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Multimodal Brain Imaging

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Special Issue

Multimodal Brain Imaging

Editorial: Kemal Arikan, Guest Editor

The importance of clinical application of electrophysiology has been very well known since Hans Berger's historical studies. It is important in diagnosis, differential diagnosis, follow-up, monitoring of the therapy response and so on. Particularly quantitative EEG has the capacity to provide the global picture of brain electrophysiological function. There are several studies investigating the validity and reliability of this approach. On the basis of the current data one can certainly claim that QEEG is helpful in differential diagnosis such as in depression and dementia. In neurology its diagnostic value such as in epilepsy is without any question. However, there are certain obstacles that have to be mentioned. First of all QEEG data can only give the electrophysiological profile of the brain with a considerable delay. The data have very little value of the structural aspect of the brain in comparison to the neuroimaging techniques like MRI, and CT.

Recent years have witnessed a rapid growth of brain research exercising two or more concurrent imaging modalities. The idea behind this tendency is to take advantage of each modality's strength for pinpointing scarcely accessible spatiotemporal brain structures. This is the case because the data gathered from the use of newer and comparatively sophisticated imaging modalities such as functional MRI have not replaced the data originating from the older ones. Essentially these new techniques offer complementary information about the brain. Multimodal brain imaging will bring a likely improvement of our understanding of the brain, if we rely strictly on the correct fusion of multimodal data. Otherwise, matters will likely become further complicated and less discernable.

Practically speaking, psychiatrists in particular are in desperate need of objective measures. It seems, invaluable efforts of the dedicated scientists of the field will certainly satisfy their needs soon.

In this issue, Bayram et al. investigate the neural events generating the steady-state visual evoked responses multimodally by EEG and functional MRI. In their authoritative review, Eickhoff and Grefkes overview the fundamental concepts and methods for assessing connections and interactions in the brain, which are clarified by the use of multimodal data. Van Luijtelaaar and his colleagues review the origin of absences in the genetic absence models. Uhlhaas examines the current literature about high-frequency oscillations and their correlations with cognition in schizophrenia. Schönknecht et al. investigate the cerebral FDG PET correlates of specific cognitive dysfunction in Alzheimer's disease.

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