2-3

人腦科學研究與腦功能造影

Jen-Chuen Hsieh

Dept. Medical Research & Education, Taipei Veterans General Hospital, Taiwan

Date: Wednesday, August 17, 2005
Time: 14:00-15:30

Functional brain imaging encompasses techniques devoted to a better understanding of the human brain through noninvasive imaging of the electrophysiological, hemodynamic, metabolic, and neurochemical processes that underlie normal and pathological brain function. These imaging techniques are powerful tools for studying neural processes in the working brain. Clinical applications include improved understanding and treatment of serious neurological and neuropsychological disorders such as intractable epilepsy, schizophrenia, depression, Parkinson's, and Alzheimer's diseases.

Brain metabolism and neurochemistry can be studied using radioactively labeled organic molecules, or probes, that are involved in processes of interest such as glucose metabolism, dopamine, serotonin and other neurotransmitter synthesis. Images of dynamic changes in the spatial distribution of these probes, as they are transported and chemically modified within the brain, can be formed using positron emission tomography (PET)

Functional magnetic resonance imaging (fMRI) is currently the most widely used for mapping central processing of human brain and mind work. fMRI studies are capable of producing spatial resolutions as high as 1-3 mm; however, temporal resolution is limited by the relatively slow hemodynamic response, when compared to electrical neural activity, to approximately 1 s under the whole brain scanning.

Time is a quintessential parameter in studies of brain functions, and thus high-resolution electroencephalography (EEG) and magnetoencephalography (MEG), which probe the neural electric activity on a msec-by-msec base directly give unique information that frequently complements the accurate spatial data obtained by means of PET and fMRI. The spatial accuracy of MEG recordings exceeds that of EEG.

In this talk, highlights on all the high-tech functional brain imaging and mapping will be given. How all the high-techs can be used to advance our understanding of human brain and mind will be elucidated.