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published by admin on Mon, 09/08/2014 - 3:07pm

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Title
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Publication Type
Journal Article

Year of Publication
2007

Authors

Journal
Neurology

Volume
69

Issue
23

Pagination
2128-35

Date Published
2007 Dec 4

ISSN
1526-632X

Keywords
Adult, Brain, Brain Diseases, Cross-Sectional Studies, Female, Humans, Linear Models, Magnetic Resonance Imaging, Male, Multiple Sclerosis, Prospective Studies, Vision Disorders, Visual Acuity, Visual Pathways

Abstract

OBJECTIVE: To examine the relation between low-contrast letter acuity, an emerging visual outcome for multiple sclerosis (MS) clinical trials, and brain MRI abnormalities in an MS cohort.

METHODS: T2 lesion volume and brain parenchymal fraction were determined for whole brain and within visual pathway regions of interest. Magnetization transfer ratio histograms were examined. Vision testing was performed binocularly using low-contrast letter acuity (2.5%, 1.25% contrast) and high-contrast visual acuity (VA). Linear regression, accounting for age and disease duration, was used to assess the relation between vision and MRI measures.

RESULTS: Patients (n = 45) were aged 44 +/- 11 years, with disease duration of 5 years (range <1 to 21), Expanded Disability Status Scale score of 2.0 (0 to 6.0), and binocular Snellen acuity of 20/16 (20/12.5 to 20/25). The average T2 lesion volume was 18.5 mm(3). Patients with lower (worse) low-contrast letter acuity and high-contrast VA scores had greater T2 lesion volumes in whole brain (2.5% contrast: p = 0.004; 1.25%: p = 0.002; VA: p = 0.04), Area 17 white matter (2.5%: p < 0.001; 1.25%: p = 0.02; VA: p = 0.01), and optic radiations (2.5%: p = 0.001; 1.25%: p = 0.02; VA: p = 0.007). Within whole brain, a 3-mm(3) increase in lesion volume corresponded, on average, to a 1-line worsening of low-contrast acuity, whereas 1-line worsening of high-contrast acuity corresponded to a 5.5-mm(3) increase.
CONCLUSIONS: Low-contrast letter acuity scores correlate well with brain MRI lesion burden in multiple sclerosis (MS), supporting validity for this vision test as a candidate for clinical trials. Disease in the postgeniculate white matter is a likely contributor to visual dysfunction in MS that may be independent of acute optic neuritis history.

DOI 10.1212/01.wnl.0000278387.15090.5a
Alternate Journal Neurology
PubMed ID 17881718