MRI detection of prion protein plaques in variant Creutzfeldt-Jakob disease

Figure 9.4T MRI of the postmortem human brain and corresponding histology

High-resolution (58 mm isotropic voxels) 3D gradient echo sequence (relaxation time = 20 ms, echo time = 5 ms, field of view $30 \times 30 \text{ mm}^2$, matrix 512×512 , 16 averages) (A, B) and magnified view (C) with corresponding immunohistochemically stained section (D-G). Scale bar: 3 mm (D) and $200 \mu\text{m}$ (E-G). sCJD = sporadic Creutzfeldt-Jakob disease; vCJD = variant Creutzfeldt-Jakob disease.

In variant Creutzfeldt-Jakob disease (vCJD), cortical deposition of abnormal prion protein (PrP) aggregates as florid amyloid plaques occur.¹ The 9.4T MRI resolves horizontal laminations of the isocortex.² We scanned blocks of postmortem vCJD brain and a sporadic CJD control after passive staining with gadodiamide using

a high-resolution 3D gradient echo sequence. Distinct hypointense foci on the MRI in vCJD (figure, A and C) but not control (figure, B) corresponded to PrP-amyloid plaques with greatest density in the central layers of the cortex on histology (figure, D–G). As human high-field systems become widespread, noninvasive monitoring of PrP-amyloid plaques may be of utility in future treatment trials.

Harpreet Hyare, PhD, Po-Wah So, PhD, Sebastian Brandner, MD, John Collinge, PhD, Harold G. Parkes, PhD

From UCL Institute of Neurology (H.H., S.B., J.C., H.G.P.), London; and Kings College London (P.-W.S.), UK.

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Correspondence to Dr. Hyare: Harpreet.hyare@uclh.nhs.uk

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