



3.4 Micro- and Macro-Vascular Remodeling and Cognitive Function in Hypertension

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ABSTRACT

Background: Cerebral microvascular alterations and hypoperfusion have been associated to cognitive disorder and dementia. We hypothesized that there is a direct link between retinal arteriolar remodelling, as assessed non-invasively using adaptive optics, and cognitive cerebral impairment in hypertensive patients.

Methods: Hypertensive patients over 65 years old with or without mild cognitive impairment were recruited. Each patient had a cognitive evaluation with MMSE; a study of retinal vasculature with adaptative optics RTX1® Camera to measure WT, internal diameter (ID), wall-to-lumen ratio (WLR) and arterio-venous ratio (AVR); an aortic, cerebral and carotid MRI to study cerebral volumes and white matter hyper-intensities (WMH) and carotid/aortic backward/forward flow (BF/FF) and distensibility. Correlations between retinal and cerebral, carotid and aortic remodelling were analysed.

Results: 51 treated and controlled hypertensive patients, aged of 74 ± 5 years, 67% males, were able to achieve all exams. Among subjects with higher WLR, a significantly lower MMSE was found ($p = 0.04$). Eye-Brain: AVR and arteriolar ID coefficient of variation were inversely related to cerebral volumes ($r = -0.61, p = 0.01$ and $r = -0.58, p = 0.02$). Eye-Carotid: AVR and arteriolar ID coefficient of variation were directly and indirectly correlated with peak BF/FF, respectively ($r = 0.47, p = 0.005$; $r = -0.39, p = 0.02$). Eye-Aorta: WT and AVR were inversely correlated with ascending aorta distensibility ($r = -0.48, p = 0.003$; $r = -0.47, p = 0.007$).

Conclusion: In elderly hypertensives, arteriolar retinal remodelling represents a potential marker of early cerebral atrophy, which might be linked to a cerebral microcirculation remodelling. This hypothesis is supported by the association between retinal vascular remodelling and impaired carotid flow and aortic elastic properties.

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