

NEURONUS 2012

IBRO & IRUN NEUROSCIENCE FORUM

APRIL 20-22, 2012, KRAKOW, POLAND

**Neuronus Student Society, Institute of Zoology
Jagiellonian University, Krakow**

Psychophysiology Laboratory of Jagiellonian University

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Dear Colleagues,

it is my great pleasure to welcome all of you to NEURONUS 2012 IBRO & IRUN Neuroscience Forum, the fifth edition of our conference and the second one organized at the international level. On behalf of the entire Organizing Committee, I would like to wish you a fruitful, inspiring participation and a very pleasant stay enriched by the remarkable beauty of Krakow.

The key purpose of our event is to provide young European students with a space that would allow them to share current neuroscientific knowledge and establish valuable contacts with experienced researchers. In order to amplify the multidisciplinary character of this initiative, we have decided to co-organize one event within the framework of the former Students' Neuroconference and Krakow Workshop on Psychophysiology. We believe that your presence at this conference will create a unique chance to meet recognized scientists of diverse approaches and will thus enable future cooperation as well as contribute to the forming of a better, multifaceted understanding of the nervous system - the physical basis of our identity.

As we are eagerly looking forward to welcome you in Krakow, this picturesque medieval city should be mentioned as a dynamically developing academic centre with an acknowledged tradition of neuroscientific research. Its vibrant nightlife, highly cultural atmosphere and excellently preserved historical sites form a perfect environment for young researchers to share their views and socialize.

Once again, we hope you will fully enjoy your participation!

Kind regards,

Marcin Kowrygo

President of the Student Neuroscience Society Neuronus

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CONFERENCE PROGRAM

FRIDAY 20/04/2012

Registration	
BIOLOGICAL SESSION <i>Main Aula B</i>	COGNITIVE SESSION <i>Conference Hall</i>
<p style="text-align: center;">15.00-17.00 Stem Cells and Regeneration</p> <p>Chair: Benedikt Berninger (IBRO Alumni) /Ludwig-Maximilians-Universität München, Germany/:</p> <p><i>Making neurons from glia and pericytes: the wizardry of transcription factors.</i></p> <ol style="list-style-type: none"> 1. Ewa Rojczyk-Gołębiewska : Canonical and new sites of neurogenesis in adult organisms 2. Piotr Łażewski-Banaszak: Neurotrophins and their receptors influence the regeneration of a nervous tissue after multiorgan injury caused by gamma irradiation 3. Martyna Śniegocka: Assessment of the angiogenesis in malignant solid tumors of the brain 4. Ryszard Sordyl: The role of IL-1β in the expression of the VEGF after subarachnoid hemorrhage in rats 5. Joanna Sordyl: Acute transverse myelitis in children – clinical presentation and the prognostic factors 	<p style="text-align: center;">15.00-17.00 Hemispheric Asymmetry of Language and Vision</p> <p>Chair: Kenneth Hugdahl /University of Bergen, Norway/</p> <ol style="list-style-type: none"> 1. Marcin Szwed: Lateralisation and specialisation of brain areas for reading. Evidence from fMRI and intracranial recordings in humans 2. Patrycja Naumczyk: Right Ear Advantage and the Level of Hemispheric Asymmetry for Language Processing – Evidence from Functional Magnetic Resonance Imaging 3. Kamila Śmigasiewicz: Is the interaction between hemispheres asymmetric during bilateral RSVP? Evidence from behavior and N2pc and P3 components of ERPs 4. Piotr Styrkowiec: Visuo-motor coding in stimulus-response compatibility: A dynamic factor in interhemispheric interaction. 5. Rob van der Lubbe: Lateralized EEG power spectra in an endogenous cuing paradigm with to be discriminated visual targets
<p>17.00 -17.30 Coffee break <i>Main Hall</i></p>	

17.45 – 18.30 Opening Ceremony
Main Aula B

18.15 – 19.15 PLENARY LECTURE
Main Aula B

Kenneth Hugdahl, /University of Bergen, Norway/
Auditory laterality: From basic science to clinical applications.

19.15 Welcome Reception
Main Hall

SATURDAY 21/04/2012

Registration
Main Hall

BIOLOGICAL SESSION
Main Aula A

COGNITIVE SESSION
Exhibition Hall

9.00 – 10.30 Neurophysiology

9.00 – 10.30 Cognitive Neuroscience

Chair: Gilles van Luijtelea
/Radboud University Nijmegen, the Netherlands/:
Dynamics of network interactions in a cortico-thalamo-cortical seizure model.

Chair: Aneta Brzezicka
/Warsaw School of Social Science and Humanities, Poland/

1. **Martin F.J. Perescis**: Convulsive seizures in rats chronically treated with a cannabinoid antagonist.

1. **Mateusz Gola**: EEG beta-band power as an indicator of top-down attention.

2. **Jeffrey Martin**: Extracranial EEG recordings of terminal depolarisation: The Wave of Death.

2. **Jan Kamiński**: Reaction time increase (delta RT) in Sternberg task correlate with individual gamma cycle length: Further evidence for Lisman and Idiart's STM model.

3. **Marianna Boros**: The role of the pontine reticular formation in conscious states.

3. **Adam Chuderski**: A computational model of fronto-parietal oscillatory mechanisms underlying individual differences in working memory capacity.

Methods I:
Katarzyna Blinowska: Information transfer in brain estimated by means of Directed Transfer Function.

10.30 Coffee break <i>Main Hall</i>	
BIOLOGICAL SESSION <i>Main Aula A</i>	COGNITIVE SESSION <i>Exhibition Hall</i>
11.00 – 12.30 Neurogenetics Chair: Oliver Griesbeck /Max Planck Institut für Neurobiologie, Martinsried, Germany/: <i>Proteins, Biosensors, Brains.</i> 1. Marcin Szczot: Mutation in hydrophobic residue of GABAA receptor binding site strongly influences channel gating. 2. Piotr Chmielarz: Gender specific behavioral and molecular changes in mice harboring glucocorticoid receptor deletion in noradrenergic system. 3. Andrea Evinova: Major depressive disorder: polymorphism of genes linked with dopamine metabolism in human patients.	11.00 - 12.30 Emotional Functioning from Clinical and Experimental Perspective Chair: Sven Muller /Ghent University, Belgium/: <i>The consequences of being anxious early in life: Adolescent anxiety and its impact on the brain and cognition.</i> 1. Annekathrin Schacht: Electrophysiological correlates of emotional stimulus processing. 2. Mirosław Wyczesany: Emotional responsiveness related to visual processing as revealed by EEG component clustering. 3. Szczepan Grzybowski: The influence of context on the processing of emotional and neutral adjectives - an ERP study.
12.30 PLENARY LECTURE <i>Main Aula A</i> Sergey Kasparov /University of Bristol, UK/ <i>How can we understand interplay between three components of the brain: neurons, glia and blood vessels?</i>	
13.30 Lunch <i>Main Hall</i>	
14.30 POSTER SESSION I <i>Main Hall</i>	14.30 MEDICAL CASE REPORTS <i>Hall, 1st floor</i>

<p style="text-align: center;">BIOLOGICAL SESSION <i>Main Aula A</i></p>	<p style="text-align: center;">COGNITIVE SESSION <i>Exhibition Hall</i></p>
<p style="text-align: center;">15.30 – 17.00 Neuropsychiatry</p> <p>Chair: Istvan Katona (IBRO Alumni) /Institute of Experimental Medicine, Hungarian Academy of Sciences, Budapest/:</p> <p><i>The synaptic circuit-breaker and its breakdown in brain disorders.</i></p> <p>1. Klaudia Szklarczyk: Susceptibility to stress and transcriptional changes in brain regions critical for fear memory – what can we learn from the mouse model of PTSD?</p> <p>2. Maria Lojowska: Functional and volumetric changes within the fronto-striatal reward system in adolescents and adults with attention-deficit/hyperactivity disorder.</p> <p>3. Anastasia Medvid: Compliance in the Treatment of Children with ADHD.</p>	<p style="text-align: center;">15.30 – 17.00 Neural Correlates of Language Processing</p> <p>Chair: Marcin Szwed /Psychophysiology Lab, Institute of Psychology, Jagiellonian University, Poland/:</p> <p><i>The metamodal brain. fMRI evidence for a reading center in the visual cortex without visual experience.</i></p> <p>1. Anna Tyborowska: Spatial cue use in bilinguals and monolinguals: An fMRI study.</p> <p>2. Jakub Szewczyk: Semantic integration and lexical access - two sides of the same coin?</p> <p>Methods II: Agnieszka Burzyńska Lower white matter integrity is related to higher BOLD signal in healthy adult brain: A whole-brain multivariate integration of fMRI and DTI.</p>
<p style="text-align: center;">17.00 – 17.30 Coffee break <i>Main Hall</i></p>	
<p style="text-align: center;">17.30 – 18.30 PLENARY LECTURE <i>Main Aula A</i></p> <p style="text-align: center;">Margaret Niznikiewicz /Harvard Medical School, USA/ Communication and communication dysfunction in schizophrenia.</p>	
<p style="text-align: center;">18.30 OPPORTUNITIES <i>Main Aula A</i></p>	
<p style="text-align: center;">20.30 SOCIAL EVENT</p>	

SUNDAY 22/04/2012

BIOLOGICAL SESSION <i>Main Aula A</i>	COGNITIVE SESSION <i>Exhibition Hall</i>
9.30 - 11.00 Neurodegeneration	9.30 - 11.00 Sleep and Pain - Experimental Approach
<p>Chair: Elena Dragicevic /Universität Ulm, Germany/:</p> <p><i>L-type calcium channels control age-dependent desensitization and plasticity of D2-AR function in dopamine midbrain neurons.</i></p> <p>1. Anna Czarnecka: Role of the nitric oxide in the modulation of L-DOPA activity in the 6-OHDA model of Parkinson's disease.</p> <p>2. Joanna Stepek: Interactions of amyloid β with RAGE (Receptor for Advanced Glycation Endproducts) – a significant phase in AD etiology that could be blocked.</p> <p>3. Karolina Krakowska: Bradykinesia and chorea in Huntington's disease - which symptom affects daily life more?</p>	<p>Chair: Rolf Verleger /Universität zu Lübeck, Germany/:</p> <p><i>Sleep inspires insight.</i></p> <p>1. Katerina Georgopoulou: Cortical excitability in insomnia patients.</p> <p>2. Clementina van Rijn: We feel what we expect: Brain Evoked Potentials measured in a cued pain paradigm.</p> <p>3. Emanuel van den Broeke: Comparing neural correlates of heterotopic facilitation induced after high frequency electrical stimulation of human skin between patients with and without persistent pain 6-7 years after inguinal hernia repair.</p>
11.00 - 11.30 Coffee break <i>Main Hall</i>	
BIOLOGICAL SESSION <i>Main Aula A</i>	COGNITIVE SESSION <i>Exhibition Hall</i>
11.30 - 13.00 Neuroplasticity	11.30 - 13.00 Visual and Auditory Processing
<p>Chair: Jacek Jaworski /International Institute of Molecular and Cell Biology, Warsaw, Poland/:</p> <p><i>Role of mTOR in neuronal development and plasticity.</i></p> <p>1. Paulina Kazmierska: Development of glutamatergically induced oscillatory activity in hippocampal formation - miroEEG approach.</p>	<p>Chair: Sumie Leung /Universitat de Barcelona, Spain/:</p> <p><i>The hierarchical organization of auditory change detection in the human brain.</i></p> <p>1. Christian Kaergel: Mismatch Negativity latency and negative symptoms in schizophrenia.</p>

<p>2. Efrén Álvarez: The excitation-inhibition balance as a gate for information propagation in the hippocampus.</p> <p>3. Sailaja A. Goda: Psychedelic hallucinogens dose-dependently increase the power of high frequency oscillations (130-180 Hz) in the nucleus accumbens of freely moving rats.</p>	<p>2. Małgorzata Wrzosek & Justyna Maculewicz: Differences between perceptual noticeable and unnoticeable changes in the human voice pitch reflected by mismatch negativity. The attempt to support dual pathway model in auditory cortex – <i>WITHDRAWN</i></p> <p>3. Michał Bola: Neurophysiology of visual processing in subjects with optic nerve damage – a VEP study.</p>
<p>13.00 - 14.00 Lunch <i>Main Hall</i></p>	
<p>14.00 – 15.00 POSTER SESSION II <i>Main Hall</i></p>	
<p>15.00 – 16.00 PLENARY LECTURE <i>Main Aula A</i></p> <p>Tibor Harkany /University of Aberdeen, UK/ <i>Molecular dissection of cannabis sensitivity in developing neuronal networks.</i></p>	
<p>16.00 AWARDS FOR BEST TALKS AND POSTERS <i>Main Aula A</i></p>	
<p>CLOSING REMARKS</p>	

ABSTRACTS:

PLENARY LECTURES:

"Auditory laterality: From basic science to clinical applications."

K. Hugdahl

University of Bergen, Norway

A frequently used method for investigation of auditory laterality is dichotic listening to repeated presentations of pairs of CV-syllables. We have shown that the typical right ear advantage (REA) effect is a very robust indicator of a left hemisphere speech perception effect, replicated in numerous laboratories and clinics all over the world. The REA is accompanied by increased neuronal activation in the left peri-Sylvian region, shown by both fMRI and PET techniques. In this respect the REA represents a bottom-up, perceptual effect, driven by the neuronal wiring of the auditory pathways. Speech perception is however, also dependent on allocation of cognitive resources, like focusing of attention to the acoustic source, as in the well-known cocktail-party phenomenon. We have simulated this situation in the laboratory by instructing the subjects and patients to selective focus attention on only the right or left ear stimulus of the dichotic pair, thus adding a top-down cognitive modulator of a bottom-up driven perceptual effect. With the "forced-attention" dichotic paradigm we have probed the interaction between perceptual laterality and cognitive processes in a range of clinical groups, revealing commonalities in cognitive impairment across diagnostic categories.

"Communication and communication dysfunction in schizophrenia."

M. Niznikiewicz

Harvard Medical School and Boston VA Healthcare System, USA

Effective social communication includes not only linguistic communication with speech consisting both of semantic messages and prosodic devices denoting a speaker's attitudes and intentions but also facial expressions and body language. Furthermore, emotions, an important component of all social interactions, can be communicated by speech, body language and facial expressions and can influence the very way a message is processed. Both electrophysiological and fMRI evidence will be presented on what kind of neurophysiological processes underlie these cognitive operations and how these processes are similar and different in schizophrenia, a disease which is characterized not only by profound cognitive impairments but also by abnormalities in social cognition.

CHAIR LECTURES:

"The consequences of being anxious early in life: Adolescent anxiety and its impact on the brain and cognition."

S. Müller

Department of Experimental Clinical and Health Psychology, Ghent University, Belgium

Anxiety disorders during childhood and adolescence are becoming a major cause of concern as 1 year prevalence rates of anxiety disorders in 9-17 year olds are estimated to range around 13%. Importantly, mounting research suggests that individuals with experience of childhood anxiety are at significantly higher risk for developing anxiety or depression in adulthood thus worsening long-term prospects for mental health and therapeutic success. In this talk, I will use a multi-

faceted approach to show the impact of anxiety during adolescence on behaviour and brain circuitry. First, behavioural evidence will be presented that shows the impact of anxiety on cognitive processes such as cognitive control or spatial navigation using eye tracking or virtual reality methods. These data will be followed by structural genetic imaging evidence, which suggests involvement of the BDNF gene in pediatric anxiety relative to unaffected youths. Finally, an fMRI study will be presented, which compares conditioning responses in adolescents relative to adults as a model of anxiety during healthy development. The data are discussed in the context of developmental models of anxiety and their relevance to understanding the development and etiology of mood and anxiety disorders in adulthood.

"The hierarchical organization of auditory change detection in the human brain."

S. Leung^{a,b}

^a Institute for Brain, Cognition and Behavior (IR3C), University of Barcelona, Spain

^b Cognitive Neuroscience Research Group, Department of Psychiatry and Clinical Psychobiology, University of Barcelona, Spain

The brain's ability to detect changes in the acoustic environment is critical for survival, as it may prevent potentially relevant events to go unnoticed. In humans, novelty detection based on acoustic regularity modelling has been associated with a brain response derived from the human EEG, the mismatch negativity (MMN) evoked potential, peaking at about 100-200 ms from auditory-novelty onset, supporting the cortical nature of both the processes of regularity extraction and deviance detection. Yet, recent single-unit recordings in rats and cats have shown novelty detection responses that occur much earlier (circa 20-30 ms) and hierarchically lower (medial geniculate body, inferior colliculus). Recently, this has been examined in several studies in our laboratory. We show that auditory novelty detection occurs in latencies and networks comparable to those observed in animals, as demonstrated by the Frequency Following Response (FFR) and the Middle Latency Response (MLR), and by using Magnetoencephalography (MEG). Taken together, our findings support the view that novelty detection is a basic principle of the functional organization of the auditory system, expanding from lower levels along the auditory pathway in the brainstem up to higher-order areas of the cerebral cortex.

"Sleep inspires insight."

R. Verleger, J. Yordanova, V. Kolev, U. Wagner, J. Born

Clinic for Neurology, University of Lübeck, Germany

Insight denotes mental restructuring that leads to some sudden gain of explicit knowledge allowing qualitatively changed behavior. Sleep consolidates recent memories and, concomitantly, could allow insight by changing their representational structure. Here, we will report studies on this topic by using the Number Reduction Task (NRT). This task allows studying how implicit knowledge of hidden task regularities is acquired and is converted to explicit insight into these regularities. In order to identify sleep-associated neurophysiological indicators of this restructuring of knowledge representations, we measured frequency-specific power of EEG while participants slept during the night between two sessions of the NRT. Alpha (8-12 Hz) EEG power during slow-wave sleep (SWS) emerged as a specific marker of the transformation of pre-sleep implicit knowledge to post-sleep explicit knowledge. Beta power during SWS was increased whenever explicit knowledge was attained after sleep, irrespective of pre-sleep knowledge. No such EEG predictors of insight were found during S2 and REM sleep. These results support the view that it is neuronal memory reprocessing during sleep, in particular during SWS, that lays the foundations for restructuring those task-related representations in the brain that are necessary for promoting the gain of explicit knowledge.

"The metamodal brain. fMRI evidence for a reading center in the visual cortex without visual experience."

M. Szwed^{b,c,d,e}, **L. Reich**^a, **L. Cohen**^{b,c,f}, **A. Amedi**^{a,g}

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^b Université Pierre et Marie Curie-Paris 6, Faculté de Médecine Pitié-Salpêtrière, IFR 70, Paris, France

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^f AP-HP, Groupe Hospitalier Pitié-Salpêtrière, Department of Neurology, Paris, France

^g The Edmond and Lily Safra Center for Brain Sciences (ELSC), The Hebrew University of Jerusalem, Jerusalem 91220, Israel

The Visual Word Form Area (VWFA) is a ventral-temporal-visual area that develops expertise for visual reading. It is activated across writing-systems and scripts, and encodes letters irrespective of case, font, or location in the visual-field, with striking anatomical reproducibility across individuals. In the blind, reading can be achieved using Braille, with a comparable level-of-expertise to that of sighted readers. This study investigated which area plays the role of the VWFA in the blind. One would expect this area to be at either parietal or bilateral occipital cortex, reflecting the tactile nature of the task and crossmodal plasticity, respectively. However, according to the metamodal theory, which suggests that brain areas are responsive to a specific representation or computation regardless of their input-sensory-modality, we predicted recruitment of the left-hemispheric VWFA, identically to the sighted. Using functional Magnetic Resonance Imaging (fMRI) we showed that activation during Braille reading in blind individuals peaked in the VWFA, with striking anatomical consistency within and between blind and sighted. Furthermore, the VWFA was reading-selective when contrasted to high-level language and low-level sensory controls. Thus, we propose that the VWFA is a metamodal reading area that develops specialization for reading regardless of visual experience. Based on: Reich, Szwed, Cohen, Amedi, *Current Biology* (2011) 21(5): 363-8.

"Information transfer in brain estimated by means of Directed Transfer Function."

K. J. Blinowska

Department of Biomedical Physics, University of Warsaw, Poland

In the last years imaging methods (fMRI, PET) contributed a lot to the problem of localization of the active sites in brain, however information processing is a short-time phenomenon and hence it is out of reach of these methods. The information about interaction of the neural assemblies is contained in EEG, but in order to extract this information the appropriate methods have to be applied. Directed Transfer Function (DTF) is a method which estimates the causal coupling between time series. It is defined in the framework of multivariate autoregressive model. All interacting channels are fitted in one model, which is crucial for correct estimation of the transmission between channels. It was demonstrated that the methods which calculate the functional connectivity pair-wise give misleading results. DTF is a method which accounts for the multivariate structure of connections. It determines the propagation between channels as a function of frequency. Its time varying version Short-time Directed Transfer Function (SDTF) estimates the propagation in time and frequency. It has been demonstrated in many applications e.g.: determination of epileptic focus, EEG propagation patterns in different sleep stages, motor experiments including movement imagery that DTF gives results compatible with the information obtained from other modalities(e.g.; imaging, intracranial recordings) and at the same time supplies the new information about the dynamics of the processes. Especially interesting are the results obtained by means of DTF in cognitive tests. In continuous attention test the role of active inhibition was elucidated. During working memory tasks the hypotheses about the the existence of a modular, well defined structure of brain networks was confirmed. It was found that the exchange of information inside the modules take place almost constantly, whereas communication between the modules takes place in certain time moments only.

"Lower white matter integrity is related to higher BOLD signal in healthy adult brain: A whole-brain multivariate integration of fMRI and DTI"

**A. Z. Burzynska^a, D.D. Garrett^a, I.E. Nagel^b, C. Preuschhof^b, S.-C. Li^a, L. Bäckmana^c, U. Lindenberger^a,
H.R. Heekeren^{a,b,d}**

^a Max Planck Institute for Human Development, Berlin, Germany

^b Department of Education and Psychology, Freie Universität Berlin, Germany

^c Aging Research Center, Karolinska Institute, Stockholm, Sweden

^d Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany

Understanding the links between white matter microstructure and neuronal activity is crucial for understanding the various structure-function-cognition relationships in the healthy human brain. Here we combined fMRI with diffusion tensor imaging (DTI) to study the whole-brain multivariate correlations between blood-level-oxygenation-dependent (BOLD) signal during working memory and fractional anisotropy (FA) in major white matter tracts. We predicted that higher FA should be related to lower BOLD signal, as higher white matter integrity may allow more robust and timely information transfer, and thus more efficient cortical processing. We obtained n-back fMRI data and DTI from 27 younger (20-31 years) and 28 healthy older adults (60–70 years). Using multivariate behavioral partial least-squares (PLS), we linked BOLD signal at 1-, 2- and 3-back with FA from 22 tracts and global FA. Our model yielded one significant latent variable (permuted $p < .001$), in which lower FA in most tracts (especially corpus callosum) correlated with greater BOLD signal in many regions, such as posterior cingulate, middle frontal gyri, visual areas, and medial temporal lobe. Importantly, despite relations between FA and age in our sample, there were various age-independent FA-BOLD effects, and only 52% voxel-wise similarity when comparing separate FA and age models. Our results suggest higher white matter integrity may yield a more efficient functional neural substrate in both younger and older adults.

BIOLOGICAL SESSION: Stem Cells and Regeneration

Friday 20/04/2012

15.00 - 17.00

Chair: Benedikt Berninger

1. "Canonical and new sites of neurogenesis in adult organisms."

E. Rojczyk-Gołębiowska, A. Pałasz, R. Wiaderkiewicz

Medical University of Silesia, Faculty of Medicine in Katowice, Department of Histology

Discoveries from the second half of the XXth century overturned a dogma about stable structure of the brain showing that the process of new neurons formation occurs in specific brain regions throughout life in all mammalian species.

Precise determination of these regions was possible thanks to development of new methods of neurons identification and imaging based on flow cytometry and confocal microscopy.

It has been shown that in adults new neural cells are derived from stem cells localized in two brain regions: subgranular zone (SGZ) of the hippocampal dentate gyrus and subventricular zone (SVZ) of the lateral ventricles. Activated stem cells give rise to progenitor cells, which migrate from SGZ to granular zone of dentate gyrus and from SVZ through rostral migratory stream (RMS) to olfactory bulb.

However, latest data indicate that constitutive adult neurogenesis may occur in several additional regions other than SGZ and SVZ, for example in the hypothalamus, amygdala, neocortex and substantia nigra.

Our project focuses on hypothalamic neurogenesis in adult rats. It is known that some elements distinctive of the SVZ neurogenic niche are also present in the hypothalamus. On the other hand, in this region (in comparison to canonical neurogenic sites) smaller proportion of new cells form mature neurons. Interestingly, hypothalamic plasticity seems to play role in energy balance regulation which suggests physiological relevance of newly formed neurons.

2. "Neurotrophins and their receptors influence the regeneration of a nervous tissue after multiorgan injury caused by gamma irradiation."

P. Lazewski-Banaszak, M. Rudnicki, M. Polakowska, A. Sobieniecki

Students Scientific Circle, Department of General Pathology, Pomeranian Medical University

BACKGROUND:

The neurotrophins (NTs) are a group of low molecular weight proteins, which belong to a family of growth factors. They are synthesized in a nervous tissue and tissues, which depend on neural activity. They regulate growth, differentiation and activity of neurons acting by receptors like p75, TrkA, TrkB, TrkC and others. Their expression is induced by different physiological and pathological factors as a part of regenerative response on a tissue as well as systemic level.

OBJECTIVE:

We aimed to evaluate a pathophysiological regenerative response of an organism by evaluating the expression of neurotrophins and their receptors in kinetics of time after radiation injury in selected mouse tissues.

METHODS:

Six to eight-week old BALB/c mice were subjected to gamma irradiation (1000cGy). In different time-points organs like: brain, heart, peripheral blood and bone marrow were collected and mononuclear cells were separated from blood and bone marrow cells by density gradient centrifugation. RNA isolated from the samples was reverse-transcribed (RT-PCR) and qRT-PCR was used to measure gene expression of NTs (NT3, BDNF, NGF, GDNF), their receptors (p75, TrkA, TrkB, TrkC), proliferation (PCNA) and stem cell marker (Sca1), as well as proteins related to apoptosis (Bax, Bcl2, Cas3). The results were correlated with identical non-irradiated controls.

RESULTS:

Since the first hours of the radiation injury we observed substantially higher production of NTs and their receptors, on mRNA level, in brain and heart tissue. Moreover, the elevated expression of NTs was accompanied by an increase in Sca-1 and PCNA transcript amount.

CONCLUSIONS:

Simultaneous, elevated expression of NTs and their receptors, along with an increase in PCNA and Sca-1 transcript level may reflect the presence of proliferating tissue-specific stem/progenitor cells within brain tissue. Together, these findings indicate that the process of endogenous CNS regeneration is realized by early residual cells (neural, glial, endothelial). The understanding of complex interaction between residual/circulating stem cells and NTs/neurotrophin receptors may contribute to developing new strategies of stem cell-based therapy for patients.

3. "Assessment of the angiogenesis in malignant solid tumors of the brain."

M. Śniegocka^a, A. Nowacka^a, M. Śniegocka^b

^a Department of Neurosurgery and Neurotraumatology Ludwik Rydgier Collegium Medicum in Bydgoszcz.

^b Department of Biochemistry, Biophysics and Biotechnology; Jagiellonian University.

Angiogenesis is a multifactorial and multistep process that leads to creation of new blood vessels from the ones, which already exist. It plays an essential role in tumor development by determining its growth and metastasis. The latest researches on the central nervous system show that the amount of micro-vessels in the tumor mass correlates positively with the degree of malignancy. Despite the growing interest in tumor angiogenesis, there is still respectively little information about this process in brain tumors. The subject of our research is the study of angiogenesis in malignant solid tumors of the brain in two ways: the first one is by assessing the correlation between the concentrations of vascular endothelial growth factor (VEGF-A) in the plasma and its vascularization, and the second one is by assessing the correlation between the concentrations of next VEGF-A and receptor-2 of vascular endothelial growth factor (VEGFR-2,Flk-1) in the tumor tissue and its vascularization. These correlations were analyzed on the base of preoperative head DCE MRI and study of micro-vessels density (MVD) in tumor tissue collected during surgery. The experimental group included 50 adult patients of both sexes treated (because of malignant solid tumor of the brain) in the Department of Neurosurgery and Neurotraumatology Ludwik Rydgier Collegium Medicum in Bydgoszcz. The control group included 50 adult volunteers of both sexes, with no diagnosis of cancer. Results showed that the correlation of preoperative plasma concentrations of VEGF-A and DCE MRI visualization of microcirculation near the tumor mass, allows to access what kind of a tumor are we dealing with and this leads to more accurate selection of the treatment.

4. "The role of IL-1b in the expression of the VEGF after subarachnoid hemorrhage in rats."

R. Sordyl, J. Sordyl, H. Jędrzejowska-Szypułka

Department of Physiology, Medical University of Silesia, Katowice

Introduction: According to recent reports Vascular Endothelial Growth Factor (VEGF) not only plays an important role in angiogenesis, but also has some neuroprotective properties. IL-1 β is considered to influence the expression of the VEGF in the central nervous system.

Aim: To estimate the role of IL-1 β in the VEGF expression after subarachnoid hemorrhage (SAH) in rats.

Methods: 91 Wistar rats were used. In experimental group, SAH was produced by the cisterna magna (CM) cannulation and injection of 150 μ l of non-heparinized arterial blood. Two control groups were established: aSAH - cannulation of CM and the injection of saline solution, nSAH - cannulation only. VEGF expression in glia and endothelium was evaluated under the confocal microscope. Brain stems were collected 90 min. or 24h after SAH. To examine the role of IL-1 β , intraventricular administration of anti-IL-1 β antibodies was performed before SAH in some animals.

Results: The highest VEGF expression in glia was observed in SAH groups (both 90 min. and 24 h after procedure). The VEGF expression increased first in glial cells (the highest value after 90 min), and then in endothelium (the highest value after 24 h). Administrated anti-IL-1 β antibodies had no influence on VEGF expression 90 minutes after SAH, but it decreased it after 24 h.

Conclusions: SAH stimulates VEGF expression in glia earlier than in endothelium. IL-1 β influences VEGF expression only 24 h after SAH, both in glial and endothelial cells.

5. "Acute transverse myelitis in children – clinical presentation and the prognostic factors."

J. Sordyl, R. Sordyl, I. Kopyta, B. Wesolek-Kamińska,

Department of Neuropediatrics, School of Medicine in Katowice, Medical University of Silesia

Introduction: Acute transverse myelitis (ATM) is a neurologic syndrome caused by focal inflammation of the spinal cord, that results in motor, sensory and vegetative disturbances.

Aims: To characterize the clinical course and establish the prognostic predictors of ATM in children.

Materials and methods: 9 children with the diagnosis of ATM (mean age 12.2 yrs), hospitalized in the acute phase of the disease in the Neuropediatric Department. The follow up examination lasted from 3 mo. to 10 yrs. The diagnosis was established according to Transverse Myelitis Consortium Working Group criteria.

Results: Children, who presented the signs of spinal cord damage in the follow up examination, were younger than asymptomatic patients (mean age: 11.17 \pm 5.56 vs 14.33 \pm 3.79 yrs, p=0.29). The spinal cord lesion was smaller in the group of children with no symptoms in the follow up than in disabled patients (3.67 \pm 1.15 vs 8.33 \pm 4.32 injured segments, p=0.113). Most of the children with no residual symptoms presented good response to initial treatment with steroids (66.7%). The patients, who required steroids in combination with immunotherapy in the acute phase, more commonly presented residual symptoms in the follow up (83.3%)(p=0.035).

Conclusion: Possible negative predictors of ATM are the young age at the disease onset and higher extension of affected segments. Poor response to initial treatment should be considered as an important prognostic factor associated with higher risk of disability.

COGNITIVE SESSION: Hemispheric Asymmetry of Language and Vision

Friday 20/04/2012

15.00 - 17.00

Chair: Kenneth Hugdahl

1. "Lateralisation and specialisation of brain areas for reading. Evidence from fMRI and intracranial recordings in humans."

M. Szwed^{a,b,c,d,e}, C. Hamame^{a,f}, E. Qiao^{b,c,d}, A. Jobert^d, P. Kahane^g, O. Bertrand^g, L. Cohen^{b,c}, S. Dehaene^{d,h}, J. Lachaux^f

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^h College de France, Paris, France

The visual word form area (VWFA) is a region of the left ventral occipito-temporal cortex (vOT) that develops with acquisition of reading skills. It is debated whether this area is specialized for word recognition, or whether it is rather a general-purpose area that associates visual form (be it words or objects) with meaning. Non-invasive neuroimaging techniques have insufficient spatial resolution to resolve this issue, and typically show strong VWFA responses to stimuli other than words, such as objects (Szwed et al., Neuroimage, 2011). Here we overcame this limitation by recording intracerebral-EEG signal from an epileptic patient undergoing surgical treatment which required implantation of one electrode in the VWFA. We recorded broadband gamma activity as an index of population-level spiking-rate, and found a small neural population inside the VWFA, which responded almost exclusively to written text. The responses to alphabetic stimuli were over tenfold stronger than the strongest responses to other classes of stimuli (objects, faces and landscapes). With the exception of the fusiform face area, the observed level of specificity has never been described before in the human visual system. Our results thus constitute novel evidence in favor of the existence of strongly specialized human brain regions. Given the fact reading was invented only ~5400 years ago and there was no sufficient time or evolutionary pressure to evolve a brain system devoted to reading, these results also demonstrate that such strong specialization can be achieved through cultural learning.

2. "Right Ear Advantage And The Level Of Hemispheric Asymmetry For Language Processing – Evidence From Functional Magnetic Resonance Imaging."

P. Naumczyk^{a,b}, M. Kurkowski^b, T. Wolak^b

^a University of Gdańsk, Poland

^b Institute of Physiology and Pathology of Hearing, Poland

The report concerns the issue of relationship between the level of hemispheric asymmetry for language processing and the Right Ear Advantage (REA) depending on attention involvement in dichotic listening task (directed attention or free-recall). Ten right-handed youth male (aged 11-16 years) took part in the research. All were given written consent by the parents. The level of hemispheric asymmetry was assessed by functional magnetic resonance imaging (fMRI) using LI-toolbox (Wilke & Lidzba, 2007). REA was measured using dichotic listening task in three sessions: free-recall paradigm (DLT-FR), directed attention to the right ear (DLT-DAR) and directed attention to the left ear (DLT-DAL). All subjects showed leftward brain asymmetry for language processing (assessed by fMRI). The level of this asymmetry and REA (assessed by dichotic listening task) related varying on attention involvement. Higher level of brain asymmetry was associated with lower REA scores but only in directed attention paradigm. The results are being discussed in regards to other reports in the field.

3. "Is the interaction between hemispheres asymmetric during bilateral RSVP? Evidence from behavior and N2pc and P3 components of ERPs."

K. Smigasiewicz, J. Weinrich, B. Reinhardt, & R. Verleger

University of Lübeck, Germany

In dual-stream Rapid Serial Visual Presentation (dual-RSVP), the second target (T2) is worse identified in the right than in the left hemifield (LVF advantage). This asymmetry might reflect different abilities of the two independently functioning hemispheres, or result from asymmetric interaction, specifically from stronger inhibition exerted by the right hemisphere over the left. In order to differentiate between those two possibilities, we facilitated T2 identification by replacing the usual letter distractors by a set of easy symbols in one of the two streams. If the LVF advantage reflects different abilities of the two hemispheres, then right-side T2 should be better identified only when presented in the easy-symbol stream. If the LVF advantage reflects mutual inhibition between hemispheres, then right-side T2 should additionally be better identified when the easy symbols are presented in the opposite, left stream. Indeed, in two experiments T2 improved when presented both in the same and in the opposite stream to symbols. However, this improvement, reflecting hemispheric interaction, was symmetric for left and right T2. Furthermore, the LVF advantage was reflected in N2pc latency and in P3 amplitude evoked by T2, but only P3 amplitude was increased by symbols independently of their side. Overall the results suggest that there is interaction between hemispheres during the dual-RSVP task in form of mutual inhibition. However, the LVF advantage seems to be better explained by different abilities of each hemisphere.

4. "Visuo-motor coding interaction in stimulus-response compatibility: a dynamic factor in interhemispheric interaction."

P. Styrkowiec^a, R. Szczepanowski^b

^a University of Wrocław, Wrocław, Poland

^b Warsaw School of Social Sciences and Humanities, Faculty in Wrocław, Poland

Research explored phenomenon known as the stimulus-response compatibility (SRC). From a neurophysiological perspective, SRC refers to the problem of interhemispheric transfer time and a Poffenberger effect. Reaction times for the contralateral hand are longer than the ipsilateral hand in response to the visual stimulus due to differences in the interhemispheric signal transfer (its presence vs. absence). These crossed and uncrossed stimulus-response differences in the brain are believed to be affected by cognitive factors. SRC is represented also by Simon effect (SE) and motion-based Simon effect (MBSE). SE occurs when responses in a left-right choice task are faster to those targets that happen to occur on the response side even though the localization is task irrelevant. MBSE effects show that moving stimuli evoke faster responses when hand movements correspond to the direction of the stimulus motion: it is held even if the movement is task irrelevant.

The hypothesis was that there is an interaction between location and motion codes for the SCR when both SE and MBSE effects happen under a single visuo-motor task condition. We tested how these codes influence each other and how such interaction affects interhemispheric transfer. The participants were presented for 200ms with a stationary moving stimulus (the red or green sine-wave grating) either on the left or right side of the screen. In each trial, the vertical strips of the grating were moving leftwards or rightwards no matter the location of the stimuli. Responses were given by leftward or rightward stylus movement either by the left or right hand depending on the colour-response mapping. Results suggest plausible interaction between different characteristics of the stimuli and motor action. The results are discussed in terms of dynamic factors that influence interhemispheric transfer.

BIOLOGICAL SESSION: Neurophysiology

Saturday 21/04/2012

9.00 – 10.30

Chair: Gilles van Luijtelaar

1. "Convulsive seizures in rats chronically treated with a cannabinoid antagonist."

M. F.J. Perescis^{a,b}, A. Lüttjohann^a, L. Vinogradova^c, G. van Luijtelaar^a, C. M. van Rijn^a

^a Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands;

^b HAS Den Bosch University of Applied Sciences, 's Hertogenbosch, The Netherlands

^c Institute of Higher Nervous Activity and Neurophysiology, Russian Academy of Sciences, Moscow, Russia;

Cannabinoid CB1 antagonists have been widely investigated for possible treatment of obesity, metabolic syndrome and drug addiction. The present study, however, was performed to investigate the origin of spasms, observed in healthy rats chronically treated with a coded CB1 receptor antagonist. During a six month pharmacological study, designed to screen for side effects of new drugs, it was found that 15% of animals treated with a low dose of the drug (1;1 mg/(kg.day) for male;female rats) and up to 70% of animals from the highest dose group (3;2 mg/(kg.day) for male;female rats) developed severe muscle contractions.

In the current study, EEG and video recordings were made from 36 animals selected from the highest dose group of the original batch of 200. During a 24 hour recording period, 26% of animals treated with this CB1 antagonist were found to have 1 to 21 convulsive seizures, whereas controls were seizure free. All observed spasms coincided with seizures in the EEG and vice versa, indicating that the spasms were not merely peripheral muscle contractions but were induced centrally. This study confirms our previous observation that long term blockade of the endogenous cannabinoid system can induce epileptic seizures (1), arguably by blocking the on-demand protection against the consequences of a variety of injuries.

(1) van Rijn CM, Perescis MFJ, Vinogradova L, van Luijtelaar G., Endocannabinoid system protects against cryptogenic seizures. *Pharmacol Rep.* 2011;63(1):165-168).

2. "Extracranial EEG recordings of terminal depolarisation: The Wave of Death."

J. Martin^a, M. L.A. Jongsma^b, N. van Alfen^c, A. M.L. Coenen^d, C. M. van Rijn^d

^a Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands.

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^c Department of Neurology and Clinical Neurophysiology, Radboud University Nijmegen Medical Center, Donders Institute for Neuroscience, Nijmegen, The Netherlands

^d Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands

Recent work in EEG of rats following decapitation or lethal anaesthesia overdose has shown the presence of a high amplitude slow brain wave approximately 50 - 80 seconds following the cessation of normal EEG signal (Van Rijn et al., *PLoS ONE* 6(1): e16514, 2011). This has, further, been hypothesised to reflect a sudden, rapid depolarisation of cell membranes following the depletion of energy required for ion transporters to maintain normal activity of the cell (Zandt et al., *PLoS ONE* 6(7): e22127, 2011), a so-called "terminal depolarization". The results obtained thus far have relied on permanent, implanted, intracranial electrode sets, which would limit the clinical usefulness of such a method for the detection of death, per se. This poster will present data reflecting attempts to observe the "Wave of Death" using extracranial electrodes, as well as using a DC EEG method to assess the hypothesis of sudden rapid membrane depolarisation in causing the wave.

3. "The role of the pontine reticular formation in conscious states."

M. Boros^a, P. Baracska^{a,b}, G. Juhász^a, and A. Czurkó^{a,b}

^a Laboratory of Proteomics, Institute of Biology, Eötvös Loránd University, Budapest, Hungary

^b Institute of Medical Chemistry, University of Szeged, Szeged, Hungary

The pontine reticular nucleus (PnO) is part of the ascending reticular activating system (ARAS) which is responsible for the endogenous arousal and transitions between sleep/wake cycles. A bilateral microinjection of barbiturate into the PnO results in reversible loss of consciousness in rats, therefore this zone was named mesopontine tegmental anaesthesia locus. To elucidate the role of the PnO in the arousal control (2R)-amino-5-phosphonovaleric acid (AP5) and N-Methyl-D-aspartic acid (NMDA) was administered in freely moving rats. The EEG activity, auditory evoked potentials (AEP) and startle response (SR) were measured. The AP5 decreased the amplitudes of AEP and SR and increased the occurrence of spindle waves in EEG recordings. The administration of NMDA was followed by two phases. In the paradox activation phase an increase of AEP amplitudes and an abolition of SRs was observed along with a bistable EEG: a desynchronized activity with spindle waves was altered by theta

waves. In the coma phase the generalization of delta waves was associated with abolition of both AEPs and SRs. The histological staining revealed the presence of „dark” giant neurons, due to the excitotoxicity of NMDA and coincided with the appearance of slow waves and coma. The state of coma is a result of a functional ablation of subcortical PnO region thus the PRF plays a crucial role in general anesthesia and conscious states.

COGNITIVE SESSION: Cognitive Neuroscience

Saturday 21/04/2012

9.00 – 10.30

Chair: Aneta Brzezicka

1. "EEG beta-band power as an indicator of top-down attention."

M. K. Gola^a, M. Magnuski^a, I. Szumska^b, A. Wróbel^c

^a Warsaw School of Social Science and Humanities, Poland

^b University of Finance and Management, Warsaw, Poland

^c Nencki Institute of Experimental Biologu, Warsaw, Poland

Increase of beta-band EEG activity was previously related to attentional modulation in the occipito-thalamic loops of animal visual system (Wróbel, 2000). We searched for the similar activity in the higher levels of attentional networks in human. We showed increased beta activity in occipito-parietal cortex prior to proper behavioral responses. Significant increase appears during the waiting for the stimuli in visual attention task engaging top-down attention. Verification of this results on groups of older subjects were characterized by behavioral responses: High Performers and Low Performers, showed that in case of Low Performers beta band power during anticipatory period preceding appearance of target stimulus decreases. To our knowledge these results are first to show that deterioration of visual attention in the aged humans is related to decreases of in beta band activity over parieto-occipital cortex.

2. "Reaction time increase (delta RT) in Sternberg task correlate with individual gamma cycle length: Further evidence for Lisman and Idiart's STM model"

J. Kaminski^a, A. Brzezicka^b

^a Nencki Institute of Experimental Biology, Warsaw, Poland

^b Warsaw School of Social Science and Humanities, Poland

In Sternberg test subject is exposed to a list of items and after short delay to test item. It was showed that reaction time (RT) in response to test item increased by ~38 ms for each additional item on the list. It was proposed that this period represent additional time in sequential scanning of items held in memory. According to Lisman and Idiart's theoretical model of STM - in which memorized item are serially activated in sequential gamma subcycles - this increase in RT should correspond to individual gamma cycle length. To test this hypothesis we recorded spontaneous EEG activity from 70 participants and measured their increase in RT in Sternberg test. Based on our new method (Kamiński et al., 2011) we extracted individual gamma frequencies from spontaneous EEG. Results showed positive correlation between individual gamma cycle length ratio and increase in RT. This result provides a direct argument in favor of Lisman and Idiart's theoretical model of STM. [Kamiński, J., Brzezicka, A., & Wróbel, A. (2011). Short-term memory capacity (7 ± 2) predicted by theta to gamma cycle length ratio. *Neurobiology*]

3. "A computational model of fronto-parietal oscillatory mechanisms underlying individual differences in working memory capacity."

A. Chuderski^a, K. Andrearczyk^b, T. Smoleń^c

^a Institute of Philosophy, Jagiellonian University, Poland

^b Institute of Psychology, Jagiellonian University, Poland

^c Pedagogical University, Krakow, Poland

Working memory (WM) is a mechanism responsible for the active maintenance of information for the purpose of its ongoing processing. Formal models which assume that maintenance relies on an oscillatory mechanism tied to theta and gamma bands appeared to be the most promising theoretical explanation of WM's limit of around four items. As brain uses temporal coding for separating WM representations, and time is a limited resource, brain is not able to pack too many oscillations into one interval, because they start to overlap and so stop being distinctive. However, existing models do not explain why people do differ in capacity. We present a novel neurocomputational oscillatory model of WM and we show which its features determine individual differences in capacity. These features include the level of inhibitory control within the focus of attention presumably located in the parietal cortex, and the strength of extra activation flowing to the focus from the prefrontal cortex. The highest capacity is reached when the internal inhibition is low and the extra activation is high. We test the model by simulating the normal distribution of capacity estimates ranging from one to six memory items, observed in a sample of 176 participants who fulfilled a memory recognition task. The model also simulates a number of other experimental effects, including that it explains how changes in activation and inhibition within WM can yield shortening of the gamma cycle in high-capacity subjects.

BIOLOGICAL SESSION: Neurogenetics

Saturday 21/04/2012

11.00 – 12.30

Chair: Oliver Griesbeck

1. "Mutation in hydrophobic residue of GABAA receptor binding site strongly influences channel gating."

M. Szczot, M. Kisiel, M. Czyzewska, J. W. Mozrzymas

Laboratory of Neuroscience, Department of Biophysics, Wrocław Medical University

GABAA receptors are ligand gated ion channels which mediate inhibition in the CNS and are a target for several clinically important drugs. In spite of a broad knowledge on GABAARs structure, the mechanism whereby ligand binding triggers conformational transitions remains poorly understood. To address this issue we have examined the activity of a recombinant $\alpha 1/\alpha 2$ GABAAR in which a point mutation was introduced at the ligand binding site. Currents were elicited by ultrafast GABA applications and measured using patch-clamp technique. We show that cysteine mutation of single hydrophobic residue located at loop D not only dramatically weakens the agonist binding (nearly 80-fold increase in GABA EC50) but also, abolished fast desensitization and slowed the onset of currents evoked by saturating GABA. Non-stationary variance analysis showed that the mutation does not affect single channel conductance, but reduces maximal open probability, further indicating a change in gating properties. Ratio of current amplitudes elicited by pentobarbital (partial GABAAR agonist activating GABAAR by different pathway than GABA), and by GABA was significantly higher for mutant receptors, further supporting interference with receptor gating. Taken together our data show that the considered residue may strongly influence conformational transitions of GABAARs thus indicating this residue as a key element in transduction of free energy supplied by agonist binding to the conformational transitions.

2. "Gender specific behavioral and molecular changes in mice harboring glucocorticoid receptor deletion in noradrenergic system."

P. Chmielarza, G. Kreiner^a, J. Kusmierczyk^a, A. Zelek-Molika^a, M. Baginska^a, R. Parlato^a, G. Schuetz^b, I. Nalepa^a

^a Institute of Pharmacology PAS, Department of Brain Biochemistry, Krakow, Poland.

^b German Cancer Research Center, Department of Molecular Biology of the Cell I, Heidelberg, Germany.

The aim of this study was to investigate if conditional inactivation of glucocorticoid receptor (GR) in noradrenergic neurons of mice affects the animal behavior in stressful conditions. Male and female mutant mice lacking GR selectively in noradrenergic neurons were investigated. Chronic restraint stress was performed for 14 days, 2 hrs/day. Animals underwent tests for anxiety (Light-Dark Box, LDB) and depressive-like behavior (Tail Suspension Test, TST). Expression of neurotrophins (NGF, NT3 and BDNF) was assessed by real-time PCR. Male mutant animals did not show any changes in basal behavior, yet after chronic restraint stress they did not reveal expected increase of immobility time and anxiety like behavior showing similar behavior as non-stressed controls. On the other hand, female mutant mice showed anxiety and depressive-like behavior already in basal state, and these changes were not modified by chronic restraint stress. Non-stressed female but not male mutant mice showed upregulation of BDNF mRNA in all investigated structures – the prefrontal cortex (PFC), hippocampus and hypothalamus. After chronic restraint stress male mutants showed profound downregulation of BDNF mRNA level in PFC. Interestingly stressed female mutants showed structure dependent changes which resulted in bringing BDNF mRNA expression in both control and mutant mice to the same level.

Our results clearly show the sex-dependent impact of GR in noradrenergic system in anxiety and depressive-like behavior. The link between these two systems and regulation of neurotrophic factors is postulated.

Acknowledgements:

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3. "Major depressive disorder: polymorphism of genes linked with dopamine metabolism in human patients."

A. Evinova^a, E. Babusikova^a, L. Ondrejka^b, I. Lehotsky^a

^a Comenius University in Bratislava, Department of Medical Biochemistry, Jessenius Faculty of Medicine in Martin,

^b Psychiatric clinic, University hospital in Martin, Slovakia

Background: It is generally anticipated that variants in many genes may contribute to the onset and mode of progression of major depressive disorder (MDD). We have focused on several genes linked with dopamine metabolism which could be involved in the etiopathogenesis of MDD. We selected four polymorphisms in the dopamine receptor (DRD4), dopamine transporter (DAT1), monoamine oxidase A (MAOA), catechol-O-methyltransferase (COMT) connected with neurotransmission and degradation of dopamine.

Methods: Venous blood of 134 depressed patients and 144 apparently healthy controls from central Slovakia were collected, and abovementioned polymorphisms genotyping were determined by PCR and restriction fragment length polymorphism.

Results: We observed higher frequency of DRD4R risk genotype in patients with MDD. We also found that MAOA risk allele was significantly associated with MDD risk. Allelic association analysis of COMT and DAT1 did not show higher risk in patients with MDD.

Conclusion: In this study, we observed that in central Slovak population DRD4R and DAT polymorphisms are associated with an increased risk depression.

This work was supported by grant MZ UK-55 UK 16/07 and project Identification of novel markers in diagnostic panel of neurological diseases. code: 26220220114, co-financed from EU sources and European Regional Development Fund.

COGNITIVE SESSION: Emotional Functioning from Clinical and Experimental Perspective

Saturday 21/04/2012

11.00 – 12.30

Chair: Sven Muller

1. "Electrophysiological correlates of emotional stimulus processing."

A. Schacht

Göttingen University, Germany

In recent neurocognitive research, the processing of emotions that are elicited in different stimulus domains has received special interest. It is suggested that emotional stimuli involuntarily draw attentional resources due to their high intrinsic relevance, resulting in preferential and sustained processing. Well-established research tools are event-related brain potentials (ERPs), which allow measuring the activity of distinct brain systems over time with high temporal resolution. Emotional stimuli such as affective pictures, emotional words, and facial expressions elicit at least two ERP components, which are distinguishable with regard to their temporal and spatial distributions and can therefore be related to different stages within the information-processing stream. The presentation will provide an overview about recent studies focusing on the functional locus of these emotion effects and their boundary conditions.

2. "Emotional responsiveness related to visual processing as revealed by EEG component clustering"

M. Wyczesany

Psychophysiology Lab, Institute of Psychology, Jagiellonian University, Poland

The study investigated neural basis of differences in emotional responsiveness. The level of responsiveness was determined by the self-report data reflecting changes in subjects' mood due to emotional stimulation. Higher activation

was expected for the cortical areas linked to affective experience in the group characterized as emotional responders. On the basis of the Heller's theory of cortical emotional systems as well as our previous studies, bilateral prefrontal cortex and right tempo-parietal regions were considered. All significant effects between the groups (emotional responders and non-responders) were found in relatively late time windows. This result could suggest that emotional responsiveness as defined here, depends on later stages of information processing such as cognitive strategies of dealing with emotional stimulation. However, a trend observed as early as 100-300ms, could suggest the differences in sensitivity to affective stimuli in the early, pre-attentive stages of visual processing.

3. "The influence of context on the processing of emotional and neutral adjectives - an ERP study."

S. Grzybowski

Psychophysiology Lab, Institute of Psychology, Jagiellonian University, Poland

The study investigated brain responses to emotional adjectives (describing moods) and neutral adjectives (describing objects) within emotional and neutral context. Participants were randomly assigned to emotional context, neutral context or no context groups where they all viewed random sequences of emotional and neutral adjectives. IAPS pictures of positive and negative valence were intermixed with the words for the emotional context group, neutral pictures for the neutral context group and blank screens for the no context group. There were differences in the processing of emotional and neutral adjectives in all groups. Within the emotional context the differences were noted as early as 230ms after the word onset (P3a potential) with greater positivity evoked to the emotional words as opposed to the neutral ones, this effect continued within the 310-390 ms time window (P3 potential). Within the neutral context group the same effects were visible, alongside greater positivity of the P2 (135-175ms) potential in response to the emotional adjectives and greater negativity of the N400 potential (400-500ms) in response to the neutral adjectives. Within the no context group only the N400 effect was visible. Thus the context of adjectives reading seems to influence word processing on many levels. There is a preference towards emotional adjectives, especially where the context information is ambiguous. However, where there is no context the emotional adjectives still seem to be preferentially processed, but only at later, conscious stages of word encoding.

BIOLOGICAL SESSION: Neuropsychiatry

Saturday 21/04/2012

15.30 – 17.00

Chair: Istvan Katona

1. "Susceptibility to stress and transcriptional changes in brain regions critical for fear memory – what can we learn from the mouse model of PTSD?"

K. Szklarczyk, M. Korostyński, W. Solecki, S. Gołda, R. Przewłocki

Dept. of Mol. Neuropharm., Inst. of Pharm. PAS, Cracow, Poland

Studies in isogenic animal populations might explain susceptibility to post-traumatic stress disorder (PTSD) by revealing associations between molecular and behavioural consequences of a traumatic event. Our study employed four inbred mouse strains: C57BL/6J, DBA/2J, SWR/J and 129P3/J to search for differences in response to a 1.5-mA electric foot shock. Firstly, mRNA level of selected genes was analyzed in hippocampus involved in contextual fear and in amygdala, due to its critical role in the acquisition and extinction of fear memory. Secondly, 1 day-6 weeks after the foot shock behavioural effects were assessed: conditioned and sensitized fear, social withdrawal, depressive-like behavior and susceptibility to drug addiction. C57BL/6J mice exhibited up-regulation in the expression of Tsc22d3, Nfkb1a, Plat and Crhr1 genes, which can be linked to an increase over time in sensitised fear and depressive-like behaviour. DBA/2J mice with increased Tsc22d3, Nfkb1a, Plat and Fkbp5 expression developed social withdrawal. Exposure to traumatic stress produced enhanced sensitivity to the rewarding properties of morphine in the 129P3/J strain and the up-regulation of Tsc22d3 and Nfkb1a. SWR/J mice displayed only increase in Pdyn gene in response to stress and had the lowest conditioned fear. We propose

the C57BL/6J>DBA/2J>129P3/J ranking of inbred strains as efficient models of PTSD symptoms and the SWR/J strain as a valuable model of stress resistance. The association between the early transcriptional and long-term behavioural effects of stress provides new insight into the brain mechanisms underlying anxiety disorders. This work was supported by Polish MSHE grants NN405 274137, IUVENTUS Plus and POIG De-Me-Ter 3.1.

2. "Functional and volumetric changes within the fronto-striatal reward system in adolescents and adults with attention-deficit/hyperactivity disorder."

M. Lojowska, D. von Rhein, J. Buitelaar

Donders Centre for Cognitive Neuroimaging, Nijmegen, the Netherlands

Introduction and objectives: Attention-deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental disorder with a worldwide prevalence rate of 5% in children and adolescents (1). Recent data suggest that only about 10% of patients with ADHD achieve functional remission by the age of 18-20 (2), suggesting that, in contrary to a common view, this disorder may persist into adulthood. One of the cognitive domains, which dysfunction has been associated with ADHD in both adolescence and adulthood, is the fronto-striatal reward pathway (3). This pathway has been implicated in the motivational processing by its involvement in the anticipation and perception of rewards. Accordingly, a number of studies have focused on investigation of the functional and volumetric abnormalities within the reward circuit, encompassing the orbitofrontal cortex (OFC), the mesial prefrontal cortex (MPFC) and the nucleus accumbens (NA). Recently, it has been shown that the adults with ADHD demonstrate hypoactivity in the NA in anticipation of reward (4, 5), but this result has been replicated in ADHD children and adolescents to less extent. Furthermore, while the volumetric abnormalities within the reward system in younger ADHD patients have been stable across studies, they are inconsistent in adult literature, raising a question of their persistence with age. Finally, while there is growing evidence supporting the functional developmental trajectories of the reward system in normally developing children (6), little is known about its course in ADHD. Therefore, in this study we sought to investigate the functional and volumetric differences within the fronto-striatal reward circuit between ADHD patients and healthy individuals in two age groups: children/ adolescents (8-20 years old), and adults (21-50 years old).

Methods: A sample of 290 ADHD and control participants, aged 10 to 50 years old, completed a Monetary Incentive Task, shown to increase the activation in the NA to reward anticipation, and in the OFC and the MPFC to reward outcomes (7). In order to compare the main and interaction effects between conditions (reward anticipation and gain outcome) and diagnostic groups (ADHD versus control), random effect analysis in SPM8 was performed for each age group.

Results: In younger group of subjects (8-20 years old), we demonstrated no differences between ADHD and control subjects in recruitment of the NA in anticipation of potential rewards, whereas during gain outcome, ADHD subjects showed higher MPFC activation relative to controls. Lower activation in the MPFC was accompanied by larger MPFC volume in ADHD patients. In older group of subjects (21-50 years old), ADHD adults showed significantly decreased NA activation relative to adult controls, while these two groups did not differ in the activation of the MPFC and the OFC during reward outcome. No significant volumetric changes were reported.

Discussion: Our results suggest different developmental trajectories of these regions in ADHD and control subjects, with greater differences in the activation and the volume of the prefrontal regions in the younger group, and greater differences in activation of the nucleus accumbens in the adult group. Furthermore, these data encourage a view of persistence of ADHD in adulthood, but expressed differently from childhood/adolescence form of ADHD at the neurocognitive level.

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3. "Compliance in the Treatment of Children with ADHD."

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Hyperkinetic disorders in ICD-10 contained in section F90. Depending on the classification in addition to the main symptoms listed in ICD-10 (violation of attention and increase of physical activity) should be called expressed impulsivity. In ICD-10 diagnostic criteria are used more stringent than for ADHD in DSM-IV. These conditions are quite common mental disabilities in childhood. Diagnosis can be exhibited in 3-7% of children reached school age. . It is investigated and treated 19 children with ADHD in age from 6 to 12 years. The basic method of examination was clinical-psychopathological method. As an additional method of research it was used a questionnaire of behavior of the child aged 6 to 18 years that was completed twice by a physician together with the father or mother of a child: in the process of initial interview (diagnosis and resolution of the basic methods of correction) and after 3 months of treatment. All the children were assigned GABA-ergic nootropic medication picamylone in doses that depended on the age of the child within three months (from 20 to 60 mg per day). Besides medication, parents with their children carried out psychological adjustment, first of all it was a psychological training of parents based system model of psychotherapy and appropriate recommendations for changes in behavioral strategies in relation to children. After treatment 100% of parents noted improvement of children's state. However, attention is paid to the fact that parents of 12 children carefully followed the recommendations for drug treatment and changed their behavioral patterns in relation to children. Symptoms significantly smoothed in these 12 children, they were more attentive, calmer, and more reflective. It was also made significant changes in the relationships of parents with children that manifested itself in improving mutual understanding, increased positive reinforcement, reducing cases of different methods of punishment and expression of dissatisfaction with the behavior of children. Parents of other 7 children sometimes violated the medication regime and did not consider it necessary or cannot deal with children differently. In this situation, we also see the fact of reducing impulsiveness, emotional lability, negativism, opposition and inattention, but to a lesser degree. Therefore, GABA-ergic medications with psychological correction based on the system model of psychotherapy including compliance with the childs' parents will result successes in the complex treatment of children with ADHD.

COGNITIVE SESSION: Neural Correlates of Language Processing

Saturday 21/04/2012

15.30 – 17.00

Chair: Marcin Szwed

1. "Spatial cue use in bilinguals and monolinguals: An fMRI study."

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Bilingualism is known to impact executive control functions (e.g. involved in task switching) on a behavioural and neural level. The present fMRI study explores the use of spatial cues in bilinguals and monolinguals while navigating in an open field virtual environment. In each trial, participants had to navigate towards a target object that was visible during encoding but hidden in retrieval. During encoding, three object cues (columns) with shadows were visible. Blocks informed the participants what type of information would most likely be available during retrieval - two objects without shadows (objects trial) or one object with a shadow (shadow trial); in each block switch trials made up 30%. An extensive network was activated in bilinguals compared to monolinguals in the encoding and retrieval phase. During normal-trial encoding, bilinguals activated bilateral temporal and parietal regions (objects trials) and left inferior frontal and precentral regions

(shadow trials) more than monolinguals. During retrieval, the same contrasts activated the left caudate nucleus and parahippocampal gyrus (objects trials) and right DLPFC, bilateral parahippocampal, and left caudate regions (shadow trials). Retrieval-related activation during switch trials involved the ACC, right frontal regions, parahippocampal gyrus, hippocampus, and the caudate nucleus. These results show that bilingualism impacts neural networks known to subservise spatial strategies and executive control processes.

2. "Semantic integration and lexical access - two sides of the same coin?"

J. Szewczyk^a, H. Schriefers^b

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^b Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, The Netherlands

Despite the popularity of the N400 component, there are opposing theories concerning underlying processes. The main point of contention is whether N400 relies on lexical access being already done (conceptual integration difficulty), or on the ease of making lexical access. Participants were visually presented with short stories, that had a direct object noun in the story-final sentence. In half of trials the noun was semantically incongruent with the story. Congruity was fully crossed with repetition priming: all story-final sentences were preceded by presentation of 4 prime words; in the primed condition, one of the words was the direct object noun of the upcoming sentence. Participants were asked to read all sentences, memorize story-final sentences for off-line cued-recall test, and temporarily memorize the prime words, for probe-recognition test. Integration theory predicts N400 for all incongruent words, independent of priming. Pre-lexical theories assume N400s index word's preactivation level and predict no N400 for primed incongruent words. Unprimed incongruent words led to a standard N400. The amplitude of N400 for critical primed incongruent words was reduced, relative to unprimed incongruent words. However, this reduction always occurred when the identity of the target word was known before its presentation. In case when its identity was unknown, both incongruent conditions led to N400 of the same amplitude. These results exclude the extreme hypothesis, that N400 in sentence processing relies only on ease of making lexical access, independent of semantic integration difficulty. They suggest that either N400 indexes integration difficulty, or, more likely, both aspects (integration and lexical access) are two sides of the same coin.

BIOLOGICAL SESSION: Neurodegeneration

Sunday 22/04/2012

9.30 – 11.00

Chair: Elena Dragicevic

1. "Role of the nitric oxide in the modulation of L-DOPA activity in the 6-OHDA model of Parkinson's disease."

A. Czarnecka, T. Lenda, J. Konieczny, E. Lorenc-Koci.

Department of Neuropsychopharmacology, Institute of Pharmacology, Polish Academy of Sciences

Strong evidence obtained from in vivo and ex-vivo studies suggests the existence of interaction between dopaminergic and nitric systems.

The aim of this study was to assess the behavioral and biochemical effects of chronic combined treatment with the nitric oxide donor, molsidomine and L-DOPA in 6-OHDA-lesioned rats. Moreover, the same parameters were investigated after inhibition of nitric oxide synthase with L-NAME.

Male Wistar rats were injected with a single dose of 6-OHDA (8µg/4µl) into the left medial forebrain bundle. After two weeks animals were divided into three groups: Two of them were treated with L-DOPA (25 mg/kg) alone or in combination with molsidomine (2 mg/kg) once daily for 15 days. Another group was treated with L-DOPA but on 14th day rats received single dose of L-NAME (50 mg/kg) ten minutes before L-DOPA injection. Rotational behaviour was recorded for more than 2 hours. On the following day, 1h after the last injections of examined drugs, animals were killed. The levels of dopamine (DA) and its metabolites were assayed in striatal and nigral homogenates using an HPLC method.

Chronic L-DOPA and molsidomine co-administration resulted in a significant lowering of the number of contralateral rotations and increasing striatal and nigral DA level in comparison with that observed after L-DOPA treatment alone. Single dose of L-NAME administered before penultimate dose of L-DOPA decreased both the intensity of contralateral rotations and striatal and nigral DA levels on the lesioned side when compared to administration of L-DOPA alone. The combined administration of L-DOPA and a nitric oxide donor seems to have beneficial effects by reducing motor complications and increasing DA level in the nigrostriatal system. L-NAME prevents the DA formation from L-DOPA finally leading to attenuation of L-DOPA-induced rotations.

2. "Interactions of amyloid β with RAGE (Receptor for Advanced Glycation Endproducts) – a significant phase in AD etiology that could be blocked."

J. Stepek^{a,b}, E. Gospodarska^c, M. Kulma^b, M. Dadlez^{a,b}

^a University of Warsaw

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In 1992 Hardy and Higgins proposed an explanation to Alzheimer's Disease by stating their amyloid hypothesis. Following their idea that the main agent in AD etiology is amyloid- β numerous studies were done revealing various interactions of this peptide. Among them the receptor for advanced glycation endproducts (RAGE) has been identified as the receptor responsible for the import of the A β peptide inside the brain. RAGE is therefore responsible for the augmentation of the A β concentration inside the brain, which leads to the increased creation of plaques and tangles, aggregates of A β characteristic for AD.

In our research we try to characterize the mechanism of the interaction of RAGE and A β 40. Our experiments led us to identifying the shortest sequence of A β indispensable for binding to the receptor. In the course of further experiments this short, 8-amino acid sequence (A β 16-23') was found to block the import of A β 40 into the mouse endothelial cells (bEnd.3). What is more, the MTT assay showed no toxic effect of A β 16-23' in comparison to a significantly lower viability of the Nb2a mouse neuroblastoma cells after the incubation with A β 40.

These results suggest a potential role of the A β 16-23' in blocking the import of full-length A β across the blood brain barrier and thus represent a new approach that could be taken in developing a therapeutic strategy in AD.

3. "Bradykinesia and chorea in Huntington's disease - which symptom affects daily life more?"

K. Krakowska, M. Błaż

Collegium Medicum Jagiellonian University

Introduction: Huntington's disease (HD) is an autosomal dominant neurodegenerative disorder, characterised by motor, neuropsychological and behavioral disturbances. They altogether contribute to the HD patients' disability. The main motor disturbances are choreatic movements and bradykinesia. In this study we aimed to investigate the influence of chorea and bradykinesia on the patients' disability.

Methods: 72 patients from the Department of Neurology of Jagiellonian University Medical College with genetically confirmed HD were enrolled into the study. The patients' functional disability was assessed with use of the Independence Scale (IS). The severity of their motor disturbances was measured with the Unified Huntington's Disease Rating Scale (UHDRS). In order to assess severity of chorea and bradykinesia the following two subscores were calculated: UHDRS Chorea (sum of: maximal chorea of face, mouth, trunk, and limbs) and UHDRS Bradykinesia (sum of: body bradykinesia, finger tapping, pronation-supination speed).

Results: UHDRS Bradykinesia and UHDRS Chorea were significantly correlated with the IS ($r = -0,81$, $p < 0,0001$; $r = -0,47$, $p < 0,0001$ respectively). There was also a significant correlation between UHDRS Bradykinesia and UHDRS Chorea ($r = -0,5$, $p < 0,0001$).

Conclusion: The results of this study suggest that bradykinesia has a greater influence than chorea on the patients' disability in Huntington's disease.

COGNITIVE SESSION: Sleep and Pain – Experimental Approach

Sunday 22/04/2012

9.30 – 11.00

Chair: Rolf Verleger

1. "Cortical excitability in insomnia patients."

K. Georgopoulou, Y. van der Werf

Netherlands Institute for Neuroscience (NIN)

Insomnia is a poorly understood condition affecting many people, up to an estimated 40% of the elderly population. It increases physical and mental health risks and is a major factor affecting quality of life. Studies have shown that patients with primary insomnia, i.e. insomnia not explained by other medical or environmental circumstances, suffer from abnormal neural activity, both during sleep and wakefulness. Among these findings are altered ERP-amplitudes, changes in resting state activity and an increase of higher frequencies in the EEG power spectrum, which have led to the hyperarousal hypothesis of insomnia. This hypothesis has been supported by a recent study showing that global intracortical excitability is increased in insomniacs (Van der Werf et al., 2010). In our research, we aim to replicate and extend this finding by use of Transcranial Magnetic Stimulation (TMS); the study is part of a larger project, with the goal of comparing the levels of excitability between different types of insomnia, such as primary insomnia and sleep state misperception, or paradoxical insomnia, an even more puzzling type of insomnia. In addition, we aim to extend the analysis to the relationship between excitability and sleep characteristics in healthy, well-sleeping participants.

2. "We feel what we expect: Brain Evoked Potentials measured in a cued pain paradigm."

C. M. van Rijn^a, R. Maes^a, R. van der Lubbe^c, O. Wilder Smith^d, K. Vissers^d, M. L. A. Jongsma^{a,b}

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^d Department of Anaesthesiology, Pain & Palliative Medicine, Radboud University Nijmegen Medical Centre, The Netherlands

Cognitive processes like expectation modulate pain experience. The aim of our study was to examine the influence of cueing a noxious stimulus on perceived pain as measured by EEG and by subjective rating. A double stimulus paradigm was used with the first stimulus being a visual cue and the second being a painful electrical stimulus. Two different intensities for the painful stimuli were used, for clarity named 'shocks'; shocks with high and shocks with low intensity, and two visual cues, each of them cueing the intensity of the coming shock. Ten percent of the shocks were not preceded by a cue (uncued) and ten percent of the cues were incorrect cues, i.e. the high cue was followed by a low intense shock or the low cue was followed by a high intense one. EEG was recorded and Brain Evoked Potentials measured. The N1-P2 component of the visual cues and the P300 components of the Pain Evoked Potentials (EPs) elicited by the shocks were analyzed. The subjective pain was quantified using a visual analogue scale (VAS). Results: 1) The brain response N1-P2 to the visual cue was lower for the cue indicating a coming low intense shock then for the cue signaling the high intense one. 2) For the uncued shocks: both the P300 components and the VAS scores in response to the correct cued shocks were higher than those to the uncued shocks. 3) For the cued shocks: an interaction of shock intensity and cue validity was found: - When participants were cued to receive a high intense shock, but did receive a low shock, both the P300 component and the VAS were higher than those of the low shocks preceded by the correct cue for this low shock and - in line, when participants were cued to receive a low intense shock, but did received a high intense shock, both P300 and VAS were lower compared to the high shock preceded by the correct cue for this high shock. 4) A very weak, but significant, correlation was found between the VAS scores and the amplitude of the P300 component. Both the pain evoked brain potentials and the subjective pain experience behaved according to nocebo effects of the modulated expectancy. This nocebo effect is mitigated by a placebo component in the low cueing but high stimulus condition. Gaining more insight in cognitive processes that determine the interplay between nocebo and placebo effects might hold important knowledge for the understanding and treatment of pain.

3. "Comparing neural correlates of heterotopic facilitation induced after high frequency electrical stimulation of human skin between patients with and without persistent pain 6-7 years after inguinal hernia repair"

E. N. van den Broeke^{a,c}, C. M. van Rijn^c, L. Arendsen^b, L. Koeslag^a, H. van Goor^{a,c}, O. H.G Wilder-Smith^{b,c}

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High frequency electrical stimulation (HFS) of primary nociceptive afferents in humans induce a heightened sensitivity to mechanical punctate stimuli in the surrounding non-stimulated skin area 30 minutes after HFS. Electrical pinprick stimuli applied in the same area simultaneously with the measurement of the EEG revealed potential cortical correlates (i.e. Event-related potentials, ERPs) of this heterotopic facilitation. Thirty minutes after HFS the ERP N1 amplitude evoked in the surrounding non-stimulated skin on the conditioned site was larger compared to the N1 amplitude evoked at the control site. In this study we compared this potential cortical correlate, induced after HFS, between patients with and without persistent pain after a inguinal hernia repair.

BIOLOGICAL SESSION: Neuroplasticity

Sunday 22/04/2012

11.30 – 13.00

Chair: Jacek Jaworski

1. "Development of glutamatergically induced oscillatory activity in hippocampal formation - microEEG approach."

P. Kazmierska, T. Kowalczyk, R. Bocian, H. Golebiewski, J. Konopacki.

Department of Neurobiology, University of Lodz, Lodz, Poland.

The basic phenomena that accompany the production of all EEG patterns in the brain are cellular mechanisms of oscillations and synchrony. Knowing these phenomena is important for understanding the relationships between specific EEG patterns and activity of neurons in certain brain structures, including the hippocampal formation (HPC). This limbic structure generates a synchronized EEG activity, termed theta rhythm. It is a sinusoidal, high-voltage activity with the frequency band ranging from 3 to 12 Hz. This activity occurs in the HPC during the planning and initiation of movements, and influences the generation of LTP. Moreover, some literature data exist which confirm the existence of epileptic component in theta rhythm observed in vitro.

It was earlier demonstrated in the in vivo and in vitro studies that the appearance of theta rhythm in HPC requires a certain level of neural network excitation. Many years of research conducted in our laboratory allowed us to determine the specific role of the cholinergic and GABAergic systems involved in this process. Earlier EEG studies performed in rodents have revealed the possible role of kainate and NMDA receptors in modulating theta activity. Therefore the aim of present study was to investigate the effect of kainic acid (KA) and N-methyl-D-aspartic acid (NMDA) on microEEG activity recorded from HPC preparations and to compare this activity with cholinergically induced theta rhythm. Field potential and extracellular recordings were made from the CA3 hippocampal field during the bath perfusion of NMDA and KA in concentrations in the following μM ratio: 1: 3: 10: 30 and 100. To increase the probability of evoking theta activity tonic NMDA/GABAergic (NMDA/bicuculine) or KA/GABAergic (KA/bicuculine and KA/muscimol) bath perfusion has been applied. Experiments were performed on 166 HPC slices obtained from 49 Wistar rats. Besides epileptic discharges, oscillatory activity in theta band was observed in slices perfused with 0,2 μM KA/100 μM muscimol and 50 μM NMDA. Despite the fact that observed activity resembles theta it significantly differs from the carbachol-induced pattern, both in terms of amplitude and duration of theta epochs. This demonstrates that synchronization of neuronal networks needs the appropriate and precise level of excitation. In addition, the increase in synchrony in theta range can be modulated not only cholinergically or GABAergically but also by glutamatergic mechanisms.

Study supported by MNiSW grant no. 2011/01/N/NZ4/01722 and EU under ESF (HUMAN-BEST INVESTMENT)

2. "The excitation-inhibition balance as a gate for information propagation in hippocampus."

E. Alvarez^a, C. Quesada^a, V. Makarov^b, O. Herreras^c, S. Canals^a

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^c Instituto Cajal, CSIC, Madrid.

In a recent study combining fMRI and electrophysiology we demonstrated that electrically induced long lasting potentiation of synaptic strength of the perforant pathway induced a functional reorganization of the hippocampal network and its long-range outputs. We have investigated the mechanisms underlying this phenomenon using multichannel electrophysiological recordings in the anesthetized rat. In contrast to most classical studies, we focus on spontaneous activity to avoid any confounding factor introduced by artificially synchronizing the network. We apply independent component analysis methods to dissect the activities of the different generators of the local field potential, and investigate the transfer of activity in the hippocampal formation and its modulation by long-term potentiation (LTP). In contrast to the electrically evoked potentials, the effect of LTP on the spontaneous ongoing activity was a modest and variable increase in the signal's power corresponding to the entorhinal input. Interestingly, the most significant change was a concomitant and transient down-regulation of the inhibitory drive in the hilus of the dentate gyrus, and within the same time window of this reduction in the inhibitory drive we observed variations in the synchrony between the studied areas of the hippocampal formation, evidencing a change in activity propagation.

We interpret our results as a gating mechanism based on excitation/inhibition balance and controlled by synaptic plasticity that may support selective information channelling in parallel systems in virtue of specific synaptic input patterns.

3. "Psychedelic hallucinogens dose-dependently increase the power of high frequency oscillations (130-180 Hz) in the nucleus accumbens of freely moving rats."

S. A. Goda, J. Piasecka, S. Kasicki, M. J. Hunt

Laboratory of Limbic System, Department of Electrophysiology, Nencki Institute of Experimental Biology, Warsaw; Poland

The nucleus accumbens (NAc) is a brain region implicated in the disturbed sensory experiences produced by drugs-of-abuse and also to some of the symptoms of psychiatric diseases. Recent studies suggest that release of serotonin in the NAc may also contribute to these effects. Previously, we showed that psychotomimetics, such as ketamine, enhance the power and frequency of high frequency oscillations (HFO, 130-180 Hz) in the rat NAc. Here, we examined the effect of psychedelic hallucinogens (serotonergic), on local field potential (LFP) oscillations recorded in the NAc of freely moving rats. Systemic injection of LSD (0.03, 0.1, 0.3 mg/kg) and DOI (0.5, 1, 2 mg/kg) dose-dependently increased the power of HFO. This was associated with increased occurrence and duration of HFO bursts. The increase in HFO power following DOI injection was reversed by systemic injection of the 5HT_{2A} receptor antagonist, MDL11939 (1mg/kg). In line with this, the highly potent 5HT_{2A} receptor agonist,

TCB-2(0.1, 0.5, 1.5mg/kg), dose-dependently increased the power of spontaneous HFO. Whilst we cannot exclude the involvement of other receptors, these findings show that 5HT_{2A} receptors contribute, at least in part, to the increase in HFO power that occur after psychedelic hallucinogen administration.

COGNITIVE SESSION: Visual and Auditory Processing

Sunday 22/04/2012

11.30 – 13.00

Chair: Sumie Leung

1. "Mismatch Negativity latency and negative symptoms in schizophrenia."

C. Kärigel^a, D. Kariofillis^b, J. Wiltfang^a, G. Sartory^b, B. Müller^a

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Mismatch Negativity (MMN) is a negative component of auditory event related potential with peak amplitude between about 100 and 250 ms after stimulus onset emerging to auditory deviants within a series of standard tones. MMN reduction in schizophrenia has been shown repeatedly indicating early auditory information processing deficits. In contrast to MMN peak amplitude, peak latency has been given less attention so far. In the present study, 30 schizophrenia patients and 15 controls were presented 2400 random ordered binaural tones (standard: 78%; deviants: 22%) while EEG was recorded. Moreover, a selection of neuropsychological tests which assessed for executive functioning, verbal memory and working speed was performed by all subjects. The severity of symptoms was evaluated by means of the Positive and Negative Syndrome Scale, Global Assessment of Functioning Scale and the Social and Occupational functioning Scale. MMN amplitude in schizophrenia patients was attenuated compared to controls in both deviant modalities and was associated with poor social and occupational functioning in patients. Concerning the latencies we found correlations between MMN latencies, PANSS negative symptoms and word fluency. Our current results replicate previous findings of an attenuated MMN peak amplitude to frequency and duration deviants. The positive relationship between latency and negative symptoms is likely to be indicative of an impaired mental processing speed in schizophrenia.

2. "Differences between perceptual noticeable and unnoticeable changes in the human voice pitch reflected by mismatch negativity. The attempt to support dual pathway model in auditory cortex." [WITHDRAWN]

M. Wrzosek, J. Maculewicz

Adam Mickiewicz University, Social Science Department, Chair of Logic and Cognitive Science, Poznań, Poland

Mismatch negativity (MMN), the EEG component observed when the change in the acoustic signal occurs, is usually correlated with human discrimination threshold. In present article authors would like to combine the idea of MMN component with previous work done in the framework of the doctoral thesis by Hafke, where hypothesis of dual processing streams has been proven as an example of unnoticeable control of the human voice. Recordings of vocalized vowel /u/ containing noticeable and unnoticeable perceptual changes in pitch are presented to the group of listeners. The present experiment is based on hypothesis that MMN signal would occur only for perceptual noticeable changes, which could verify the assumption of existence of two separate processing streams in the auditory cortex.

3. "Neurophysiology of visual processing in subjects with optic nerve damage – a VEP study."

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Introduction: The visual field (VF) of patients with visual system lesions is traditionally divided into blind field and intact field. However, there are residual visual capacities of the "blind" VF ("blindsight", Weiskrantz et al., 1974) and there are yet unappreciated perceptual deficits in the "intact" field – phenomenon we call "sightblind" (Bola et al., submitted). Moreover, at the border between the "blind" and "intact" VF there is typically an area of residual vision (ARV; Sabel et al., 2011) where perception is unreliable but present. As physiology of processing in particular VF areas is unclear, we conducted a visual evoked potentials (VEP) study. Methods and results: Patients with partial optic nerve lesion (n=18) performed a shape

discrimination task with stimuli presented in the intact, ARV and blind VF areas. EEG was recorded from the scalp with 32 electrodes positioned in the 10-20 system. VEP analysis revealed that the N2 component evoked by ARV visual stimulation had a significantly lower amplitude when compared to the intact field (elec. O1; t-test, $p < 0.001$). Further, analysis of event related synchronization (ERS) and desynchronization (ERD) revealed that during ARV stimulation theta band ERS at the occipital site was normal ($p < 0.05$) but alpha ERD was significantly less pronounced ($p = 0.003$) than in the intact field. Conclusions: VEP indicates that processing in the ARV is impaired in comparison to the intact field. Based on ERS/ERD findings we hypothesize that visual processing in ARV is accompanied by normal cortical excitation, as marked by normal theta ERS. However, visual cortical areas are not released from inhibition, as indicated by the lack of alpha ERD.

POSTER SESSION I

Saturday 21/04/2012

1. "Fluorescence-based high-throughput assays for measuring drug-induced oxidative stress and mitochondrial dysfunction in neuronal cell cultures."

J. Krzemień, S. Jacobsson

(all experiments were made in Sweden)

Medical Biology Student Society Antidotum, University of Warsaw

Drugs of abuse may cause acute as well as chronic damage to the nervous system, and a common mechanism of neurotoxicity is to induce disturbances in mitochondrial function. The mitochondrion is also an important source for cytotoxic reactive oxygen species (ROS). If the mitochondrial membrane potential (MMP) becomes depolarized, it can increase the production of ROS. This project has evaluated whether the fluorophore JC-1, which measures the depolarisation of MMP, and the fluorophore H2DCFDA that oxidizes and produce fluorescence in the presence of oxygen radicals, are useful tools to screen for drug-induced neurotoxicity. The studies have been performed in embryonal carcinoma (EC) P19 cells that are pluripotent and upon retinoic acid (RA)-treatment will differentiate in culture into neurons, astrocytes and oligodendrocytes. In order to determine the predictive validity of the model/methods, a number of compounds known to cause oxidative stress and mitochondrial dysfunction have been examined (hydrogen peroxide, ionomycin, sodium azide).

Main techniques employed culturing, induction and differentiation of neuronal cells, pharmacological dose-response experiments, detection and quantification of fluorescence using microplate reader and fluorescence microscopy, microplate-based colorimetric methods for assessment of cell viability, pharmacological/toxicological data and statistical analyses using the GraphPad prism software.

2. "Altered corneal nerve morphology and increased responsiveness of corneal cold receptors in experimental model of dry eye."

K. Mizerska^a, I. Kovács^{a,b}, C. Luna^a, S. Quirce^a, M.C. Acosta^a, J. Gallar^a, C. Belmonte^a

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Purpose: To evaluate in a lacrimo-deficient dry eye model in guinea pig the effect on nerve impulse activity of corneal cold thermoreceptors and the morphological changes of the corneal innervation.

Methods: To develop dry eye, the main lacrimal gland was surgically removed. For the morphological study the eyes were dissected 4 weeks after, fixed in PFA, cryoprotected in sucrose. Corneas were incubated in mouse monoclonal antibody against neuronal class III β -tubulin and secondary anti-rabbit antibody. Some corneas were stained with the ABC technique; corneal nerves were drawn with camera lucida. Single nerve terminal impulses were recorded from excised corneas 1 to 4 weeks after surgery. The mean frequency of the spontaneous activity (SA) at 34°C and peak frequency of the response to cooling to 22°C (PF) were analyzed.

Results: The density and the length of epithelial terminations and of subbasal nerve plexus were significantly decreased in dry eye corneas, they were less branched and presented tortuous trajectories. SA ($p=0.003$) and PF ($p=0.006$) of corneal thermoreceptors were significantly increased in dry eye compared to control.

Conclusions: The altered morphology of subbasal corneal nerves suggest that animals with dry eye exhibit nerve degeneration 4 weeks after surgery. Decreased tear secretion in these animals altered the response characteristics and sensitivity of corneal cold nerve terminals. Increased activity in these sensory afferents may contribute to dryness sensations in dry eye pathologies.

3. "Multi-target approach for osteoarthritis pain treatment - complementary mechanisms of action of CB1 and TRPV1 receptors."

N. Malek, M. Mrugała, W. Makuch, B. Przewłocka, V. DiMarzo, K. Starowicz

Department of Pharmacology of Pain, Institute of Pharmacology Polish Academy of Science, Krakow;
Istituto di Chimica Biomolecolare-CNR, Pozzuoli-Naples

Osteoarthritis (OA) is the most common degenerative joint disease, characterized by permanent destruction of articular cartilage and subchondral bone, which leads to pain during joint loading and chronic physical disability. OA's therapy is limited to NSAIDs, which may not always control pain and local inflammation. Thus there is a strong need to develop new treatments for OA. Presented research focuses on endocannabinoid and endovanilloid interaction in the development and treatment of OA. Cannabinoid receptor 1 agonists, like anandamide, modify the neurotransmission of pain, which therapeutic effect is antinociception. They may also stimulate TRPV1, the endovanilloid receptor, which plays a key role in the induction of inflammation and the development of chronic pain associated with OA. Unfortunately, locally released endocannabinoids have a short half-life, due to efficient enzymatic degradation mainly by fatty acid amides hydrolase (FAAH). The aim of presented studies was to assess the analgesic activity of OMDM198, which is an inhibitor of FAAH and a blocker of TRPV1, in the MIA model of osteoarthritis in rats and to estimate the benefits of its two-way action profile compared to compounds acting exclusively on one biological component (FAAH or TRPV1). Obtained results allow better understanding of the use of endocannabinoid and endovanilloid systems for the management of OA pain and consequently propose innovative pharmacotherapy of the most common type of arthritis.

4. "Change in the tissue gene expression induced by injury."

M. Pavlikova, M. Kovalska, J. Lehotsky

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Ischemic-reperfusion injury (IRI) induces changes in the functional and biochemical parameters of brain cells. Cytoplasmic Ca²⁺ play an important role in the injurious process of brain cells induced by IRI. Tissue tolerance to a subsequent insult can be induced by ischemic preconditioning (IPC). Hyperhomocysteinemia (hHcy) is a risk factor for ischemic damage to CNS. Ca²⁺-ATPase of secretory pathways (SPCA) localized in the Golgi complex, which is responsible for regulating Ca²⁺ levels in the cytoplasm. The aim of this study was to analyze gene expression at the transcription and translation level (SPCA1 isoform) in brain after IRI. We also monitored biochemical changes of SPCA1 after induction of IPC and chemically induced hHcy. Animals were induced with a short 15 minute lethal ischemia (4-vessel occlusion), followed by a reperfusion of 1, 3 and 24 hours. Another group of animals was induced with a 5-minute by sub-lethal ischemia - preconditioning (IPC). The second group of animals was subcutaneously administered with homocysteine (Hcy) for a period of two weeks, 15 min lethal ischemia was induced followed by reperfusion and induced IPC as described above. SPCA1 gene expression (RT-PCR) and protein levels (Western blot) were supplemented with immunohistochemical analysis of tissue. The levels of mRNA and protein were raised with increasing duration of reperfusion. The correlation between the expression of secretory SPCA1 pathways and IPC was confirmed. On the other hand, the impact of hHcy on the expression SPCA1 appeared as a factor that significantly reduces the levels of SPCA1. Our work allows a deeper understanding of the toxic effect of Hcy. IPC is showing as a perspective tool used in clinical practice and treatment of CNS disorders.

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5. "Changes in MAPK pathways after global ischemia injury of rat brain in association with induced hyperhomocysteinemia."

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Hyperhomocysteinemia (hHcy) is one of the risk factors with presumptive negative impact on the onset/progression of ischemia/reperfusion (IR) injury [1]. Ischemic brain injury is a very severe condition with the multiple etiopathogenesis.

Ischemic tolerance can be developed by preconditioning (IPC), which represents phenomenon of adaptation of CNS to subsequent ischemia [2]. Ischemic tolerance elicits a wide range of events, including complex activation of various intracellular signaling pathways. An altered cross-talk between intracellular MAPK signaling pathways is presumed in the mechanisms of ischemic damage/protection. The ERK pathway is part of this cascade which is involved in promoting cell survival [3]. The aim of this research was to study the changes in MAPK pathways after global IR injury in hippocampus. Namely, the effects of IPC and hHcy on IR-associated alterations of protein levels of ERK were determined. Global brain ischemia was induced by 4-vessels occlusion. Rats were preconditioned by 5 min of sub-lethal ischemia and 2 days later, 15 min of ischemia with reperfusion period of 1h, 3h, 24h and 72h was induced. hHcy was induced twice a day by subcutaneous injection of Hcy (0.45 μ mol/g). Immunohistochemical as well as Western blot analysis identified ERK protein in injured areas. The highest level of ERK protein was detected at the reperfusion time after IPC. Converse effect was observed during reperfusion time after induced hHcy. These results suggest that adaptive mechanisms in the MAPK transduction machinery might have a potential role in tissues response subjected to IR injury and in the IPC. Our observations proved that IPC as well as hHcy affect post-translational changes in the rat brain induced by ischemia.

Supported by VEGA 213/12, and by project: "IDENTIFICATION OF NOVEL MARKER IN DIAGNOSTIC PANEL OF NEUROLOGICAL DISEASES"; co-financed from EU sources and European Regional Development Fund.

6. "Cholinergic-GABAergic interaction in the generation of theta rhythm in transected hippocampal slices."

J. Motylewski

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Theta rhythm is the most spectacular, synchronized activity in mammalian brain. The best known generator of this activity is hippocampal formation. During experiments *in vivo*, pharmacological profile of theta was examined. It was demonstrated that theta activity was correlated with the interaction between cholinergic and GABAergic systems. It appeared that theta rhythm depends on cholinergic excitation, as well as GABAergic inhibition. The crucial question of this study was, whether cholinergic/GABAergic relationship determines the pattern of discharges of theta-related cells. In this study cholinergic-GABAergic interaction in the generation of theta rhythm in transected hippocampal (HPC) slices were examined. During experiments transected HPC slices were incubated in ACSF containing carbachol and 2HS. The recordings included both field theta activity and activity of theta-related cells. All types of theta-related cells, specific for *in vitro* theta rhythm were observed. The data obtained provided evidence for GABAergic mediation in generating cholinergically induced theta. Quantity of theta-related cells was much higher in slices preincubated in CCH + 2HS, than in those treated with CCH only. In addition, all major parameters of theta rhythm (amplitude, power and frequency) were enhanced.

7. "Cholinergic theta rhythm in supramammillary region of posterior hypothalamus slices *in vitro*."

B. Caban, T. Kowalczyk

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Hippocampal formation theta rhythm is one of the best examples of neural synchrony in mammalian brain. HPC theta field potentials in rats consists of high-amplitude, almost sinusoidal waves in 3-13 Hz frequency range. It is well-known that the pathway of theta generation originates in the nucleus reticularis pontis oralis (RPO), then RPO projects to supramammillary nuclei (SuM), and finally through the medial septal area (MS) to HPC and other limbic structures. This tract is called the ascending brainstem-hippocampal synchronizing pathway.

For many years MS was thought to be the only theta "pacemaker" but recent evidence tends to give more credit for HPC theta frequency modulation to SuM. On the basis of this assumption and well-documented existence of rhythmical firing supramammillary cells highly correlated with hippocampal theta, we have conducted *in vitro* experiments in the search of theta rhythm in posterior hypothalamic slices containing SuM.

The aim of the present study was to induce theta activity in the SuM region with tonic administration of cholinergic (carbachol) or cholinergic/GABAergic (carbachol/bicuculine) agents. 15 out of total 22 preparations generated well-synchronized theta activity. Among them, 7 were found to generate theta after carbachol treatment and 8 after bicuculine/carbachol perfusion. Moreover, both carbachol and carbachol/bicuculine theta was abolished after atropine sulphate administration.

Supported by NCN grant 2011/01/B/N24/00373

8. "Pharmacological activation of metabotropic glutamate receptor subtype 5 reduces Spike and Wave Discharges in the WAG/Rij rat model of absence epilepsy."

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Absence epilepsy is generated by the cortico-thalamo-cortical network under the form of spike and wave discharges (SWDs) as captured on the cortical EEG. This loop is under the control of a reverberant excitatory glutamatergic projections that are shaped by inhibitory GABAergic interneurons both in the thalamus and cortex. The control of firing properties of this network has been demonstrated to be also under the influence of the group I metabotropic glutamate receptors. Furthermore, the use of animal models to identify molecular and cellular mechanism has sometimes been controversial due to lack of supplementary specific group I mGlu receptor subtype ligands and also how genes are being expressed in different animal models. We have used the WAG/Rij rat model and recently synthesized group I mGlu receptor ligands to study the in vivo influence of mGlu5 receptor on SWDs.

Symptomatic WAG/Rij rats showed lower levels of mGlu5 receptor protein in ventrobasal thalamic nuclei as compared to age-matched controls, the reduced expression of mGlu5 receptors in the ventrobasal thalamus of WAG/Rij rats was confirmed at mRNA level by in situ hybridization.

Systemic injection of the selective mGlu5 receptor NAM, MTEP (30 or 10 mg/kg, i.p.), did not influence the number of SWDs; in contrast, pharmacological activation of mGlu5 receptors with a selective and systemically active receptor PAM, VU0360172-6 (10 or 3 mg/kg, i.p.), drastically reduced the frequency of SWDs during the first 2 hours after administration. No reduction was seen when the PAM was combined with MPEP. These data suggest that mGlu5 receptors exert a phasic control over the generation of SWDs, and that mGlu5 receptor PAMs are potential candidates to the treatment of absence epilepsy.

9. "The effects of transcranial DC stimulation on absences."

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Transcranial direct current stimulation (tDCS) is a novel approach of brain stimulation which has been suggested as a helpful therapy for some psychological and neurological disorders. The cortical neuronal excitability changing properties of tDCS make it a possible therapy for different types of epilepsy. To examine if tDCS is an effective therapy in absence epilepsy and to improve our understanding about mechanisms involved in its antiepileptic action, the present study was conducted in the WAG/Rij strain of rats, a valid genetic model of absence epilepsy with spontaneously- occurring age dependent spike and slow wave discharges (SWDs) due to a hyperexcitable focus in the somatosensory cortex.

Methods: Ten male WAG/Rij rats, minimally six months of age were used. Two stimulation electrodes were cemented on the cranium above the focal regions in the left and right hemisphere. EEG electrodes were epidurally implanted. Rats received 4 series of 15 minute cathodal and anodal stimulation of 100 μ A with an interval of 1h45 in a counter-balanced order while EEG was recorded and behaviour was monitored. In a second experiment (n=4) the cumulative effects of cathodal stimulation with the same intensity and duration at 4 different time points were examined.

Results: Cathodal tDCS decreased the number and total duration of SWDs in WAG/Rij rats ($p < 0.05$) in comparison with anodal stimulation, but only during and after the first 15 min of stimulation (Exp 1). The effects of cumulative cathodal tDCS (Exp 2) tended to increase ($F = 3.14$, $p = 0.06$) over time. Cathodal stimulation tended to activate the rats.

Conclusion: The preliminary outcome shows that cathodal tDCS can be considered as an effective method to reduce SWDs in this genetic absence model and that its effects may be longer than the actual duration of tDCS. Whether the reduction

is due to changes in the excitability in the focal region or whether the effects are secondary to the behaviour changes, needs to be established.

10. "Electrical stimulation in the thalamus of the WAG/Rij rat initiates a mild form of generalized limbic convulsive epilepsy."

I.B. Iotchev, K. Halfwerk, S. Riemann, S. Vreeke, A. Lüttjohann, G. van Luijelaar

Intro: Spike-wave discharges(SWDs), the EEG-correlates of absence seizures, originate in the cortico-thalamo-cortical network, containing the somatosensory cortex and the Vento-Posterior Medial nucleus of the thalamus(VPM). Afterdischarges(ADs), mimicking SWDs, were observed in a previous study directly after electrical stimulation(ES) of the somatosensory cortex. Using an animal model of absence epilepsy, it is investigated whether ADs can be elicited in the VPM. An increase in SWDs was expected for stimulating the Anterior Thalamic Nucleus(ATN). ATN-coactivation during SWDs suggests the ATN is sustaining seizures after their onset.

Method: 18 male, adult WAG/Rij rats received ES of varying frequencies and intensities to either the ATN or VPM within 12 sessions. EEG was recorded from the thalamus and cortex, comparing the occurrence and duration of ADs and SWDs across groups. The behavior was monitored and quantified.

Results: ADs were found in both groups, strongest in the VPM. More SWDs were observed during ATN stimulation. Eventually both groups showed a decrease in SWDs and ADs and an increase in wet-dog shakes and de novo 2 Hz epileptiformic episodes. Mild convulsions were observed incidentally two weeks later.

Conclusions: ADs arise from interference with the primary SWD-circuitry. Higher AD-occurrence due to VPM-stimulation confirms the VPM is part of this circuitry. VPM-stimulation also leads to a faster decrease in SWD-occurrence compared to ATN-stimulation. Interestingly, convulsive symptoms emerged in both groups. Such change in symptoms was never observed in WAG/Rij rats before, but is known from patients. This suggests a thalamic trigger for the transition from absence- to convulsive epilepsy.

11. "Association of EGF and p53 gene polymorphisms with major depressive disorder."

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Major depressive disorder (MDD) is a mood disorder affecting a large portion of population. Growth factors play significant roles in specific neuronal terminal differentiation of the developing brain and in neuronal survival, axonal branching and synaptic plasticity of the adult brain. Epidermal growth factor (EGF) is a potential player in either the etiology or the expression of depression. A nuclear phosphoprotein p53 is involved in neurodevelopmental processes and can constitute a candidate susceptibility gene for mental disorders. Our aim was to investigate whether EGF promotor polymorphism (A61G) and p53 polymorphism at codon 72 predispose to MDD. These polymorphisms were studied in 129 patients with MDD (52 men and 83 women) using PCR-RFLP method. The control group consisted of 253 (107 males, 146 females) healthy blood donors from central Slovakia. We detected no significant differences in the allele and genotype frequencies of EGF A61G or p53 Arg72Pro between the patients and the controls. Sex-stratified analysis showed opposite effects of EGF G/G and AG+GG genotypes on MDD in males versus in females. Genotypes G/G and AG+GG had a significant protective effect in male subjects with MDD (OR= 0.286; P=0.001 and OR= 0,305; P=0.001, resp.) in comparison to the genotype AA. Allelic comparison revealed increased risk for G allele in women (OR=1.45; P=0,07). We observed 2-fold increased risk in women with AG+GG and Arg/Arg genotype compared to women with AA and Arg/Arg (OR= 2.06; P=0.089). Our results suggest that the allele G is connected with higher risk of MDD in women than in men. The co-presence of genotypes AG+GG and Arg/Arg is connected with higher risk of MDD in women.

Acknowledgements

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12. "Polymorphism in the CRF1 (CRHR1) gene and temperamental traits."

A. Zielińska, W. Domozych, P. Czerski, F. Brockschmidt, S. Heilmann, S. Herms, W. Dragan
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Corticotropin releasing hormone receptor 1 (CRF1), in humans encoded by the CRHR1 gene, is a protein involved in the functioning of hypothalamic-pituitary-adrenal axis and thus it is responsible for the regulation of organism's stress response. Numerous research data shows connections between various polymorphisms in CRHR1 gene and the occurrence of different mental and behavior disorders, such as depression, anxiety disorders and alcohol abuse, in subjects with stressful life events and childhood trauma.

In the present study we investigated possible associations between 22 SNPs in the CRF1 (CRHR1) gene, traumatic life events and temperamental traits according to Gray's reinforcement sensitivity theory in a group of 425 adults. Temperament traits were assessed using Polish version of Carver and White's BIS/BAS scales. To test statistical significance two-way ANCOVA (SNP x trauma) was conducted. After controlling for sex and age a main effect of rs242948 polymorphism on BAS Drive scale has been found. Additionally haplotype analyses have been performed.

The results of our study give evidence for the genetic basis of temperamental traits and, as rs242948 polymorphism has been demonstrated to have some effect on adult depression in subject with childhood trauma, they may indicate that BAS Drive trait may be potential mechanism linking the CRF1 (CRHR1) gene variability and proneness to mood disorders.

13. "A pragmatic approach as a measure of the effectiveness in psychiatric and neurological research."

Ł. Kaczyński, B. Solnica

Department of Diagnostics, Jagiellonian University Medical College

Background: Acquisition of scientific data became the gold standard in making decisions concerning the selection procedure in the course of the treatment the patient. The primary source of scientific evidence for health technology assessment (HTA) are randomized controlled trials (RCTs), but possibility of transfer of the results and conclusions from RCTs to the level of routine practice is problematic. In this situation an important role begin to play studies that provide data on effectiveness – pragmatic clinical trials (PRCTs).

Aim: The aim of this study was to gather and systematize the current information about pragmatic randomized trials in psychiatry and neurology.

Methods: A systematic review in Medline through Pubmed using the following query: "pragmatic OR practical OR naturalistic OR real world" was performed.

Results: Using this search strategy 10 920 hits were obtained, of which a preliminary evaluation included nearly 40 publications. The included research (e.g. CATIE, IMPACT or EVIDEM-ED) demonstrated that the best reflection of the usual conditions of medical practice (generalizability) in psychiatric or neurological PRCTs can be obtained mostly through minimization the exclusion criteria, development of broader inclusion criteria or broaden the scope of evaluation of patients. Found studies will be also evaluated using tools which can solve the problem of determining whether the results of a randomized controlled trial may be really regarded as pragmatic: PRECIS criteria.

Conclusion: Properly assessed PRCTs data in conjunction with information about the efficacy from RCTs will serve as a whole to determine effectiveness of investigated drugs or methods in psychiatric and neurological trials.

14. "The brain correlates of the mechanisms engaged in the van der Molen-Keuss effect – an fMRI study."

I. Roszuk^a, M. Gut^a, I. Szumska^a, P. Jaśkowski^a, R. Winiarski^b, R. Blaut^b, W. Szeszowski^b and A. Cieszanowski^b

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Elongation of reaction time (RT) is a typical effect of extremely loud auditory or ultrabright and large visual stimuli, but only in case of the choice reaction task (CRT). In a simple reaction task (SRT) the greater stimulus intensity the shorter RTs. It was hypothesized that this effect results from an arousal-driven elongation of response-selection processes (the van der Molen-Keuss effect). To shed some light on the issue of its neurobiological basis, we conducted the event-related fMRI study in which participated 18 volunteers. The stimuli used in the experiment were squares with a black letter (A or O) in

the center of them. Five luminance levels of squares were used: 5.45, 22.75, 109.5, 520 and 2366.7 cd/m². The experimental session was divided into 3 runs: two SRT blocks (one for left and one for right hand) and one CRT block. During SRT runs participants responded with the right (or left) hand to all stimuli, while during CRT the left/right response key was assigned to A/O respectively. The behavioral results showed that in SRT the more intensive stimuli the shorter RTs, however this relationship was obtained only for the first four levels of intensity (except of the greatest 5th level). Moreover, in CRT we did not observe a clear and typical van der Molen-Keuss effect in RT values, because there were shorter RTs to 2nd level of luminance than to the 1st level, but the RTs were extended also in case of even 3rd level of stimuli intensity. These results will be discussed in the context of the brain activation patterns obtained for each stimuli intensity in SRT and CRT separately, especially the role of the basal ganglia and cortical areas in response selection processes engaged during CRT in case of the greatest luminance level.

15. "SNARC-Like Effect Based on Luminance Magnitude and Response Duration."

M. Lewicki, M. Gut

Department of Cognitive Psychology, University of Finance and Management, Warsaw

There are several ways in which magnitudes may be used to represent mentally the space, time, number, luminance, rate, etc. A Theory Of Magnitude (ATOM) predicted that manipulating of magnitudes may share a common mechanisms located in the parietal cortex. A connection between space and number magnitude has been established and it is clearly demonstrated by the so-called SNARC (Spatial-Numerical Association of Response Codes) effect. However, it is unclear how a non-numerical magnitudes (such as luminance level, luminance contrast) are represented in the brain. It is possible that the brain represents magnitudes across different dimensions using a common abstract magnitude code. The aim of the study was to find interactions between the intensity of visual stimulus and reaction time (RT). We applied the typical SNARC-paradigm to a non-numerical stimuli. Forty-two volunteers participated in the experiment (consisted of two identical blocks of trials) and performed the luminance level judgment task. Each trial started with a fixation point replaced by the stimulus – a centrally presented square. The stimuli varied in four values of luminance (2,60; 5,64; 33,46 and 67,31 cd/m²). It means that two squares were defined as the "brighter" ones and the other two as "darker" ones. Responses were made with the left and right hands on the left and right response keys. Participants indicated whether the stimulus was the brighter square or the darker one. One half of the subjects were asked to respond to the brighter (darker) stimuli with the left (right) hand respectively, while other participants received the reverse response key assignment. Results did not show a significant differences between groups in RTs to brighter and darker stimuli, what means that there is no confirmation of the concept of "bright" and "dark" spatial representations in the brain.

16. "The role of procedural memory in number processing – an fMRI study."

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Brain representations of numbers appear to be spatially organized according to the so-called mental number line (MNL). We investigated the neurobiological mechanisms underlying this phenomenon using an orienting attention paradigm during fMRI scanning. Each trial started with a fixation point replaced by a cue stimulus. The cue was one out of four digits (1, 2, 8 or 9) or non-digit symbols (#, %, & or \$) sets. The target stimulus consisted of an intermixed pair of such digits and/or symbols and participants responded by indicating the position(left/right) of the cue digit or symbol within the target. The digit position within the target was either congruent with its localization on the MNL (e.g. 8 on the right) or incongruent (e.g. 9 on the left). The trials with non-digit cue were defined as neutral condition. The results showed faster reactions to low than high number magnitude digit and significant interaction between magnitude and congruency. The fMRI results showed right parietal activation only after non-digit cue presentation, while digit cue activated basal ganglia and cerebellum. Moreover, the activation patterns were dependent on the digit cue magnitude. The activation in basal ganglia and cerebellum was observed also after presentation of the target with a digit, irrespectively of the congruency. The functional asymmetry patterns were dependent of the digit magnitude in the target. In trials with low digit magnitude the right hemisphere as well as left cerebellum preponderance was observed, while in trials with high digit magnitude the opposite pattern was present. Furthermore congruent and incongruent trials contrasted with neutral ones revealed the

activation in sensory-motor areas. These results are discussed in the context of the brain lateralization concerning the digit magnitude processing and the role of procedural memory and sensory-motor processes engagement in such spatial-numerical task performance.

17. "Effect of visual stimulus intensity on the reaction time of the choice task - A spatio-temporal EEG analysis."

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Previous studies revealed that in simple reaction tasks reaction time (RT) decreases as a function of stimulus intensity although in choice tasks paradoxically long RTs have been observed with auditory stimuli of high intensity (Van der Molen and Keuss, 1979, 1981). This so-called van der Molen-Keuss effect has additionally been observed with visual stimuli of high intensity (Jaśkowski & Włodarczyk, 2006). Previous ERP studies showed that the amplitude of both early (P1) and late (P3) components decrease with increasing intensity. However, the latency of the stimulus-locked lateralized readiness potential (s-LRP) was found to be U-shaped, suggesting that the locus of the van der Molen-Keuss effect is in premotor processing stages (Jaśkowski et al, 2009). In the current study, visual stimuli with three intensity levels were used to further examine the locus of this effect in both simple and choice tasks. EEG was measured from 64 electrode positions and was analyzed with the use of standardized low resolution brain electromagnetic tomography (sLORETA), to determine the likely neural locus of the van der Molen and Keuss effect. The behavioral data replicated the van der Molen-Keuss effect in the choice task. Results from sLORETA comparing these from the choice task with those from the simple task showed increased activation in the Cingulate Gyrus for the first and the second intensity. For the third intensity activation was inhibited. These findings will be discussed in terms of hypothesis proposed by van der Molen and Keuss, which assumes that this effect of intensity results from an arousal-driven elongation of response-selection processes.

18. "The effect of spatial predictability of digits assessed with behavioral and electrophysiological measures."

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Several studies suggest that digits are automatically represented along a mental number line. In line with this idea, responses to stimuli in the left visual field are faster when preceded by low-magnitude digits. In the current study, we investigated the role of spatial predictability of digits by using them as predictive or unpredictable spatial cues in an endogenous orienting paradigm. Each trial started with a fixation point that was replaced by the digit "2" or "9". After 1050 ms a target (diamond/square) was presented to the left or right from fixation together with a distractor (hexagon) on the opposite side. Participants were instructed to press a left or right button to a diamond or square, respectively. In the predictive blocks of the experiment, participants were informed that the target would most likely be presented on the left side after a "2" and most likely on the right side after a "9". In the unpredictable part there was no systematic relation between digit magnitude and side of the target. The results revealed faster reaction times (RT) to validly than to invalidly cued targets in the predictive block, but no systematic facilitation when digits were unpredictable. These results were additionally confirmed by effects on the amplitude of the target-evoked N1 component. Additionally, faster RTs were observed in the unpredictable as compared to the predictive blocks. Furthermore, in the predictive block, the N1 component was enlarged for invalidly cued targets. Together, these results suggest that the orienting effect by digits is not strongly automatic.

19. "Neuroplasticity after Physical Therapy. A Pre-Study: Test-Retest Effects in Healthy Participants."

I.M.Zielinski ^{a,b},

J.W. Ek ^c, **E. van den Broeke** ^d, **J. van Egmond** ^d, & **C.M. van Rijn** ^b

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The P300, a positive deflection in the human event-related potential has frequently been used to study maladaptive neuroplasticity in chronic pain patients. It has not only been found that patients suffering from chronic pain show a significant increase in P300 latency, but furthermore that successful pain therapy is able to normalize this latency. Hence the P300 can be used as an objective parameter to assess pain relief in chronic pain patients. Pain exposure physical therapy (PEPT) is a new treatment for patients with complex regional pain syndrome type I (CRPS-I). An important question is whether PEPT is able to reverse the maladaptive neuroplasticity of CRPS- I patients, which is thought to be the cause of the chronic pain. Using the P300 as an objective parameter to assess pain relief and as a measure of neuroplasticity, this question could be answered. However, before testing the assumption that the P300 changes due to the pain relieving effects of the PEPT, it is important to find out, whether there is a general effect of physical therapy (sham PEPT) on the P300 in healthy controls. The values of absolute peak latency and amplitudes of the P300 were recorded in 15 healthy participants before and after a sham therapy. No test- retest effects were observed. The P300 can therefore be used as a reliable measure to evaluate pain relief and neuroplasticity following PEPT in CRPS- I patients.

20. "Electrodes in the Brain – Does Subthalamic Deep Brain Stimulation (STN-DBS) affect cognitive functions in Parkinson's Disease Patients?"

K. Potasz, A. Pirga, K. Kulikowski

Parkinson's Disease (PD) is one of the most common neurodegenerative disorder. It is usually characterized by its motor impairments, but several changes in cognition and personality also occur. The cognitive domains most often affected in PD patients include executive functions, verbal fluency, attention difficulties, slow thinking, memory problems, visuospatial functions. STN-DBS has become accepted treatment for movement disorders for well-selected patients with medically intractable PD. The beneficial effect of STN-DBS on motor symptoms in PD is well established, while its effect on cognitive functions is still controversial. Several reviews reported reductions in verbal fluency as the most common result after STN-DBS, (Parsons et al., 2006). Another studies reported declines in verbal memory, psychomotor speed and visuospatial memory. Other investigators have even suggested that STN DBS might hasten the onset of dementia, particularly in older patients, (Volkman et al., 2010).

Using a comprehensive neuropsychological assessment, we examined the cognitive effects of bilateral simultaneous STN-DBS in 10 PD patients compared to the group of 40 medically-managed patients with idiopathic PD. Our research has been carried out in the Department of Neurology at Jagiellonian University Medical College in Cracow. The purpose of our poster is to present the results of the cognitive assessment of these two groups of PD patients.

21. "Differences between perceptual noticeable and unnoticeable changes in the human voice pitch reflected by mismatch negativity. The attempt to support dual pathway model in auditory cortex."

M. Wrzosek, J. Maculewicz

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Mismatch negativity (MMN), the EEG component observed when the change in the acoustic signal occurs, is usually correlated with human discrimination threshold. Authors would like to combine the idea of MMN component with hypothesis of dual processing streams with dorsal stream responsible for action, which has been proven in the case of unnoticeable control of the human voice. Normal hearing listeners were instructed to relax, look at the small cross fixation point in front of their eyes and to not pay special attention to the presented auditory stimuli. They heard series of 960 recorded vocalized vowel /u/ each lasting 250 ms with 140 ms intervals. The series contain randomly 720 times repeated standard stimuli ($f_0=247$ Hz) and 8 deviants each repeated 30 times. Deviants differed in fundamental frequency (10, 20,

50, 100 cents in both directions) with the difference detection threshold 26 cents. The experiment was design in Presentation. Stimuli were presented via insert headphones ER-2 Etymotic Research. The electroencephalogram (EEG) results were continuously recorded by The Biosemi Active Two (64-channel) and event-related potentials (ERP's) were obtained in Brain Vision Analyser 2. The preliminary results from our experiment show that MMN occurs for both noticeable and unnoticeable changes for electrode Fz. Statistically significant difference in latencies of MMN weren't found for different parameters of stimuli. Our initial results might reflect the detection of perceptually unnoticeable differences, which may serve the mechanism responsible for motor compensation during the feedback vocalization with frequency changes.

22. "MCR: The executive functioning and depression in the group of stroke patients"

E. Błaszczuk, J. Różycka

In the contemporary times stroke is said to be the leading cause of adult disability, especially when refers to patients after 60 years old. The impairment of cognitive and emotional functioning in stroke patients are frequently the subject of neuropsychological observation and diagnosis. In this group dysexecutive syndrome seems to be prevalent when cognitive dysfunctioning is discussed (Pohjasvaara et al., 2002) and co-morbidity of depression influences substantially stroke patients' day-to-day life (Melkas, Vataja i wsp., 2010; Bour, Rasquin, 2011). The executive function is the basis of efficient functioning in the present times. It is concerned to be responsible for such abilities as- inhibition and cognitive control, speed of mental processing, cognitive flexibility, theory of mind, ability to comprehend of figurative and abstract concepts, visual-spatial planning and planning of complex activity, as well (Vataja, 2003; Martin, MacDonald, 2006). The research concerning the relationship between localization of stroke and particular executive dysfunction are ambiguous. Recently, the laterality is postulated to play a significant role when it comes to the specified components of executive dysfunction. The aim of this poster is to present the issues concerning laterality of executive dysfunction after stroke based on the latest research and preliminary report of our studies. In the preliminary research 15 patients and 15 non-patients took part. Patients were examined during their stay at the neurology department (between 7 and 10 day of hospitalization). The results of the research are still in elaboration.

23. "The hypothetical predictors of prospective memory impairment in pulmonary diseases."

M. Witkowska
Uniwersytet Gdański

Chronic pulmonary disorders, such as asthma (AS) and chronic obstructive pulmonary disease (COPD) are diseases which lead to respiratory failure. Decreased transportation of oxygen to the brain may affect mental efficiency, including prospective memory (PM) which is a crucial cognitive process associated with formulation of goals and intentions that will be fulfilled in the future. The main objective of the research is to establish the general characteristics of PM and to specify the hypothetical predictors of it's impairment in pulmonary diseases. Several tests (i.e. a quasi-experiment based on the Cambridge Prospective Memory Test, Beck Depression Inventory, Prospective-Retrospective Memory Questionnaire) were administered to 117 adults diagnosed with allergic rhinitis (AL), AS and COPD and control subjects. COPD group (mean=21.97,SD=5.75) compared with other groups, obtained lower scores in PM performance tasks ($F(3,112)=38.55, p<0.001$). Also COPDs (mean=32.44,SD=10.28), similar to AS patients (mean=34.87,SD=7.70) self-assessed their overall level of PM functioning, defining it as below norm ($F(3,112)=12.42, p<0.001$). Decreased level of depressive symptoms in the controls & high self-assessment of PM in ASs explains better functioning of the PM. In COPD and AS groups - the higher the rate of FEV1 (less respiratory failure) and fewer cigarettes smoked per day, the better functioning of PM. There is a significant relationship between the PM and type of illness. The level of respiratory failure and the number of cigarettes smoked per day directly affects the cognitive functions of pulmonary patients and their ability to cope with the disease.

24. "Relation between age and theta/gamma ratio: The moderating role of working memory capacity and sex."

A. M. Wiczorek

Interdisciplinary Center for Applied Cognitive Studies, Warsaw School of Social Sciences and Humanities and Visual Laboratory, Nencki Institute of Experimental Biology.

Older adults, when compared to younger participants, show apparent decrease when tested on various cognitive tasks. In this study we tested the relationship between age, cognition and psychophysiological measures. Two groups of participants - younger (<20) and older (>50) were tested with a battery of cognitive tasks. Additionally, to test the neuronal correlates of age-related cognitive decline, we measured the spontaneous EEG from prefrontal region. With the method developed by Kamiński et al. (2011) we calculated the individual length of gamma cycle, and correlated it with level of performance in cognitive tasks. The results show that psychophysiological measures are correlated with age. Moreover, we discovered that this effect was moderated by working memory capacity and sex.

MEDICAL CASE REPORTS

Saturday 21/04/2012

1. "Magnetic resonance spectroscopy and its role in diagnosis of brain tumor - case report."

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Magnetic resonance imaging (MRI) is standardly provided in patients with brain tumors and gives informations crucial for clinical decision making and postoperative monitoring. Magnetic resonance spectroscopy (MRS) provides informations about brain metabolism.

We present a case of 42-years old woman with brain tumor. Initial symptoms were: paresthesia of left hand and headache. Later appeared uncontrollable convulsions of left hand, neurological examination showed no deficit. During the next days progressively developed weakness of left sided extremities. Computer tomography showed expansive tumor in fronto-parietal area in right hemisphere (L.dx) with significant perifocal oedema.

Before surgery we examined the patient on MRS in order to view to metabolic activity of the lesion and find the most representative (biochemically active) part of tumor to increase the accuracy of bioptical examination of tumor sample.

Patient underwent surgical near-total extirpation of the tumor F L.dx. After surgery persisted plegia of left upper extremity and severe paresis of left lower extremity. Histologically was confirmed glioblastoma multiforme (WHO grade IV.)

During the next 4 months patient underwent chemotherapy (temozolomide) and external radiotherapy. Neurological status deteriorated, patient had plegia of left sided extremities. Five months after diagnosis patient died in consequence of failure of vital functions as a result of intracranial progression of tumor growth.

Patient underwent 3 MRI and MRS examinations – before surgery, 4 weeks and 4 months after surgery. Within MRS we focused on mapping signals mainly of N-acetyl aspartate (NAA), choline and creatine, whose changes are indicators of tumor activity. We found higher level of choline, creatine (indicating presence of tumor cells) and lactate (indicator of presence of necrosis) and lower levels of NAA (as a result of inhibition of healthy neurons). Metabolic map of choline showed higher amounts of choline beyond the macroscopic boarder (contrast-enhanced ring) seen on conventional MRI, what indicates that metabolic spreading of tumor outruns macroscopic spreading. Adjuvant therapy resulted in continuing reduction of NAA signal and higher levels of lactate.

MRS is appropriate additional examination that helps to differentiate between tumorous and non-tumorous lesions, in case of tumor helps surgeon to find a place in tumor with highest metabolic activity to obtain the most accurate biopsy. MRS also helps to detect early recidive and distinguish it from post-radiation changes.

2. "Friedreich's ataxia; a case report and short review of the literature."

A. M. Gurgacz, S. Bartyzel

INTRODUCTION: Friedreich's ataxia (FRDA) is the most common form of hereditary ataxia. About 97% of FRDA cases are caused by GAA repeats expansion on chromosome 9q13 leading to deficiency of frataxin protein. Key symptoms of FRDA include progressive limb and trunk ataxia, dysarthria, loss of vibration sense, extensor plantar responses and impairment of the tendon reflexes. Hypertrophic cardiomyopathy, scoliosis and diabetes mellitus are also very common.

CASE REPORT: A 25-year-old man was admitted to the Department of Neurology of Jagiellonian University Medical College with exacerbation of cerebellar syndrome. At the age of 11 tripping and slow speech occurred. The patient also suffered from hypertrophic cardiomyopathy and neurogenic scoliosis which was operated. Molecular diagnosis confirmed Friedreich ataxia. No familiar case of FRDA was noticed. The patient was treated with synthetic analog of coenzyme Q10.

On examination the patient had significant dysarthria, dysmetria, gait instability, loss of balance and positive Romberg test. Diadochokinesia and the tendon reflexes were impaired. Visual impairment, loss of vibration sense and the Babinski sign tended to be asymmetrical.

EMG examination revealed no sensory response in peripheral nerves. There was electric silence in the muscles at rest. Transthoracic echocardiography disclosed left ventricular hypertrophy and systolic dysfunction. Rehabilitation was ordered. Cardiac dysfunction required institution of B-blocker and angiotensin-converting-enzyme inhibitor. Treatment with synthetic analog of coenzyme Q10 was continued.

Providing multidirectional care is of great importance for patients with FRDA to improve the quality of life.

3. "Hemichorea in patient with stroke."

E. Klimiec, P. Moskal

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A 68-year old female was admitted to the Department of Neurology due to involuntary movements of right upper and lower limb with abrupt onset on the previous day. They were preceded with agitation and inadequate behaviour observed by family for few days. Past medical history was non-significant.

On neurological examination the patient was conscious but disoriented to place and time and had problems in recalling past events. Patient had mild motor aphasia. Chorea and dystonia were observed in right limbs. Chorea was constantly present but had variable severity. It was aggravated when patient was stressed. Dystonic movements were mild and rare. Two generalized tonic-clonic seizures occurred on the first day of hospitalization.

There was a loss of insular ribbon sign in the left hemisphere in CT scan. Brain magnetic resonance imaging showed lesions in head and the anterior part of caudate body and putamen. EEG, ECG and USG of cranial arteries did not show any significant abnormalities. Treatment with acetylsalicylic acid 150 mg and simvastatin 20 mg was administered. Involuntary movements diminished within days and were absent when discharged.

Diagnosis of left hemispheric ischemic stroke was made on the basis of clinical symptoms and MRI findings. Lesions in regions involved in motor control may result not only in loss of motor functions but also may rarely present with hyperkinetic syndrome like chorea or dystonia. Therefore, physicians must consider this diagnosis when the onset of chorea is sudden and unilateral.

4. "LCHAD deficiency in a six-month-old boy."

D. Kaps, M. Gmerek, J. Paprocka, E. Jamroz

Student's Scientific Society, Child Neurology Department, Katowice, Poland

The long chain fatty 3-hydroxyacyl-CoA dehydrogenase deficiency (LCHAD, OMIM # 609016) was described in 1989. It is an autosomal recessive disorder. The disease is caused by the deficiency of long chain 3-hydroxyacyl-CoA dehydrogenase. Most symptoms appear during the periods of decompensation with accelerated catabolism such as infections, fever, operations, physical stress. The main symptoms are: hypoglycemia, feeding difficulties, vomiting, diarrhoea, unconsciousness, respiratory insufficiency, heart failure, hepatomegaly, polyneuropathy. The symptoms bear resemblance to the brain inflammation, poisoning or Reye's syndrome.

The authors present a six-month-old boy with manifestations of the Reye's syndrome. The child was first admitted to the Intensive Care Unit then transferred to the Child Neurology Department in Katowice.

At the beginning the baby suffered from fever, vomiting and diarrhea. Physical examination showed hepatomegaly, which was confirmed in ultrasonography examination. In the neurology examination dyscrania, axial hypotonia, increase muscle tone in the extremities (R>L). The laboratory tests detected hypoglycemia, hyperamonemia, hyperlactatemia, elevated transaminases and creatine kinase. Brain MRI showed ischemic changes of the left cerebral hemisphere. The child was put on glucose infusion and special diet which resulted in the improvement of the child status and normalization of laboratory examinations.

5. "Opsoclonus-Myoclonus Syndrome (OMS)."

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Kinsbourne Syndrome, which other names are Dancing Eye Syndrome (DES) or Opsoclonus-Myoclonus Syndrome (OMS), is a neurological disorder with acute onset of non-synchronized, multi-directional eye movements and myoclonic jerks of the limbs, a trunk or a head. Additional symptoms may be ataxia or changes in behaviour. OMS is usually diagnosed in children as an isolated disorder (about 50% of cases). Its etiology is not precisely known but it is believed to be postinfectious or neoplasm-related organism response. OMS may coexist or be a sign of neuroblastoma (3% of cases).

The authors present a 22-month-old girl admitted because of ataxia, intention tremor, opsoclonus, myoclonias. Previously she underwent pharyngitis treated with antibiotic and she experienced head injury several months before. On admission the child was irritated and hyperactive, with general hypotonia, ataxia, opsoclonus and myoclonus. Encephalitis was excluded by CT of the head and lumbar puncture.

In brain MRI hyperintensive subcortical areas were showed. Based on clinical symptoms the patient was diagnosed as Kinsbourne Syndrome. CT of the abdomen and thorax did not confirm neoplastic process. Repeated MRI revealed cortico-subcortical atrophy with widened ventricular system and pericerebral spaces. Gradual improvement was noticed after intravenous immunoglobulin infusions with steroid therapy.

6. "Globoid Leukodystrophy (Krabbe disease)."

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The statistical analysis reveals that Krabbe Disease (OMIM # 245200) is a rare disorder which affects about 1 in 100 000 individuals. A higher incidence has been reported in a few isolated communities in Israel and Scandinavia. Krabbe disease is a degenerative disorder which is caused by mutation in the GALC gene coding the enzyme galactosylceramide beta-galactosidase. It is a progressive disorder and there is no casual treatment. It is caused by a deficiency of galactocerebrosidase enzyme important for myelin metabolism, so the substances which should be broken down start to accumulate and nerves and another parts of the body cannot work properly. The disease is often accompanied by manifestations like: epileptic seizures, weakness of muscles, visual problems.

The authors present 7-year-old girl with unremarkable family history. The pregnancy history was complicated by the threatening of preterm delivery. The psychomotor development was delayed. At the age 4 the girl was diagnosed as having epilepsy. Three years later she was admitted to the Child Neurology Department with suspicion of progressive encephalopathy. On neurological examination: microcephaly, ataxia, intention tremor, dysmetria, improper muscle tone. On brain MRI areas of the abnormal signal in the substantia alba of parietal and occipital lobes were detected. The cerebrospinal fluid examination was normal. The diagnosis was based on the low activity of the beta-galactosidase enzyme in the blood leukocytes.

7. "A case report of a patient with treatment-resistant schizophrenia and massive drug-induced symptoms."

L. Popiołek, I. Gawlik

Students' Scientific Society, Jagiellonian University Medical College, Kraków

Tutors: Dr hab. Dominika Dudek, Dr Marcin Siwek

Introduction: Antipsychotic medications can produce adverse effects, which are usually unpleasant and significantly decrease patients' quality of life. Our poster presents medical history of patient with treatment-resistant schizophrenia, who shows massive drug-induced symptoms, but does not respond to many typical and atypical neuroleptics.

Case description: A 20-year-old male patient KD was first admitted to psychiatric ward in July 2010 due to constant persecutory delusions, delusions of reference, high level of anxiety, lack of insight and depressed mood. Diagnosis of paranoid syndrome (F 20.0) was made.

Between July 2010 and February 2012 the patient was hospitalized 13 times. He was treated with 8 different antipsychotic medications (typical and atypical) and electroconvulsive therapy (which was repeated 35 times). All forms of therapy were ineffective. In August 2010 KD started presenting wide variety of drug-induced symptoms. He presented with muscle stiffness, dystonia, akathisia, dyskinesia, drooling (sialorrhoea), slurred speech (aphasia), psychomotor retardation and morning sleepiness. These symptoms were changing between August 2010 and February 2012, but they were always present and treatment-resistant. After nine months of treatment diagnosis of paranoid schizophrenia (F 20.0) was made.

Conclusions: KD presents massive drug-induced symptoms after treatment with low doses of antipsychotic medications. Mechanism of this abnormality is unknown. It is probably connected with aberrant drug metabolism or with genetic polymorphism of dopamine receptors. Discovering mechanisms of inadequate response to neuroleptics in case of KD requires further and more complex studies.

8. "Non-ketotic hyperglycinemia."

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Non-ketotic hyperglycinemia (glycine encephalopathy) is an autosomal recessive disorder of glycine metabolism caused by a defect in the glycine cleavage system (GCS). It is characterized by progressive hypotonia, drowsiness leading to coma, seizures (most frequently myoclonic seizures), apneas, circulatory problems. During the course of the disease the patients may experience pyramidal syndrome, epileptic spasms, developmental delay, microcephaly, vision and hearing impairment. EEG usually shows: burst-suppression and afterwards hypsarrhythmia may occur. Neuroimaging demonstrates corpus callosum defects and varying degrees of spongiform encephalopathy or cystic degeneration of the brain. Diagnosis is confirmed by abnormally high levels of the glycine in body fluids, especially the cerebrospinal fluid and blood, absence of ketosis in urine analysis.

The authors analyze the clinical presentation and results of additional examinations (including molecular study) of a 5-month-old boy hospitalized in Child Neurology Department of Medical University of Silesia in Katowice in whom non-ketotic hyperglycinemia was recognized. Neurological examination on admission showed axial hypotonia, hypertonia of the extremities, dyskinetic movements, lack of fixation and following objects. Laboratory test demonstrated high level of the glycine in plasma and cerebral spinal fluid (Scriver index = 0,081). Brain MRI disclosed narrow corpus callosum, cystic degeneration and lack of myelination of white matter of the brain.

9. "Aphasia and vertical gaze palsy as a rare presentation of ischemic stroke."

A. Stanuszek, K. Krakowska

INTRODUCTION: There are several areas in the brain which are responsible for speech production. The most common cause of aphasia due to stroke is a lesion in frontal and/or temporal cortex of the dominant cerebral hemisphere. However ischemia of the anteromedian territory of thalamus may also be a cause of so-called subcortical aphasia which is a rare type of motor aphasia. Another rare symptom of stroke is vertical gaze palsy which is usually caused by the lesion in mesencephalic rostral interstitial nucleus of medial longitudinal fasciculus in the midbrain. The presented case shows a co-occurrence of vertical gaze palsy and aphasia due to ischemic stroke.

CASE PRESENTATION: The 67-year-old female patient complained about speech disturbances, double vision and weakness of the right limbs, which started after waking up. On neurological examination she had right homonymous hemianopia, vertical gaze palsy and convergent strabismus of the right eye. She also had aphasia and right hemiparesis. Computed tomography on admission excluded intracranial bleeding. CT performed two days later revealed hypodense area in the left thalamus and midbrain. No pathologies were found in her ECG, heart ultrasonography and USG of carotid arteries. The patient was diagnosed with a stroke of unknown origin.

This case underlines that two apparently unrelated symptoms may be caused by a single lesion.

10. "Diagnostic difficulties in amyotrophic lateral sclerosis."

M. Błaż, A. Stanuszek, K. Krakowska, S. Bartyzel

Department of Neurology, Jagiellonian University Medical College

Introduction: Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disorder of late-onset. The diagnosis of ALS requires evidence of central and peripheral motor neuron degeneration at one or more of the four levels of the central nervous system (CNS): medulla oblongata, cervical, thoracic or lumbar level of the spinal cord. Electromyography (EMG) is helpful in diagnosing this disorder, as it detects lesions in the peripheral nervous system. Neuroimaging in ALS typically does not reveal any specific focal abnormalities in the CNS. In this case report we present diagnostic difficulties caused by a focal lesion in the brainstem of a patient suspected of ALS.

Case report: Neurological examination of a 64-year old patient revealed degeneration at three levels of CNS. Increased mandibular reflex, dysarthria, dysphagia, atrophy and fasciculations of tongue indicated lesions at the level of medulla oblongata. Bilateral Babinski sign and hyperreflexia in all extremities (central motor neuron degeneration), atrophy and fasciculations of muscles in all extremities (peripheral motor neuron degeneration) reflected lesions at cervical, thoracic and lumbar levels of the spinal cord. EMG detected muscle fasciculations and low-amplitude motor nerve responses in all extremities. MRI scan revealed a venous malformation in the ventral part of the medulla oblongata.

The venous malformation may explain the symptoms associated with the level of medulla oblongata. Signs of neurodegeneration at cervical, thoracic and lumbar levels of the CNS are indicative of ALS. Diagnosis of ALS is possible despite the neuroimaging evidence of lesions in the central nervous system, provided that the patient fulfills the diagnostic criteria of ALS.

11. "Case study of 101 years old woman after ischemic stroke of right temporal-parietal-occipital region suffering from anosognosia for hemiplegia with later occurrence of prosopagnosia."

J. Gerłowska

PhD student at Department of Neurology, Medical University of Lublin

101 years old woman before the stroke didn't show abnormal cognitive decline, memory and vocabulary skills characteristic for age and education. Patient's vision was persevered, no other problems with sensory reception were observed.

In the hyperacute period anosognosia for hemiplegia occurred. Within prodromal phase and first 24 hours after stroke patient was responding but moderate Wernicke aphasia was seen. Patient was aware of the deficits, directly showing them to the examining doctor. Later confusion was noticeable with increasing agitation. Anosognosia for hemiplegia with anosodiaphoria was observed during first five days of hospitalisation.

In subacute period patient was responding, fulfilling the commands, slight dysarthria was observed. Patient was neglecting left arm but was aware of the left leg. Hemiplegia was withdrawing in the leg but was still profound in the arm. After two weeks after the onset patient was aware of the hemiplegia only when the arm was put on the contralateral part of the body. When the arm remained on the ipsilateral side anosognosia was still present. After three weeks prosopagnosia was observed. Patient was aware of her cognitive deficits but still mild anosognosia was present. Patient died after 34 days after the stroke.

POSTER SESSION II

Sunday 22/04/2012

1. "Influence of 9-methyl-2[-3-(4-phenyl-1-piperazinypropyl)]-1,2,3,4-tetrahydro-b-carbolin-1-one on epinephrine levels in pregnant Wistar rat brains and de and development fetuses."

A. Anasiewicz, U. Cieślak, K. Wróblewska, A. Podkowiński, D. Lewicki, M. Wilk, M. Gula

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The chemical compound 9-methyl-2[-3-(4-phenyl-1-piperazinypropyl)]-1,2,3,4-tetrahydro-b-carbolin-1-one which resembles the atypical antidepressant drug trazodone in its chemical structure - in particular in the phenylpiperazine group connected by means of a propyl chain with the cycloamide nitrogen atom of the heterocyclic system - is characterized by a potent antiserotonin action. This chemical compound has been synthesized at the Institute of Pharmacology, Polish Academy of Sciences in Cracow.

The aim of this experiment was to study the influence of 9-methyl-2[-3-(4-phenyl-1-piperazinypropyl)]-1,2,3,4-tetrahydro-b-carbolin-1-one on epinephrine levels in pregnant females rats and development rat fetuses.

The studies were performed as recommended by WHO.

Pregnant females (10-12 rats in each group) were treated with 1/50, 1/100, 1/250, 1/500, 1/1000 of DL50 (650 mg/kg body mass) of 9-methyl-2[-3-(4-phenyl-1-piperazinypropyl)]-1,2,3,4-tetrahydro-b-carbolin-1-one in H₂O with carboxymethylcellulose by gavage on each day 7-14 of gestation. Controls were performed on rats: UC – untreated control, TC – treated control with H₂O by gavage in equal volume, TCc- treated control with H₂O and carboxymethylcellulose by gavage in equal volume and ST - pregnant females receiving chlormethine hydrochloride as a standard teratogen.

Females were euthanized and caesarean section were performed on last day of gestation. Macroscopic external evaluation of fetuses, both sectional and skeletal according to Dawson's and Peter's methods / Alcian Blue with Alizarin Red double skeletal staining / were employed. The evaluation of birth defects of internal organs was carried out according to Wilson's technique in Barrow's and Taylor's modifications.

Obtained brains of pregnant females were fixed in liquid nitrogen homogenized and tested.

On the basis of this study it has been found out that 9-methyl-2[-3-(4-phenyl-1-piperazinypropyl)]-1,2,3,4-tetrahydro-b-carbolin-1-one in all doses has teratogenic effects. A significant differences of epinephrine levels in pregnant females brains after 1/50 and 1/100 of DL50 of 9-methyl-2[-3-(4-phenyl-1-piperazinypropyl)]-1,2,3,4-tetrahydro-b-carbolin-1-one was noted.

2. "Influence of low oxygen tension on proliferation and differentiation of Human Umbilical Cord Blood Neural Stem Cell (HUCB-NSC)."

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Culture conditions, that are usually applied for in vitro cell maintenance are characterized by atmospheric oxygen tension (21%). However human Neural Stem Cells (NSC) in their physiological niches such as Subventricular Zone (SVZ) and Denta Gyrous (DG) of hippocampus are exposed to much lower oxygen level (2-8%). The oxygen conditions together with the

other components of the stem cell niche including matrix extracellular proteins, proteoglycans and other cells arranged as a 3D structure, seems to play an important role in maintenance of NSC fate decisions.

In this study we are investigating the influence of low oxygen tension conditions on proliferation and differentiation of Human Umbilical Cord Blood Neural Stem Cell (HUCB-NSC). For this purpose, HUCB-NSC cultivated in two oxygen tension conditions: 21% and 5% with or without presence of dBcAMP (N6,2'-O-Dibutyryl adenosine 3',5'-cyclic monophosphate sodium salt) were compared for the expression of the markers characteristic for proliferation (Ki67) as well as neuronal and astroglial lineage commitment (MAP2, GFAP, β -tubulin, NF200). The presence of tested markers was revealed on the protein (immunocytochemistry) and gene expression level (Real-Time PCR).

Our data show, that the low oxygen tension promote HUCB-NSC differentiation into neuronal lineage. We also observed that low concentration of oxygen increases cell proliferation.

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3. "Induction of pluripotency genes in cord blood derived neural stem cells."

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Pluripotency is regulated by the set of genes including the expression of Oct4, Nanog and Sox2. Methylation status of the promoters of pluripotency genes as well as the chromatin histone acetylation determine self-renewal and differentiation of stem cells.

In this report we were studying the process of induction of pluripotency in neural stem cells using epigenetic stimulation by small molecules, changing oxygen tension and reprogramming proteins: Oct4, Klf4 and Sox2- (9R). We were testing the influence of low (5%) oxygen conditions as well as TSA and RG-108 (histone deacetylase and DNA methyltransferase inhibitors respectively) and proteins on the expression of Oct4, Sox 2, Rex1 and Nanog genes in HUCB-NSC (human umbilical cord blood neural stem cells).

Our results show that low oxygen tension can activate Oct4 and Nanog genes in HUCB-NSC. Epigenetic stimulation by small molecules TSA and RG-108 enhance this process and additionally induce expression of Sox2 and Rex1. The time of cultivation of the cells in low oxygen conditions and the developmental stage of the cells are the important factors for the induction of the expression of "pluripotency" genes. Transduction with reprogramming proteins accompanied by low oxygen level and epigenetic stimulation with small molecules allow successful derivation of iPS cells.

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4. "Xanthine Dehydrogenase Inhibition Stimulates Growth and Development of Human Brain Derived Cells."

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Background. It is very well demonstrated experimentally and proved practically that Reactive Oxygen Species (ROS) play a critical role in the pathological processes of number of disorders. Xanthine Oxidase (XO) as well as the Xanthine Dehydrogenase (XD) are two enzymes responsible for the last steps of purines metabolism, hydroxylation of a wide variety pyrimidine, and the initiators of ROS synthesis. In our current experiments we have analyzed whether exogenous addition of XD's co-ferment - NAD⁺, substrate and its inhibitor- allopurinol are capable for in vitro human brain derived cells growth, development and proliferation.

Methods. We have used described by Mark Mattson neuronal cells' culturing techniques to seed and keep cells in vitro over 12 days. The death of the cells was visualized by the staining with Trypan Blue. Pixcavator and Image Tool programs served for the calculation of the cells' number and size. **Results.** In comparison with the control group (2710,1200 \pm 110,6833) exogenously added xanthine (2704,2500 \pm 156,3334) as well as NAD (2964,0000 \pm 204,2934), NAD and xanthine (2682,3636 \pm 120,9563) didn't play any critical role. Only the group treated with NAD, xanthine and allopurinol (3267,7273 \pm 212,6140, $p < 0,05$) promoted elevation of the cells' number in the statistically significant way on the day 12th. Number of the death cells in comparison with the control groups in the cells groups treated with the

xanthine, NAD, as well as allopurinol group was less ($1900,8889 \pm 285,5781$; $275,6667 \pm 50,8538$; $1096,5000 \pm 167,6762$; $107,3333 \pm 18,8022$, $1480,8333 \pm 397,6639$; $151,8333 \pm 27,2732$; $1486,5000 \pm 15,5000$; $150,0000 \pm 4,0000$), whereas in the NAD and xanthine treated group this number was higher than in the control group in the statistically significant way ($3360,0000 \pm 250,5780$; $277,0000 \pm 18,5023$, $p < 0,05$).

Conclusion. We have concluded that treatment with the low concentration of allopurinol will guarantee the survival of the cells, decrease the number of the death cells and promotes the proliferative processes. These conclusions are similar for allopurinol treatment in condition of exogenously stimulated activity of XO/XD as well as endogenously stimulated activity of these enzymes.

5. "Developmental changes in the expression of calbindin, calretinin and parvalbumin in the anterior thalamus of the guinea pig."

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Calcium ions play a crucial role in the regulation of multiple neuronal activities during development. Intracellular level of Ca^{2+} is tightly controlled by calcium-binding proteins (CaBPs), such as calbindin (CB), calretinin (CR) and parvalbumin (PV). The aim of this study is to revealed developmental alterations in the distribution of these CaBPs within the anterior thalamus, which is a key component of very significant circuit of the limbic system, related to mnemonic processes and emotions. The study was performed on the embryonic (E40, E50, E60) and postnatal (P0, P20, P80) brains of the guinea pig. Coronal sections through the anterior thalamus were processed for a double-labeling immunofluorescence, using solutions of antibody raised against CB, CR and PV. Four nuclei of the anterior thalamus were investigated: the anteromedial (AM), anteroventral (AV), anterodorsal (AD) and laterodorsal (LD). The main findings are: (1) only in the LD, calretinin and calbindin colocalize in perikarya in all of the studied stages; (2) in the AM, where CR appears in perikarya at E50, CB is present only at P80 and both colocalize; (3) starting at E60 of the AV development, CB colocalizes in the bundles of fibres with CR, but not with PV; (4) the AD is devoid of perikarya showing CaBPs immunoreactivity, but displays fairly moderate neuropil for PV and CR. Our results show that the expression of CaBPs differs throughout the ontogeny and it may coincide with some developmental events.

6. "Odor identification, discrimination and threshold in obese adults."

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Introduction and objectives: Studies on the olfactory function in obese individuals brought inconsistent results so far.

The aim of the study was to assess olfactory performance in adult individuals in relation to the BMI range from normal weight, overweight to obesity.

Material and methods: Fifty adult subjects (44 women, 6 men, mean age 64.7 ± 6.6) were recruited from the University of the Third Age. Participants were divided into three groups based on the BMI scores: 13 normal-weight (BMI < 25), 24 overweight ($25 > \text{BMI} < 30$) and 13 obese (BMI > 30) subjects. The age of participants did not differ statistically among groups. Olfactory functions was assessed using 'Sniffin' Sticks' including identification, discrimination and threshold tests.

Results: Obese adults tended to score worse in odor identification and discrimination than normal-weight controls. Olfactory threshold did not differ significantly in studied groups. Odor identification and discrimination correlated negatively with BMI score with statistically significant level.

Conclusion: Our findings suggests, that olfactory functions are weakened in obese individuals comparing the normal-weight people. Observed correlation between BMI score and olfactory features seems to confirm the contribution of olfaction in weight gain process. The understanding of nature of this association requires further investigations.

7. "The insight into animal models of olfactory disorders- comparative study of human and rat rhinencephalon."

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Olfactory disorders are common syndrome in the course of most of human neurological diseases, in particular in neurodegenerative ones (such as Alzheimer's Disease etc.). In those disorders anosmia and hyposmia can develop before other characteristic symptoms, as this is how the preclinical phase most frequently manifests itself. Rats are macrosmatic animals, which means that olfaction is their key sensory modality. This feature might be used in modeling leading to earlier, more reliable and valid detection of previously mentioned clinical conditions in their preclinical stage. Poster presents comparison of rhinencephalon in humans and rats from anatomical, functional and pathophysiological view, and assessment of rat models usability in the research of olfactory disorders associated with neurodegenerative diseases.

Presented project was conducted by Students' Scientific Society "Homunculus" affiliated with Department of Animal Physiology, University of Gdansk and Students' Society of Neurobiology, Faculty of Biology, University of Warsaw. The mutual cooperation was taking place during two weekend-long symposiums and workshops.

8. "Smell or appearance? What determines partner preference in rats?"

P. Zawistowski, M. Dylewski, M. Rykaczewski, I. Michalska, A. Kozłowski, K. Fic, M. Kołtun, E. Kurowska, K. Krawczyk, A. Haraś, M. Gappa, I. Niekraszewicz, A. Działoszewski, A. Gołębiowska, O. Uzarska, K. Ptaszek, W. Glac

Student Scientific Society "Homunculus", University of Gdańsk

It is commonly believed that smell is a very important criterion in partner preference in animals. The purpose of this study was to determine whether olfactory or visual stimuli are more important in mate choice in rats. Experiments were performed on twenty male and female rats. Two male and 2 female rats were used as potential partners and 8 males and 8 females were used as choosing individuals. In the first part of the study, choosing males and females were placed in a three-chamber room. Wire cages with females or males serving as potential partners were placed into the far chambers. Potential partners were additionally placed into carton perforated boxes to hide they appearance (choice on the basis of smell only). In the second part of the study, males and females which were used as potential partners were placed only in the wire cages (choice on the basis of both smell and appearance). In both parts of the experiment, choosing male and female rats were tested daily for 5 consecutive days. The residence time of males and females in each of the far chambers were measured. In the case of male rats, adding the possibility of choosing on the basis of appearance apart from smell led to confirming (or even increasing) the choice made solely on the basis of smell, while in the case of female rats it completely reversed partner preference. The results show that in rats mate choice is made based on both smell and appearance, but it seems that the appearance has a prevailing value.

9. "Modulation of social status in rats by the influence on food competition."

L. Gaffke, M. Rykaczewski, K. Pis, W. Formela, W. Formela, M. Gappa, P. Zawistowski, J. Kostiuk, M. Dylewski, K. Krawczyk, B. Tyda, M. Pobłocka, J. Ruciński, O. Plotta, K. Ptaszek, W. Glac

Student Scientific Society "Homunculus", University of Gdańsk

Animals, including rats, establish strong dominance structures in their colonies. One of the manifestations of social hierarchy is different access to food by dominants and subordinates. The aim of the study was to determine if it

is possible to change social status by an external influence on food competition. The experiment was performed on male Wistar rats. Eight pairs of rats were subjected to food competition tests twice a week for four weeks. For every rat the efficiency index (on the basis of the number of won competitions) and the bravery index (on the basis of offensive-aggressive and defensive-submissive behavior in confrontations) were calculated. The social hierarchy within all the pairs were determined on the basis of the efficiency and bravery indexes. Next, the same pairs of rats were subjected to modified food competition tests twice a week for three weeks. In these tests, submissive rats were favored in access to food (dominants were separated from food, but they saw and smelt it). Then, pairs of rats were again subjected to the food competition tests twice a week for four weeks to determine if their efficiency and bravery indexes changed. The results indicate that favoring of submissive rats reduces disproportions between dominants and subordinates in access to food. These data suggest that in some cases it is possible to equalize the social position of individuals showing initially clear differentiated hierarchy in a group.

10. "In vitro and in vivo evaluation of activity of new synthesized ziprasidone analogues."

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Complex mode of action of atypical antipsychotics, e.g. ziprasidone involving not only blockade of D2 receptor, as in case of classical neuroleptics, but also 5-HT_{2A} antagonism and 5-HT_{1A} partial agonism contributes to the reduction of both positive and negative symptoms of schizophrenia without producing extrapyramidal side effects. A series of quinolone-piperazine derivatives of sulphonamide with benzisothiazole moiety has been synthesized and their in vitro affinity for D₂, 5-HT_{1A}, 5-HT_{2A}, 5-HT₆, 5-HT₇, α ₁ receptors has been evaluated. To establish functional profile of new compounds towards some of above receptors, behavioral tests have been conducted including lower lip retraction in rats as well as hypothermia (5-HT_{1A} inner activity), (\pm)DOI-induced head twitches (5-HT_{2A} inner activity) and apomorphine-induced climbing (D₂ inner activity) in mice. The highest and most promising affinities towards examined receptors were shown for compounds PZ-384, PZ-385, PZ-388, PZ-390. Their K_i values (in nM) were ranging for receptors: D₂ 3 – 6, 5-HT_{1A} 20 – 28, 5-HT_{2A} 2.8 – 6.1, 5-HT₆ 55 – 331, 5-HT₇ 7.4 – 18 and α ₁ 24.8 – 51.5. All studied compounds have turned out to be postsynaptic 5-HT_{1A} receptor antagonists, with the exception of PZ-390, a partial 5-HT_{1A} receptor agonist. All four compounds examined were found to be 5-HT_{2A} and D₂ (PZ-384 and PZ-385) receptor antagonists. In comparison to atypical antipsychotic and antidepressant drugs, the obtained preliminary functional results are promising enough to warrant further detailed research to determine their properties in animal models commonly used to predict antipsychotic and/or antidepressant activity.

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11. "Insect locomotor activity under acute caffeine exposure."

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Caffeine is a methylxanthine commonly used as neurostimulant that increase behavioral activity in humans and various animals. However, very little is known about chronic effects of this compound on insect nervous system, since *Drosophila melanogaster*, was the main study object. So far there were no studies on short-term effects of caffeine in insects. It is suggested that caffeine acts as antagonist of adenosine receptors (AdoR), and also possibly as inhibitor of cAMP phosphodiesterase; besides it also may interact with other cellular targets. The aim of our study was to find out short-term behavioral effect of single-dose injection of caffeine. Different doses of caffeine, synthetic adenosine receptor agonist (CHA), antagonist (CPT) and inhibitor of cAMP PDE (IBMX) were injected into abdomen of 10-day old house crickets males (*Acheta domesticus*). Spontaneous activity of crickets was recorded 30, 60 and 90 min after injection by open field method with the use of digital camera. Activity during 10-min intervals was quantified by SwisTrack software and elaborated calculation formulas. Contrary to expectation caffeine resulted in depression of locomotor activity in crickets in a dose-dependent manner. CPT caused stimulation of the activity but only 90 min following the injection. CHA administration

resulted in inhibition of the activity. These results point out that caffeine, at least after single-dose administration, acts as agonist of adenosine receptor rather than postulated antagonist. Stimulatory effect of IBMX injection did not confirm inhibitory effects of caffeine on cAMP phosphodiesterase.

12. "Synergistic effect of chronic oral octopamine treatment and olfactory colony recognition cues on exploratory behaviour of workers of the red wood ant (*Formica polyctena* Först)."

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Octopamine (OA) is a biogenic amine implicated in the mediation of many behavioural and physiological processes in invertebrates. Among others, OA exerts a stimulatory effect on responses to olfactory communication signals in solitary and social insects, and enhances nestmate recognition in honeybees and ants. We investigated the effects of chronic oral OA treatment on exploratory behaviour of workers of the red wood ant *Formica polyctena* and in particular, on their responses to potential building material (dry pine needles) marked/not marked with olfactory colony cues. Workers from queenright groups were fed during a month with sucrose solution supplemented with OA or with pure sucrose solution. During 15 min behavioural tests single workers were exposed to a pine needle marked or not marked by olfactory colony recognition cues inside a set of two connected test tubes. Chronic oral OA treatment alone did not influence ant behaviour, but OA treatment combined with colony recognition cues (marked needle) exerted a significant stimulatory effect on antennal contacts both with the needle and with the test tube, locomotory activity both on the needle and away from the needle, and general activity of the tested workers. These results suggest that combination of octopamine and olfactory colony cues not only influences responses of the tested ants to potential building material, but also increases their general exploratory activity. This result is thus in concordance with the latest results of other authors showing that OA treatment has a stimulatory effect on scouting behaviour in honey bee workers.

13. "Comparative immunocytochemical analysis of localization of corazonin and adipokinetic hormone in central nervous system of two cockroach species: *Periplaneta americana* and *Leucophaea maderae*."

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Many neuropeptides present in insects have unknown functions, or their function is species-specific. Among these neuropeptides are corazonin and adipokinetic hormone. By using immunocytochemical methods, we confirmed presence of these neuropeptides and determined their localization in central nervous system of two cockroach species: American cockroach (*Periplaneta americana*) and Madeira cockroach (*Leucophaea maderae*).

Distribution patterns which we received are various. There is no colocalization of immunostained cells and pathways of adipokinetic hormone and two isoforms of corazonin in one species. They also differ between these two species. Both in *P. americana* and *L. maderae* conservative corazonin pattern was preserved, which is an evidence for evolutionary old localization pattern of this neuropeptide in insects.

Investigated neuropeptides were found in structures of brain, where they were not detected before. Very important fact is that localization pattern of both corazonin isoforms are not the same and, additionally, are different from the pattern obtained for adipokinetic hormone, what implies that these three peptides play different roles in physiology of investigated animals. Identification of neuropeptides in structures, which have specific physiological or developmental function may be helpful in directing future researches and bioassays.

14. "Links between Alexithymia and the dysfunction of Corpus Callosum."

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The redundancy gain paradigm, a task where visual stimuli are presented to the left, right, or both visual hemifields simultaneously, may provide reliable information about interhemispheric processing offering mainly two measures: the

crossed–uncrossed difference (CUD) and the redundancy gain effect (RG). CUD reaction times are an indicator of interhemispheric transfer time and are usually larger in patients with corpus callosum disorders. An enhanced redundant gain effect (RG) to stimuli presented bilaterally may serve as an indicator of callosal dysfunction as well, and was shown to correlate negatively with the degree of callosal fractional anisotropy (FA) in patients with multiple sclerosis (MS). It has been shown as well that people with callosal dysfunction (including MS patients as well) may exhibit symptoms of Alexithymia where one experiences more or less difficulty in verbalizing own emotions and affects. In our study we sought to determine behaviorally a link between the degree of RG and the degree of self-reported Alexithymia. A preliminary study on 8 MS patients showed an enhanced RG effect in comparison to the control group. Interestingly in the MS group we didn't observe the Alexithymia dominance of men over women. The current study aims at replicating this effect on a far larger study including over 60 MS patients. The data is currently being analyzed.

15. "Searching for clues on Duchenne versus fake smile - how good are we in detecting deception from face."

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The smile is universally recognized from facial expressions or so it has been claimed. It has been observed in many studies that happy or smiling faces are recognized more quickly and with higher accuracy than other facial expressions (Ekman & Friesen, 1982). Nevertheless, judgments of observers whether the person is lying or not are not better than chance (e.g. Ekman & Friesen, 1974; Ekman, 1988). Poster presents two studies on real versus fake smile detection. First study focuses on the effect of time exposure (200 ms, 5000 ms), nationality (Poles, Swedes) and gender (male, female) on detecting fake smile from photographs. Time, nationality and gender turned out to be significant. The longer time the higher participants judge sincerity, authenticity and trust of presented people. The aim of second study, beside studying the accuracy of recognition Duchenne and fake smile, was to find out where participants search for clues about authenticity of smile. Two series of pictures presenting real and fake smile were presented to subjects in two exposure time 500 ms and 5000 ms. Subjects were asked to assess sincerity of presented person, authenticity of smile, trust and liking for them. In addition, eye tracker was used to record data on eye movement and fixation on the interesting areas of the face: eyes and mouth. The results showed that subjects made significantly more fixations on eyes' area compared to mouths' area in both time exposure conditions. Smiles from pictures, both real and fake, were significantly higher assessed in case of short exposure compared to longer one. No statistically significant differences were obtained between the assessment of real and fake smiles - subjects were not able to distinguish real from fake smiles.

16. "Saccadic latency in children with FASD- preliminary study."

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It is evidenced that children with Fetal Alcohol Spectrum Disorders show abnormalities in brain areas which are responsible for saccade generation and inhibition, which cause the increase of saccadic latency and number of sideway errors in saccadic tasks. To evaluate this reports we examined 7 children (mean 10 years) with defined FASD and 6 age-matched controls. FASD children were examined and diagnosed during the therapeutic camp organized by Ernst&Young Foundation with the approval of the project manager- Mrs. Teresa Jadczyk Szumiło. Controls were examined by a psychiatrist in order to exclude children with FASD or other disorders. Children carried two saccadic tasks: the prosaccade, shifting the gaze toward suddenly appearing lateral target and the antisaccade, looking away from the eccentric target to the opposite side. There were no significant differences within the groups neither in the mean, median or variability of saccadic latency in both tasks. In the prosaccade task control children perform higher proportion of saccades characterized by latency between 135 and 179 ms. We found significant differences between the groups for latency distributions (for both tasks). We analyzed distribution of saccadic latency using Carpenter's model LATER. According to it the decision signal r rises linearly (with mean μ and SD σ) from initial threshold S_0 until it reaches decision threshold S_t what causes triggering of saccade. In all controls children the execution of antisaccade task in comparison to prosaccade task was associated with the increased distance between the threshold S_0 and S_t . Only 4 of 7 FASD children have shown such tendency (one of which insignificantly).

17. "Eyetracking as cheap assistive technology."

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University of Warsaw

In Department of Biomedical Physics at University of Warsaw created innovative project of making devices that would help disabled people to communicate with others. It is first program in the world which does not assume any payment from patient. One of ways to accomplish this project is EyeWriter made in our Department. It is a device which enables patient to write any information on computer only by using their eyes. Main advantage of this technology is easiness of control and low costs. Base of this device is common and cheap webcam and open source software. The project also assumes intensive cooperation students with patients. Students task is configuration of all devices to be optimal for patient's individual needs. After the configuration process every participating patient will receive a computer with his individually configured EyeWriter. This year 6 patients took part in this project.

18. "Defocused attention in dysphoria: Eye movement evidence."

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The defocused attention hypothesis (von Hecker & Meiser, 2005) assumes that negative mood broadens attention, whereas the analytical rumination hypothesis (Andrews & Thompson, 2009) suggests a narrowing of the attentional focus with depression. We tested these conflicting hypotheses in two experiments. In first experiment (Brzezicka et al., 2011) we directly measured the perceptual span in groups of depressed and control subjects by using eye tracking the moving window paradigm, in which information outside of a variable-width gaze-contingent window was masked during reading of sentences. In measures of sentence reading time and mean fixation duration, depressed subjects were affected earlier and more strongly than controls by a reduced window size. In second experiment we applied so called „messy desktop“ paradigm, in which participants were required to solve centrally presented task (solving of the anagrams) but than were asked about peripherally exposed items. The results showed better memory for peripheral objects in depressed group. Moreover, the eye movement data analysis revealed that depressed people spent less time fixating on central task, which explained the behaviorally observed better memory for peripheral items. The results from both experiments support the defocused attention hypothesis and seem hard to reconcile with a narrowing of attentional focus in depression.

Literature:

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19. "Neural correlates of phonological awareness for spoken language in subgroups of children with developmental dyslexia."

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Nencki Institute of Experimental Biology

Phonological awareness is a critical skill for reading acquisition and is considered to be a main underlying cognitive deficit in developmental dyslexia. Previous research has shown that typically developing children, but not dyslexic, recruited left dorsal prefrontal cortex (DLPFC) (Kovelman et al., 2011) and left fusiform gyrus (Desroches et al., 2010) when making explicit phonological judgments. Dyslexia however is a very heterogeneous disorder and not all dyslexic children have phonological awareness deficits (Heim et al., 2009, 2010). Here we examined using fMRI the neural correlates of phonological awareness for spoken language in good readers (35 children) and 3 subgroups of dyslexic children with different cognitive deficits. The first subgroup (15 children) had auditory attention deficit and rapid naming deficit but good phonological skills. The second (14 children) had visual attention and phonological awareness deficits. The third (17 children) had phonological awareness and rapid naming deficits. All groups were matched for age (9-11 years), gender, IQ

(<85) and socioeconomic status. In the scanner children had to judge whether two aurally presented words rhyme or not. The performance was better for non-rhyming (94.3%) than rhyming words (90.5%), but the groups did not differ in accuracy or reaction times. In the first group of dyslexic children (with good phonological skills) no areas of hypoactivation compared to controls were revealed, whereas the other two subgroups had lower activity in the left hemisphere in: precuneus (both), supramarginal gyrus and cerebellum (2nd subgroup), dorsal prefrontal cortex and supplementary motor area (3rd subgroup).

20. "Functional Magnetic Resonance Imaging Assessment Of Brain Asymmetry For Language Processing – Methodological Issues."

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Functional magnetic resonance imaging (fMRI) provides a powerful tool for assessing brain asymmetry in various cognitive functions. It is widely used for clinical purposes i.e. preoperative examination in neurosurgery. Still there are some methodological issues that influence the results of fMRI lateralization assessment. Those issues include the paradigm used, the localization of Region of Interest chosen and the method of Lateralization Index specification applied. The report summarizes two years of experience in fMRI assessment of lateralization of language perception and production. The results are being discussed in terms of validity and reliability of the examination.

21. "The effect of physical parameters of auditory stimuli on reaction time response and electrical properties of neck skin."

A. Nowik, J. Moczko, E. Marzec

Simple reaction time (SRT) decreases as a function of stimulus intensity approaching an asymptote for the most intense stimuli. Van der Molen and Keuss (1979, 1980, 1981) reported an U-shaped relationship between reaction time and loudness in difficult tasks requiring choice responses (CRT). In the current experiments, in addition to replicating an U-shaped distribution of CRTs for five levels of loudness intensity, we also found a disparate effect of stimulus loudness on dielectric properties of the skin over time. With the highest loudness, we observed skin-conductivity changes in the dispersion frequency of 50kHz. The rapid increase in skin conductance following stimulus off-set suggests that the observed effect is due to an enhancement in activity of sweat glands and changes in fluid flow in the vessels of dermis.

22. "RESAP: an automated stream for analysis of the resting-state fMRI data."

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Intrinsic fluctuations in the blood oxygenation level-dependent (BOLD) signal exhibit spatial and temporal properties which could be used to delineate functional organization of the human cortex. Currently this neuroimaging method is rapidly evolving. Great part of this development was driven by multicenter collaboration which results in sharing the data from hundreds of subjects (Biswal et al. 2010). At this point there are only few tools which are designed to facilitate analysis of intrinsic alterations in resting BOLD signal. Therefore, there is a need for a reliable combination of software tools which will help in dealing with massive datasets. Here we present the REsting State Analysis Pipeline (RESAP) which is an automated pipeline for investigation of the endogenous changes in BOLD signal. RESAP takes advantages of highly accurate non-linear registration algorithm ANTs and FAST segmentation tool in order to map sources of the spurious variance in BOLD signal. This approach is less computational demanding than other proposals (e.g. Jo et al. 2010) and offers better control of the noise than typical pipelines (e.g. Biswal et al. 2010). It also presents its outcome in user friendly way to aid visual check of the results. [Biswal, B.B., et al. 2010. Toward discovery science of human brain function. P. N.A.S.

U. S. A. 107 (10), 4734–4739.; Jo, H.J., et al. 2010. Mapping sources of correlation in resting state FMRI, with artifact detection and removal. *NeuroImage* 52, 571–582.]

23. "Cardiovascular reactions to affective pictures."

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Faculty of Psychology, University of Warsaw

The aim of the present study was to investigate the impact of the exposition to affective pictures on cardiovascular reactivity. Participants were presented with colored photographic pictures that varied in valence (pleasant-unpleasant), but were equal in arousal. Their cardiac responses to presented stimuli were measured simultaneously. As found in earlier studies, the exposition to unpleasant pictures causes greater heart deceleration than viewing pleasant pictures. The results obtained in the present experiment confirmed that founding. Furthermore, we observed that heart period variability (HPV-HF) increased while unpleasant pictures were presented, but decreased during presentation of pleasant pictures. However, no significant group differences in pre-ejection period (PEP) occurred. This result suggests that deceleration of heart rate while viewing unpleasant stimuli may be explained rather by parasympathetic than sympathetic mechanism. Moreover, described effect probably is not associated with effort mobilization. Instead, consistent with Lacey's (1967) theory, it may be the result of the sensory intake process (perception).

24. "Emotion comes first, color closely follows."

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The details of the mechanism that allows the physical features of visual stimulus to mold into coherent percept pose an unresolved puzzle. Closely related to that question and equally mysterious is the way by which we delineate emotional from neutral visual stimuli. In the current study we focus on the hypothesis that the red color, being evolutionally salient, constitutes an important cue in this process. Using dot probe paradigm we briefly presented pairs of pictures having the same valence (positive, negative or neutral) one of which was always featuring a prominent red dominant. The following target-dot was than flashed either on the side of the red picture (congruent condition) or non-red picture (incongruent condition). P1 component was enlarged in response to emotional pictures as compared to neutral ones, without any influence of color. N2pc component was more negative contralateral to the red picture but only in case of emotional stimuli. Reaction times were shorter in congruent as compared to incongruent condition especially for emotional pictures. The results suggest that the pure valence of the stimulus is evaluated extremely fast and regardless of coloration. The red dominant however acts as an attractor on the later stages of visual processing capturing visual attention and eventually facilitating motor preparation.

25. "Montreal Cognitive Assessment as a new screening tool for dementia in Huntington's disease - a validation study."

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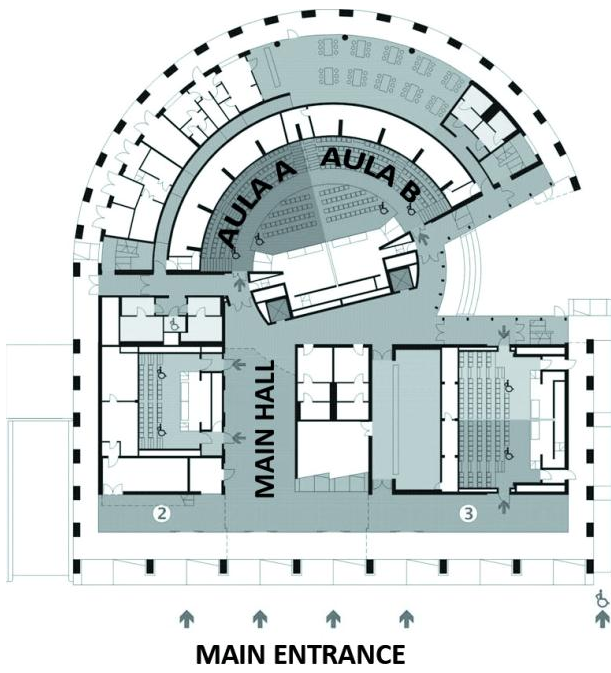
Introduction: Cognitive disturbances are often the first manifestation of Huntington's disease (HD) and are an important factor contributing to patients' disability. Neuropsychological assessment is the most relevant but time consuming method of cognitive evaluation. The Montreal Cognitive Assessment (MoCA) is a new screening instrument which detects early cognitive impairment. However, MoCA has not been compared with neuropsychological tests in HD. The aim of this study was to find cut-off for MoCA that sensitively screens for dementia in HD patients.

Methods: 22 HD patients were examined with MoCA and a battery of neuropsychological tests which assessed 5 cognitive domains: Stroop Test and Perception and Attention Test for attention; Benton Visual Retention Test for memory; Trail

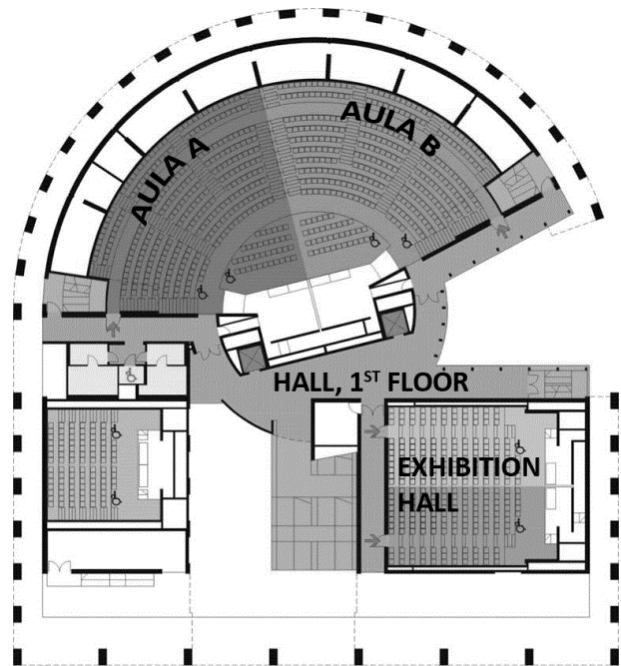
Making Test, Wisconsin Card Sorting Test and Similarities from Wechsler Adult Intelligence Scale (WAIS) for executive functions; Verbal Fluency Test for language; Block Design from WAIS for visuospatial abilities. Dementia was defined as an impairment in at least two cognitive domains. Receiver operating characteristics analysis was used to find a sensitive cut-off in MoCA to diagnose dementia.

Results: According to neuropsychological assessment 15 patients had dementia. The most sensitive MoCA cut-off score was 26, with 100% sensitivity and 71% specificity. Another two patients were impaired in only one cognitive domain and scored ≤ 26 on MoCA, the other 5 patients without any cognitive disturbances scored < 26 . Conclusion: MoCA cut-off score ≤ 26 allows for sensitive screening for dementia in HD.

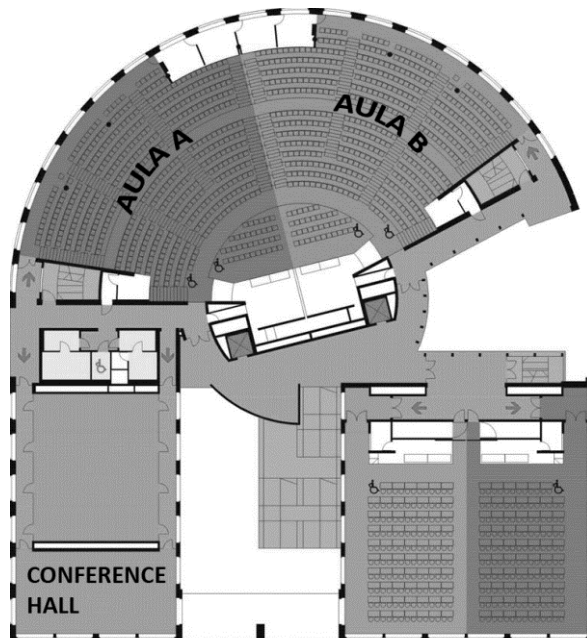
Auditorium Maximum Plans



Legend — level **0**



Legend — level **+1**



Legend — level **+2**

Neuronus 2012, IBRO & IRUN Neuroscience Forum –

GET-TOGETHER PARTY !

On behalf of the Organizing Committee, we have a pleasure to cordially invite you to join our party on Saturday, April 21st! As the social encounters were always an essential part of Neuronus conferences, providing the attendants with a possibility to socialize and meet people with various interests, we decided to prepare two separate events. We encourage you to join both of them!

Please bring conference badges with you; they are necessary to identify you on both events.

Tram party!

Dancing, enjoying drinks and having a good time in the club - too mainstream? We don't think so; however, if you are a novelty-seeking person and want to admire the unique spirit of Krakow, we invite you to meet with us at the tram party. Our journey through the centre of the city will last about 1 h 15 min when we would reach the party venue. Prepare for a huge dose of reward system stimulation!

Get-together party: Shakers club, Szewska Street 5

The party starts at 20:30

If you wish, you can join us directly at the club which has been also indicated on the map. Neurally-themed drinks and a large portion of outstanding music are awaiting you!

Dress code: smart casual

Our previous parties were each time unforgettable so you cannot miss this one!

Do not wait! We have just 300 places for TramParty! First - come, first - serve basis.

There are three rounds planed, each one with 100 participants on board:

I. 20:30-21:40

II. 21:55-23:05

III. 23:20-00:30

If you are interested, please let us know (at the registration desk), which one you are going to participate in.



TramParty
www.trampartykrakow.com

Dariusz Kukowka
tel +48 793 020 712
www.trampartykrakow.com



