EEG signals recorded during the AM task. The method showed a 93% success rate, good reliability, and a full range of variability of the extracted ITFs. The method considers the individual differences in theta-peak latencies and enables quantification of the within-person reliability of the extracted ITF. The approach has been implemented in a healthy-subjects experiment assessing the neurophysiological and behavioral effects of ITF-tES. We will discuss the implementation of the method and how ITF could be used as an input parameter for personalized frequency-modulated NIBS approaches—transcranial alternating current stimulation (tACS) and transcranial oscillatory direct current stimulation (otDCS) directed at AM neuromodulation.

Keywords:
EEG; Theta band; Associative memory; Brain stimulation.

N°156 – Quantitative and automated analysis of post-anoxic neonatal EEGs: Development of a clinical tool for the early diagnosis of neonatal hypoxic-ischemic encephalopathy

Laure Lacan [a], Nacim Betrouni [b], Marie-Dominique Lamblin [c], Laurence Chaton [c], Arnaud Delval [c], Philippe Derambure [c], Sylvie Nguyen The Tich [a]

[a] *CHU Lille, Department of Pediatric Neurology, France,*
[b] *Lille University, Inserm U 1172, France,*
[c] *CHU Lille, Department of Clinical Neurophysiology, France*

Objectives:
Introduction: Neonatal hypoxic-ischaemic encephalopathy (HIE) after perinatal anoxia remains a major public health issue. The prognosis of moderate and severe HIE is improved by therapeutic hypothermia (TH) started within 6 hours of life. EEG allows early and reliable assessment of HIE severity but its interpretation requires expertise that is not always available. The aim was to develop a clinical tool for automatic classification of EEG severity and early discrimination of neonates requiring TH.

Content:
Methods: 150 EEGs, recorded within 6 hours of life after perinatal anoxia, were visually graded into 3 severity groups according to the French classification (Lamblin et al., 2013) and quantified using 6 qEEG markers measuring signal amplitude, continuity and frequency content. The qEEG variables that best described the severity groups were combined in machine learning algorithms. Different models were trained on a development cohort ($n = 90$) to classify the EEG severity and then tested on a validation cohort ($n = 60$). RESULTS: The qEEG variables significantly discriminated the 3 EEG visual severity groups. The most efficient automatic classification model was an SVM algorithm with an accuracy of 80% compared to visual classification. Conclusion: The use of clinically relevant qEEG markers allowed to quantitatively describe the severity of post-anoxic neonatal EEGs according to the French classification and to develop an automatic EEG classification model effective in the latent phase to discriminate neonates requiring TH. This model can be used to implement a clinical tool for automatic assessment of HIE severity that can assist medical decisions at bedside.

Keywords:
Neonatal EEG; Perinatal anoxia; Hypoxic-ischemic encephalopathy; Quantitative EEG analysis; Automated EEG classification.

N°157 – A direct comparison of tDCS, theta tACS, and theta oscillatory tDCS effects on short-term associative memory

Marko Zivanovic [a], Jovana Bjekic [b], Uros Konstantinovic [b], Sasa Filipovic [b]

[a] *University of Belgrade, Faculty of Philosophy, Institute of Psychology, Serbia,*
[b] *University of Belgrade, Institute for Medical Research, Serbia*

Objectives:
To comparatively assess the online effects of constant anodal tDCS, oscillatory tDCS, and tACS over the left posterior parietal cortex on the short-term associative memory.

Content:
Transcranial electric stimulation (tES) techniques are promising tools for the neuromodulation of memory functions. Here we comparatively assess the online effects of three tES protocols over the left posterior parietal cortex on the short-term associative memory (AM): oscillatory tDCS (otDCS, 1.5 mA ± 0.5 mA), tACS (0 ± 1 mA) both delivered at personalized theta frequency (4–8 Hz) and constant anodal tDCS (1.5 mA). Forty participants took part in a sham-controlled cross-over experiment where they received different tES protocols in separate sessions (tDCS/otDCS/tACS/sham) while performing parallel forms of the short-term AM task. In AM task, single digits were successively presented on the cards of different colors (digit-color associations). The length of sequences varied between three (low-demand) to five stimuli (high-demand). The participant's task was to remember digit-color associations presented in each sequence. At the end of each sequence, participants were shown one of the previously seen color cards, and they needed to recall the digit that was presented on a given card. Results showed that participants outperformed sham in all three real tES conditions. Despite comparable effectiveness, the effects of tES protocols varied depending on the task demand, with tDCS being more beneficial when the memory demand was low, while theta-modulated tACS and otDCS predominantly promoted short-term AM when the memory load was high. The results indicate that tDCS, otDCS, and tACS, due to their different modes of action, potentially affect different memory processes.

Keywords:
Transcranial direct current stimulation (tDCS); Transcranial alternating current stimulation (tACS); Individual theta frequency; Associative memory.

N°158 – Electrophysiological study of attentional disorders in idiopathic generalized epilepsy

Nicolas Dochez [a], Aude Warniez [b], Nacim Betrouni [b], Arnaud Delval [a], Philippe Derambure [a]

[a] *Lille University Hospital, UMRS 1172, France,*
[b] *Inserm UMRS, 1172 Lille Neuroscience and Cognition, France*

Objectives:
To study the electrophysiological substrate of attentional disorders in idiopathic generalized epilepsy using the attention network test task (ANT).

Content:
Attentional disorders are extensively described in patients suffering from idiopathic generalized epilepsy (IGE), and are correlated to abnormal patterns of connectivity in fMRI studies. The ANT task was developed to study the three attentional components: alert,