

Parkinson and Multiple System Atrophy

Parkinson (PD) and Multiple System Atrophy (MSA) are neurodegenerative disorders characterized by neuronal loss and a steadily worsening disability over time. The prevalence of Parkinson is very high among the population (an estimated 6.3 million people have Parkinson's worldwide¹) and to the extent that it is defined as a "common neurodegenerative disease".

Although PD and MSA are clinically different, they share common symptoms such as motor symptoms alterations and impairment of the autonomous system (dysautonomia).

Impairments of the autonomous system occur prior to any manifestation of motor symptoms. The autonomic impairment can be quantified by measuring blood pressure, heart rate variability (HRV) and changes during the sleep REM stage; these changes are used as markers in clinics for diagnosis of the disease.

In animal models for PD and MSA, changes during HRV or REM states have also proven to be important endpoints for early disease detection and for disease progression.

Therefore, further characterization of the disease through studying these biomarkers could lead to drug optimization and early detection of the disease.

Shared symptoms/parameters include:

- Autonomic nervous system dysregulation²⁻⁴ at the level of the heart, e.g. heart rate variability (HRV) changes ([HRV](#))
- Aberrant EEG patterns in sleep stages⁵ (changes in frequency component/sleep deprivation) ([Sleep](#))

Selected Publications

- 1 Baker, M. G. & Graham, L. The journey: Parkinson's disease. *BMJ* 329, 611-614, doi:10.1136/bmj.329.7466.611 (2004).
- 2 Haensch, C. A., Lerch, H., Jorg, J. & Isenmann, S. Cardiac denervation occurs independent of orthostatic hypotension and impaired heart rate variability in Parkinson's disease. *Parkinsonism Relat Disord* 15, 134-137, doi:10.1016/j.parkreldis.2008.04.031 (2009).
- 3 Kuzdas, D. *et al.* Oligodendroglial alpha-synucleinopathy and MSA-like cardiovascular autonomic failure: experimental evidence. *Exp Neurol* 247, 531-536, doi:10.1016/j.expneurol.2013.02.002 (2013).
- 4 Fleming, S. M. Cardiovascular autonomic dysfunction in animal models of Parkinson's disease. *J Parkinsons Dis* 1, 321-327, doi:10.3233/JPD-2011-11042 (2011).
- 5 Verhave, P. S. *et al.* REM sleep behavior disorder in the marmoset MPTP model of early Parkinson disease. *Sleep* 34, 1119-1125, doi:10.5665/SLEEP.1174 (2011).

