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Predicting phenoconversion of REM sleep behaviour disorder due to synucleinopathy using dopaminergic imaging

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Background and aims: REM sleep behaviour disorder (RBD) is a REM sleep parasomnia that in the majority of cases precedes the development of overt alpha-synucleinopathies. Aim of this study was to apply a machine learning analysis to clinical and presynaptic dopaminergic imaging data of iRBD patients to investigate whether it is possible to identify those patients eventually developing Parkinson's disease (PD) compared with those developing dementia with Lewy bodies (DLB).

Methods: This is a retrospective international multicentre study of the International RBD Study Group. Patients with polysomnography-confirmed RBD who phenoconverted to overt alpha-synucleinopathy were enrolled and underwent baseline clinical and presynaptic dopaminergic imaging assessment. Motor, cognitive, olfaction and constipation data were collected.

Results: 173 patients with RBD due to synucleinopathy (mean age 70.3±6.3 years, 70.5% males) were enrolled. After a mean follow-up of 41.1±30.0 months, 94 (54.3%) patients developed PD, 74 (42.8%) DLB and 5 (2.9%) multiple system atrophy. The machine learning analysis showed that clinical data alone poorly predicted phenoconversion. Presynaptic dopaminergic imaging significantly improved the prediction, especially in combination with clinical data (89% sensitivity, 89% specificity). Compared with patients developing DLB, those developing PD were younger and showed more severe baseline presynaptic dopaminergic imaging deficit.

Conclusion: Routine clinical data alone are not able to predict the phenoconversion diagnosis in patients with RBD due to synucleinopathy. Conversely, presynaptic dopaminergic imaging may help in achieving a good prediction of forthcoming phenoconversion diagnosis. This finding may be used in designing future disease-modifying trials.

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