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Cornea: A Window to White Matter Changes in Stroke; Corneal Confocal Microscopy a Surrogate Marker for the Presence and Severity of White Matter Hyperintensities in Ischemic Stroke

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Abstract

Purpose

The presence of white matter hyperintensities (WMH) on MRI imaging confers an increased risk of stroke, dementia, and death. Corneal confocal microscopy (CCM) can detect nerve injury non-invasively and may be a useful surrogate marker for WMH. The objective is to determine whether corneal nerve pathology identified using CCM is associated with the presence of WMH in patients with acute ischemic stroke.

Methods

This is a cross-sectional study where 196 consecutive individuals with acute ischemic stroke were enrolled and underwent neurological examination, MRI brain imaging and CCM. Participants underwent blinded quantification of WMH and corneal nerve fiber density (CNFD), corneal nerve branch density (CNBD) and corneal nerve fiber length (CNFL).

Results

The prevalence of hypertension [$P = .013$] was significantly higher and CNFD [$P = .031$] was significantly lower in patients with WMH compared to those without WMH. CNFD and CNFL were significantly lower in patients with DM without WMH [$P = .008$, $P = .019$] and in patients with DM and WMH [$P = .042$, $P = .024$] compared to patients without DM or WMH, respectively. In a multivariate model, a 1-unit decrease in the CNFD increased the risk of WMH by 6%, after adjusting for age, DM, gender, dyslipidemia, metabolic syndrome, smoking, and HbA1c. DM was



associated with a decrease in all CCM parameters but was not a significant independent factor associated with WMH.




Conclusions

CCM demonstrates corneal nerve pathology, which is associated with the presence of WMH in participants with acute ischemic stroke. CCM may be a useful surrogate imaging marker for the presence and severity of WMHs.

Key Words

[Corneal confocal microscopy](#) • [white matter hyperintensities](#) • [ischemic stroke](#) • [MRI](#)

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