Quanterix®

PUBLICATION BRIEF

Monitoring Neuroinflammatory Disease Activity in Multiple Sclerosis with Nf-L and GFAP

Introduction

Multiple sclerosis (MS) is a chronic immune-mediated disease characterized by inflammation, neuroaxonal injury, and progressive neurological disability. While MRI and clinical assessments remain central to disease management, blood-based biomarkers are emerging to better characterize the disease and monitor treatment response.

Two valuable biomarkers have emerged for monitoring MS over time. Neurofilament light chain (Nf-L) reflects neuroaxonal injury associated with inflammatory disease activity, relapses, and treatment response. Glial fibrillary acidic protein (GFAP), a marker of astrocyte activation and glial pathology, provides complementary insight into chronic glial pathology and progression independent of relapse activity (PIRA). Nf-L and GFAP offer a more complete picture of neuroinflammation and its downstream consequences when measured together.

Because MS requires lifelong management, longitudinal biomarker monitoring is often more informative than single or sporadic measurements. Establishing an individual baseline and routinely tracking changes over time can reveal shifts in disease activity, treatment response, and progression that may not be apparent from isolated measurements.

Both Nf-L and GFAP circulate at low concentrations in blood; therefore, sensitive and reproducible detection is essential.

The Simoa® Neurology 2-Plex B (N2PB) (Nf-L + GFAP) assay enables simultaneous measurement of both biomarkers from a single sample, allowing researchers to track key aspects of MS biology with confidence across longitudinal studies.

Why Researchers use Simoa N2PB in Multiple Sclerosis Studies:

- Measure Nf-L and GFAP simultaneously from a single serum or plasma sample.
- Capture complementary biology spanning inflammatory activity, neuroaxonal injury, and astrocyte responses.
- Longitudinally monitor biomarker trajectories to evaluate disease progression.
- Assess treatment response using sensitive blood-based biomarkers.
- Support patient stratification studies and identification of progression risk.
- Generate reproducible data suitable for large-scale and long-term research studies.

Investigating Neuroinflammation in Multiple Sclerosis?

Connect with a Quanterix Biomarker Expert to discover how the Simoa Neurology 2-Plex B assay enables sensitive measurement of Nf-L and GFAP to study neuroinflammatory activity, disease progression, and treatment response in MS.

This publication brief highlights recent studies demonstrating the value of combined Nf-L and GFAP measurements in multiple sclerosis using the Simoa N2PB assay.

Featured Publications

Complementary Biomarkers of Disease Activity and Progression

This study directly compared serum Nf-L and GFAP as predictors of disability progression in multiple sclerosis. Nf-L was closely associated with inflammatory disease activity, whereas GFAP was strongly linked to progression-related pathology and future disability worsening. Importantly, the combination of elevated Nf-L and GFAP levels had a substantially greater risk of future disability worsening and PIRA, highlighting the benefit of dual-biomarker assessment.

Benkert P, Meier S, Schaedelin S, et al. Serum Glial Fibrillary Acidic Protein Compared With Neurofilament Light Chain as a Biomarker for Disease Progression in Multiple Sclerosis. JAMA Neurology. 2023;80(7):705-714. doi:10.1001/jamaneurol.2023.1098.

Nf-L and GFAP Support Longitudinal Monitoring of Disease Activity and Progression

This longitudinal study evaluated serum Nf-L and GFAP measurements in fingolimod-treated MS patients to determine whether the biomarkers predict different forms of disease worsening. Elevated Nf-L levels were associated with future relapse activity, while elevated GFAP levels were linked to progression independent of relapse activity (PIRA). These findings support the use of Nf-L and GFAP as complementary biomarkers for tracking different aspects of disease worsening in MS.

Benkert P, Meier S, Schaedelin S, et al. GFAP and Nf-L as predictors of disease progression and relapse activity in fingolimod-treated multiple sclerosis. Brain. 2024;147(12):4084-4098. doi:10.1093/brain/awae306.

Treatment Response Monitoring with Nf-L and GFAP

This study evaluated serum Nf-L and GFAP levels using Simoa technology in MS patients treated with dimethyl fumarate or ocrelizumab. The authors found that Nf-L and GFAP exhibited distinct biomarker dynamics following treatment: Nf-L responded rapidly and reflected inflammatory disease activity, while GFAP showed a more gradual decline and captured persistent astroglial pathology. These findings highlight the complementary value of Nf-L and GFAP for monitoring treatment response and tracking different aspects of disease biology over time.

Mingione A, Corona A, Monzani C, et al. Serum Neurofilament Light Chain and Glial Fibrillary Acidic Protein as Differential Biomarkers of Response to Dimethyl Fumarate and Ocrelizumab in Multiple Sclerosis. International Journal of Molecular Sciences. 2026;27(3):1441. doi:10.3390/ijms27031441.

Combined Nf-L and GFAP Assessment Reveals Distinct MS Disease Phenotypes

This multicenter study evaluated serum Nf-L and GFAP levels collected within the first year of MS onset and identified distinct patient subgroups with different risks of disability worsening. Elevated Nf-L was associated with inflammatory disease activity, while elevated GFAP (with low Nf-L) was linked to progression-related biology and PIRA. The findings suggest that Nf-L and GFAP provide complementary insight into systemic CNS inflammation and may help identify patients who are likely to follow different disease trajectories and respond to treatment differently.

Benkert P, Meier S, Schaedelin S, et al. Serum biomarkers at disease onset for personalized therapy in multiple sclerosis. Brain. 2025;149(7):2295-2308. doi:10.1093/brain/awaf173.

Stratifying Progressive MS with Nf-L and GFAP

This study evaluated serum Nf-L and GFAP in patients with MS at high risk of underlying progressive pathology. Consistent with previous findings, elevated Nf-L levels were associated with active inflammatory disease, while elevated GFAP levels were associated with later disability progression, particularly in patients with low inflammation. These findings suggest that Nf-L and GFAP can help distinguish active from nonactive progressive disease and identify patients at risk of continued disability worsening.

Woo MS, Benkert P, Meier S, et al. Serum GFAP and Nf-L Levels Differentiate Subsequent Progression and Disease Activity in Patients With Progressive Multiple Sclerosis. Neurology: Neuroimmunology & Neuroinflammation. 2025;12:e200052. doi:10.1212/NXI.0000000000200052.