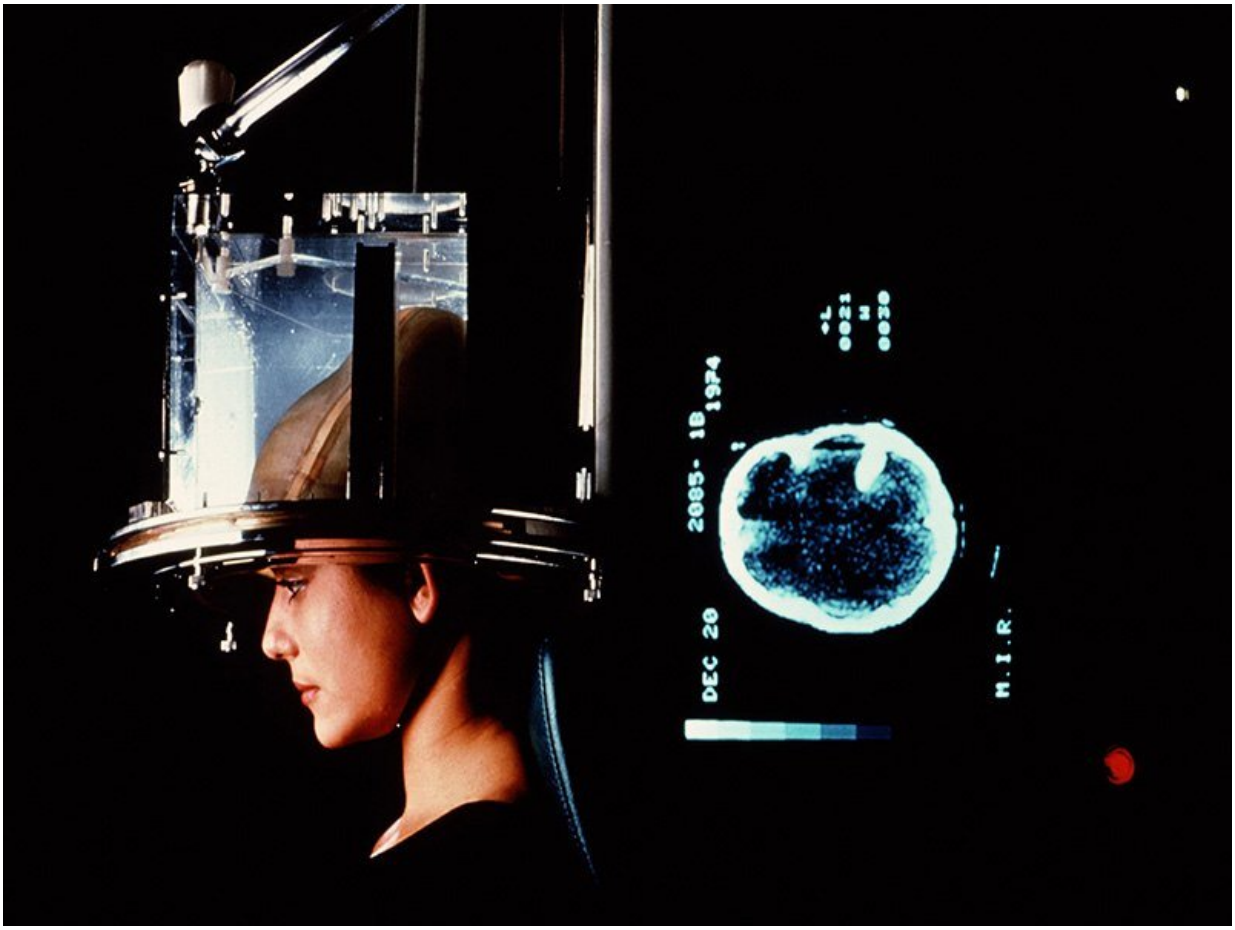
Brain zaps may help curb tics of Tourette syndrome

January 16 2018, by Dennis Thompson, Healthday Reporter



Electric zaps can help rewire the brains of Tourette syndrome patients,

effectively reducing their uncontrollable vocal and motor tics, a new study shows.

The procedure, called deep brain stimulation (DBS), improved tic severity by nearly half in 171 patients with uncontrolled Tourette symptoms at 31 hospitals in 10 countries.

"That's an impressive number," said senior researcher Dr. Michael Okun, chair of neurology and co-director of the Movement Disorders Center at the University of Florida's College of Medicine. "To get that much improvement in these symptoms is difficult when using medication or behavioral therapy."

With DBS, brain surgeons run thin electric leads to specific regions of the basal ganglia, a cluster of nerves in the brain related to motor control and behavior, Okun explained.

Doctors then apply electricity to the brain circuits they've most closely linked to Tourette, to try to control the patient's tics.

"We're eavesdropping on the brain and trying to find the circuit responsible for adversely affecting the patient's quality of life," Okun said. "We then introduce electricity into the brain to change the way these circuits function."

However, the procedure still needs more work. More than a third of patients experienced adverse events, most often slurred speech or a pins-and-needles sensation.

These side effects occur when electricity meant for one brain circuit unintentionally spreads to other nearby nerves, Okun explained.

"The circuits we want to drive or suppress are frequently next to circuits

we don't want to disturb," Okun said. Future research will focus on improvements to electrical leads so they will more precisely deliver current to targeted brain circuits, he said.

Tourette patients are typically treated using medications and speech or behavioral therapy. An estimated 300,000 U.S. children—about 1 out of every 160—are affected by Tourette, according to the Tourette Association of America.

Another option for severe Tourette cases is deep brain stimulation, which also is used to treat many other motor disorders, including Parkinson's disease, essential tremor and multiple sclerosis, experts said.

Researchers wanted a better idea of whether DBS is effective in treating severe cases of uncontrolled Tourette, which can cause motor tics so strong that people end up hurting themselves.

Unfortunately, even top institutions tend to use DBS on only one or two patients each year, Okun said.

To come up with a comprehensive review, an international network of hospitals began submitting data on Tourette syndrome patients treated with DBS, to create a public database and registry that would help determine the pros and cons of the procedure, Okun said.

This latest study focused on the one-year follow-up results from 171 patients who underwent DBS implantation between 2012 and 2016, after other means of treating their Tourette had failed.

Average tic severity in these patients improved by 45 percent within one year of DBS implantation, the data shows.

"From this study, we see it could have some promise for those with

severe Tourette syndrome that haven't been responsive to other treatments," said Diana Shineman, vice president of research and medical programs at the Tourette Association of America.

But more than 35 percent of patients treated with DBS developed adverse side effects. The most common were a pins-and-needles sensation (8 percent) and slurred speech (6 percent). Two patients suffered from bleeding in their brain, and four patients developed an infection from their surgery.

"It is brain surgery and we do know there are some serious side effects, and those should not be taken lightly," Shineman said.

The good news is that the pins-and-needles sensation (called paresthesia) and the slurred speech (dysarthria) were reversible.

"In almost all the cases, the effects resolve by changing the program or turning the device off," Okun said.

To further reduce these side effects, future efforts will try to more precisely identify the nerves that cause Tourette symptoms, and then target them with better technology that more accurately monitors signals and delivers electrical impulses, Okun said.

Researchers are also developing a "smart" DBS that will only discharge current when it's needed, rather than maintain a continued electrical charge, Okun said.

"We're beginning to move past some of the earlier notions of how electricity was given, where we just put the lead in and turned it on, and set it to the best risk/benefit that we can in the best region," Okun said. "Now we're beginning to refine that with better leads and better technologies."

The study was published online Jan. 16 in the journal *JAMA Neurology*.

More information: Daniel Martinez-Ramirez et al. Efficacy and Safety of Deep Brain Stimulation in Tourette Syndrome, *JAMA Neurology* (2018). DOI: 10.1001/jamaneurol.2017.4317

For more on Tourette syndrome, visit Tourette Association of America.