

Low-frequency deep brain stimulation improves difficult-to-treat Parkinson's symptoms (Update)

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Parkinson's disease patients treated with low-frequency deep brain stimulation show significant improvements in swallowing dysfunction and freezing of gait over typical high-frequency treatment. The study, published in *Neurology* on Jan 27, provides a new route for treating Parkinson's patients with these difficult-to-treat and sometimes life-threatening symptoms.

"This is the first study to successfully treat swallowing dysfunction, and one of the first to treat difficulty with gait, using this unusual low-frequency 60Hz stimulation," said study author and principal investigator Tao Xie, MD, PhD, Assistant Professor of Neurology at the University of Chicago. "These conditions are usually difficult to manage by typical deep brain stimulation or medications. Our findings have a significant and direct clinical impact on improving quality of care and potentially reducing the morbidity and mortality in Parkinson's disease."

Deep brain stimulation (DBS) is often the major treatment that alleviates symptoms of Parkinson's disease that cannot be adequately controlled by medications. The procedure, which involves the implantation of a "brain pacemaker," sends electrical impulses to specific parts of the brain. Routine DBS typically uses a high-frequency 130Hz impulse. However, this has been ineffective at improving swallowing issues and freezing of gait – symptoms which can lead to disability and mortality in Parkinson's.

Xie and his colleagues tested whether low-frequency stimulation at 60Hz would be more effective at treating these symptoms in a small trial involving seven Parkinson's patients who had swallowing issues and freezing of gait despite standard medication and 130Hz DBS treatment. In two separate sessions separated by six weeks, patients received either 60Hz, 130Hz, or no stimulation in a randomized, double-blind manner.

The researchers recorded and analyzed the oral, pharyngeal, laryngeal functions of patients after DBS treatment, paying close attention to whether airway aspiration occurred during swallowing. Patients also filled out a swallowing questionnaire. Freezing of gait was assessed via a stand-walk-sit test and a questionnaire. Patients were also scored on a standard Parkinson's symptom scale which measures gait, posture and speech (known as axial symptoms), tremor and other motor symptoms.

The team found that 60Hz stimulation reduced airway aspiration issues by 57 percent and swallowing difficulty by 80 percent, as well as significantly reduced freezing of gait and axial symptoms, when compared to 130Hz stimulation. Patients continued on 60Hz treatment and benefits persisted when assessed six weeks later.

"For those with freezing of gait that cannot be treated with routine 130Hz stimulation, 60Hz stimulation should be used as it not only improves gait, but also swallowing and other Parkinsonian symptoms," Xie said. "It is more effective than 130Hz in overall motor function, though it may not be good for those with medication refractory tremors."

Six out of the seven patients involved in the study have remained on 60Hz stimulation due to persistent benefit for about a year so far. Xie and his team are pursuing long-term follow up studies for these patients, as well as exploring the underlying brain circuitry that makes this treatment effective.

More information: "Low-frequency stimulation of STN-DBS reduces aspiration and freezing of gait in patients with PD," *Neurology*, 2014.

Provided by University of Chicago Medical Center

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