Assessment of normal-appearing white matter in patients with Vascular Parkinsonism and Parkinson's Disease with cerebrovascular lesions

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Introduction

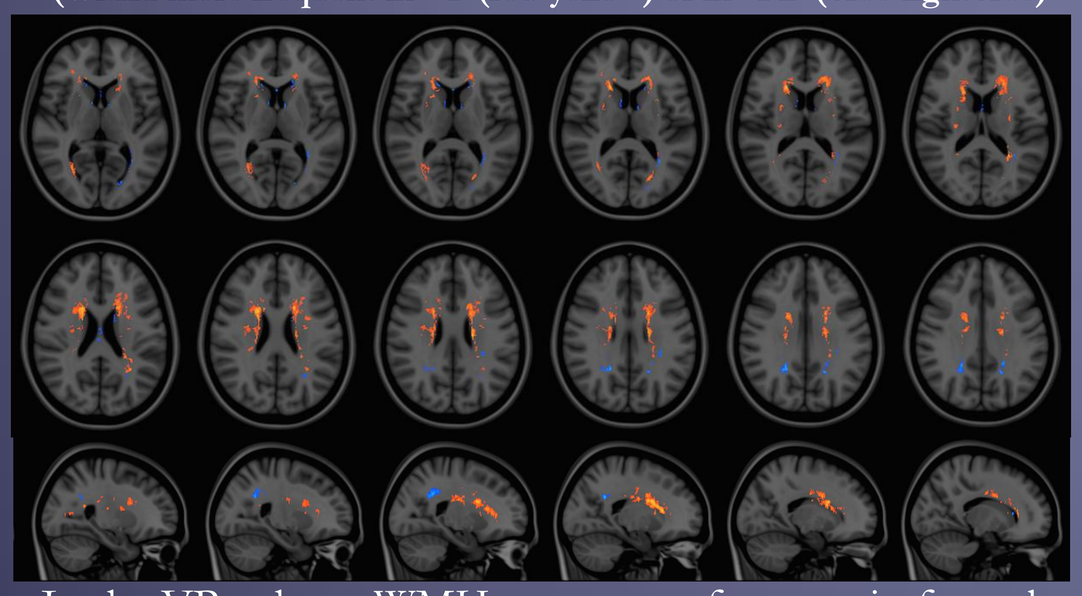
- Differential diagnosis of Vascular Parkinsonism (VP) and Parkinson's disease associated with cerebrovascular lesions (vPD) may be challenging, especially when the lesion burden is comparable across patients.
- In this study, instead of merely focusing on the presence and extent of vascular pathology, we analyzed the microstructure of normal-appearing white matter (naWM) in patients with VP and vPD with similar lesion load, in order to identify neuroimaging correlates of the two pathologies beyond the sole damaged tissue.

Materials&Methods

- Twelve patients with VP and abnormal DAT-SPECT (8 male, mean age 73.9 ± 5.7) and thirteen patients with vPD (8 male, mean age 73.1 ± 5.2) were included in this study.
- All patients underwent the same 3 T MRI protocol including whole-brain 3D T1-weighted, T2-weighted, fluid-attenuated inversion recovery (FLAIR) and diffusion-weighted MRI.
- White matter hyperintensities of vascular origin (WMH) were manually segmented on FLAIR images, in order to quantify WMH load and obtain a binary WMH mask for each subject. These masks were subsequently averaged within each group, in order to compare the spatial distribution of WMH in VP and vPD patients.
- Tract-based spatial statistics (TBSS) was performed on naWM, using the WMH maps for excluding damaged tissue from microstructural analysis.

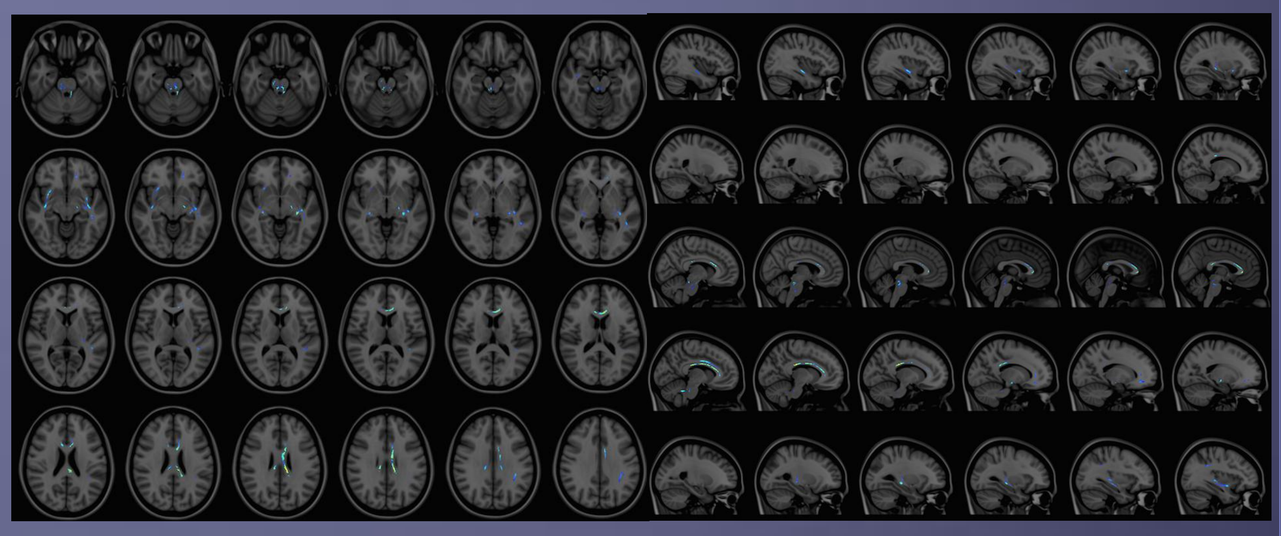
Results

Figure 1. Differences in WMH distribution (WMH more frequent in VP (red-yellow) or in vPD (blue-lightblue)



In the VP cohort, WMH were more frequent in frontal regions, whereas in vPD patients WMH were more frequently detected in parietal-occipital WM.

Figure 2. Significant differences in naWM as detected by TBSS



TBSS analysis showed that FA was significantly reduced in VP compared to vPD patients in corpus callosum, external capsule, midbrain and left superior cerebellar peduncle.

Conclusions

Multimodal MRI assessment in VP and vPD uncovered two main findings: first, the spatial distribution of WMH in the two diseases was different in specific regions of the brain; second, microstructural alterations occurred in the normal-appearing tissue of patients with VP compared to vPD, regardless of WMH load and extent.

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