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USE OF THE BRAIN PARENCHYMAL FRACTION TO MEASURE WHOLE BRAIN ATROPHY IN RELAPSING-REMITTING MS

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Background: Episodic inflammation in the CNS during the early stages of MS results in progressive disability years later, presumably due to myelin and axonal injury. MRI demonstrates ongoing disease activity during the early disease stage, even in some patients who are stable clinically. The optimal MRI measure for the destructive pathologic process is uncertain, however. ***Methods:*** In this post-hoc study, MRI scans were analyzed from patients with relapsing MS participating in a placebo-controlled trial of interferon β-1a. The brain parenchymal fraction, defined as the ratio of brain parenchymal volume to the total volume within the brain surface contour, was used to measure whole brain atrophy. The relationship between disease features and brain atrophy and effect of interferon β-1a were determined. ***Results:*** MS patients had significant brain atrophy that worsened during each of 2 years of observation. In many patients, brain atrophy worsened without clinical disease activity. Baseline clinical and MRI abnormalities were not strongly related to the rate of brain atrophy during the subsequent 2 years. Treatment with interferon β-1a resulted in a reduction in brain atrophy progression during the second year of the clinical trial. ***Conclusions:*** Patients with relapsing-remitting MS have measurable amounts of whole brain atrophy that worsens yearly, in most cases without clinical manifestations. The brain parenchymal fraction is a marker for destructive pathologic processes ongoing in relapsing MS patients, and appears useful in demonstrating treatment effects in controlled clinical trials.

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Comment from Richard M. Ransohoff, MD, Associate Editor: *This study showed conclusively that MS is a neurodegenerative disorder from early phases of disease and also delineated a useful tool for monitoring therapeutic trials.*

Use of the brain parenchymal fraction to measure whole brain atrophy in relapsing-remitting MS

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