

Modelling the early stages of Parkinson's disease to provide insight into disease progression

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While it is generally known that Parkinson's is a progressive disease with highly heterogeneous symptoms, it is not clear what factors are associated with progression and how such factors progress over time. To investigate this, we propose a statistical modelling approach to explain the disease progression. The models are based on the random effects mixture model, taking into account the serial correlation of the data over time. Upon obtaining satisfactory results from simulated data, the models are then applied to longitudinal multivariate Parkinson's Progression Markers Initiative (PPMI) data, consisting of 6 clinical measurements assessed annually for 4 consecutive years. Three subgroups of patients are identified and characterized as having low, moderate, and high rate of progression. Profiles for each subgroup were also generated.

Keywords: Autoregressive model of order 1 (AR 1), Bayesian modelling, random effects mixture model, relevance parameter, subgroup identification, subgroup profiling, Unified Parkinson's Disease Rating Scale (UPDRS).