Retinal inner nuclear layer volume; a potential new outcome measure for optic neuritis treatment trials in MS


BACKGROUND

• The association of peripapillary retinal nerve fibre layer (pRNFL, Fig 1A) and ganglion cell-inner plexiform layer (GCIP, Fig 1B) thickness, with neurodegeneration in multiple sclerosis (MS) is well established.1

• The potential relationship of the adjoining inner nuclear layer (INL, Fig 1B) with inflammatory disease activity is less well understood.2,3

METHODS

• A longitudinal, multi-centre study including eleven MS centres.
• Spectrum-domain optical coherence tomography (OCT) and clinical data were collected in 785 patients with MS and 97 healthy controls (HCs) between 2010 and 2017 (see Fig1 and Table 1).
• Clinical data included EDSS score, occurring of relapses, including MS-associated optic neuritis (MSON).
• At each centre, automated segmentation of OCT scans was performed to obtain data on the INL and GCIP volume (mm3) and pRNFL thickness (μm).
• (Relative) annualised changes were calculated and generalised estimation equations (GEE) were used to analyse associations with clinical measures.

RESULTS

• Longitudinal changes in INL volume were comparable for MS patients and HCs. Changes in GCIP and pRNFL were more pronounced in MS (Fig 2A).
• An episode of MSON during follow-up (N=61/1562) was associated with a significant increase in INL volume (Fig 2B).
• The occurrence of clinical relapses (present in 24.4%) was significantly associated with an increase in INL volume in the subsequent follow-up (Table 2).
• INL volume was independent of clinical progression (present in 17.2%) based on change of the EDSS score (Table 2).

CONCLUSION

• An increase of the INL volume is associated with adjacent inflammation of the optic nerve and retina, and with the occurrence of clinical relapses.
• INL volume changes may be considered as a secondary outcome measure for anti-inflammatory treatment trials.

Table 2. The temporal effect of clinical relapses (other than MSON) and disease progression on annualised change in INL, GCIP, and pRNFL thickness

Table 3. Demographic and clinical characteristics at baseline

References