Human brain mapping using intracranial EEG recording

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Human brain mapping is performed to understand the functional and anatomical organization of healthy and diseased human brain. For example, physicians need to identify functionally-important areas prior to brain surgery, in order to minimize the risk of unwanted post-operative deficits in a given patient.

Today, I will introduce the principle of human brain mapping using intracranial electroencephalography (EEG) recording. Previous studies have shown that focal cortical activation elicited by a behavior can be represented by focal augmentation of gamma-oscillations (>50 Hz) on EEG. Based on this notion, we have developed a novel brain mapping technique referred to as “in-vivo animation of event-related gamma-oscillations”. This method animates where, when and how the amplitude of gamma-oscillations is modulated by a task of interest every 10 milliseconds. Using this method, we identify motor, sensory, visual and language areas without electrically stimulating the brain surface of a patient who undergoes brain surgery.

By simultaneously acquiring EEG, electromyography, voice, and eye tracking measures, we plan to elucidate the mechanisms involved in various forms of human behaviors such as reading, writing, attention, emotion, or even optical illusion. Brain-computer interface is also of our great interest. I am looking forward to hearing the idea of audience and having discussion of possible projects.

All students, faculty, and anyone interested are welcome.