Overview

Useful For
Quantitative measurement of neurofilament light chain in human cerebrospinal fluid

Method Name
Chemiluminescent Immunoassay

NY State Available
No

Reporting Name
Neurofilament Light Chain, CSF

Aliases
NfL

Specimen

Specimen Type
CSF

Specimen Required
Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Container/Tube: Sarstedt screw cap tube, 5 mL; 62.504.040
Specimen Volume: 1 mL
Collection Instructions:
1. Perform lumbar puncture and discard the first 1 to 2 mL of cerebrospinal fluid (CSF).
2. Collect CSF directly into the collection tube.
Note: Polypropylene collection tubes must be used. Polystyrene collection tubes are not acceptable.
3. Inspect specimen for visible blood contamination:
    a. If bloody, centrifuge specimen and transfer supernatant to a new collection tube prior to freezing and sending to laboratory. The supernatant, not the cellular material, is used for analysis.
    b. If specimen is clear, centrifugation is not necessary.
4. Freeze sample upright prior to placing in transport container.

Specimen Minimum Volume
0.5 mL

Reject Due To

Gross hemolysis	Reject
Thawing	Cold reject; Warm reject
Gross lipemia	Reject
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
CSF	Frozen	90 days	

Clinical & Interpretive

Clinical Information
Neurofilament light chain (NfL) is a nonspecific marker of neuro-axonal injury showing promising associations with outcomes in several neurological conditions. In neurodegenerative diseases, NfL may also serve as a prognostic marker of decline and an efficacy biomarker of experimental therapies. In a meta-analysis of Alzheimer disease, frontotemporal dementia, and amyotrophic lateral sclerosis (ALS), plasma NfL levels were elevated in patients compared to controls with utility in differentiating neurodegenerative conditions from non-neurodegenerative mimics. However, due to a lack of specificity to a particular neurodegenerative disease, its role as a diagnostic marker is limited.

Reference Values
Not established

Interpretation
Neurofilament light chain (NfL) results need to be interpreted in the context of the specific clinical trial aim and endpoint.

In multiple sclerosis (MS), cerebrospinal fluid (CSF) NfL concentrations are elevated in newly diagnosed patients, and concentrations correlate with disease severity and prognosis. Measurements of CSF NfL concentrations in patients newly diagnosed with MS can predict brain atrophy and lesion load on magnetic resonance imaging. Reductions in CSF NfL concentrations after different treatments tend to follow the hierarchy of treatment efficacy, with greatest reductions observed with the most intensive treatments.

In Alzheimer disease (AD), CSF NfL concentrations have been shown to correlate with cortical thinning and cognitive decline in both sporadic and familial AD. However, at this point, the clinical utility of NfL in AD is not fully understood. In amyotrophic lateral sclerosis (ALS), CSF NfL concentrations have been suggested to be able to discriminate ALS from ALS-mimics. NfL concentrations at symptom onset may be prognostic of disease progression rate and may be used to stratify patients into groups with a similar prognosis in clinical trials.

Cautions
Increases in neurofilament light chain are not disease specific. Results should only be used in conjunction with other clinical information when evaluating patients with neurodegeneration.
All immunometric assays can, on rare occasions, be subject to a hook-effect at extremely high analyte concentrations (false-low results), heterophilic antibody interference (false-high results), or autoantibody interference (unpredictable effects). If the laboratory result does not fit the clinical picture, these possibilities should be considered.
Results obtained with different assay methods or kits may be different and cannot be used interchangeably.

Clinical Reference
1. Cross AH, Gelfand JM, Thebault S, et al. Emerging cerebrospinal fluid biomarkers of disease activity and progression in multiple sclerosis. JAMA Neurol. Published online March 11, 2024. doi:10.1001/jamaneurol.2024.0017
2. Khalil M, Salzer J. CSF neurofilament light: A universal risk biomarker in multiple sclerosis?. Neurology. 2016;87(11):1068-1069. doi:10.1212/WNL.0000000000003107
3. Bhan A, Jacobsen C, Dalen I, et al. CSF neurofilament light chain predicts 10-year clinical and radiologic worsening in multiple sclerosis. Mult Scler J Exp Transl Clin. 2021;7(4):20552173211060337. Published 2021 Dec 6. doi:10.1177/20552173211060337
4. Yuan A, Nixon RA. Neurofilament proteins as biomarkers to monitor neurological diseases and the efficacy of therapies. Front Neurosci. 2021;15:689938. Published 2021 Sep 27. doi:10.3389/fnins.2021.689938
5. McGrowder DA, Miller F, Vaz K, et al. Cerebrospinal fluid biomarkers of Alzheimer's disease: Current evidence and future perspectives. Brain Sci. 2021;11(2):215. Published 2021 Feb 10. doi:10.3390/brainsci11020215
6. Verde F, Otto M, Silani V. Neurofilament light chain as biomarker for amyotrophic lateral sclerosis and frontotemporal dementia. Front Neurosci. 2021;15:679199. Published 2021 Jun 21. doi:10.3389/fnins.2021.679199

Performance

Method Description
The Lumipulse G NfL CSF is an assay system for the quantitative measurement of neurofilament light chain (NfL) in cerebrospinal fluid (CSF) specimens based on chemiluminescent immunoassay technology by a specific two-step sandwich immunoassay method on the Lumipulse G System. The specimen and biotinylated antibody solution are both added to the antibody coated particle solution. The NfL in the specimen specifically binds to anti-NfL monoclonal mouse antibody on the particles and biotinylated mouse antibody. Biotinylated antibody-antigen immunocomplexes are formed. The particles are washed and rinsed to remove unbound materials. Alkaline phosphatase labeled streptavidin specifically binds to biotinylated immuno-complexes on the particles. The particles are washed and rinsed to remove unbound materials. Substrate solution is added and mixed with the particles. 3-(2'-Spiroadamantyl)-4-methoxy-4-(3"-phosphoryloxy)-phenyl-1,2-dioxetane (AMPPD) contained in the substrate solution is dephosphorylated by the catalysis of alkaline phosphatase indirectly conjugated to particles. Luminescence (at a maximum wavelength of 477 nm) is generated by the cleavage reaction of dephosphorylated AMPPD. The luminescent signal reflects the amount of NfL present in the sample.(Package insert: Lumipulse G NfL CSF. Fujirebio Inc; 04/2023)

Day(s) Performed
Tuesday. Days performed may be flexible if samples are scheduled to arrive in a batch.

Report Available
1 to 9 days

Specimen Retention Time
90 days

Performing Laboratory Location
Rochester

CLIA Laboratory Number
24D1040592

Test Classification
For research use only. This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.