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Advancing the Arizona State University Knowledge Enterprise

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Deep Brain Stimulation with Imaging Capabilities

Deep brain stimulation (DBS) is a procedure that is used to treat intractable pain as well as many movement disorders and the applications are continually expanding. DBS uses electrical current to stimulate brain tissue and modulate the communication between nerves. Currently, when DBS is performed, it is done with little visual guidance, and no real-time visual guidance. MRI imaging is often used to calculate the relative distance between the point of entry of the electrode and the area of brain that needs stimulation. Surgeons rely on real-time measured electrical activity of the brain compared to known electrical activity of different areas of the brain to provide information about the location of the electrode. Success of DBS is dependent on the accuracy of the electrode placement.

Researchers at Arizona State University have developed an electrode for deep brain stimulation which has real-time imaging capabilities to allow surgeons to insert the electrode and apply stimulation with greater accuracy. This electrode enables 360 degree scanning of the region perpendicular to the axis of the electrode so that the surgeon can see where the probe is relative to the skull and the surrounding brain tissue.

This electrode has the potential to change the way that deep brain stimulation is performed to vastly improve the procedure.

Potential Applications

- Deep brain stimulation
  - Reduce seizures in Epilepsy
  - Intractable pain control
  - Treatment for movement disorders like Parkinsons, dystonia, meige syndrome, essential tremor, multiple sclerosis, etc.

Benefits and Advantages

- Can peer 1-3 cm into the brain

- Enables imaging analysis
- Real-time imaging and electrical feedback
- Greater implantation and stimulation accuracy
- 360 degree imaging

For more information about the inventor(s) and their research, please see Dr. Smith’s departmental webpage