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Olfactory mucosa seeding assay in the diagnosis of Parkinson's disease and α-synucleinopathies

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Introduction: Parkinson's disease (PD), dementia with Lewy bodies (DLB) and multiple system Atrophy (MSA) are characterized by misfolding and aggregation of pathological a-synuclein (a-syn). Real-time quaking-induced conversion (RT-QuIC) is able to detect misfolded α-syn in cerebrospinal fluid (CSF) and other peripheral tissues of patients with a-synucleinopathies. The aim of this study is to investigate the proficiency of RT-QuIC in detecting the presence of pathological a-syn on the olfactory mucosa (OM) and cerebrospinal fluid (CSF) of patients with a-synucleinopathies.

Methods: 53 patients with neurodegenerative diseases has been enrolled in the Neurological Clinic of Trieste University. 37 patients (SYN group) received a diagnosis of PD (29), DLB (4) and MSA (4) while 16 patients (6 Alzheimer's disease, 3 progressive supranuclear palsy, 3 fronto-temporal dementia and 4 with other diagnosis) were included in the NO SYN group. OM was obtained through nasal swab in 45 patients while CSF, through lumbar puncture, in 42; 34 patients performed both examinations. Presence of pathological a-synuclein seeding activity was assessed by means of RT-QuIC, in the Neuropathology laboratory at the University of Verona.

Results: RT-QuIC resulted positive in 25/33 OM samples (75.8%) of SYN group, in 22/27 of PD patients (81.5%) and in 1/12 (8.3%) of NO SYN group. 23/27 (85.2%) SYN, 19/20 (95.0%) PD and 3/15 (20.0%) NO SYN patients, had α-syn seeding activity in the CSF. Among the 34 patients who underwent both examinations, 21/23 (91.3%) SYN patients, 18/18 (100%) PD patients and 1/11 (9.1%) NO SYN patients, tested positive for either OM or CSF.

Conclusions: RT-QuIC assay performed in OM and CSF of patients with α-syn-related disorders shows a comparable diagnostic accuracy. The advantage of non-invasiveness, suggests that OM sampling might be used as a first screening tissue. The combination of the two samples analysis, may improve diagnostic accuracy especially in PD patients.