

Quesiti

- 1) Il candidato esponga le sue conoscenze riguardo il controllo di qualità di dati misurati tramite di apparecchiature multicanale per elettroencefalografia, quando il segnale è acquisito simultaneamente ad altre tecniche (e.g., risonanza magnetica funzionale, stimolazione magnetica transcranica).
- 2) Il candidato esponga le problematiche relative alla gestione dati elettroencefalografici e magnetoencefalografici.

Prova inglese

Evoked potentials (EPs) are neural responses time-locked to some stimulation (e.g., auditory or somatosensory) and can be used for clinical purposes. EPs are often low in amplitude compared to ongoing electrical activity such as electroencephalographic (EEG) and environmental noise responses, which are not time-locked to the stimulation. Thus, averaging of the response to many stimuli is necessary to obtain reliable EPs. EPs can be characterized by waveform latency and amplitude, with the peak and interpeak latencies being the prime determinant of clinically significant changes. The series of stereotypic wave-forms following each modality of stimulation are named either as a sequence (e.g., wave I to wave V) or by the average latency seen in controls (P100 being the positive wave at a latency of about 100 ms). Based on lesion studies and invasive recordings in humans, the generators of the various waveforms are known with some accuracy. The waves may be dichotomized into near-field and far-field potentials: near-field potentials require a recording electrode relatively near the generator (e.g., an ear electrode can record a distal eighth nerve potential) and far-field potentials may be recorded with electrodes at some distance from the generator (e.g., a potential generated in cervico-medullary junction can be recorded with a scalp electrode).

Prova informatica

Calcolare il valore minimo, massimo, la media e la deviazione standard di venti valori posti in 20 celle contigue.

ESTRATTA

TRACCIA 1

Diego L. P.

Quesiti

- 1) Il candidato esponga le sue conoscenze riguardo il funzionamento di apparecchiature multicanale per magnetoencefalografia, con particolare riguardo alle problematiche legate al loro utilizzo.
- 2) Il candidato esponga le funzionalità dei più diffusi software, commerciali e non, di analisi dati per segnali elettroencefalografici.

Prova inglese

Transcranial magnetic stimulation (TMS) has developed into a powerful tool for studying human brain physiology and brain-behavior relations. When applied in sessions of repeated stimulation, TMS can lead to changes in neuronal activity/excitability that outlast the stimulation itself. Such aftereffects are at the heart of the offline TMS protocols in cognitive neuroscience and neurotherapeutics. However, whether these aftereffects are of applied interest critically depends on their magnitude and duration, which should fall within an experimentally or clinically useful range without increasing risks and adverse effects. In this short review, we survey combined TMS-EEG studies to characterize the TMS-aftereffects as revealed by EEG to contribute to the characterization of the most effective and promising repetitive TMS-parameters. With one session of conventional repetitive TMS (of fixed pulse frequency), aftereffects were consistently comparable in magnitude to EEG-changes reported after learning or with fatigue, and were short-lived (<70 min). The few studies using recently developed protocols (such as theta burst stimulation) suggest comparable effect-size but longer effect-durations. Based on the reviewed data, it is expected that TMS-efficacy can be further promoted by repeating TMS-sessions, by using EEG-gated TMS to tailor TMS to current neuronal state, or by other, non-conventional TMS-protocols.

Prova informatica

Date le componenti di cinque vettori x , y e z in una terna di riferimento cartesiana, disposte su 3 colonne, calcolare il modulo del vettore somma.

TRACCIA 2

NON ESTRATTA

Quesiti

- 1) Il candidato esponga le sue conoscenze riguardo il funzionamento di apparecchiature multicanale per elettroencefalografia, con particolare riguardo alle problematiche legate al loro utilizzo.
- 2) Il candidato esponga le funzionalità dei più diffusi software, commerciali e non, di analisi dati per segnali magnetoencefalografici.

Prova inglese

To understand why MEG and EEG are actually different and complementary techniques for observing the electrical activity of the brain, we need to go back to Maxwell electrodynamics. These rules show that the spatial topography of magnetic induction and electrical potentials created by the same current source depend very differently on key factors. First and foremost, EEG signals are primarily and strongly affected by the substantial difference in electrical conductivity between the scalp, skull and other biological tissues. Magnetic permittivity, the magnetic equivalent of conductivity, is homogenous and identical across all compartments, including the air between the scalp and sensors. Consequently, the spatial topography of MEG sensor data is visually and quantitatively less smeared and distorted than that of EEG electrical potentials produced by the same physiological brain sources. This contributes to a clearer interpretation of MEG sensor topography in terms of the putative anatomical locations of its underlying brain sources. It also helps separate the contributions of brain signals from ambiguous physiological contaminants, such as ocular micro-saccades and muscular artifacts, which can be confounded with high-frequency brain signals in EEG but are more clearly distinguished on the basis of their distinctive sensor topography with MEG. Artifact components can be eliminated or corrected when good-practice guidelines are respected.

Prova informatica

Disegnare un grafico di tipo "a torta", utilizzando come dati 40 valori compresi tra -10 e 10 e come etichette: "valore positivo o nullo"; "valore negativo"

TRACCIA 3

NON ESTRATTA