

Relationship between cerebrovascular reactivity and age in multiple sclerosis

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Background

Cerebrovascular reactivity (CVR) alterations have been observed within gray matter (GM) in multiple sclerosis (MS) patients.^{1,2} This study aimed to: i) test alterations of cerebral blood flow (CBF) and CVR in MS, within GM and white matter (WM) regions of interest (ROIs); ii) assess CVR within MS WM lesions; iii) investigate the association between CVR and age in MS.

Methods

Thirty-one MS patients (median age [IQR]=39.8 [33.3-51.3] years old, median EDSS [IQR]=1.5 [1.0-3.0]) and 25 healthy controls (HC) (median age [IQR]=42.3 [29.3-56.7] years old) were scanned with pseudo-continuous arterial spin labeling MRI using a 1.5T scanner, once under normocapnia and once under hypercapnia. CBF images were computed,³ and partial volume effect correction was performed. CVR maps were derived.¹ Median CBF (at normocapnia) and CVR were extracted from GM atlas-derived functional ROIs,² GM vascular territory ROIs, WM lesions and normal appearing WM (NAWM). MS-*vs*-HC CBF and CVR differences were assessed in all the ROIs. Spearman's correlations between CVR and age were computed for MS and HC groups. The false discovery rate (FDR) method was used to correct for multiple comparisons.

Results

No significant MS-*vs*-HC differences were observed for CBF and CVR. Significantly lower CBF, but not CVR, was found in WM lesions with respect to NAWM ($P < 0.0001$) in MS group. A significant FDR-corrected inverse correlation between CVR and age was observed in the HC group for all GM ROIs and WM (*e.g.* within somatomotor network, $r = -0.437$, $P = 0.031$; WM, $r = -0.488$, $P = 0.025$), but not in MS group.

Conclusions

The relatively low-grade of inflammation in our MS patients may have prevented us from showing significant CVR differ-

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ences between MS and HC groups. Since CVR and age were correlated in HC group but not in the MS one, some other factors, that may be MS-related, could be associated with CVR in MS patients.

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