

Correlation between semi automated measurement of whole brain atrophy and T2W lesion load with Disability (EDSS) in multiple sclerosis

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Abstract

Multiple Sclerosis (MS) is an autoimmune disease of the central nervous causing severe disability via progressive damage to white matter. Measuring brain parenchymal volume is an objective and reliable surrogate for destructive pathological process in MS. The brain parenchymal fraction (BPF) is the ratio of brain parenchymal volume to the total volume within the surface contour.

MATERIALS AND METHODS

In this study 20 patients (age 18-53) with definite relapsing-relapsing (R-R) or slowly progressive (S-P) MS disease based on MacDonald criteria were selected. [4 slowly progressive (S-P), 16 Relapsing-relapsing (R-R)]. The neurological exam and Expanded Disability Status Score (EDSS) were enrolled by a well qualified neurologist.

MR images were obtained on a 1.5 Tesla General Electric SIGNA System. T2 Fast spin echo and T1 Spin Echo sequences, covering the entire brain were gathered in the axial plane 5 mm thickness contiguously with a 256 x 256 acquisition matrix.

A multi-step volume analysis was then performed using several processing tools available in semi automated

software package including interactive image editing, region of interest pixel counting, registration and threshold. We measured BPF in patients with MS and 34 healthy controls.

RESULTS

There was strong correlation between EDSS and brain parenchymal atrophy ($r=0.67$, $p<0.01$), but there was moderate correlation between T2w load and EDSS ($r=0.34$, $p<0.2$).

CONCLUSION

BPF correlated negatively with expanded disability status scale (EDSS), but not with total T2 hyper intense lesion volume. We conclude that whole-brain atrophy in MS can be reliably and readily quantified by a semi automated approach

References

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