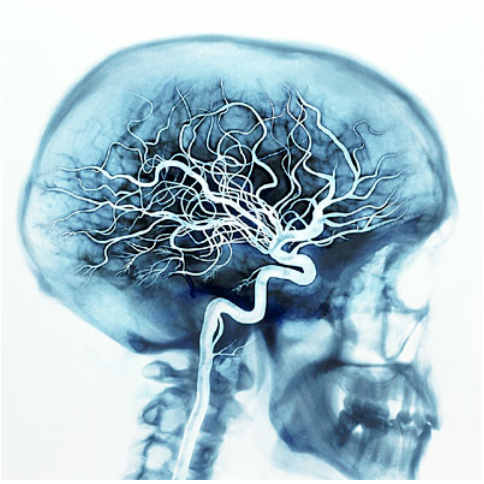
Digging For Gold: The NEW Deep Brain Stimulation

By Jeremy Brousseau

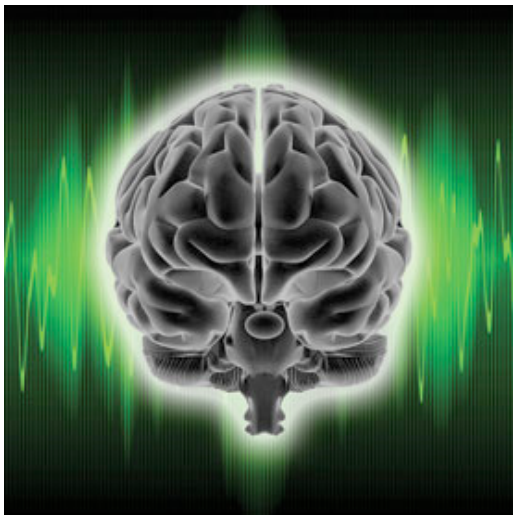
Deep brain stimulation, developed in France in 1987, is used today as a reliable form of Parkinson's Treatment, as well as a treatment for other neurological diseases. Deep brain stimulus can correct abnormal cardiac and respiratory signals, tremors do to epilepsy or Parkinson's, or even slow the degradation of Alzheimer's. The BCI, Brain-Computer Interface, is also an ever expanding market, also dealing with deep brain electrodes. With all this demand, scientists are working to find more reliable procedures than we currently have.

Today, deep brain stimulation is performed by cutting open the skull and implanting electrodes deep into the brain. There are many issues with these processes. First, doctors must cut into the skull. This is both dangerous during operation and after, causing the body's immune system into overdrive and opening doors for infection. Second, the implantation of electrodes can inadvertently destroy other neurons along the path. Finally, many applications make use of wires that extend from the skull to some sort of device. This issue is dangerous, as well as causing disapproval from he FDA. The two main issue scientists and doctors are trying to overcome are the cutting of the skull and the unnecessary destruction of neurons.

There are currently two new methods being looked at. The first is an old approach reapplied.



Researchers from MIT, the New York University Medical Center and the University of Tokyo are using nanotechnology to crack the problem without cracking the skull. They are studying the use of nanometer thin wires that can be fed or driven into the brain to the correct positions through arteries veins and even capillaries to deliver signals. These nanowires can enter the body through he neck or chest and enter the brain in the same way as a shunt, without interfering with any other nerves. Also, biodegradable temporary polymers can be used.



Another method is being looked at at Arizona State University. William J. Tyler and his colleagues are studying the effects of ultrasound on brain waves. They are finding that bursts of ultrasound at frequencies between .44 and .67 MHz can have the same effect as an impulse from an electrode. Currently, both method is still in its development stages, but progress is being made. Hopefully, soon there will be less issue with cracking the skull and we will learn infinitely more about the brain.

Resources:

1. “Fiber to the Brain” Jones, Willie D. IEEE Spectrum. http://www.spectrum.ieee.org/print/1910.
2. “Sound Waves for Brain Waves” Jones, Willie D. IEEE Spectrum. http://www.spectrum.ieee.org/print/7097.
3. “How Deep-Brain Stimulation Works” Sora Song. TIME. Sunday, Jul. 16, 2006. http://www.time.com/time/magazine/article/0,9171,1214939,00.html.