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Assessing Brain Pathophysiology through Non-Linear Analysis of MEG in Idiopathic Generalized Epilepsy Cases

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ABSTRACT

Background: Non-linear signal analysis has proven to be a technique that is capable of revealing qualitative and quan- titative differentiations between different dynamical systems (biological or otherwise). In the present work it has been demonstrated that this capability reveals quantitative differences in the Magnetoencephalograms (MEG) received from patients with Idiopathic Generalized Epilepsy (IGE) and from healthy volunteers. Method: We present MEG record- ings of 10 epileptic patients with IGE and the corresponding ones from 10 healthy volunteers. A 122-channel SQUID biomagnetometer in an electromagnetically shielded room was used to record the MEG signals and the Grassber- ger-Procaccia method for the estimation of the correlation dimension was applied in the phase space reconstruction of the recorded signal from each patient. Results: The aforementioned analysis demonstrates the existence of spatially diffused low dimensionality in the MEG signals of patients with IGE. Conclusion: The obtained results provide support for the hypothesis that low dimensionality in MEG signals is linked to functional brain pathogeny.

KEYWORDS

Non-Linear Analysis; MEG; IGE

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