A method to improve deep brain stimulation treatments by using cortical evoked potentials as a biomarker

Unmet Need

Neuromodulation therapies are used to treat a wide variety of clinical conditions. For example, an estimated 150,000 deep brain stimulation (DBS) implants are performed globally to help treat movement disorders like Parkinson’s Disease. One of the primary challenges in implementing neuromodulation therapies is determining the proper “dose” of the therapy due to the lack of a strong clinical biomarker that can inform parameter settings that produce the desired clinical effect without unwanted side effects. Clinicians have historically had to rely solely on patient feedback during treatment. Additionally, the parameters may vary over time due to a variety of factors, including disease progression and the medication status of the patient. Though the field is evolving, the latest advancements typically use spectral biomarkers that are not reliable indicators of symptoms. There is a need for improved methods to inform the parameter settings of neuromodulation treatment methods to treat patients more effectively.

Technology

Duke inventors have developed a method of determining the efficacy of a neuromodulation therapy that can be implemented into DBS systems, and other neuromodulation treatment systems, to inform the parameter selections that are used to treat patients. Specifically, the inventors have identified that cortical evoked potential (cEP) resulting from DBS in a subcortical brain region can be used as a control signal for closed loop DBS. The inventors have demonstrated in rat models that this technology better correlated with motor behaviors and was less variable across animals

Duke File (IDF) Number

IDF #:T-006616

Meet the Inventors

Grill, Warren
Cassar, Isaac

Department

Biomedical Engineering (BME)

Publication(s)

•

External Link(s)

• From the lab of Dr. Warren Grill

than several commonly used spectral-based biomarkers. Further, the inventors developed a method to quantify reliably evoked potential biomarkers, even when the parameters of stimulation are changing.

Advantages

- Enables improved efficacy of neuromodulation treatments while increasing energy optimization that’s likely to reduce symptoms
- Uses a novel biomarker that’s more consistent across time and subjects than currently accepted biomarkers
- Can be recorded under anesthesia
- Simple to quantify with a large signal-to-noise ratio