

Electrode lead and method for epileptogenic brain localization and functional mapping in stereotactic thermal therapy

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Technology description

Background and Summary

Nearly half of thermal ablation procedures have a less than an ideal post-operative seizure outcome. A possible explanation is that the epileptogenic focus is not completely delineated prior or during the performance of this surgical procedure. The post-operative seizure outcome from LITT for medically refractory focal epilepsy would be improved if epileptogenic foci could be better delineated. Many different methods have been used in attempt to determine the location of epileptogenic foci. One common method is sensing cortical electrical activity using electrical contacts. Electrical recordings are not performed during a LITT procedure for treating medically refractory seizure disorders, because the thermal ablation applicator does not include electrical contacts. Also, it is unclear if the information from such electrical recordings could be used to accurately delineate the epileptogenic foci. Thus, there is a significant need for a device that can perform electrical recording during the LITT procedure and a signal processing methodology for accurately identifying epileptogenic foci on the basis of these recordings. This invention is related generally to sensing and signal analysis devices for use in defining epileptogenic foci during thermal ablation procedures and, more particularly, to the systems and method for intracranial recording and analysis during the laser interstitial thermal therapy procedure.

Detailed Description

This invention is a novel device for performing electrical recordings during the LITT procedure for the purpose of identifying epileptogenic foci, having a dielectric cylinder, radio dense electrode contacts arranged in an array mounted on the dielectric cylinder, leads extending from each contact, a connector at the most proximal end for connecting the leads from the electrodes, a removable dielectric tip at the most distal end that is attached to an apparatus bolt at the most proximal end through a coupling section, and a proximal bolt attached to the cylinder. In certain embodiments the device can be connected with a system for analyzing the electrical recordings from the device to determine the location of the epileptogenic foci. This system involves band-pass filtering of the signals in a referential montage and automatically determines contaminated electrode contacts. It then removes the recordings from these contacts, performs independent component analysis on the brain recordings, and prunes the first independent component to remove artifactual signals.

Application area

- Electrical brain-contact device that can be utilized during thermal ablation procedures & can improve the accuracy in the determination of epileptogenic foci during thermal ablation procedures
- Provides a device in which the thermal ablation applicator can be inserted
- Provides a device that can be removed prior to the activation of the thermal ablation applicator for the purpose of tissue destruction

Institution

[Thomas Jefferson University](#)

Inventors

[Shennan Weiss](#)

Assistant Professor

Neurology

联系我们



叶先生

电话 : 021-65679356

手机 : 13414935137

邮箱 : yeyingsheng@zf-ym.com