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O-FUN-16 - A REAL-TIME INTRA-OPERATORY SYSTEM FOR RIGIDITY EVALUATION DURING DEEP BRAIN STIMULATION SURGERY

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Resumen

Objectives: Deep Brain Stimulation (DBS) has a proved value in the treatment of severe forms of Parkinson's Disease. Intraoperative evaluation of the efficacy of stimulation includes evaluation of the effect on rigidity. A subjective semi-quantitative scale is used, dependent on the examiner perception and experience. So, the system proposed herein aims to tackle this subjectivity, using quantitative data and providing real-time feedback of the computed rigidity reduction, hence supporting the physician decision.

Material and methods: This system comprises of a gyroscope-based motion sensor in a textile band, placed in the patient's hand, which communicates its measurements to a smartphone. The latter computes a signal descriptor from the angular velocity of the hand during wrist flexion in DBS surgery and applies a polynomial model to determine the rigidity reduction, which is communicated to the physician. This model was trained using signals from 8 patients (Mean Age: 61) and validated in 5 patients (Mean Age: 56) surgeries. These patients were subjected to bilateral DBS implantation and stimulation.

Results: The system presented 3.2% of error and 77.1% of accuracy (when compared to two specialists' agreement). The implemented descriptor proved to discriminate well high and low rigidity reduction ($p < 0.001$), but was unable to distinguish equal improvements from patients with different baseline rigidity. This will hinder the future design of different models for each baseline rigidity profile.

Conclusions: Overall, we present a simple, wearable, mobile system, suitable for intra-operatory conditions during DBS, providing a reliable second-opinion about the improvement in rigidity for different stimulation settings.