P16

Subthalamic Nucleus - Deep Brain Stimulation deteriorates speech in Parkinson's disease: a machine learning study

Francesco Asci[1,2], G. Costantini[3], F. Bove[4], C. Piano[4], F. Pistoia[5,6], R. Cerroni[7], L. Brusa[8], V. Cesarini[3], S. Pietracupa[1,2], N. Modugno[2], A. Zampogna[1], P. Sucapane[6], M. Pierantozzi[7], T. Tufo[9,10], A. Pisani[11,12], A. Peppe[13], A. Stefani[7], P. Calabresi[4], A. Rita Bentivoglio[4], G. Saggio[3], A. Suppa[1,2] e Lazio DBS Study Group

[1]Department of Human Neurosciences, Sapienza University of Rome, Rome, Italy
[2]IRCCS Neuromed Institute, Pozzilli, Italy
[3]Department of Electronic Engineering, University of Rome Tor Vergata, Rome, Italy
[4]Neurology Unit, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy
[5]Department of Biotechnological and Applied Clinical Sciences, University of L'Aquila, L'Aquila, Italy
[6]Neurology Unit, San Salvatore Hospital, L'Aquila, Italy
[7]Department of System Medicine, University of Rome Tor Vergata, Rome, Italy
[8]Neurology Unit, S. Eugenio Hospital, Rome, Italy
[9]Neurosurgery, Policlinico A. Gemelli University Hospital Foundation IRCSS, Rome, Italy
[10]Neurosurgery Department, Fakeeh University Hospital, Dubai, UAE
[11]Department of Brain and Behavioral Sciences, University of Pavia, Pavia, Italy
[12]IRCCS Mondino Foundation, Pavia, Italy
[13]IRCSS Fondazione Santa Lucia, Rome, Italy

Introduction: Deep brain stimulation of the subthalamic nucleus (STN-DBS) can worsen speech in Parkinson's disease (PD).

Objective: We here examined voice impairment objectively in STN-DBS patients, by using artificial intelligence.

Methods: We enrolled 108 controls and 101 patients (50 with STN-DBS and 51 under the best medical treatment). Voice was clinically evaluated using the Unified Parkinson's Disease Rating Scale part-III subitem for voice (UPDRS-III-v). We recorded and then analysed voices using specific machine-learning algorithms. The likelihood ratio (LR) was also calculated as an objective measure for clinical-instrumental correlations.

Results: Clinically, voice impairment was greater in STN-DBS patients than in those under oral treatment. Machine-learning discriminated voices recorded from STN-DBS patients and those under oral treatments, objectively and with high accuracy. We also found significant clinical-instrumental correlations since the greater LRs, the higher UPDRS-III-v scores.

Conclusions: STN-DBS deteriorates speech in patients with PD as objectively demonstrated by machine-learning voice analysis.