

## Nocturnal manifestations of Parkinson's disease and atypical Parkinsonism

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In this Supplement of the *Journal of Neural Transmission*, we address an important feature of Parkinson's syndrome, i.e. nocturnal problems. We feel very honoured that so many eminent experts in this field have contributed to a supplement which should be of interest to everyone who deals with Parkinson's disease (PD).

It is accepted by neuroscientists that PD is a progressive disease with an accumulation of  $\alpha$ -synuclein (Spillantini et al. 1997). Since these accumulations are also found in the mesencephalon where sleep regulation is located, it follows that impairment of sleep is a natural consequence of this progressive disease (Braak et al. 2003). Even James Parkinson addressed sleep problems in his essay on the shaking palsy when he writes "...as the malady proceeds, the sleep becomes much disturbed..." (Parkinson 1817).

REM sleep behaviour disorder (RBD) is associated with hyposmia, constipation and depression as among the most frequent and important pre-motor symptoms in PD (Bhidayasiri and Reichmann 2013; Reichmann 2010). Patients with RBD lack physiological atonia during REM sleep and frequently scream and move violently, often injuring their

sleeping partners. More than 60 % of these patients will later develop a second neurodegenerative disorder, very often PD or atypical parkinsonism (Claassen et al. 2010). But there are many more nocturnal disturbances in patients with PD such as nocturia, pollakisuria, problems falling asleep, problems staying asleep, restless legs syndrome, pain during nighttime, early morning akinesia and many more (Grandas and Iranzo 2004). Patients rate nighttime problems rather high when they are asked what impairs their quality of life the most (Barone et al. 2009). Thus, it is obvious that we need scales to quantify these features. Fortunately, such scales have been developed which give a good estimate of sleep problems in PD (Hogel et al. 2010). For others we can use the Parkinson's disease sleep scale (PDSS) or the scales for outcomes in PD sleep (SCOPA-S) (Chaudhuri et al. 2002; Marinus et al. 2003). Of all non-motor symptoms in PD, sleep problems belong to the most serious ones since they do not only impair quality of sleep and rest but also impair motor performance in the early morning and give rise to fatigue and somnolence during daytime (Comella 2006). Both nighttime and daytime problems also impair the quality of life of the patients' caregivers since they do not find enough rest to take care of the patients during the daytime (Martinez-Martin et al. 2007).

Thus, treatment of nocturnal problems in PD is extremely important. Most PD specialists use a long-acting dopamine replacement therapy to address a dopaminergic trough during the nighttime (Ray Chaudhuri et al. 2012; Trenkwalder et al. 2011). It is helpful to use extended-release preparations of levodopa since there would not be any interference with food at nighttime (Chouza et al. 1990). Long-acting dopamine agonists are extremely helpful to overcome nighttime problems and to increase the possibility of a good start of the next day. In addition, the

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use of MAO-B inhibitors or COMT inhibitors may be a good option (Rascol et al. 2011; Reichmann and Emre 2012). RBD can be addressed by the use of clonazepam and melatonin (Aurora et al. 2010; Kunz and Mahlberg 2010).

Finally, it should also be noted that patients with a so-called atypical parkinsonism suffer from nighttime problems and also need help to address these features. RBD is found in multiple system atrophy (MSA), dementia with Lewy body (DLB), progressive supranuclear palsy (PSP) and corticobasal syndrome (CBS) (Arnulf et al. 2005; Boeve et al. 2001, 2013; Cooper and Josephs 2009). MSA is also associated very often with sleep apnea and periodic limb movements. DLB is often associated with extensive daytime sleepiness (Arnulf 2005; Hirayama et al. 2003).

In conclusion, addressing nighttime problems and solving them by adequate treatment are of major importance for our PD patients and using this supplement will certainly help in achieving this goal.

**Conflict of interest** The authors have no conflict of interest.

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