**Diffusion tensor imaging of corticospinal tract, cingulum and corpus callosum in Parkinson's Disease (PD) Patients**

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**Introduction:** Considering the variability of symptoms of Parkinson’s disease (PD) and the still unclear etiology, MRI-based studies are important tools to better understand the mechanisms behind the disease [1]. Diffusion tensor imaging (DTI) is a valuable tool to assess abnormalities in PD [2], especially in early stages. Previous studies demonstrated fractional anisotropy (FA) reduction in substantia nigra, globus pallidus, thalamus, uncinate fasciculus, superior longitudinal fasciculus and thalamic radiation [3]. Our main objective was to evaluate white matter tractography of the corticospinal tract, cingulum and corpus callosum in PD.

**Materials and Methods:** 58 patients with PD (42 men, mean age 60.3 years, SD 8.99; average disease duration 7.88, SD 6.29) and 33 healthy subjects (mean age 57.8 years, SD 10.59) underwent the same MRI protocol, and 46 patients were assessed by clinical scales and a complete neurological evaluation. We performed DTI analysis using the ExploreDTI software to compare PD patients and controls. After the initial analysis we divided patients into early PD, moderate PD and severe PD. For statistical analysis we used Stata 13.1 (<http://www.stata.com>).

**Results:** We found higher FA and reduced medial (MD), radial (RD) and axial diffusivity (AD) in the corticospinal tract. Diffusion values from the mild PD group were also different than controls.

There was no difference between patients and controls at cingulum, however we found reduced FA in severe PD in comparison to controls. At corpus callosum we found lower FA in PD when compared to controls.

There was also an association between MD and RD values of the corticospinal tract and cingulum with SCOPA-COG scores, and between FA and RD values of the corpus callosum and UPDRS-III scores.

**Discussion:** We assesses three tracts relevant to PD and found abnormalities in all of them, demonstrating important white matter involvement in the disease. We also found differences between groups, showing that more severe patients have more diffuse brain alterations. The association between diffusion values and scales scores also demonstrate a relation between motor and non-motor symptoms and cerebral abnormalities.

**Conclusion:** Our data suggest that DTI analysis is a sensitive tool to asses microstructural abnormalities already in early stages of the disease and in areas beyond the substancia nigra, and the association with clinical scores indicate that these alterations might be measured indirectly by clinical evaluation.

**References:** [1] Kalia L V et al., Nat Rev Neurol. 12(2):65-6, 2015; [2] Skidmore FM et al., Neuroinformatics. 13(1): 7-18, 2015; [3] Gattellaro G et al., Am J Neuroradiol. 30(6):1222-6, 2009.