

PARKINSON DISEASE

Deep brain stimulation can alter speech-related respiratory and laryngeal control in Parkinson disease

Subthalamic nucleus deep brain stimulation (STN DBS) is known to be highly effective at treating limb motor impairments in patients with Parkinson disease (PD), but its effects on speech physiology have not been examined in detail. New research published in the *Journal of Neurology* suggests that lower-frequency STN DBS may be of more benefit than high-frequency stimulation to the speech-related respiratory and laryngeal control problems experienced by individuals with PD.

“...most individuals with PD will experience reduced speech audibility and intelligibility...”

“Adequate respiratory driving pressure and laryngeal function are essential for speech, but are impaired in more than 90% of individuals with PD,” says lead author Michael Hammer from the University of Wisconsin. “As a result, most individuals with PD will

experience reduced speech audibility and intelligibility, and communicative impairment, with a substantial negative impact on quality of life.”

The researchers used aerodynamic measures to assess respiratory and laryngeal control in 18 patients with advanced idiopathic PD, all of whom had received bilateral STN DBS surgery at least 3 months previously. “Measuring air pressure and air flow during syllable production provided a relatively simple, noninvasive assessment to examine physiological changes in speech respiratory and laryngeal control,” explains Hammer. The tests were performed first with STN DBS switched on, then 1 h after the device was switched off.

The results varied widely between participants, but most exhibited increased respiratory driving pressure and/or vocal fold closure when the DBS was switched on. High-frequency STN DBS, however, often resulted in respiratory overdrive and excessive vocal fold closure. According to

Hammer, “the changes in aerodynamic measures did not parallel clinical ratings of limb function, but were correlated with DBS parameters such as frequency and pulse width.” Specifically, the patients’ speech seemed to benefit more from lower-frequency DBS than from the high-frequency stimulation typically selected to achieve optimal limb motor control.

“Differences in limb-related versus speech-related functions in PD, and differences in their response to treatment, are essential areas of research to explore,” says Hammer. The findings could have important implications for the future development of DBS-based protocols to treat patients with PD.

Heather Wood

Original article Hammer, M. J. *et al.* Subthalamic nucleus deep brain stimulation changes speech respiratory and laryngeal control in Parkinson’s disease. *J. Neurol.* doi:10.1007/s00415-010-5605-5