Advanced Brain Imaging Methods for EEG Analysis: Functional Connectivity and Source Imaging

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Electroencephalography (EEG) is a brain-sensing technique to noninvasively measure electrical activity with higher temporal resolution than other brain-imaging techniques, such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET). Especially, the advantages of mobility, cost efficiency, and ease of access make EEG preferable to the study of brain diseases and cognitive processes under real-life stimulation. Along with conventional event-related potential (ERP) and time-frequency analysis of EEG signals, recent advances in functional source imaging and connectivity methods have largely progressed in exploration and understanding of underlying brain-network dynamics. In this presentation, several functional connectivity and source imaging methods will be introduced. These methods can be employed to reveal the functional connectivity between different brain regions for objective assessment of brain diseases, such as schizophrenia, Asperger syndrome, anxiety disorder, and dementia.