

Proceedings

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Coherence Analysis of All-Night Sleep EEG. - P. Achermann and A.A. Borbély (Institute of Pharmacology, University of Zurich, CH-8057 Zurich, Switzerland).

The interhemispheric and intrahemispheric coherence of the EEG may provide information on the functional connectivities between brain regions. The present study was designed to explore state-specific changes of EEG coherence during sleep. The nocturnal sleep EEG of 8 young healthy subjects was recorded. The power spectra (averages of five 4-s epochs) and coherence spectra (20-s epochs) between different bipolar derivations were calculated in the frequency range of 0.25-25 Hz. - Intrahemispheric anterior-posterior coherences in nonREM sleep showed distinct peaks in the frequency range of sleep spindles, in the low delta band, and in the alpha band. Coherence was low throughout the entire frequency range in stage 1 and REM sleep. - Interhemispheric coherences of corresponding sites showed an entirely different pattern. Coherence in nonREM sleep was high in the delta, theta and alpha range, and the distinct peaks of intrahemispheric coherence were also present. They were most prominent in the anterior derivations. The pattern in stage 1 and REM sleep was similar to that of nonREM sleep although the typical peaks were absent and the values in the low delta range were lower. - Our results indicate that a state-specific high coherence is limited to distinct frequencies within the low delta, alpha and sigma band.

Effect of Inter-Target Interval on P300 Source Distribution in Young and Elderly Normal Healthy Subjects. - P. Anderer*, H.V. Semlitsch*, R.D. Pascual-Marqui and B. Saletu* (*Dept. of Psychiatry, University of Vienna, Vienna, Austria; **The KEY Institute for Brain-Mind Research, University Hospital of Psychiatry,**

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According to the triarchic model, P300 amplitude depends, at given levels of global probability, stimulus meaning and information transmission, on the specific sequence of preceding stimuli. Thus, in an oddball paradigm, P300 amplitude should depend on $1/ITI$ where ITI is the inter-target interval. - Single potentials evoked by target tone bursts ($p=0.10$; $N=31$), were averaged according to their occurrence in the experiment, separately for 58 normal healthy subjects aged 20-29 years, and 41 normal healthy subjects aged 60-79 years. Latencies, amplitudes and electrical activity in the brain localized by means of "low resolution electromagnetic tomography (LORETA)" were evaluated. - P300 latency was strongly related to $1/ITI$ both in young and elderly subjects, with short latencies for long ITIs ($r=0.91$ and $r=0.89$ in young and elderly, respectively). On the other hand, P300 amplitude at Pz was related to $1/ITI$ only in young subjects with high amplitudes for long ITIs ($r=-0.75$), but not in elderly ($r=-0.19$). - As shown previously, LORETA revealed frontal and parieto-occipital P300 generators. In young subjects the parieto-occipital source was predominant for short ITI. With increasing ITI the parieto-occipital source decreased, while the frontal increased. In elderly, however, frontal and parieto-occipital P300 sources were approximately equal in size and strength, independent of the ITI.

Sex or Pre-Treatment Differences on EEG-Effects of Morphine in Low Concentrations? - M.J. Barbanoj*, G. Salazar*, R.M. Antonijuan*, F. Jane*, P. Anderer and B. Saletu** (*Pharmacological Research Area, Research Institute of Sant Pau Hospital, Dept. of Pharmacology and Therapeutics, U.A.B., E-08025 Barcelona, Spain; **Pharmacopsychiatry Section, Sleep Laboratory, Dept. of Psychiatry, University of Vienna, Vienna, Austria).**

In contrast to the abundant findings on EEG-effects of anaesthetic doses of opiates there are scarce data reporting on low-concentrations.

The Influence of Skull Parameters in a Realistically Shaped Head Model on the Accuracy of EEG Dipole Localisation. - F. Zanow and M.J. Peters (University of Twente, Enschede, Fac. of Applied Physics, 7500 AE Enschede, The Netherlands).

Magnetic resonance imaging (MRI) provides the means for the generation of head models with a high geometrical detail. Errors in the generation of realistically shaped models are likely to be made, due to the identification of the different anatomical structures. The poorly conducting skull layer plays a special role, since it is known to have a large effect on the scalp potentials and is difficult to distinguish in MRI. If source localisation is applied to EEG, then the systematic errors in the parameters of the reconstructed sources are partly due to the misspecifications of the head model. - In this paper, the influence of certain head model parameters on the systematic errors of reconstructed dipole sources is investigated. Variations in the skull conductivity and thickness, as well as local variations in the skull thickness, are considered. In order to do so, the sensitivity measure is introduced, which specifies the amount of change of a dipole parameter due to a specific model variation. Sensitivity maps are constructed for layers of dipoles underneath the brain surface. The maps of dipole sensitivities show the local distribution of the systematic errors to be expected. The computations are performed by means of a derivative method, which utilizes a linearization of the forward problem.

Extensive Medial and/or Dorsolateral Prefrontal Cortex Ablations and Bit-Mapped Auditory ERPs (CNV Complex) in Humans. - R. Zappoli, A. Versari, F. Zappoli, R. Chiaramonti, V. Zeraushek and G.D. Zappoli Thyron (Dept. of Neuro-Psychiatry, University of Florence, Italy).

Our previous researches in patients with extensive surgical ablations of prefrontal cortex contradict the hypothesis of some authors that the generators of several auditory late EPs (N100; P200; N200; P300; SW), recordable in humans with depth/scalp electrodes and MEG over the prefrontal dorsolateral cortical areas, are located in medial prefrontal and anterior cingulate cortices. Using a standard CNV paradigm and topographic mapping analysis, the post-warning auditory N100 a-b-c, P200, P300 (binaural clicks) and CNV activity were recorded in 3 patients after extensive medial and/or dorsolateral prefrontal cortex ablations, identified through CT/MRI examinations. In one patient (male, aged 53), after bilateral excision of most of Brodmann's medial prefrontal 8, 9, 10 and cingulate 24, 32 areas (huge frontal falx meningioma), almost normal auditory post-S1 and CNV complex components were recordable over the spared dorsolateral prefrontal areas. In a second patient (male, aged 24; diffuse astrocytoma), after complete left premotor/prefrontal, superior/middle lobectomy (anterior limbic cortex included), no true post-S1/CNV components were recordable over the ablated frontal areas, only occasional volume-conducted ERPs probably generated in the temporo-parietal lobes or posterior cingulate gyrus. For the third patient (female, aged 35), after excision of a vast right frontal epileptogenic cortical area (including dorsolateral areas 4, 6, 8, 9, 10, 44, 45, 46, but sparing the fronto-medial cortex and anterior/middle cingulate gyrus) no post-S1 ERPs and CNV components were recordable over the ablated regions. These latest observations again indicate that diffuse neuronal generators of several post-warning auditory and CNV components are located in the supramodal, dorsolateral, premotor/prefrontal cortical areas which are directly, ipsilaterally connected to the uni/multimodal temporo-parieto-occipital regions through the long, two-way fairly superficial superior longitudinal and deeper occipito-parieto-frontal fasciculi.

Topology of EEG Coherence and Voluntary Movements during Different Functional States in Right- and Left-Handers. - L.A. Zhavoronkova and E. Efremova (Institute of Higher Nervous Activity and Neurophysiology, Moscow, Russia).

The present study was aimed at the comparison of EEG coherence mapping and motor reactions in right-handers and left-handers during different functional states. EEG from 16 electrodes, EOG and motor reactions by both hands to faint random sounds were recorded in 12 healthy volunteers (6 right-handers and 6 left-handers) during the states of wakefulness, slow wave sleep and awakening. In the state of wakefulness, averaged and alpha-band coherence was higher in most pairs in the left hemisphere in right-handers and in the right hemisphere in left-handers. During the 1st stage of sleep coherence revealed a tendency to decrease, especially in the alpha-band in the left hemisphere of right-handers. This process was accompanied by movement performance only of the left hand while responses of the right hand were absent. During the 2nd stage, coherence was increased especially in the theta-band in central derivations and both hands were unresponsive. Left-handers demonstrated opposite features of coherence and motor reactions during the 1st stage of sleep and similarity with right-handers during the 2nd stage. During awakening the recovery of specific EEG coherence asymmetry in right- and left-handers was accompanied by asymmetric recovery of movement performance. Responses by non-preferred hands appeared first. Thus, topological analysis of EEG coherence allows to propose that cortical-subcortical interactions are more alike than cortical-cortical in the organisation of sensorimotor processing in right-handers and left-handers.

EEG Mapping Correlates of Emotional and Cognitive Disorders in Chernobyl Patients. - L.A. Zhavoronkova, N.V. Gotitdze and N.B. Kholodova (Institute of Higher Nervous Activity and Neurophysiology, Moscow, Russia).

Our previous investigations showed that persons who ten years ago took part in the cleaning of the Chernobyl disaster consequences now had organic brain impairments accompanied by mental disorders. The present study was aimed at the comparison of EEG data and neuropsychological syndromes in these patients. EEG was recorded in 150 patients and included power mapping, source localization method and coherence analysis. Neuropsychological investigation based on Luria's method with evaluation of attention, emotions, praxis, gnosis, spatial functions, memory, thinking and was performed in 30 of the patients. The present study revealed, as typical for all patients, disturbances of hemispheric interaction. Neuropsychological findings and source localization analysis suggested predominantly subcortical damage namely of the limbico-reticular system. The observed EEG signs of the left hemispheric dysfunctions were considered to result from brain stem damage and were accompanied by pathological exhaustibility, deficit of voluntary attention and emotional disorders with elements of apathy. The right hemispheric EEG dysfunctions were explained predominantly by the diencephalic damage and were observed with elements of dysphoria in their emotional state, gnostic and visual-spatial disorders, and specific memory impairments.

Changes of Brain Electrical Fields during the Continuous Performance Test in ADHD Children Depending on Methylphenidate Medication. - K.E. Zillessen*, P. Scheuerpflug*, A. Fallgatter, W.K. Strik**, G.E. Trott* and A. Warnke* (*EEG-EP-Mapping Laboratory, Dept. of Child and Adolescent Psychiatry, University Hospi-**