Human Brain Connectomics: Mapping, Physiology and Disease

Yong He

State Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University

The human brain is structurally and functionally organized into a complex network. Recently, the topological description of the network has been proposed as "human connectomics". In the past five years, researchers have demonstrated that by combining a variety of different imaging technologies [e.g. structural MRI, diffusion MRI and functional MRI (fMRI)] with sophisticated analytic strategies such as graph theory, it is possible to noninvasively map the patterns of structural and functional connectomes of the human brain. Specifically, Dr. Yong He's team has: (i) developed a series of graph-theory based approaches of structural and functional connectivity to unravel topological principles of human brain connectomics and their physiological correlates, (ii) applied these approaches to study changes in brain connectivity in neuropsychiatric disorders (e.g., Alzheimer's disease and depression) and network-based imaging biomarkers for disease diagnosis, and (iii) developed graphic network analysis and visualization tools as well as computing cluster platform for the studies of human brain connectomics. In this talk, Dr. Yong He will present their connectome-based analysis methods and applications of human connectomics in healthy and diseased populations