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### Association between physical fitness and cerebral grey matter integrity in patients suffering from Parkinson's disease, a structural MRI study

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**Introduction/Background** Being physically active protects the elders against cerebral grey matter (GM) loss in regions particularly exposed to aging [1]. This cross-sectional study extended this hypothesis by searching correlations between volume or microstructure of GM and physical fitness in the nigrostriatal system of patients suffering from Parkinson's disease (PPD).

**Material and method** Cerebral grey matter volume (GMV), magnetization transfer (MT) and R2\* (an index of local iron) parameters were extracted from whole brain 3 T MRI and were analysed voxel-by-voxel using SPM12 in 42 PPD and 32 matched healthy controls (HC). All subjects were also tested for Peak work load (PWL) and knee flexor strength (KFS).

First, we performed a two-sample *t*-test to look at areas affected in the nigrostriatal system of the PPD in comparison to HC. Next, we used a regression analysis to test which of these regions, if any, showed a relationship between (1) GMV, MT or R2\* and (2) individual PWL or KFS.

**Results** The comparative study showed increased R2\* in bilateral SN, reduced GMV and increased R2\* in left and right striata ( $P_{\text{uncorrected}} < 0.001$ ). In PPD, GMV in the head of the right caudate nucleus and anterior putamen showed a positive correlation with PWL and GMV ( $P_{\text{corrected}} < 0.023$ ). Besides, GMV in this cluster also correlated with global cognitive performance assessed by the Mattis Dementia Rating Scale ( $P_{\text{corrected}} < 0.024$ ). None of the disturbed regions correlated with KFS. No significant correlations were observed in these regions for HC.

**Conclusion** Aerobic fitness may have a specific neuroprotective effect on the right anterior striatum of PPD, and this could be associated with better cognition.

**Keywords** Parkinson's disease; Physical fitness; Neuroprotection

**Disclosure of interest** The authors have not supplied their declaration of competing interest.

#### Reference

[1] Colcombe, et al. Aerobic fitness reduces brain tissue loss in aging humans. *J Gerontol* 2003.

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## ISPR8-1735

### Relations between rhythmic impairment in speech and non-verbal domains in Parkinson's disease

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**Introduction/Background** Rhythmic disorders are common in patients with Parkinson's disease (PD), both in speech (i.e., dysarthria) and in non-verbal rhythmic tasks (e.g., tapping to a beat). However, it is still unknown whether rhythmic disorders in the speech and non-speech domains come from the same source (e.g., an impaired general system for beat perception and production). The goal of this study was to examine the relation between impaired speech rhythm in PD patients and non-speech rhythmic skills.

**Material and method** Twenty-two PD patients (mean age: 69.3, SD: 5.5) performed (i) an oral diadochokinesis task, (ii) motor and perceptual non-verbal rhythmic tasks from the BAASTA battery. The patients were divided into two subgroups depending on their performance in the non-verbal rhythmic tasks: good beat-trackers ( $n = 12$ ) and poor beat-trackers ( $n = 10$ ). The two subgroup of patients were compared in terms of their speech performance. In addition, correlations were run to test the link between speech and non-verbal rhythmic skills.

**Results** Good beat-trackers showed greater speech-related rhythmic abilities as compared to poor beat-trackers, such as lower

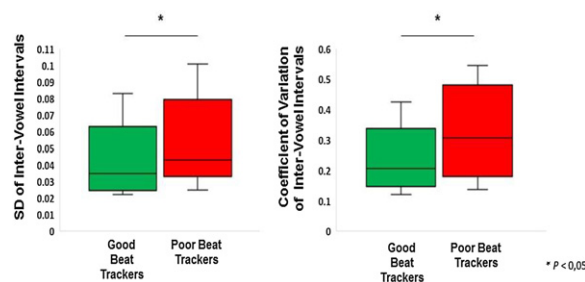


Fig. 1

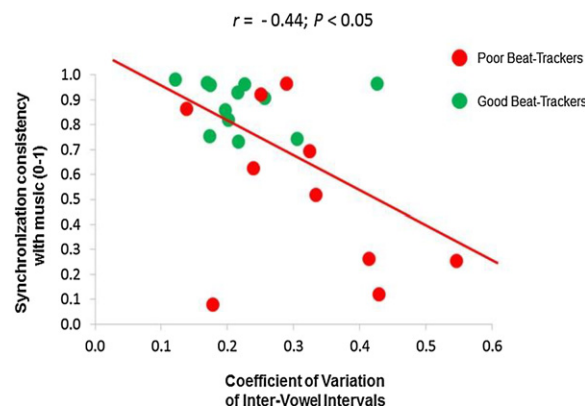


Fig. 2