Reviewer's report

Title: Actigraphy as a diagnostic aid for REM sleep behavior disorder in Parkinson's disease

Version: 2 Date: 20 December 2013

Reviewer: Samuel Bolitho

Reviewer's report:

- Minor Essential Revisions

Please explain what was done statistically to adjustment for age, disease duration and LED. It appears that the RBD positive group are older, have longer disease duration, higher LED and higher disease stage and each of these has the potential to contribute to higher amounts of sleep wake disturbance.

The Hoehn and Yahr scores for those participants RBD positive do not appear normally distributed. A non-parametric statistical test is advised. An alternative would be to include the UPDRS as a measure of progression of disease.

The RBDSQ (Stiasny-Kolster et al 2007 Movement Disorders) does not require a mandatory bed partner. Please correct this statement in the introduction.

The PLM index is much higher in the RBD positive group but yet is not statistically different possibly due to the large difference in variance. This needs to be discussed as a limitation, as PLM are an alternative cause for sleep-wake disturbance.

The epoch length was specified by Naismith et al as 30 seconds. The manuscript referred to an earlier study referenced by methodology (Naismith et al 2010 Journal of Geriatric Psychiatry & Neurology). Please include this value.

“Although a correlation was found between number of bouts classified as wake and actual wake time \(r = .31, p = .39\)”. Is the \(p\) value correct?

More discussion is need in regards to alternative explanations for the results in view of the RBD positive and negative groups not matched for age, disease duration, medication, stage, PLMs.

More discussion is needed regarding the limitations of actigraphy in Parkinson’s disease cohorts. Issues such as on/off fluctuations, dyskinesia, and tremor can all reduce the accuracy of actigraphy and must be included as discussion/limitation points.

- Discretionary Revisions

Given the recent consensus statement for the International REM Sleep
Behaviour Disorder Group (IRBD-SG) has suggested strict criteria to quantify RWA, this brings in to question previous studies that did not measure RWA using one of the methods suggested in the IRBD-SG consensus statement. The RBD questionnaire validation studies fall into this category and thus there validity compared to this new standard must be established. Given the comprehensive diagnostic strategy you have fulfilled to satisfy RBD positive status, I don’t think your results can be compared to studies validating questionnaires using the ICSD-2 or AASM without complying with the IRBD-SG consensus statement criteria for RBD. Please add this as a discussion point.

Do the wake bouts during PSG correlate with the wake bouts from actigraphy? If so this would add further validity top the use of actigraphy

Consider including the correlation between REM without atonia scores measured as a continuous variable and the wake scores measured from actigraphy. This would answer the question if more severe REM without atonia contributes to more severe sleep-wake disturbance

Consider quoting the rate of wake episodes per hour and compare this across the groups.

Your results suggest actigraphy may be useful to identify RBD and thus may be a strategy to identify RBD patients in at risk groups to see who will transition to a neurodegenerative disorder. Please consider adding this discussion point with reference to recent publications supporting this.

Consider including the breakdown of different medication groups between RBD positive and negative in addition to the levodopa dose equivalent. Groups could include unmedicated, Levodopa mono therapy, dopamine agonist mono therapy, Levodopa plus adjuvant. This would give a better idea of the different medication regimes potentially contributing to sleep disturbance.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**

I declare that I have no competing interests