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Autor(en) des Beitrags: Mühlau, M; Buck, D; Förschler, A; Boucard, CC; Arsic, M; Schmidt, P; Gaser, C; Berthele, A; Hoshi, M; Jochim, A; Kronsbein, H; Zimmer, C; Hemmer, B; Ilg, R

Titel des Beitrags: White-matter lesions drive deep gray-matter atrophy in early multiple sclerosis: support from structural MRI.

Abstract: In MS, the relationship between lesions within cerebral white matter (WM) and atrophy within deep gray matter (GM) is unclear. To investigate the spatial relationship between WM lesions and deep GM atrophy, we performed a cross-sectional structural magnetic resonance imaging (MRI) study (3 Tesla) in 249 patients with clinically-isolated syndrome or relapsing-remitting MS (Expanded Disability Status Scale score: median, 1.0; range, 0-4) and in 49 healthy controls. Preprocessing of T1-weighted and fluid-attenuated T2-weighted images resulted in normalized GM images and WM lesion probability maps. We performed two voxel-wise analyses: 1. We localized GM atrophy and confirmed that it is most pronounced within deep GM; 2. We searched for a spatial relationship between WM lesions and deep GM atrophy; to this end we analyzed WM lesion probability maps by voxel-wise multiple regression, including four variables derived from maxima of regional deep GM atrophy (caudate and pulvinar, each left and right). Atrophy of each deep GM region was explained by ipsilateral WM lesion probability, in the area most densely connected to the respective deep GM region. We demonstrated that WM lesions and deep GM atrophy are spatially related. Our results are best compatible with the hypothesis that WM lesions contribute to deep GM atrophy.
atrophy through axonal pathology.