

Will neurofilament (NFL) serum levels be the gold standard for monitoring MS progression, replacing MRI?

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Neurofilament light chain (NFL) is a major component of the neuronal cytoskeleton and is important for axonal growth, stability, and intracellular transport. NFL are released upon axonal or neuronal damage or degeneration, and can be found as a consequence, in the CSF and blood. Prior studies have shown that NFL concentrations in CSF are associated with the occurrence of MRI lesions, relapses, neurological disability, and treatment status in MS. Other studies have found predictive value of CSF NFL light or heavy chain levels with clinical outcomes and MRI measures. MRI primarily detects lesions in the white matter, and grey matter damage is largely missed with standard imaging techniques. In addition, MRI does not allow selective detection of neuroaxonal degeneration. Patients with increased serum levels of NFL at baseline, independent of other clinical and MRI variables, experience significantly more brain and spinal cord volume loss over 2 years and 5 years of follow-up. Third-generation (electrochemiluminescence) and fourth generation (single-molecule array) assays permit highly sensitive, longitudinal detection of blood NFL levels even in mild disease and in healthy controls. Multicenter studies are underway to consolidate NFL as biomarkers that reflect brain tissue damage, enabling longitudinal monitoring of disease activity and drug effects in clinical trials in neurological disorders including MS. Will NFL replace MRI for monitoring MS progression?

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