BUFFALO NEUROIMAGING ANALYSIS CENTER

Jacobs School of Medicine and Biomedical Sciences
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A Better Way to Measure Progressive MS

Research Summary

prepared for the MS community by

Buffalo Neuroimaging Analysis Center Advisory Council

Neuroimaging Correlates of Patient Reported Outcomes in Multiple Sclerosis

Dejan Jakimovski, Taylor R Wicks, Niels Bergsland, Michael G Dwyer, Bianca Weinstock-Guttman, Robert Zivadinov. Published in *Degenerative Neurological and Neuromuscular Disease* by Dove Press in 2023.

MAJOR FINDINGS

- **The MRI metric correlating best with MS disability is deep gray matter volume.**
- **The relationship between patient-reported outcomes such as life satisfaction and the volume of the thalamus is significantly influenced by the level of reported depression.**
- **Participant responses about their symptoms (patient-reported outcomes) on simple questionnaires correlate closely with deep gray matter volume, current disability, and future disease progression.**

Currently, MS Disability is assessed by two standards:

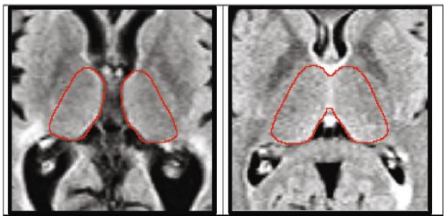
Physical performance testing Clinicians traditionally measure MS disability using assessments that focus on physical, especially walking disability. The most common of these assessments has been the Expanded Disability Severity Scale (**EDSS**). However, EDSS scoring comes up short because of its narrow focus. For example, two people with MS may have identical EDSS scores, but report vastly different levels of fatigue, chronic pain, cognitive decline, bowel and bladder issues, and/or depression.

MRI analysis MRI imaging for multiple sclerosis looks mostly at the number and intensity of lesions in the brain's white matter. This is referred to as white matter lesion load. This metric falls short because the experience of people with MS does not correlate with what is observed in clinic

and MRI findings. For example, someone with a high white matter lesion load may have no clinical symptoms, while someone else with low white matter lesion loads may be significantly disabled.

The paper describes **two better standards** for assessing and predicting MS Disability

Deep gray matter analysis Newer MRI analyses, such as measurement of the deep gray matter volume, have recently been suggested as the best radiologic markers of MS disability. As its principal finding, this paper concludes patient-reported outcomes correlate well with deep gray matter volume.



Above are examples of very high atrophy (left panel) and low atrophy (right panel).

Patient-Reported Outcomes This study used a patient-reported outcome questionnaire that compiled measurements that line up with what people with MS experience. This tool, currently used mostly for research, could also be used by clinicians as an additional way to track MS progression. Several papers published by the Buffalo Neuroimaging group over the past two years have shown that patient-reported outcomes are better at assessing patient condition and predicting future progression than more widely accepted metrics such as EDSS. Further research will be needed to understand how depression, a symptom reported by a significant number of people with MS, might affect disease progression.

This Research Summary was prepared by Buffalo Neuroimaging Advisory Council Members, Carol Schumacher, Mitchell Sturgeon, Tracie Jacquemin, Patricia Picco, Marc Stecker, and Craig Walters.

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