

Conventional and iron-sensitive MRI brain imaging in the differential diagnosis of 4RTauopathies

*Eleonora Del Prete*¹, G. Migaleddu², D. Frosini¹, E. Benevento³, S. Barone³, S. Mazzucchi³, M. Cosottini⁴, R. Ceravolo³

¹Neurology Unit, Department of Medical Specialties, Azienda Ospedaliero-Universitaria Pisana, Pisa, Italy

²Neuroradiology Unit, Azienda Ospedaliero-Universitaria Pisana, Pisa, Italy

³Neurology Unit, Department of Clinical and Experimental Medicine, University of Pisa, Pisa, Italy

⁴Neuroradiology Unit, Department of Translational Research and New Technologies in Medicine and Surgery, University of Pisa, Pisa, Italy

Background: Progressive Supranuclear Palsy (PSP) and Corticobasal Degeneration (CBD), are 4RTauopathies presenting as atypical parkinsonisms. Although the clinical presentation is usually different between them sometimes the differential diagnosis could be challenging.

The research of radiological biomarkers to help the clinician to differentiate these disease is fervent. Susceptibility weighted imaging (SWI) is sensitive to iron accumulation and allows to identify micro-structural brain modifications in substantia nigra pars compacta of subjects with neurodegenerative parkinsonism, moreover susceptibility abnormalities are detected in the cortex of CBD patients. This last sign, recently described, consists of a signal alteration on the frontoparietal cortex, expression of the ongoing neurodegeneration at this level.

Objectives: The aim of this study is to explore the accuracy of different radiological MRI imaging biomarkers in the differential diagnosis between PSP and Corticobasal Syndrome (CBS) and between CBS patients and a subgroup of PSP patients with CBS phenotype (PSP-CBS).

Materials and methods: We recruited patients with clinical diagnosis of PSP and CBS. All patients underwent a neurological examination and 3T MRI imaging. Conventional and iron sensitive radiological biomarkers were investigated in our cohort.

Results: We found that signal alteration of substantia nigra pars compacta on SWI was present in 97% of PSP patients and 54% of CBS patients. Mesencephalic atrophy was detected in 66% of PSP patients and none of CBS, moreover in the 81% of CBS and 4% of PSP asymmetric frontoparietal atrophy was found. Our study also showed that cortical intensity abnormalities in SWI was present in all patients with CBS, it was also present in 60% of PSP-CBS patients and in 14% of PSP phenotypes other than CBS.

Conclusions: These results confirm the importance of brain MRI imaging in the differential diagnosis of 4RTauopathies, with interesting perspective regarding iron-sensitive imaging.