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**1 Deficits of fine motor function in individuals at risk for schizophrenia (confounding factors) – U. Gschwandtner, V. Semenik, M. Pflüger, S. Borgwardt, A. Riecher-Rössler (Department of Psychiatry, University Hospital Basel, Switzerland)**

**Objective:** Fine motor function deficits as risk factor for beginning psychosis were investigated with a computerised fine motor function testbattery and compared with healthy controls.

**Methods:** 44 individuals at risk for schizophrenia and 42 healthy, age- and sex-matched controls were examined with the computerised testbattery “Motorische Leistungsserie” (Schuhfried, 1997). The tested factors were: dexterity, precision, tremor, velocity (arm/hand and wrist/fingers). The influences of age, sex, educational level, medication and cannabis use were statistically controlled as confounding factors by multivariate analysis of covariance.

**Results:** Significant differences between individuals at risk for schizophrenia and controls were found in all above quoted factors but remained significant after control of confounding factors only in the factors tremor ( $p < 0.01$ ) and dexterity ( $p < 0.001$ ).

**Conclusion:** We detected fine motor function impairment in individuals at risk for schizophrenia in all parameters measured by the fine motor function testbattery. Nevertheless, with exception of the factors tremor and dexterity, these impairments must be carefully interpreted.

**2 Symptomatic partial seizure: is EEG or neuropsychology the best procedure to localize the lesion? – P. Weber, S. Jourdan, J. Lütschg (Department of Neuropediatrics, Children’s Hospital, University of Basel, Switzerland)**

**Objective:** Besides clinical symptoms EEG is one of the most used procedures to localize brain lesion, frequently supplemented by neuroimaging and neuropsychological examinations.

**Case report:** We report on a right-handed 7 year old girl presenting with absence-like seizures and dysfunction in word generation. The neurological examination was normal. The EEG showed a hypersynchronous activity fronto-temporally and frontoparietally right-sided more than left-sided. The neuropsychological examination demonstrated a dysfunction of verbal memory

with normal spatial memory, indicating a lesion in the left temporal region. The MRI confirmed this assumption and showed a tumor in the left medio-temporal region. The histological diagnosis was a benign xanthoastrocytoma. After resection of the tumor, the EEG and the verbal memory were normalized within a few weeks.

**Discussion:** EEG is one of the most used procedures to localize brain lesions in symptomatic seizures. Our case report demonstrates that rarely the neuropsychological dysfunctions are more sensitive to localize brain lesions. Therefore, a standardized inclusion of neuropsychological examination in the diagnostic workup of focal seizures in childhood is recommended.

**3 Changing autonomic moods by repeatedly listening to EEG-based auditive patterns – B. Fricker (Zurich, Switzerland)**

Auditive patterns (such as music) not only have an emotional influence on people, they also have a direct effect on the autonomic nervous system. Music can restore people’s sense of well-being after a day of stress. Likewise, the impact of acoustic rituals for cult uses or the soothing effect of children’s songs and the autonomic reactions to acoustically conditioned reflexes all provide us with a number of clues to this phenomenon. There has been a great deal of research done on the eminent role that hearing plays from the mean age of gestation, and people’s sense of hearing maintains this capability to activate the autonomic nervous system throughout life.

This talk describes an audiocerebral method of regulation that works with sound patterns that can be calculated based upon people’s basic individual EEG activity. After intensive regular listening, we can effortlessly achieve autonomic reactions while bringing about a permanent change in mood. Tests have shown a significant improvement in effects arising from the person’s individual EEG as compared with random synthetic sequences of sounds without differentiation. Finally, this method of autonomic patient self-influencing has a high degree of therapy compliance without having any hazardous side-effects.

**4 Pathological EEG-patterns in individuals at risk for psychosis and in patients with a first episode of psychosis (Basle FEPSY Study) – U. Gschwandtner<sup>a</sup>, V. Semenin<sup>a</sup>, M. Pflüger<sup>a</sup>, A. Riecher-Rössler<sup>a</sup>, P. Fuhr<sup>b</sup> (<sup>a</sup>Department of Psychiatry; <sup>b</sup>Department of Neurology, University Hospital Basel, Switzerland)**

**Objective:** To investigate whether individuals at risk (IR) and patients with a first episode (FE) of psychosis have EEG abnormalities.

**Methods:** 73 patients (42 IR, 31 FE) from an early recognition clinic for psychosis and 29 healthy controls (HC) were investigated. The at risk state of the patients was assessed with a screening instrument for beginning of psychosis. The transition to psychosis was evaluated by the Brief Psychiatric Rating Scale (BPRS). EEG recording was done with 16 channels using the 10/20 system. The neurologist, blinded to the subject's group, analyzed visually the EEG for the presence of generalized or focal slowing and epileptiform discharges. Statistical analysis was done with chi-square test.

**Results:** IR showed more pathological EEG patterns (35.7%) as compared to the FE (29%) and as compared to HC (13.7%). In both groups of patients the combined pathological EEG patterns (slowing and epileptiform discharges) were predominant (IR 14.2%, FE 19.3%). Neurological standard examination was normal.

**Conclusion:** IR, and less so FE, show a remarkable number of EEG abnormalities. Some psychiatric patients fulfilling the criteria for being at risk or for having a first episode of psychosis may suffer from subtle organic brain disease.

**5 Predictive value of sleep EEG markers in long-term course of depression – M. Hatzinger, S. Brand, U. Hemmeter, B. Annen, E. Holsboer-Trachslar (Psychiatric University Hospital, Basel, Switzerland)**

The predictive value of altered sleep regulation for long-term course of depression is unclear. Thus, the present study aimed to identify sleep EEG markers that may have predictive value for the long-term outcome. In order to characterize related pathophysiological mechanisms, hypothalamic–pituitary–adrenocortical (HPA) system function was assessed as well.

In fifteen patients with depression, HPA system assessments using the DEX/CRH test and sleep EEG studies were conducted during a controlled antidepressant treatment study (TS) and during a follow-up (FU) investigation 2 to 10 years later.

Unfavorable sleep EEG measures during the TS were significantly associated with the previous course of depression and with the prospective outcome until FU, as reflected by the number of episodes. Moreover, the identified sleep EEG markers correlated significantly with the amount of HPA system dysfunction.

We conclude that sleep EEG markers and HPA system regulation may predict the long-term course of depression.

**6 Time-related change of amygdala response to emotional auditory stimulation in patients with emotional dysregulation: a functional magnetic resonance study in borderline personality disorder – G. Dammann<sup>a</sup>, F. Di Salle<sup>b</sup>, F. Esposito<sup>c</sup>, A. Luethi<sup>d</sup>, E. Seifritz<sup>a,e</sup> (<sup>a</sup>Psychiatric University Hospital, University of Basel, Switzerland; <sup>b</sup>Division of Neuroradiology, University of Naples Federico II, Italy; <sup>c</sup>Second Division of Neurology, Second University of Naples, Italy; <sup>d</sup>Friedrich Miescher Institute, Basel, Switzerland; <sup>e</sup>University Hospital of Clinical, Psychiatry, University of Berne, Switzerland)**

Borderline Personality Disorder (BPD) is associated with altered emotional regulation. Functional magnetic resonance imaging (fMRI) evidence suggests an involvement of the amygdala and associated circuits. Here we used event-related fMRI and emotional auditory stimuli in a group of BPD patients and normal control subjects. The temporal structure of the blood-oxygen level dependent (BOLD) signal response was analyzed using single trial-by-trial analysis. Averaged across the entire experimental sessions, we found significantly greater BOLD signal response in the amygdala of BPD patients than in the controls. The BPD patients showed a uniform level of response, whereas the controls showed rapid habituation to the stimuli. Our data support existing evidence of altered amygdala responsiveness to emotional stimuli and suggest that disturbances in physiological habituation processes are associated with this phenomenon.

**7 Recent technical advances of ambulatory EEG increase its clinical usefulness in epileptology – P. Hilfiker, I.W. Mothersill, Th. Grunwald, G. Krämer (Swiss Epilepsy Centre, Zurich, Switzerland)**

Ambulatory EEG (AEEG) fills the diagnostic gap between routine EEG and cost-intensive, continuous EEG/Video monitoring in the evaluation of seizure disorders. Recent technological advances in portable recorders and storage media allow a continuous, uninterrupted recording of all of the 21 channels of the 10–20 electrode system for more than 24 hours with a quality comparable to digital routine EEG.

We evaluated AEEG recordings of the first 240 patients investigated with this method using Trackit® recorders and Profile® review software. The average duration of the recording was 2.4 days (range 4–304 hours). The most frequent clinical questions asked were those concerning verification and classification of seizures (57.1%) and the evaluation of interictal EEG activity (41.7%). These questions could be answered in 75.4% of all patients. The number of investigations increased by 128% compared to the previous 8-channel cassette recording. Critical success factors for the clinical use of AEEG are discussed.

The technical improvements of ambulatory recorders and review software can answer clinical questions that were previously obtainable by inpatient EEG-/video long-term monitoring alone and widen its use in the differential diagnosis and therapeutic control of seizure disorders.

**8 High resolution electric neuroimaging for epileptic focus localization – G. Lantz<sup>a</sup>, C.M. Michel<sup>a</sup>, L. Spinelli<sup>a,b</sup>, R. Grave de Peralta<sup>a</sup>, T. Landis<sup>b</sup>, M. Seeck<sup>c</sup> (<sup>a</sup>Functional Brain Mapping Laboratory, <sup>b</sup>Department of Neurology, University Hospital Geneva, Switzerland, <sup>c</sup>Laboratory of Presurgical Epilepsy Evaluation, University Hospitals of Lausanne and Geneva, Switzerland)**

The purpose of the study was to evaluate the feasibility, clinical yield, and localization precision of high-resolution EEG source imaging of interictal epileptic activity. Forty-four consecutive patients with focal epileptic seizures, who underwent a comprehensive presurgical epilepsy evaluation, were subjected to a 128-channel EEG recording. A standardized source imaging procedure constrained to the individual gray matter was applied to the averaged spikes of each patient.

In 32 of the patients a focal epileptogenic region was identified during the presurgical workup, and in 30 of these patients (93.7%), the 128-channel EEG source imaging correctly localized this area. In cases where imprecise localizations were obtained, this could be explained by simplifications of the recordings and analysis procedure, which had been accepted for the benefit of speed and standardization. In 24 patients cortical resections had been performed, and in these cases the sublobar precision of the 128-channel EEG source imaging could be evaluated by calculating the distance from the source maximum to the resected area. This analysis revealed zero distance in 19 cases (79%).

In conclusion, high-resolution interictal EEG source imaging is a valuable non-invasive functional neuroimaging technique. The speed, ease, flexibility, and low cost of this technique warrant its use in clinical practice.

**9 EEG characteristics in Rett syndrome – S. Jourdan Moser, J. Lütschg (Department of Neuropediatrics, Children's Hospital, University of Basel, Switzerland)**

Clinical manifestations and typical sequence of stages of Rett syndrome (RS) are well-known. 60–70% of patients develop epilepsy. The EEG pattern is invariably abnormal during the course of RS. Characteristic EEG patterns have been described and suggest a typical developmental pattern. They have been correlated with the clinical staging. The aim of this study was to examine the correlation between clinical and EEG stages.

We compared clinical manifestations and EEG recordings from 9 classic cases. Patient age varied between 1 1/4 and 32 years, thus all four clinical stages were included.

EEG patterns correlate only partially with clinical stages and show great variability. Some typical manifestations (apneic pauses, episodic laughing, hand movements) can appear as fits without being of epileptic origin. Epileptogenic activity in the EEG is commonly present without clinical seizures. Conversely there are patients with clinical seizures without epileptic discharges in their EEG.

There are characteristic EEG findings in RS without being diagnostic. EEG patterns correlate only partially with the clinical stages. To not overestimate or under-recognize seizures in patients with RS, the clinical history as well as the EEG pattern have to be

followed carefully. Regarding the need for anticonvulsant therapy clinical symptoms are most important.

**10 Contribution of short term frequency-dependent plasticity to seizure generation and spread – S. Rüegg<sup>a</sup>, M. Kaplan<sup>b</sup>, M.A. Dichter<sup>b</sup> (<sup>a</sup>Department of Neurology, University of Basel, <sup>b</sup>University of Pennsylvania, Philadelphia)**

Neurons in the mammalian cortex fire in short, high frequency bursts or trains during interictal epileptiform discharges and fire in longer, high frequency trains during ictal activity. The nature of the responses in neurons that are synaptically coupled to these neurons, however, is not well characterized. Our laboratory has been analyzing the nature of synaptic responses in both excitatory and inhibitory circuits in response to repetitive firing of the presynaptic neuron in order to understand the mechanisms by which seizures may develop and spread throughout the brain. Whole-cell patch-clamp experiments in monosynaptically connected pairs of neurons were performed in dissociated hippocampal neuronal low-density cultures. Despite reduction in neurotransmitter release with repetitive activation of excitatory synapses, small excitatory circuits demonstrate dramatic facilitation of synaptic transmission. This is mediated by both, AMPA and NMDA receptor-mediated currents. Such powerful short term synaptic facilitation can clearly play an important role in the development and spread of seizures.

**11 Brain areas for “atoms of thought”: mental imagery versus abstract thinking – D. Lehmann, T. Koenig, B. Henggeler, W. Strik, K. Kochi, M. Koukou, R.D. Pascual Marqui (Psychiatric University Hospitals Zurich and Berne, Switzerland)**

EEG- and ERP-data can be parsed into microstates, i.e. epochs (< 100 ms) of quasi-stable potential distribution maps (“atoms of thought”). In Experiment 1, subjects were prompted to report “what was on your mind”. In these spontaneous mentations, two classes can be distinguished, visual imagery and abstract thought (e.g. “apple” vs. “theory”). The last EEG-microstate before prompting was marked as visual imagery or abstract. In Experiment 2, subjects read visually imaginable and abstract words (1/s); after a “?”, they repeated last word. The ERP-microstate 286–354 ms poststimulus showed different potential maps for the 2 word classes. EEG and ERP potential maps were analyzed into LORETA tomographic images. In both experiments, visual conditions showed maximal activation right-posterior, abstract conditions left-anterior: common for both experiments, activation for abstract was in Brodmann 38, 47 left (orbito-frontal) and for visual in Brodmann 20, 36, 37 right (inf. temporal). In both experiments, subjects did not know that imagery vs. abstract mentation was studied, but had to remember the last spontaneous mentation or presented word. Activation of brain areas thus occurred automatically without tasks to imagine or formulate, and identical areas were active regardless whether mentations were started by exterior (word display) or internal, spontaneous events (sudden idea).

**12 Electroencephalographic findings in a juvenile patient with steroid-responsive encephalopathy associated with autoimmune (Hashimoto) thyroiditis – Th. Schmitt-Mechelke (Neuropediatric Department, Lucerne, Switzerland)**

Hashimoto's encephalopathy, a rare disorder with subacute onset of psychiatric symptoms and focal or generalized seizures, is associated with laboratory evidence of autoimmune thyroiditis and may precede symptoms of thyroid disease. The rare descriptions of EEG emphasise rhythmic slowing of background activity with frontal or temporal dominance.

A 14-year old patient presented with generalized seizures and a pre-existing hyperactivity/attention-deficit disorder, presumed to be aggravated by puberty. His EEG initially showed paroxysmal frontal high amplitude 2.5–3/sec spike and poly-spike/slow-wave-activity indicative of atypical absences, generalized spike/slow-waves and a less dominant rhythmic slowing of background activity frontally. Behaviour worsened and seizures reoccurred despite anticonvulsant treatment. EEG deteriorated, showing a peculiar periodic rhythmic high voltage 1.5–2/sec activity in both parieto-occipital regions with interspersed spikes and poly-spikes. Cranial MRI was normal. Further work-up revealed elevated TSH-, lowered T<sub>4</sub>-concentrations and elevated anti-thyroxine-peroxidase antibodies (TPO) indicative of auto-immune thyroiditis. Clinical symptoms and EEG-abnormalities rapidly resolved with steroid treatment.

Hashimoto's encephalopathy may present as primary seizure disorder accompanied by EEG alterations mimicking idiopathic generalized epilepsy. Periodic posterior rhythmic spike/slow-waves should raise the suspicion of this encephalopathy. Deterioration of EEG led to diagnosis; EEG was the most useful marker of CNS-involvement in this probably underdiagnosed condition.

**13 Rituximab stabilizes multifocal motor neuropathy in a patient progressively less responsive to intravenous immunoglobulins – S.J. Rüegg, P. Fuhr, A.J. Steck (Department of Neurology, University Hospital of Basel, Switzerland)**

We report on 71 year-old patient with GM-1-antibody negative multifocal motor neuropathy (MMN). Twenty years ago, he was first diagnosed with lower motor neuron disease, but in 1995, the diagnosis of MMN was established according to electrophysiological and clinical criteria. He initially responded well to i/v

immunoglobulins (IVIG). He experienced one transient ischemic attack during IVIG administration and he underwent cardiac bypass surgery for coronary heart disease. Within subsequent years, the frequency of IVIG administration steadily increased from once per month to once per week. This frequency remained unchanged despite additional immunomodulatory and -suppressive therapy with interferon-beta and cyclophosphamide. However, one yearly course of the anti-CD20 chimeric antibody rituximab proved effective by extending the interval of IVIG administration from 7 to 12 days, i.e. by the reduction of IVIG by 43%. The drug was well tolerated and the patient remained stable since four years.

Rituximab may become an alternative, complementary, and IVIG sparing drug in patients with MMN.

**14 Cerebral hemodynamic changes to cognitive tasks in children with attention deficit disorder measured by near infrared spectroscopy – P. Weber, H. Fahrenstich, J. Lüttschg (Department of Neuropediatrics, Children's Hospital, University of Basel, Switzerland)**

**Objective:** To evaluate the hemodynamic changes in both prefrontal regions induced by a cognitive task in children with a developmental attention deficit disorder using the near-infrared spectroscopy (NIRS).

**Method:** 11 boys with a mean age of 10.4 ( $\pm$ 1.2) years meeting the DSM-IV criteria of ADD/ADHD and were compared with 9 age- and sex-matched healthy controls (HC). Using a trail-making test designed to connect numbers from 1–90 in four sets, changes in oxygenated (O<sub>2</sub>Hb) and deoxygenated (HHb) hemoglobin, tissue oxygenation index (TOI) and cerebral blood volume (CBV) were measured by NIRS.

**Results:** During the first test set, designed as a short attention task, the children with ADD/ADHD showed a significant increase in O<sub>2</sub>Hb and CBV, but only the controls showed also an increase in HHb in the left prefrontal region. TOI increased only in the patients, mainly on the left side.

**Conclusions:** NIRS is a sensitive tool for measuring differences in hemodynamic changes between boys with ADD/ADHD and normal controls. The HC showed lateralized oxygen consumption in the left prefrontal cortex during an extended attention task, whereas the patients showed an imbalance between oxygenated and deoxygenated hemoglobin during short and extended attention tasks.