Direct visualization of remyelination in multiple sclerosis using T2-weighted high-field MRI

Figure Demyelinated (block arrow) and partially remyelinated (red arrow = demyelinated; blue arrows = remyelinated) lesions in postmortem multiple sclerosis brain

Spin-echo MRI (relaxation time = 3,000 msec, echo time = 60 msec, field of view = $30 \times 30 \text{ mm}^2$, matrix size 256×256 [$\sim 117 \mu\text{m}^2$ in-plane resolution], 16 averages). The corresponding histologic section was immunostained for myelin basic protein.

In multiple sclerosis (MS), remyelination may restore conduction and prevent axonal degeneration.¹ Ability to monitor remyelination in MS *in vivo* would benefit natural history studies and clinical trials of novel drugs.² High-field MRI ($\geq 3 \text{ T}$) is a promising tool to detect remyelination. We scanned a block of postmortem MS brain at 9.4 T. Histology revealed two areas of demyelination, and one showing remyelination. These findings corresponded to distinct changes visible on the T2-weighted MRI (figure). As human high-field MRI systems become increasingly widespread, remyelination in patients with MS may become detectable on T2-weighted scans.

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