Background: Relapsing neuromyelitis optica (R-NMO) is the first central nervous system inflammatory autoimmune disease with a defined target molecule: the astrocytic water channel aquaporin-4 (AQP4). We have reported structural brain abnormalities in R-NMO patients by visual analysis on magnetic resonance (MR) images. Objectives: We sought to confirm these structural abnormalities using statistical parametric mapping and also to determine whether brain perfusion shows similar abnormalities.

Methods: Brain structure and perfusion were compared between 15 R-NMO patients (13 female, 2 male; mean ± SD age, 40.6 ± 10.7 years) and 15 healthy volunteers (13 female, 2 male; mean age, 55.3 ± 3.4 years) by voxel brain morphometry on MR images and voxel-based perfusion single-photon emission computed tomography (SPECT). Considering the difference in mean age between groups, an analysis of covariance design was used to model age and gender as nuisance covariates. Results: R-NMO patients showed significantly reduced gray matter (GM) density (one cluster of voxels: P < .05, corrected by multiple comparison) in the bilateral thalamus regions bordering the third ventricle. White matter (WM) density was also significantly reduced, represented by a cluster wider than the GM cluster, located bilaterally in the corpus callosum in WM regions contiguous to the third ventricle and both lateral ventricles, mainly around the posterior lateral horns. GM and WM clusters seemed to be very close to each other in a posterior region of the left thalamus. There was no difference between groups in terms of GM and WM volumes. Brain perfusion showed a very similar pattern to GM density. However, hypoperfusion also extended to the left middle cingulate cortex. Conclusions: We confirmed structural abnormalities in R-NMO patients represented by differences in gray/white matter density in regions contiguous to ventricular spaces, mainly around the third ventricle, which are known to have high AQP4 expression. Brain hypoperfusion is probably due to GM density reduction or vice versa. Longitudinal studies are needed to clarify this, and further quantitative analysis is required to elucidate the significance of the partial mismatching between GM density and brain perfusion.

Disclosure: Nothing to disclose

Keywords: imaging and MS