Deep Brain Stimulation: Evidence Based Science or Wishful Thinking?

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Because of new imaging techniques and advances in our understanding of neurophysiology, neurological and psychiatric disorders are increasingly being recognized as disorders of circuit functions in the brain. Using techniques such as DBS, neurosurgeons are able to pinpoint malfunctioning circuits and to recalibrate them.

I have a friend whose nephew received a diagnosis of late stage cancer about 9 months ago—everyone thought (but didn’t say) his chances for survival were slim. After stem cell transplantation, he’s just marked 100 days of being cancer free.

Cancer outcomes like this make me optimistic for the future. Deep brain stimulation (DBS) might be another reason to feel optimistic about the future.

One of my favorite sites on the internet is Ted Talks. I don’t spend a lot of time on the internet, but I do have a few favorites (eg, New York Times, Psychiatric Times, the National Gallery of Art), and Ted Talks tops this list. The topics are varied and I learn something new every time: I recently learned how to tie my shoelaces so that they don’t untie and had my future brightened by Andres Lozano, MD, PhD, who talked about Parkinson, depression, and ways that their processes might be turned off.

Because of new imaging techniques and advances in our understanding of neurophysiology, neurological and psychiatric disorders are increasingly being recognized as disorders of circuit functions in the brain. Using techniques such as DBS, neurosurgeons are able to pinpoint malfunctioning circuits and to recalibrate them. DBS is very precise—the electrode is inserted through the skull and into any area of the brain to deliver electricity.

Dr Lozano is chief of neurosurgery at the University of Toronto, where he and his team are studying the use of DBS to turn brain circuits on and off, depending on the circuits’ role in certain disorders (eg, movement, mood, memory). In his presentation on Ted Talk, Lozano describes the case of a little boy with dystonia who is no longer able to stand or walk and whose prognosis is dismal—he will be progressively more disabled and his chances of survival are nil. Dr Lozano and his team used DBS to suppress the circuits in his brain responsible for movement. Three months later the boy is walking. As a young adult he is living a normal life and going to university.

Both pharmacological and psychotherapeutic modalities are used to treat MDD, yet 10% to 20% of patients with depression do not respond to treatment. PET scans have shown that areas of the brain responsible for motivation, drive, and decision making are impaired in patients with severe depression, and the sadness center is overactive. After six months of continuous DBS, the sadness center is turned off, and the circuits responsible for motivation, drive, and decision making have made a comeback.

Similar positive results were seen when DBS was used in patients with early Alzheimer disease. Healthy brains use 20% of the body’s supply of glucose—as Alzheimer disease progresses, glucose utilization shuts down. Dr Lozano and his team wanted to know if this “power failure” could be reversed. They placed DBS electrodes in the Fornix area of the brain and looked at what happened to glucose consumption. After one month, areas of the brain that had stopped using glucose had resumed consumption. The implications seem to be that not only can DBS modify symptoms but that the technique can help repair damaged areas of the brain as well.

Is DBS evidence-based science or wishful thinking? What do you make of the different brain stimulating techniques? Is there reason for my optimism? Can I continue to believe that my golden years will not be plagued by memory loss and cognitive decline?

Oh, my friend’s nephew . . . he celebrated by getting engaged!
Links: