; $p < .001$), DES ($F(1,139) = 11.8$; $p = .001$) and ACE ($F(1,139) = 6.3$; $p = .013$) scores. In CTQ, ADHD subjects had emotional abuse ($F(1,139) = 16.1$; $p < .001$) and neglect ($F(1,139) = 6.2$; $p = .014$) scores. ASRS and WURS scores were correlated with PCL, ACE, CTQ Emotional Abuse and DES scores; WURS score was also correlated with CTQ Physical Abuse and Neglect scores. Regression analysis indicated that general level of psychopathology was most significantly associated with DES and PCL scores.
Conclusion: Adult ADHD cases reported more frequent adverse childhood experiences than healthy controls and were more commonly exposed to emotional abuse and neglect. ADHD subjects had significantly more dissociative experiences and PTSD symptoms. PTSD symptoms, severity of dissociative experiences and adverse childhood experiences were all significantly correlated with adult ADHD symptom severity. Dissociative and PTSD symptoms were the most significant determinants of general level pf psychopathology. The results pointed to the importance of childhood traumatic and adverse experinces in adults with ADHD.

P-35-002 A seven-year follow-up study of adult patients with ADHD: Preliminary results

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Objective: Most evidence about persistence of ADHD symptoms in adulthood comes from follow-up studies in which individuals are children or adolescents at baseline. This study aims to verify how psychiatric and socio-demographics characteristics impact the number of ADHD symptoms 7 years after first assessment in patients with ADHD that are adults at baseline.
Method: Face-to-face follow-up interviews evaluating social and psychiatric outcomes have been carried out. Up to now, we have assessed 165 adult patients with ADHD (mean age at baseline = 34 years) of the 359 previously evaluated between 2003 and 2007 in the ADHD outpatient clinic of HCPA. Diagnoses were based on DSM-IV criteria. ADHD and oppositional defiant disorder were evaluated with the K-SADS-E, and other comorbidities with SCID-IV and MINI. The main outcome variable is the number of K-SADS-E ADHD symptoms at baseline minus the number at follow-up. In this preliminary analysis we used two-step forward regression models.
Results: Age, gender, impairment and months at treatment were not associated with variation in ADHD symptoms. Bipolar disorder, nicotine use and problems with authority and discipline were associated with symptom persistence, whereas ADHD severity at baseline was associated with improvement.
Conclusion: The results of this 7 years follow-up are consistent with results from short-term response to treatment studies suggesting that ADHD severity is positively associated with potential for

improvement. On the other hand, the observed role of bipolar disorder, nicotine dependence and problems with authority and discipline need to be confirmed with a larger sample size. The results draw attention not only to factors that were associated to the persistence or decline of symptoms, but also to those that were not associated. Age and gender, strongly associated with decline of symptoms in childhood and adolescence, don't seem to have the same effect in adulthood.

P-35-003 Effects of labelling and attributions on adolescent attitudes toward people with ADHD

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* Puebla, Mexico

Objective: To determine the relationship between label, attributions and attitudes toward people with adhd.
Method: We studied students from a junior high school in Mexico. We presented them a vignette about john, a student who has been diagnosed (labeled) as hyperactive, hyperkinetic, or with attention deficit disorder (add). We asked them if john had a mental illness, a physical illness, or normal adolescent mood swings. Attitudes were measured with questions regarding social distance: rejection, desire to work with john and desire to socialize with him. Questions were derived from the work by pescosolido and colleagues and were answered with a likert scale. Pretend that john is a student who came to your class this year and you know that… · john goes to a doctor because he has attention deficit disorder/is hiperactive/hyperkinetic · because of this, john takes medicine every day · in addition, john spends much of the day in special classes and activities.
Results: We included 534 students, mean age 13.76 years old, 54 % females. John had been labeled as hyperactive in 34 % of the vignettes, hyperkinetic in 31.6 % and as add in 33.9 %. Label was not associated with attitudes. However label was significantly associated with the attribution of mental illness ($p = 0.0009$), 63 % of those who received the vignette with john labeled as attention deficit disorder reported that john had a mental disorder. Regardless of label, those who thought that john had a mental disorder or a physical illness expressed more rejection than those who did not think that. Those who said that john had normal mood swings expressed desire to work with him more often than those who did not report this. The desire to socialize with john was not associated with attributions.
Conclusion: The identification of adhd as a disease leads to rejection of the person who has it.

P-35-004 Self-concept and academic achievement of elementary school students with ADHD symptoms

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Objective: Children with ADHD show a positive illusory bias (PIB), providing extremely positive reports of their own competence in comparison to criteria reflecting actual competence (Owens et al. 2007). This study investigates whether children with ADHD symptoms show a PIB with respect to their academic achievement compared to children without ADHD symptoms and compared to children matched for academic achievement.
Method: In a German study, teachers of 1,675 2nd Graders (820 girls; M-age = 8.4 years, SD = 0.49) filled out the Strengths and Difficulties Questionnaire (Goodman 1997). According to the cut-offs for the hyperactivity/inattention scale, we assigned children to two groups: 262 children showed ADHD symptoms and 981 children did not. Their self-concept in reading, writing, and math was related to their academic achievement, measured via teacher ratings and objective achievement tests in these domains.
Results: Children with ADHD symptoms showed worse academic achievement and a lower self-concept, but overestimated their achievement more than children without ADHD symptoms. However, when children with ADHD symptoms were compared to a control group matched for academic achievement, no group differences were found. Furthermore, children with ADHD symptoms had the highest self-concept in the domain of their best performance.
Conclusion: Our data suggests that the PIB is not specific for ADHD and can also be found in children with low academic achievement. It would be valuable but difficult to compare groups with clinical ADHD diagnosis and low versus high academic achievement and to conduct longitudinal studies to find out whether a PIB in academic achievement is adaptive or maladaptive. Note. The results presented in this abstract are part of the following manuscript: Ehm, J.-H., Merkt, J., Gawrilow, C., & Hasselhorn, M. (2012). Selbstkonzept und Schulleistungen von Grundschülern mit ADHS-Symptomen [Self-Concept and Academic Achievement of Elementary School Students with ADHD Symptoms]. Manuscript submitted for publication.

P-35-005 The executive and academic functioning of medicated and non-medicated adult college students with ADHD: A neuropsychological perspective

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Objective: This program will provide information to participants regarding the executive and academic functioning of adult college students possessing ADHD. With stimulant-medication as a factor of consideration, post-secondary professionals and students gain a greater understanding of how these students cope in the competitive environment of academia.
Method: This correlational study examined the relationship between stimulant medication status and executive and academic functioning of college students with ADHD. Participants were assigned to a group based on medication status (stimulant medicated and non-stimulant medicated). A control group consisted of non-ADHD students. Surveys assessed academic functioning (cumulative G.P.A.). The Test of Variable Attention (TOVA) and Kauffman Short Neuropsychological Assessment Profile (K-SNAP) were then given to assess executive function. A between groups comparison was then conducted.
Results: Statistical analysis indicated that there was not a significant difference between the executive and academic functioning of stimulant-medicated and non-stimulant medicated ADHD college students as indicated by T.O.V.A. and K-SNAP scores. There also was not a significant difference between the cumulative G.P.A. of stimulant-medicated and non-stimulant medicated students. However, there was a weak positive relationship between T.O.V.A. scores and self-reported G.P.A.
Conclusion: Establishing potential relationships between stimulant-medication status and neuropsychological and academic functioning may answer a number of questions for ADHD patients, educators, and educational psychologists. Though there is much to be done before direct links between medication and specific achievements can be made, this study contributes to knowledge gaps in the area of adult

ADHD and the functioning of these patients at the post-secondary level. In addition to discussing the nature and results of the study, this program will highlight contributions made to the following areas: Adult ADHD research, neuropsychological research involving adult ADHD subjects, and neuropsychological research analyzing stimulant-medicated and non-stimulant medicated adults.

P-35-006 Arithmetical difficulties in Attention Deficit Hyperactivity Disorder (ADHD) children: Clinical evaluation and stimulant response

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* São Paulo, Brazil

Objective: To evaluate the frequency of arithmetical difficulties in ADHD children before and after administration of medication compared to a control group.
Method: A prospective study, interventional, single center, case–control approved by Ethics Committee of the University of São Paulo (USP). We evaluated forty children (twenty with ADHD and twenty typically-developing peers) from nine to 12 years old, from fourth to sixth grade. We used the WISC IQ test with four verbal sub-tests and four non-verbal sub-tests. Arithmetical skills were assessed using three tests: TDE Arithmetic, the Bastos Test, and WISC-III subtest Arithmetic, which together evaluate the processes of arithmetic, following McCloskey's principles (McCloskey et al. 1985). The ADHD group was tested in two moments: before and after methylphenidate.
Results: From the results obtained in these three arithmetical tests, all the participants were classified in two groups: with and without arithmetical difficulty. We found that the frequency of arithmetical difficulty in patients with ADHD (note: these patients were not on drug therapy for at least one week) was greater than the control group, which was supported by a statistically significant association between the presence of arithmetical difficulty and ADHD (Fisher, $p = 0.001$). Otherwise, after medication the ADHD group showed statistically significant discrepancy between the presence of arithmetical difficulty and the use of medication (McNemar, $p = 0.021$), in other words, methylphenidate reduced the number of ADHD children with arithmetical difficulties in our sample.
Conclusion: Following medication, there persisted a significant difference between ADHD children with arithmetical difficulties who were on medication versus ADHD children with arithmetical difficulties who were not on medication.

P-35-007 ADHD identity: A conceptual developmental model

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* Los Angeles, USA

Objective: There is an extremely limited amount of research that looks at identity development for adults with disabilities, particularly those who identify with a hidden diagnosis of Attention Deficit/Hyperactivity Disorder (ADHD). More and more students with disabilities, such as ADHD, are entering college in the United States. As such, it is increasingly important to understand the processes by which adults with ADHD develop psychosocially and develop a healthy identity around their diagnosis. Faculty and administrators in education can better understand how to assist this exceptional population in order to support them in their development of a positive identity. This phenomenological study was focused on investigating the process of forging an ADHD identity.
Method: This study was qualitative phenomenological research. Participants (N = 31) answered a series of 26 structured questions, including basic demographic information.
Results: This was an exploratory study to understand the experiences for those adults with ADHD and how those experiences go on to shape and influence their identity. The results generate a conceivable model of ADHD identity development that considers other dimensions of identity, such as gender, race/ethnicity/culture, and sexual identity, were not ignored in the examination of an ADHD identity. The model explored aspects of developing an ADHD identity without discounting the influences of internal and external factors.
Conclusion: Implications for the ADHD community and those involved for this study are: (a) become more knowledgeable about ADHD, (b) include ADHD and disability in definitions and discussions of diversity, (c) clinicians and educators can display indicators of support, for example a poster announcing ADHD Awareness Week, (d) providers can confront discriminatory behavior and respond to it in the same way as sexual harassment or racial/ethnic/cultural incidents, (e) include disability questions on survey instruments in the mental health, medical, and educational settings, and (f) consider the stigma involve for those disclosing a hidden diagnosis and allow these individuals to have a safe and private way to disclose their identity.

P-35-008 Symptoms of Attention-Deficit/Hyperactivity Disorder and autism spectrum disorder as risk factors of psychosocial maladjustment in children and adolescents

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* Nagoya, Japan

Objective: The effects of symptoms of attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) on psychosocial maladjustment in 4 domains (academics, peers, teachers, and family) were examined in a community sample of children and adolescents.
Method: A total of 4,732 children and adolescents (3–9 graders; 2,412 boys) participated in the investigation from all 13 schools in a suburban city in Japan. Symptoms of ADHD and ASD were measured by parent-ratings using the ADHD-Rating Scale-IV (ADHD-RS; DuPaul et al. 1998) and the Autism Spectrum Screening Questionnaire (ASSQ; Ehlers et al. 1999), respectively. Psychosocial maladjustment was assessed by self-ratings using an original scale consisted of 16 items, each 4 items from the 4 domains.
Results: Principal component analysis for the maladjustment scale yielded 4 components that were completely consistent with the hypothesized structure. Pearson's correlation coefficients showed significant correlations between symptoms of ADHD and ASD and maladjustment in 4 domains for all combinations (Table 1). An analysis by the structural equation modeling indicated the following (Figure 1): (1) Maladjustment in academic performance and relations toward teachers were affected by inattention. (2) Maladjustment in peer relations was influenced by ASD symptoms. (3) Maladjustment in family relations was affected by inattention and ASD symptoms.
Conclusion: The results indicated that symptoms of ADHD and ASD play important roles in psychosocial maladjustment in various domains. Specifically, it is suggested that ADHD symptoms affected on both academic and social maladjustment while ASD

symptoms affected on social maladjustment, especially in peer relations.

P-35-09 Effect of depression, self-regulation control and characteristics of ADHD as the cause of school brawl in Jakarta, Indonesia

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* Jakarta Barat, Indonesia

Objective: School brawls has taken casualties to the life of students in Jakarta. In the last time, school brawl studies investigate the cause with groups approach such as cognitive dissonance that provocation and resentment among student in the schools. This research focus on individual factors as the cause of school brawls, where the characteristics of children with ADHD, lack of self-control regulation, and level of depression. The results show that in fact the lower influence of individual factor to be come conduct disorder. The meaning students have good self-regulation control, insignificant characteristics of children with ADHD, and moderate of depression level. Concluded group factor more significant than individual factor to caused school brawl.
Method: A study was conducted on male junior high school students aged 11–15 years old residing in Jakarta, Indonesia. The survey was conducted in five secondary schools in Jakarta, Indonesia with a total population of 900 students. Students who are diagnosed with conduct disorder and the brawl involved acquired by questioner Behavior Model of Conduct Disorder filled by teachers and mini ICD-X [33, 34] interviewed by researcher. 105 male students aged 15 years of the total sample were diagnosed with conduct disorder and indicated brawl involved. The students were then taken blood samples to observed the level of depression of cortisol levels in the blood.
Results: EF SUMMARY INTERPRETATION Bellow 12 17 % Borderline Somewhat Deficient 35 50 % Marginal Clinical Deficient 15 21 % Mildly Deficient 5 7 % Moderately Deficient 1 1 % Severe 2 3 % Total 70 100 %.
Conclusion: children who engage in conduct disorder and brawl largely not influenced by individual factors. Individual factors such as the characteristic of ADHD, weakness control self regulation and depression. From data analysis is founded that characteristic ADHD in below and moderate level, control self regulation in moderate level and moderate depression level, although the data showed the trend of depressed children. From BDEF Scale, conduct disorder into "above marginal until severe level".

Saturday, 8 June 2013, 15.00–16.00

P-36 Miscellaneous I

P-36-001 The association between cyber-victimization and Internet addiction of children and adolescents in Korea

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Objective: This study aimed to investigate the relationship between internet use patterns and psychopathological traits in the 5th and 6th graders of elementary school as well as the 1st and 2nd graders of middle school in Korea. The association of excessive internet use with cyber-victimization was also examined.
Method: A total of 4,555 students in Jeollabuk-do province were surveyed using demographic information, internet or cellphone usage patterns, Korean Internet Addiction Scale (Internet K-Scale) and the Korea-Youth Self Report (K-YSR). We also assessed the patterns of cyberbullying by analysis of cyberbullying questionnaire.
Results: Boys had higher scores in internet K-scale and were more vulnerable to cyberbullying victimization than girls ($p < .01$). Adolescents with higher scores of internet K-scale had tendencies to be less socialized and engage in anxiety/depression, externalizing problems, and behavioral problems. Divided 3 groups of addicted, risk, non-addicted groups by internet K-scale, the addicted group, compared to others, had more experiences in cyberbullying. The addicted group showed lower academic performance and significantly higher points in every clinical subscale.
Conclusion: Internet addiction of children and adolescents was significantly relevant to cyberbullying-victimization. High scores of internet addiction strongly correlated with low academic performance, immature social skills, emotional and behavioral problems.

P-36-002 Enhancing leadership capabilities towards effective ADHD management in Saudi Arabia: A challenge in paediatric practice

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* Riyadh, Saudi Arabia

Objective: ADHD is the most common childhood behavioral disorder, with high socioeconomic impact if untreated. It is essential that children with ADHD have access to treatment. In Saudi Arabia, 42 % of the population are under 15; and 15 % have ADHD. There are less than 6 child psychiatrists and 35 pediatric neurologists. Primary care physicians are essential for ADHD management, but in Saudi Arabia they are unwilling to manage psychiatric disorders, because they lack specialized resources to support their development as leaders, resulting from the absence of leadership training in medical schools. We stimulate leadership for ADHD using the American Academy of Pediatrics' Pediatric Leadership Alliance (PLA), based upon the Five Principles of Exemplary Leadership, designed to develop core competencies for public health leadership, and shown to create long-term behavioral change, accompanied by a comprehensive ADHD management course.
Method: 60 Saudi clinicians from government hospitals participated in the PLA—mean age 31 ($\pm$ 2); (f = 48) pediatricians; (f = 12) family physicians. They completed a Leadership Challenge Assessment (LCA) and individual change goals were solicited. A pre-evaluation design and Cronbach α were used to promote blind evaluation.
Results: 78.3 % (f = 47) completed the LCA; 80.85 % were male. 68.08 % displayed leadership behavior "enabling others to act" (SD = 0.72) extensively, with significant correlation (sig $p = 0.03$, $\alpha = 0.519$) indicating probability of accomplishing set goals. 28.08 % will "challenge the process" (sig $p = 0.01$, $\alpha = 0.653$), but may skip step/s towards goals (coef = 71.667); those who "enable others to act" will follow through goals (coef = 42.0). Participants positively evaluated the PLA (78.8 %) with 35 % intending to use their training for ADHD management activities.
Conclusion: Variability in measured leadership behaviors indicate that challenging the process in Saudi Arabia is particularly demanding and liable to fail. Future courses will include additional local case-studies that explore this area, strengthening potential impact on health system change and improved ADHD management.

P-36-003 The prince who gave up the throne, did he have ADHD?

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* Seoul, Republic of Korea

Objective: Diagnosing ADHD in adults is not easy. Although the diagnostic criteria in DSM-V raises the cutoff age from 7 to 12 years old, it is difficult to precisely remember one's childhood. It would be even more difficult to differentiate if the patient has comorbid diseases. By reviewing historical figures, we intend to look over important points to consider in diagnosing adult ADHD.
Method: In biographies and autobiographies of historical figures, there is not enough information about the person before the age 12. That is why the authors decided to review Yangnyeongdaegun (1394–1462) from the Chosun dynasty, who relatively has an abundant amount of records.
Results: He was very active and hated reading books since his early childhood. In his childhood when he was 10 years old, he was installed as crown prince but he had no interest in studying and spent most of his time in exercising and playing. In his adolescent period he exhibited sexual promiscuity, rule violation and he was only interested in archery. In his early adulthood due to his promiscuous behavior and interest in hunting, he was dethroned. His behavioral problems continued after his dethronement. Besides his childhood history, he showed certain aspects of the Utah criteria such as, impulsivity, stress intolerance, hot temper and affective lability. Though he had no interest in academics, he showed talent in calligraphy and painting. In that point of view, he seems to be a person with high creative achievements and lower level of executive inhibitory control.
Conclusion: Yangnyeongdaegun seems to be compatible with the diagnostic criteria of ADHD. If he had received proper treatment, would he be on the throne?

P-36-006 "Uninhibited Imaginations": Relation of impulsivity and creativity in college students

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* Frankfurt, Germany

Objective: Adults with ADHD perform better on tasks requiring divergent creativity, asking to produce a large number of responses to an open-ended question, but not on tasks taping convergent creativity, asking to solve a problem by the production of only one possible answer (White and Shaw 2007). This might be due to low inhibitory control (White and Shah 2010). We tried to replicate this finding in hypothesizing that high impulsivity in the population of college students is related to good divergent but worse convergent creativity.
Method: Fourty-four college students participated in the study (M-age = 23.09 years, SD = 5.97; 35 females). We measured divergent thinking with the Unusual Uses Task, asking participants had to generate as many uses as possible for two presented objects (i.e., brick, bucket) and asked them to generate new names for pasta. To measure convergent thinking we used the Remote Associates Test (RAT) in which participants had to find a matching word (e.g., salt) for 18 given trios (e.g., mines, lick, and sprinkle). Furthermore, participants filled out the Behavioral Inhibition and Approach System questionnaire and the Conners Adult ADHD Rating Scales to measure symptomatology that is associated with ADHD.
Results: Low behavioral inhibition and inattention were related to generating more new pasta names, $r = -.342$, $p < .05$, $r = ,372$, $p < .10$. Low inhibition, high approach and hyperactivity were related to worse performance in the RAT measuring convergent creativity, $r = .351$, $p < .05$, $r = -.307$, $p < .05$, $r = -.298$, $p < .05$.
Conclusion: Traits that are typical for ADHD (i.e., low inhibition, high approach, inattention, and hyperactivity) can be related to good performance on a task measuring divergent creativity but to worse performance measuring convergent creativity. Knowledge of this strength may benefit in terms of self-efficacy and perhaps even achievement.

P-36-007 Core symptoms, emotional dysregulation and functional impairment in adults with Attention Deficit/Hyperactivity Disorder

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* Basel, Switzerland

Objective: Inattention, hyperactivity and impulsivity as core symptoms of attention deficit hyperactivity disorder (ADHD) can't explain the whole intensity of impairment, patients have. Over 50 % of ADHD patients seem to have problems with their emotional reactions. In the last years there is an increasing scientific discussion about the role of emotional dysregulation (ED) in symptomatology of ADHD. Emotional symptoms are often associated with higher severity of general symptoms, with more comorbid disorders and substance abuse. Studies also showed, that ED can explain an amount of functional impairment. Yet, the way symptoms lead to impairment isn't explored. Aim of this research is a first step to explain the relation between symptoms and functional impairment in patients with ADHD. Therefore our hypothesis is a partial mediation of the impact of ADHD core symptoms on functional impairment through ED.
Method: For the present study patients of the specific ADHD diagnosis consultation-hour of the University of Basel Psychiatric Clinics were used. Thereby they were interviewed by a professional and answered several ADHD self- and others questionnaires (e.g., Wender Reimherr Adult Attention Disorder Rating Scale) and Barkley Functional Impairment Scale. For statistical analysis we use SPSS 20.0 and AMOS 20.0. We calculate descriptive statistics, regressions and mediator models.
Results: At present we didn't calculate all models. In initial analysis a significant partial mediation effect from ED for general impairment over all patients was found. Exact analysis for different domains of impairment will follow.
Conclusion: Our study is a first step to explain the relation between ADHD symptoms and impairment. ADHD has a lot of adverse outcomes and understanding their origin is important. ED seems to be an important factor in origin and maintaining of ADHD. At moment ED isn't listed as a symptom of ADHD, although it seems to be a decisive domain of the ADHD symptomatology. A closer look on ED could help to understand and to treat the impairment that ADHD patients have.

P-36-008 Prevalence and comorbidity of ADHD in a historical cohort (1934–1970) in Madrid (Spain)

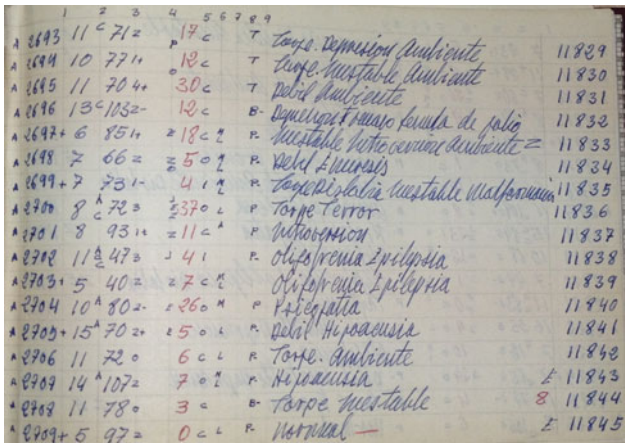
A. Pelaz*, M. De los Reyes, R. Camarneiro, S. Rodriguez, A. J. Heras, P. Rodriguez Ramos

* Madrid, Spain

Objective: To determine the prevalence and comorbidities of "Unstable Disorder" in a historical cohort of children seen in a child psychiatry consultation between 1934 and 1970 in Madrid.

Method: The historical cohort comes from collection data of new cases of a child psychiatrist, Dr. Vazquez Velasco who attended children between 0 and 18 in Madrid from 1934 to 1970 (Image 1).
Results: Of the 11,750 new cases treated in this period, 2,115 (18 %) had the diagnosis "unstable": 495 as the only diagnostic and appeared in 1,620 cases associated with other diagnoses (349 as first diagnosis and 1,271 as associated diagnosis). Among other diagnoses associated mentions "weak", "clumsy", "comitial latent", "depression", etc. 1,419 boys and 696 girls between 2 and 17 years old, mean age 8.9.
Conclusion: ADHD is not a modern disorder that already was prevalent in the studied period, and with a lot of comorbidities, as happens at present.

Collection data



P-36-009 Training needs analysis and the effectiveness of multidisciplinary ADHD training

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Objective: Professionals from health and education play an important role in implementing multi modal management of ADHD. The National Institute of Clinical Excellence recommends training of professionals, from education. The training needs of multidisciplinary staff and their improvement in levels of confidence in managing ADHD and co morbidity in children was studied.
Method: A one day training 'Recognition and management of ADHD to enhance learning for students with ADHD' provided strategies and resources to manage ADHD. Pre and post training questionnaires were analysed.
Results: 75 of the 78 participants completed the questionnaires. 71.7 % were from Education, 25.6 % from Health and 2.6 % from Social Care. Some training needs are: · Basics of ADHD, ASD (Autistic Spectrum Disorder) and associated problems, · Behaviour and Anger Management Strategies. · Improvement in Emotional and Social Skills, Self Esteem Learning and Memory. · Dealing with Bullying and Provide Training to Parents The level of confidence significantly improved in managing: · ADHD, · Low self esteem, · Lack of motivation, · Poor social skills, · myths of ADHD.
Conclusion: "Overall a very informative day, the materials are fantastic, I look forward to passing my knowledge to my colleagues, parents, children and the schools I work with." "would be beneficial to all professionals…it has dispelled a lot of myths." "Brilliant to bring the medical and educational aspects together." "All topics were informative and will contribute to the effective management of pupils with ADHD as well as making other staff members more aware of ADHD strategies and support." The majority of professionals have similar training needs and 98 % appreciated the training and resources provided. Over 90 % achieved their expectations. There was very good improvement in the level of confidence in dealing with the ADHD and related problems The multidisciplinary ADHD training identifies training needs and provides effective strategies in increasing professionals confidence in the management of ADHD.

P-36-010 Evaluation of impact of ADHD training on education staff and service needs assessment

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Objective: The effective management of ADHD in children involves implementation of multi modal strategies and provision of a variety of services by professionals. Various studies and NICE have identified the importance of training staff in education in the management of ADHD. This study assessed the impact of previous training (in 2011) and service development needs.
Method: An annual training on ADHD to multidisciplinary staff by a paediatrician and a specialist teacher (2012). Questionnaires were administered and analysed.
Results: 56 of the total 77 participants were from Education (72.7 %). They varied from teachers, special educational needs coordinators (SENCO), learning support assistants and head teacher. 76.7 % of participants from education cited their knowledge and skills in managing children with ADHD is 'Good'. The service (assessment and management) provided for children up to the age of 11 with ADHD was reported as good. However, service gaps were identified in the following areas: · Parent Training Programme · Training Programme for Children to improve social skills · Training Programme for Siblings · Assessment and Management of Children over 11 years (Adolescent group) · Transition into Adulthood · Services for Adults · Effective Parent Support Group Additional comments received were: "Learnt new skills to develop my knowledge" "Better understanding of ADHD symptoms and management" "Gave me a much better understanding of ADHD and ways of dealing with students" "Extremely helpful, picked up so many tips that I found useful to help when working with families".
Conclusion: The study highlights that there is a need for regular multidisciplinary training which can increase knowledge and skills in the management of ADHD. There is a greater need for training for a child with ADHD, their siblings and parents. Commissioners and professionals need to understand that ADHD is a life span condition and therefore services need to be developed for adolescents and transition into adulthood.

P-36-011 The impact of methylphenidate and its enantiomers on the dopaminergic synthesis and metabolism in vitro

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Objective: Attention-deficit/hyperactivity disorder (ADHD) is one of the most frequent psychiatric disorders in children and adolescents. Racemate of d/l-threo-methylphenidate (MPH; Ritalin) is an effective

first-line treatment for the symptoms associated with ADHD. Although MPH has long been administered as a racemic mixture of the two enantiomers, converging lines of evidence drawn from investigations using in vitro systems indicate that it is predominantly, d-threo MPH which mediates the pharmacological/therapeutic actions of MPH. In the present study, we investigated the MPH influence on the tyrosine hydroxylase (TH), monoamine-oxidase B (MAO-B), catechol-O-methyltransferase (COMT) and aldehyde dehydrogenases (ALDH) enzyme activity in vitro, which are all involved in dopamine synthesis or metabolism.
Method: The isolated enzymes (TH, MAO-B, COMT and ALDH) from rat pheochromocytoma cells (PC-12) were used for investigations of dose dependent in vitro effects of racematic, d- and l-threo MPH (0,1,10,100 nM and 1,10,100 μM). TH and COMT activity were detected via high-performance liquid chromatography methodology, while MAO-B and ALDH activity were measured using fluorescent based enzyme-linked immunosorbent assay.
Results: We could observe dose dependent differences between racematic and isomers of MPH on almost all investigated enzymes activity.
Conclusion: This exploratory investigation revealed in vitro pharmacological evidence for a potential difference between MPH racemate and isomers on dopaminergic enzyme activity. This finding might point to the therapeutic effects in the treatment of ADHD.

P-36-012 Polyunsaturated fatty acids and the combination of iron, zink and vitamin-B5 on neuronal cell line growth

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Objective: A factor, such as life style, in particular dietary supplementation was indicated to have a great influence in mental disorders. Attention-deficit hyperactivity disorder (ADHD) has high prevalence as mental disorder in child and adolescent, in which both environmental factors as well as genetic factors play major roles. Polyunsaturated fatty acids (PUFAs) were postulated to be beneficial in the development of the infant brain, in which imbalance in the two major classes, omega-3 and omega-6, probably has a risk to develop ADHD. In recent clinical studies supplementation with PUFAs showed in some cases improvement of symptoms of ADHD. Similarly, treatment in neuronal cell culture could point to some beneficial effects via PUFAs.Therefore, in this study, the combination of PUFAs as EquazenTM and the minerals, iron and zinc as well as vitamin B5 (vitB5) are hypothesized to show an additive beneficial effect on growth of neuronal cell line, PC12 cells.
Method: This was tested using the impedance technique in real-time with the xCELLigence (Roche), which enables to monitor cellular events in real time without the incorporation of any labels. After testing separately each of the components in a dose response manner, the combination of the four components were tested.
Results: EquazenTM promoted significant cell growth at doses corresponding to 10-100pM starting at ca. 40 h and continued up to 90 h. The combination of all components did not show any additive effect as postulated.
Conclusion: We could confirm the beneficial effect on neuronal cells growth by this specific PUFAs combination treatment, which seems not to be additionally enhanced by the supplementation of minerals and vitB5. This finding support the recent meta-analysis showing beneficial symptoms improvements of ADHD patients treated with PUFAs.
Conflict of interest: The study was supported by Vifor SA.

Saturday, 8 June 2013, 15.00–16.00

P-37 Miscellaneous II

P-37-001 ADHD-like behaviours and epigenetic dysregulation in mice offspring sired by male mice exposed to ethanol in pre-mating periods

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Objective: We investigated the effects of chronic EtOH administration before mating to sire mice on the ADHD-like behavioral phenotypes of male offspring mice.
Method: Sire mice were treated with EtOH in a concentration range approximating human binge drinking (0–4 g/kg/d EtOH) for 7 weeks and rescued for a week. The EtOH-exposed sire mice mated with untreated female mice to produce offspring mice.
Results: EtOH administration to sire mice induced ADHD-like hyperactive, inattentive and impulsive behaviors in offspring mice. The expression of dopamine transporter (DAT), a key determinant of ADHD-like phenotypes in experimental animals and human, were significantly decreased by paternal EtOH exposure in cerebral cortex and striatum of offspring mice along with increased methylation of a CpG region of DAT gene promoter, which may induce the down-regulation of DAT gene expresion. The increase in methylation of DAT gene promoter was also observed in the sperm of sire mice, suggesting germ line changes in epigenetic methylation signature in DAT gene by paternal EtOH exposure. In addition, the expression of MeCP2 and DNMT1, key regulators of methylation-dependent functional gene expression, was profoundly decreased in the cortex and striatum of offspring mice sired by EtOH-exposed mice.
Conclusion: These results suggest that exposure to EtOH during pre-mating periods may alter epigenetic signature of male germ line cells, which will be transmitted to the differential expression of key factors regulating ADHD-like behavioral phenotypes in the brain of offspring.

P-37-004 Knowledge and misperceptions about Attention Deficit/Hyperactivity Disorder of schoolteachers in Mumbai

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Objective: The present study aimed to assess teachers' knowledge and misperceptions about ADHD in the Mumbai area. The researchers also wished to see if there was any correlation between the years of teaching experience and knowledge of the teachers. While several studies have been conducted globally, no study has been done in India. This current study aimed to focus on teachers across schools in Mumbai.
Method: A total of 106 teachers from 12 English-medium schools across Mumbai completed the Knowledge of Attention Deficit Disorders Scale (KADDS). Formal permission was obtained from the school principals, and research assistants traveled to these schools to hand over the questionnaires to the teachers, along with a sheet seeking demographic details. The completed questionnaires were then collected from the respective schools. A 3 by 3 Factorial ANOVA was used to analyse the data.
Results: Results were consistent with global studies that suggest that teachers lack adequate knowledge about Attention Deficit

Hyperactivity Disorder. Overall, only 47 % of the teacher responses were correct; a figure much lower than that seen in studies in the Western countries. Further, results indicated that teachers' scores on the three sub-scales of KADDS, i.e., general knowledge, symptoms/diagnosis and treatment, were not statistically significant. Teachers' years of experience was also not seen to be positively correlated with knowledge scores.
Conclusion: The researchers conclude that teachers in Mumbai lack adequate knowledge about ADHD and significant awareness needs to be created regarding ADHD, its symptom picture, diagnosis and treatment aspects. This finding has far reaching implications, as the current trend toward inclusive education in the Indian education system necessitates well trained and knowledgeable teachers, who have enough knowledge to deal effectively with ADHD children in their classrooms.

P-37-005 Attention-Deficit/Hyperactivity Disorder: Are all the costs, benefits and outcomes being captured in economic evaluations?

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Objective: Cost-effectiveness models of chronic conditions, such as attention-deficit/hyperactivity disorder (ADHD), should capture long-term health and non-health outcomes, from childhood into adolescence/adulthood. We reviewed published ADHD models with a special focus on long-term (>2 years) outcomes (LTOs).
Method: A literature search up to September 2012 was conducted in eight English- and eight German-language databases via the German Drug Information Agency's interface. Six prominent national health technology assessment (HTA) agencies' websites were searched separately. Search terms covered the concepts of ADHD, cost-effectiveness, pharmacoeconomics, and economic modelling. Key information relating to the models' structure was extracted from publications.
Results: Nineteen publications on economic models were identified. Outcomes included therapeutic response/remission, relapse, and discontinuation due to adverse effects or other causes. One model stratified ADHD severity into three levels. The only LTOs were sudden cardiac death (SCD) and all-cause mortality in two models assessing screening strategies to avoid SCD in stimulant-treated children. One publication described a theoretical framework for modelling multiple cost-driving ADHD LTOs, including those generating indirect and societal costs throughout the lifespan. In five studies, the time horizon was 10 + years (but only two extended from childhood/adolescence into adulthood), while for the remaining 14 studies it was 12–14 months. The German, Catalan, and a Swedish HTA agencies assessed treatment for ADHD and highlighted the need to conduct long-term economic evaluation in adults but provided no specific guidance.
Conclusion: There remains a need for a comprehensive cost-effectiveness model that captures long-term treatment benefits for children, adolescents and adults with ADHD. Current models miss the societal perspective and underestimate the long-term costs and benefits of ADHD treatment, leading to a lack of understanding of its real value.

P-37-006 Service users experience of a national adult ADHD service

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Objective: Adult ADHD is currently underdiagnosed and undertreated in many countries, with service provision varying widely across the world. In the UK, the National Institute for Health and Clinical Excellence (NICE) recommends that either generic mental health teams should be trained to treat adults with ADHD or specialist teams are formed, to develop expertise in this area. Research on Adult ADHD service provision and service users' experiences is limited. The purpose of this study was to evaluate adult ADHD service user satisfaction with the aim to better tailor services to needs.
Method: The National Adult ADHD Service at The Maudsley Hospital is a specialist service for the assessment of suspected adult ADHD and it receives referrals from primary care and secondary mental health teams. Data from 68 assessments was collected through service user surveys over a one year period.
Results: The majority of service users were satisfied with pre-assessment processes and with the assessment itself. The assessment report was described as helpful by 79 % service users. Most service users stated that reports were factually correct, understandable and did not have too much jargon. 73 % received a diagnosis of ADHD. 27 % received an additional diagnosis (including obsessive–compulsive disorder, anxiety, depression, or an additional neuro developmental disorder).
Conclusion: Results indicate a high level of satisfaction from National Adult ADHD Service users. The high rate of ADHD diagnosis may reflect the increased awareness of referrers regarding Adult ADHD but the low comorbidity rates in comparison with current clinical research could indicate that where ADHD is comorbid with another disorder, impairment may be attributed to the comorbid disorder leading to delayed referral for ADHD assessment. Our view is that education of clinicians to detect ADHD in a priority and further development of services to diagnose and manage adult ADHD is needed.

P-37-008 Survey of young people 11 years and above referred to an UK community paediatric child development centre with suspected ADHD-the need for clear ADHD pathways from primary care to specialist CAMHS and community paediatrics

S. Yarney*, V. Tyagi

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Objective: Examine the profiles of children aged 11 years and above referred to the child development centre (CDC)for suspected ADHD. Identify associated comorbidities and interventions at time of referral and determine whether a direct referral to Specialist CAMHS from primary care would have been a better option for cohort.
Method: Retrospective case note analysis of referrals to the CDC from February 2010 to February 2011 from primary care services.
Results: Children 11 years and above (58.1 %) referred to the CDC with suspected ADHD presented with mental health issues/significant

behaviour issues and were already receiving Specialist CAMHS and other psychological/behavioural input (48 %). Further mental health comorbidities were identified post assessment requiring referral to Specialist CAMHS Services (65 %).
Conclusion: ADHD Teams working within CAMHS and Community Paediatrics need to develop clear and robust pathways/a single point of access (SPA) to identify early vulnerable young people referred for suspected ADHD. This audit will inform commissioner led ongoing discussions for SPA implementation between CAMHS and the Community Paediatric services.

P-37-009 Roles of N-methyl-d-aspartate receptor and protein kinase B/glycogen synthase kinase-3ß signalling in the paradoxical calming effect of amphetamine in a mouse model of Attention-Deficit/Hyperactivity Disorder

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Objective: Selective breeding with outbred CD1 mice for low anxiety behaviors resulted in LAB mice which fulfill face validity (hyperactivity, cognitive deficits) and predictive validity (calming response to amphetamine) of attention-deficit hyperactivity disorder (ADHD). Although psychostimulants are the most commonly prescribed medications in ADHD patients, little is known about neural underpinnings of their paradoxical calming effects. Recent studies have demonstrated that amphetamine may have direct effects on monoaminergic transmission and N-methyl-d-aspartate (NMDA) receptors. Our previous pharmacological screening revealed that the commonality of calming substances in LAB mice is inhibition of AKT/GSK3β signaling. The present study aims to investigate the effects of GSK3β inhibitors on hyperactivity and to elucidate the underlying mechanism of paradoxical calming effect.
Method: In vivo microdialysis and pharmacological interventions were used to assess the roles of monoaminergic neurotrasmission and NMDA receptors in the paradoxical calming effect of amphetamine. Non-specific (lithium) and specific (TDZD-8) inhibitors of GSK3β were administered to examine the role of GSK3β in mediation of calming effect. Western blot analyses were performed to study the effects of amphetamine on regulation of AKT/GSK3β signaling.
Results: There was no correlation between the extracellular dopamine release and the paradoxical calming effect of amphetamine. Rather, the calming effect of amphetamine could be diminished by NMDA receptor antagonist. Both lithium and TDZD-8 significantly reduced hyperactivity in LAB mice. Analysis of the levels of phospho-GSK3β and phospho-AKT indicated that amphetamine increased the phosphorylation of GSK3β in the frontal cortex and caudate putamen, but only AKT in the caudate putamen.
Conclusion: These data support a role for GSK3β in the paradoxical calming effect of amphetamine. The effect is not reflected by dopamine release, but seem to modulate the NMDA signaling. Increasing knowledge of the underlying mechanism of paradoxical calming effect may help elucidate the etiology of ADHD and provide insight into the search for optimal treatments.

P-37-010 Identification of the prenatal maternal stressors associated with attention deficit-hyperactivity disorder in children

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Objective: Exposure to prenatal maternal stressors during pregnancy seems to be influential risk factors for the development of attention deficit-hyperactivity disorder (ADHD). The aim of the present study, therefore, was to identify the prenatal maternal stressors associated with ADHD in a group of children.
Method: In this ex post facto research 64 boys with ADHD and 61 typically developing boys were identified by the teachers in nursery and primary schools in Parand, Iran using the 18-Item Diagnostic Checklist of ADHD (Ghanizadeh and Jafary 2010). In order to identify the prenatal maternal stressors, a checklist was also developed by the researchers and administrated to the mothers of subjects. In this study, the prenatal factors were as predictive variables, ADHD as criterion variable and gender was considered as control variable.
Results: The results showed that prenatal maternal diseases, arguing with relatives, delivery worrisome and mother's financial problems of children with ADHD were significantly higher than the group without ADHD. The results also revealed that the weight average of children with ADHD was significantly lower than the normal group at birth time. No association was found between maternal smoking and ADHD during pregnancy.
Conclusion: However, our findings strengthen the previous ones in significant ways that some prenatal maternal stressors and low birth weight are associated with the symptoms of ADHD.