Somatomotor Cortical Mapping for Neurosurgical planning

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Technology description

Epilepsy is one of the most common neurological disorders affecting approximately 65 million people worldwide. Most cases of epilepsy can be controlled through medications, however in about one-third of patients, medication isn’ t adequate and surgical resection is considered. In order for surgery to be a viable option, a single localizable focus must be identified and safely removed. If the seizures are focal and unilateral electrocorticographic (ECoG) electrodes are placed on the cortical surface and used to monitor cortical activity. During this monitoring, several procedures are performed to map areas of eloquent cortex and estimate the cognitive functions which may be affected by the surgery. Mapping is achieved through direct electrical cortical stimulation (ECS) of the brain. While ECS is beneficial for mapping, it is subjective and interpretive based on a patient’ s response, which makes it less useful when the patient isn’ t able to communicate effectively, which is particularly significant in the case of children who are prelingual, or who are language delayed, which is common amongst pediatric epilepsy patients. Further, ECS is uncomfortable and can trigger seizures or pain and nausea.
Researchers at Arizona State University have developed a tool that provides a means to effectively map the somatosensory and motor cortical regions of epilepsy patients undergoing ECoG recording for evaluation of tissue resection. This mapping requires no passage of current from the ECoG grids, and instead is based entirely on the physiology of neural responsiveness in these areas of cortex. There are multiple components for this system including hardware, software, and an interface to achieve mapping of the desired regions.
This system, which does not rely on exogenous electrical activation, eliminates the possibility of pain/ nausea in evaluating epilepsy patients, does not require detailed communication with the patient, and provides a faster and more objective map to better anticipate outcomes of surgical resection.

Application area

• Somatomotor cortical mapping

Advantages

• Does not require detailed communication with patients
• Does not use electrical stimulation - reduces risk of noxious sensations

• Produces a cortical map with finer details
• Produces a more objective cortical map
• Faster than current methods/systems

Institution

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