Blood neurofilament light chain as a biomarker of MS disease activity and treatment response

Jens Kuhle, MD, Harald Kropshofer, PhD, Dieter A. Haering, PhD, et al.

Cite as: Neurology® 2019;92:e1007-e1015. doi:10.1212/WNL.0000000000007032

Study objective and summary result
This study examined whether blood neurofilament light chain (NfL) levels can serve as a biomarker of disease activity and treatment response in patients with multiple sclerosis (MS), and it found that blood NfL levels can serve as a biomarker of disease activity and treatment responses in patients with MS.

What is known and what this paper adds
Elevated CSF and blood NfL levels correlate with more relapses, greater disability severity, and greater brain volume loss in patients with MS. This study provides further evidence for the utility of blood NfL levels as a marker of disease activity and treatment response.

Participants and setting
This study examined samples and data from 589 patients with relapsing-remitting MS who participated in clinical trials comparing fingolimod to placebo treatment (FREEDOMS; NCT00289978) or interferon β-1a (TRANSFORMS; NCT00340834).

Design, size, and duration
The FREEDOMS and TRANSFORMS trials collected blood samples at baseline and follow-up timepoints. Blood NfL levels were quantified with a highly sensitive immunoassay (SIMOA) by personnel blinded to clinical data and treatment assignments. Cox proportional hazard, negative binomial and multiple linear regression models were used to determine whether baseline blood NfL levels were associated with baseline and follow-up clinical and MRI variables, and a mixed model was used to assess the effects of fingolimod treatment on blood NfL levels.

Primary outcome measures
The primary outcomes were disease activity measures association with blood NfL levels and the effects of fingolimod treatment on blood NfL levels.

Main results and the role of chance
Higher baseline blood NfL levels were associated with more new or enlarging T2 lesions (p = 0.0006), more relapses (p < 0.0001), and greater brain volumes losses (p < 0.0001). Fingolimod treatment reduced blood NfL levels (p < 0.001).

Bias, confounding, and other reasons for caution
Blood samples were only available for ~25% of participants in the FREEDOMS and TRANSFORMS trials.

Generalizability to other populations
The international nature of the FREEDOMS and TRANSFORMS trials favors the generalizability of this study’s results.

Study funding/potential competing interests
This study was funded by Novartis and the Swiss National Science Foundation. Some authors report receiving personal fees, committee appointments, and funding from various foundations, government agencies, and healthcare companies, including Novartis. Some authors are employed by Novartis or companies closely associated with Novartis. Go to Neurology.org/N for full disclosures.

A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The authors of the full-length article and the journal editors edited and approved the final version.

Copyright © 2019 American Academy of Neurology
Blood neurofilament light chain as a biomarker of MS disease activity and treatment response

Neurology 2019;92:e1007-e1015 Published Online before print February 8, 2019
DOI 10.1212/WNL.0000000000007032

This information is current as of February 8, 2019

Updated Information & Services
including high resolution figures, can be found at:
http://n.neurology.org/content/92/10/e1007.full

References
This article cites 22 articles, 6 of which you can access for free at:
http://n.neurology.org/content/92/10/e1007.full#ref-list-1

Citations
This article has been cited by 3 HighWire-hosted articles:
http://n.neurology.org/content/92/10/e1007.full##otherarticles

Subspecialty Collections
This article, along with others on similar topics, appears in the following collection(s):
MRI
http://n.neurology.org/cgi/collection/mri
Multiple sclerosis
http://n.neurology.org/cgi/collection/multiple_sclerosis

Permissions & Licensing
Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
http://www.neurology.org/about/about_the_journal#permissions

Reprints
Information about ordering reprints can be found online:
http://n.neurology.org/subscribers/advertise