our series and in adults, less with definitive epilepsy diagnosis. A common denominator is their appearance in drowsiness and in sleep, rhythmically discharging for several seconds without any clinical changes on Video recording.

Keywords:
Review the characteristics of Subclinical Rhythmic Electrographic Discharges (SRED) in children and adults.

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N°152 – Small fiber neuropathy in polyneuropathies of different etiology

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Objectives:
Introduction: Polyneuropathy (PNP) is a frequent complication of metabolic, paraneoplastic, and autoimmune diseases. Autonomic dysfunction might remain underdiagnosed until late disease stages. Aim: We purposed to determine the frequency of small fiber involvement and possible associations with large fiber neuropathies in different PNP etiologies.

Content:
Method: The patients were clinically assessed using the Utah Early Neuropathy Scale (UENS). The functional integrity of small fibers was determined with sympathetic sudomotor skin response (Sudocheck), while large sensory fibers were assessed with antidromic sensory neurography. Result: We included 26 patients, classified into 3 groups based on PNP etiologies (7 autoimmune, 9 paraneoplastic, and 10 metabolic cases). We found low skin conduction velocities (29–46 μs) in 46% of all the patients. These cases, with impaired skin conduction showed significantly worse ($p = 0.0369$) sural nerve conduction and higher UENS total score as well as longer symptomatology ($p = 0.0431$). Patients with autoimmune disease showed more frequent (57%) and more severe (hand: 29.8 μs, leg: 18.9 μs) small fiber involvement. The highest rate of sensory nerve conduction abnormalities was found within the autoimmune patient group (71% median nerve, 85% ulnar, and sural nerve). Conclusion: Our results suggest that small fiber neuropathy with lower limb involvement is more common in polyneuropathies due to autoimmune pathomechanism. More studies with larger case numbers, and routine small fiber screening might be necessary to understand better the correlation between PNP and small fiber involvement.

Keywords:
Polyneuropathy; Paraneoplastic neuropathy; Autoimmune disease; Small fibers.

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N°153 – Simulating motor neuron degeneration and reinnervation in motor neuron diseases based on surface-electromyography recorded single motor unit potentials

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Objectives:
Purpose: Motor neuron diseases (MND) are characterized by two prominent disease mechanisms: loss of motor units (MUs) and enlarged MUs due to collateral reinnervation. By simulating their interaction, we aim to provide insights into how they affect the sensitivity of surface-electromyography (EMG) methods to monitor disease progression in MND.

Content:
Methods: We developed a muscle model in which high-density surface-EMG recorded single MU potentials (MUPs) formed the basic building blocks. From the baseline MU pool, progressive MU loss was simulated by removal of MUs, one-by-one. These removed MUs underwent reinnervation with scenarios varying from 0% to –>100%. We tailored the model to generate compound muscle action potential (CMAP) scans, which is a promising surface-EMG method for monitoring patients with MND. This allowed us to compare simulated and recorded CMAP scans in healthy controls and patients with MND. Results: Simulated baseline maximum CMAP showed values up to 12 mV. During progressive MU loss and reinnervation, the CMAP scan pattern showed a transition from a smooth towards a more discrete stepwise pattern, which matched well with experimental observations. Reinnervation was successfully reflected by increases in MU size resulting in enlarged MUs up to 2 mV when only a few MUs are left, which are sizes also occasionally observed during experiments. Conclusion: The muscle model was able to capture on average the pathological MU characteristics observed in patients with MND. The model could be used as platform to train personnel in applying surface-EMG methods prior to their use in clinical practice and clinical trial setting.

Keywords:
Motor neuron diseases; Single motor units; Compound muscle action potential scan; Simulations; High-density surface-electromyography.

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N°154 – Individual theta frequency for associative memory targeted personalized transcranial electrical stimulation

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Objectives:
To develop and evaluate a new approach for determining individual theta frequency (ITF) in EEG data recorded during an associative memory task, that can be used for personalization of frequency-modulated electrical brain stimulation (tACS, otDCS).

Content:
Non-invasive brain stimulation (NIBS) methods have gained increased interest in research and therapy of associative memory (AM) and its impairments. However, the one-size-fits-all approach yields inconsistent findings, thus putting forward the need for electroencephalography (EEG)-guided personalized frequency-modulated transcranial electrical stimulation (tES) protocols to increase the focality and the effectiveness of the interventions. Still, extraction of individual frequency, especially in the theta band, turned out to be a challenging task. We present an approach to extracting the individual theta-band frequency (ITF) from context-dependent

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.

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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

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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.

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

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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.

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

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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,