1407

Event Related Potentials (ERP's) differentiate cognitive impairments in Multiple Sclerosis (MS) and NeuroBehçet's (NB) Disease

Kara S[1], Akman-Demir G[2], Emir Ö[2], Gürvit H[2], Demiralp T[1].
[1]Istanbul University, Istanbul Faculty of Medicine, Department of Physiology, Turkey; [2]Istanbul University, Istanbul Faculty of Medicine, Department of Neurology, Turkey

Background: MS and NB disease processes show similarities in terms of somatic neurological signs and exclusively subcortical involvement. Both diseases lead to similar cognitive impairment patterns characterized by executive dysfunction and memory impairment, but linguistic processing remains intact. In a previous study, the performance of NB patients on neuropsychological tests emphasizing frontal lobe functions was significantly worse than that of MS patients that were matched for age, disease duration, EDSS and education. Our working hypothesis is that the worse executive functions of NB patients are associated with more pronounced disconnection of fronto-striatal circuits due to additional subcortical gray matter involvement.
Method: We recorded Event-Related Potentials (ERPs) sensitive to frontal system functions with the aim of revealing the electrophysiological correlates of this difference. ERPs were recorded using the Continuous Performance Test (CPT), Novelty paradigm and Contingent Negative Variation (CNV) paradigm.
Results: While no significant difference was found either in CNV potentials, or in P3a and P3b potentials of the Novelty paradigm and Go-P3 potentials of the CPT paradigm, the amplitudes of Nogo-P3 potentials in the CPT paradigm were significantly smaller in the NB group compared with the MS group.
Conclusion: These results showed that the response inhibition process is more impaired in NB patients than in MS patients, while novelty detection, sustained attention, expectation or motor preparation didn't show any difference between the two groups. More severe dysfunction of inhibition for NB patients than MS patients might reflect more severe involvement of the orbitofronto-striatal circuits in NB patients.

1408

Usefulness of an EEG-based brain-computer interface to establish communication in ALS

Lahrmann, H[1], Neuper, C[2], Müller, G R[2], Scherer, R[2], Pfurtscheller, G[2]. *[1]Department of Neurology and Ludwig-Boltzmann Institute for Neurooncology, Kaiser Franz Josef Hospital, Vienna, Austria; [2]Ludwig Boltzmann Institute for Medical Informatics and Neuroinformatics and Institute for Biomedical Engineering, Technical University, Graz, Austria*

Background: Lack of communication is a severe problem and contributes to the low quality of life in tetraplegic, anarthric patients with amyotrophic lateral sclerosis (ALS). We investigated the possibility to establish an effective communication with an ALS patient in locked-in state at his home using the Graz brain computer interface (BCI) and telemonitoring system.
Methods: A 60 years old ALS patient (mechanically ventilated, tetraplegic, anarthric) was trained to use an EEG-based BCI system at his home. The patient had to perform right and left motor imagery. EEG was recorded from surface electrodes overlaying sensorimotor areas and analysed in real time to provide subject-specific classifiers. A telemonitoring system was implemented to control the quality of the data and adjust the analysis parameters on line during each training session. Training was performed twice weekly and consisted of cursor control with visual feedback and letter selection using a virtual keyboard.
Results: In 82 training sessions the patient learned to produce two distinct, reproducible EEG patterns. Discrimination accuracy increased from 49.3% initially to 82.6% and the patient was able to spell short words finally.
Conclusion: We could demonstrate that it is possible to establish an effective communication with a completely locked-in, home-ventilated ALS patient using the Graz-BCI system. The telemonitoring has been particularly useful during the training sessions. The BCI system is a useful communication tool for selected locked-in patients.

1409

Electrophysiological study of cognitive function in benign Multiple Sclerosis: preliminary results

Ana Martins da Silva[1], R Meneses[2], C Moreira[2,4], C Pinho[3], M Quintas[2,4], E Santos[1], E Vilhena[5], L Monteiro[1], D Mendonca[2,6], A Martins da Silva[2,3,6]. *[1]Serviço de Neurologia do Hospital Geral de Santo António, Portugal; [2]Unidade de Neurofisiologia e Psicofisiologia, Instituto de Biologia Moleculare Celular (IBMC), Universidade do Porto, Portugal; [3]Departamento de Doenças Neurológicas e Orgãos dos Sentidos do HGSA, Portugal; [4]Serviço de Neurofisiologia do HGSA, Porto, Portugal; [5]Instituto Politécnico do Cávado e do Ave, Barcelos, Portugal; [6]Instituto Ciências Biomédicas Abel Salazar, Universidade do Porto, Portugal*

Background: Impairment of cognitive skills, mainly affecting memory and attention, has been reported in more than 60% of multiple sclerosis (MS) patients. Nevertheless little information is available on cognitive impairment in subgroups of MS.
Objective: To study the cognitive (dys)function using long latency event-related potentials (ERPs) in a group of Benign Course MS (BCMS).
Population and methods: Sixteen patients (Kurtzke EDSS of $\leq$3 at least 10 years from onset) and eighteen healthy subjects were studied. ERPs were elicited using visual and auditory oddball paradigm. Latencies of ERP were related with demographic and clinical data and statistically validated using Spearman, Mann-Withney and chi-square tests.
Results: Ten patients were female, the mean Mini-Mental State Examination score of patients was 29.5 and 60% were professionally active. No statistically significant differences were found in N1, P2 and P3 auditory or visual latencies between patients and controls. In 5 out of 16 patients (31.3%), visual P3 (vP3) was absent. On the contrary no vP3 absence was found in controls ($p = 0.04$). Significant correlation were found between index progression and auditory P3 latencies (aP3) ($r = 0.58$, $p = 0.018$) and EDSS with aP3 ($r = 0.58$, $p = 0.018$), not correlated with age and disease duration.
Conclusion: The normality of aP3 in our BCMS patients suggests that cognitive function is relatively preserved in this subtype of MS. However, the absence of vP3 in some patients and the correlation between aP3 and disease severity (measured by EDSS score and progression index) can reveal subtle cognitive dysfunction. To confirm these results larger population should be studied.

1410

Usefulness of the Auditory Event-Related Potentials (AERP's) in identifying the severity of mild cognitive impairment

Papaliagkas, V[1], Anogianakis, G[1], Tsolaki, M[2], Kimiskidis, V[2], Anogeianaki, A[3], Kazis, A[2]. *[1]Department of Physiology, Faculty of Medicine, Aristotle University of Thessaloniki, Thessaloniki, Greece; [2]3rd Department of Neurology, Aristotle University of Thessaloniki, Greece; [3]Faculty of Medicine, Aristotle University of Thessaloniki, Greece and Medical University of Varna, Bulgaria*

Background: The aim of this study is to investigate the correlation of amplitudes and latencies of the major waves of the Auditory Event-Related Potentials (AERP) with age and performance of patients with mild cognitive impairment in the psychometric test MMSE (Mini Mental State Examination).
Method: 35 patients with mild cognitive impairment were studied (median age = 66.7, average performance in MMSE = 26). Amplitudes and latencies of N200, P300 and Slow Wave (SW), considered to be

the major waves of the ERP's, were determined. Correlations were tried among them and also among each one of them and the age or/and the performance of the patient in the MMSE.
Results: (a) The latencies of the major waves of the AERP's, increase with age ($p < 0.01$); (b) The latency of the N200 wave has a direct effect on the latency of the P300 wave ($p < 0.01$); (c) There is a direct correlation ($p < 0.01$) between the amplitude of the P300 wave and the amplitude of the SW; (d) It appears that there is no connection between the performance of the patients in the MMSE and the amplitudes or the latencies of the major waves of the AERP's.
Conclusion: Serious indications arise from this study for the usefulness of the characteristics of the major waves of the Auditory Event-Related Potentials in stratifying the severity of disease in patients with mild cognitive impairment.

1411
Periodic Lateralised Epileptiform discharges in Dengue Fever

R Sahathevan[1], Tan HJ[1],Norlinah MI[1], Hamidon B[1], Raymond AA[1]. *[1]Department of Medicine, Faculty of Medicine, National University of Malaysia, Malaysia*

Background: A 50 year-old lady presented to our institution with partial seizures preceded by a one week history of fever and headaches suggestive of a viral illness. On admission her level of consciousness was poor and she was electively intubated and ventilated for cerebral protection. A lumbar puncture was performed following normal findings on CT scan of the brain. The findings of a raised protein level and normal CSF glucose compared to her serum were compatible with a viral encephalitis. In view of the partial seizures an electroencephalogram was performed which showed periodic lateralised epileptifom discharges (PLEDs) over the right cerebral hemisphere. Based on the history and EEG findings an initial diagnosis of herpes simplex encephalitis was made and treatment with acyclovir was initiated. Nevertheless investigations included serological screening for common viral aetiological agents including dengue which is endemic to this region. The patient's serum was found to be positive for dengue IgG and IgM which indicated a current secondary dengue infection. She was given supportive treatment and subsequently discharged with significant neurological deficit.
Methods: We submit a case report of PLEDs seen in dengue encephalitis.
Conclusion: Encephalitis is an uncommon manifestation of dengue fever though it is the commonest neurological manifestation seen in dengue infection. While PLEDs are seen in many conditions including viral encephalitis this is the first case of PLEDs in dengue that we have encountered in our practice. A review of the literature showed that there have been no reported cases of PLEDs in dengue encephalitis.

1412
Crossed inhibition of Sensory Cortex by 0.3 Hz transcranial magnetic stimulation of Motor Cortex

Seyal, M[1], Shatzel, A[1], Pirio Richardson, S[1]. *[1]Department of Neurology, University of California Davis, Sacramento, CA, USA*

Background: Low frequency repetitive transcranial magnetic stimulation (rTMS) of motor cortex causes persistent inhibitory effects in the targeted area. rTMS of motor cortex impairs sensory perception. rTMS also results in a persistent change in cortical function at remote sites. The ability of rTMS to induce sustained changes in cortical function has led to studies testing its therapeutic efficacy in neurological disorders including epilepsy. Studies on the effect of low-frequency rTMS of motor cortex on the contralateral motor cortex have provided evidence for both inhibitory and excitatory changes. This study was designed to determine the effect of low-frequency rTMS of the right motor cortex on the contralateral sensory cortex.
Method: Before and after 0.3 Hz rTMS of right motor cortex, perception of ipsilateral threshold of cutaneous stimuli was assessed and somatosensory evoked potentials (SEPs) recorded following stimulation of the right thumb in 8 normal subjects. In a control group of 6 subjects, sensory responses were assessed following rTMS anterior to the right motor cortex.
Results: Following rTMS of motor cortex, detection of threshold sensory stimuli decreased by more than 50% compared to pre-rTMS ($P < 0.05$). The change in sensory perception lasted at least 30 minutes. No change was detected in the control group. Amplitude of the N20-P25 waveform of the SEP decreased from a mean of 0.84 microvolts prior to rTMS to 0.54 microvolts immediately following rTMS of motor cortex ($P < 0.05$).
Conclusion: 0.3 Hz rTMS of motor cortex inhibits the contralateral sensory cortex.

1413
Modulation of cortical and subcortical neural functions by electric and magnetic brain stimulation in rats: Electrophysiological and Immunohistochemical studies

Touge, T[1], Gonzalez, D[2], Miki, T[2], Takeuchi Y[2], Hiramine, C[1]. *[1]Health Sciences, School of Nursing, Faculty of Medicine, Kagawa University, Kagawa, Japan; [2]Department of Anatomy and Neurobiology, Faculty of Medicine, Kagawa University, Kagawa, Japan*

Background: Since the mechanism that repetitive electric (rES) or transcranial magnetic stimulation (rTMS) transiently modulates neural function is not clear, we studied the effects of rES and rTMS using electrophysiological and immunohistochemical procedures in rats.
Methods: rES was performed with a frequency of 1 or 0.2 Hz for 3 hours and 20 minutes using a pair of stainless steel screws set on the right motor cortex. The right parietal cortex was magnetically stimulated with 0.2 Hz for 2 hours and 20 minutes using a small eight-figure coil. Somatosensory evoked potentials (SEPs) were recorded before and after rES or rTMS. Amplitudes and latencies of SEP components were measured and compared between the rES or rTMS and control groups. Following scarifying rats, histological and immunohistochemical analysis of rat brain was performed using c-Fos and glial fibrillary acidic protein (GFAP) antibodies.
Results: Amplitudes of cortical components of SEPs were significantly reduced after 1 Hz and 0.2 Hz rES compared with the control. rTMS also showed the same effects as rES on SEPs. The other SEP components did not significantly change by rES or rTMS. Hematoxyline-eosin (HE) and Nissl staining presented no histochemical change after rES or rTMS. Immunohistochemical analysis showed c-Fos immunoreactive neurons in the wide spread cortical areas and subcortical nuclei including the amygdala in the stimulated hemisphere.
Conclusion: The present results support that low frequency rES and rTMS have transient inhibitory effects on neurons, and seem to affect widely distributed cortical and subcortical areas.

1414
The utility of threshold tracking transcranial magnetic stimulation in assessing Cortical Excitability

Vucic S[1,2], Howells J[1,3], Trevillion L[1,3], Kiernan M[1,2]. *[1]Prince of Wales Medical Research Institute, University of New South Wales, Sydney, Australia; [2]Institute of Neurological Sciences, Prince of Wales Hospital, Sydney, Australia; [3]College of Health Sciences, University of Sydney, Sydney, Australia*

Background: Paired-pulse transcranial magnetic stimulation (TMS) assesses cortical excitability using a constant stimulus intensity. One limitation of this technique is the marked variability of motor evoked potential (MEP) amplitude from stimulus to stimulus. The threshold tracking technique has the potential to overcome this limitation. However, although threshold tracking has been extensively utilised to