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The central vein sign in multiple sclerosis: a real-life multi-centre MAGNIMS study

Introduction: There is no single test for multiple sclerosis (MS) and a variety of demyelinating conditions can mimic its appearance. The central vein (CV) sign is a characteristic of MS lesions, whereby demyelinating plaques form perivascularly and has the potential to become a diagnostic biomarker in MS. Most of the studies of CVs in MS so far have been single centre and included small sample sizes. This is the first multi-centre study to test the usefulness of the CV sign as an MS specific biomarker.

Methods: 479 patients with a variety of conditions including CIS/RRMS, NMOSD, vasculitis, migraine, small vessel ischaemia (SVI) and diabetes from nine MAGNIMS centres were included. Each patient had 1.5 or 3T MRI with variable protocols including SWI (to detect veins) and FLAIR (to detect lesions), co-registered and examined for this study. The co-registered scans were divided into 8 equal blocks and randomly analysed by blinded raters. Lesions >3mm were included and categorised according to location and size. Confluent lesions were split into fingers. The presence of a CV was determined for each lesion.

Results: 3784 lesions were analysed. The proportion of white matter lesions (WMLs) with CVs were as follows: MS: 0.46(SE=0.009), NMOSD: 0.21(SE=0.050); vasculitis: 0.22(SE=0.036); migraine 0.17(SE=0.035); SVI 0.17(SE=0.019); diabetes 0.13(SE=0.026). Sensitivity and specificity values based on 35% threshold of WMLs with CVs for patients with >2 lesions were equal to 0.63 and 0.84, respectively. Positive and negative predictive values were 0.90 and 0.51, respectively. Initial findings suggest WMLs in the centrum semiovale may best distinguish MS from non-MS.

Discussion: This is the first multi-centre study involving large numbers of participants to test the usefulness of the CV sign in distinguishing MS from non-MS. Our initial findings are encouraging and further analyses will focus on simplifying the diagnostic criteria using the CV sign.