Atrophy and structural variability of the upper cervical cord in early multiple sclerosis.

Despite agreement about spinal cord atrophy in progressive forms of multiple sclerosis (MS), data on clinically isolated syndrome (CIS) and relapsing-remitting MS (RRMS) are conflicting. To determine the onset of spinal cord atrophy in the disease course of MS. Structural brain magnetic resonance imaging (MRI) was acquired from 267 patients with CIS (85) or RRMS (182) and 64 healthy controls (HCs). The upper cervical cord cross-sectional area (UCCA) was determined at the level of C2/C3 by a segmentation tool and adjusted for focal MS lesions. The coefficient of variation (CV) was calculated from all measurements between C2/C3 and 13 mm above as a measure of structural variability. Compared to HCs (76.1±6.9 mm(2)), UCCA was significantly reduced in CIS patients (73.5±5.8 mm(2), p=0.018) and RRMS patients (72.4±7.0 mm(2), p<0.001). Structural variability was higher in patients than in HCs, particularly but not exclusively in case of focal lesions (mean CV HCs/patients without/with lesions: 2.13%/2.55%/3.32%, all p-values<0.007). UCCA and CV correlated with Expanded Disability Status Scale (EDSS) scores (r =-0.131/0.192, p=0.044/<0.001) and disease duration (r=-0.134/0.300, p=0.039/ < 0.001). CV additionally correlated with hand and arm function (r=0.180, p=0.014). In MS, cervical
cord atrophy already occurs in CIS. In early stages, structural variability may be a more meaningful marker of spinal cord pathology than atrophy.