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MULTI-PARAMETER MRI ANALYSIS IN THE NATIONAL PRION COHORT

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Quantitative MRI measures can detect the presence of microstructural pathology in human prion disease not visible on conventional MR imaging. Few studies have examined longitudinal change and correlation with clinical measures. To test if longitudinal change could be identified on quantitative MRI, we performed a multiple-parameter analysis in the largest data set of patients with prion disease to date.

Multiple-parameter analysis of quantitative MRI sequences including diffusion tensor imaging, magnetisation transfer ratio and T2-weighted imaging was performed in 106 subjects (37 asymptomatic gene mutation carriers, 39 symptomatic patients and 30 healthy controls). The analysis included voxel-based morphometry, voxel-based analysis of diffusion tensor imaging and magnetisation transfer imaging measures, grey and white matter histograms and region of interest analysis.

Symptomatic patients showed significant longitudinal grey matter atrophy. Additionally a significant decrease in magnetisation transfer ratio and mean diffusivity was observed in grey matter structures; the decline in all MRI parameters strongly correlated with a decline in a functionally orientated outcome measure, the MRC Prion Disease Rating Scale. These data show that multi-parameter MRI analysis can identify longitudinal microstructural grey matter changes and may be able to provide objective and anatomically-specific biomarkers of disease progression in future clinical trials.