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The intent of the study was to assess whether measurements of neuronal and axonal degeneration measured with the latest OCT technology (SPECTRALIS® with Nsite Analytics™) are related to MRI measurements of global brain atrophy (brain parenchymal fraction [BPF]) and grey and white matter fraction at very early disease stages.

Forty-four patients with clinically isolated syndrome or relapsing-remitting MS were enrolled in this highly powered (95%) cross-sectional study. OCT scans of peripapillary retinal nerve fiber layer (RNFL) thickness and total macular volumes (TMV) were performed using SPECTRALIS® with Nsite Analytics™ technology. BPF as well as white and grey matter fractions (WMF/GMF) were assessed by 1.5 Tesla MRI scans, and age-adjusted, generalized estimating equation models were used to assess the association between SPECTRALIS OCT and MRI measures.

SPECTRALIS measurements of RNFL thickness and TMV independently predicted WMF (P = 0.003 and P = 0.032) but not GMF (P = 0.717 and P = 0.357) when corrected for age. The most important observation of this study is the independent association of OCT measures of retinal atrophy with MRI-derived WMF, but not GMF or black hole fraction when corrected for age and a history of optic neuritis (ON).

In early MS, OCT measurements of retinal atrophy are related to MRI assessed volumetric changes in the white matter. The study further substantiates the association of retinal thinning and brain tissue loss in MS.