STROKE

Retinal abnormalities predict brain infarcts

The occurrence of silent brain infarcts doubles the risk of future clinical stroke, but little is known about the pathophysiology of or risk factors associated with such infarcts. In the first prospective study of silent brain infarcts, Cheung *et al.* have shown that microvascular abnormalities in the retina are associated with such events. In the future, this association might allow clinicians to predict the development of silent brain infarcts and, ultimately, stroke by monitoring changes in the eye.

“Silent brain infarcts ... are commonly identified on MRI scans”

Silent brain infarcts are associated with neurological deficits and are commonly identified on MRI scans. Such infarcts are also recognized to be a key risk factor for clinical stroke. The pathogenesis of brain infarcts is not well understood; abnormalities in cerebral small vessels have been implicated, but these vessels are difficult to study directly. The cerebral microvasculature shares several key features with the retinal microvasculature, which can be studied noninvasively and with relative ease. Moreover, pathological changes in the retinal microvasculature might be indicative of broader processes

also affecting small vessels in the brain. Cross-sectional studies have previously shown an association between retinopathy and clinical stroke. Thus, Cheung *et al.* aimed to see “if retinal microvascular abnormalities in fact predicted ‘silent’ stroke”, says Tien Wong, one of the study’s researchers.

The investigators assessed data from the Atherosclerosis Risk in Communities Study, a longitudinal study based in four US communities. 1,684 patients aged ≥ 55 years underwent brain MRI scans and retinal photography between 1993 and 1995. These retinal photographs were assessed for the presence of microvascular abnormalities. At a median follow-up of 10.5 years, 1,031 of the patients underwent further MRI scans, which were assessed for signs of cerebral or lacunar infarcts. Following exclusions, the researchers were, therefore, able to assess the prospective relationship between retinal photographs taken at baseline and the later development of brain infarcts in 810 patients.

Among participants with retinopathy at baseline, the incidences of cerebral and lacunar infarct at follow-up were 37.7% and 35.8%, respectively. By contrast, these incidences in participants without retinopathy were 19% and 14.8%, respectively.

According to the authors, “pathophysiological processes underlying

Moderate hypertensive retinopathy, with retinal hemorrhages and cotton wool spots. Image provided by Professor Tien Y. Wong.

... retinopathy may mirror similar disease processes occurring in the brain that lead to the development of ischemic cerebral small-vessel disease.”

The association between retinopathy at baseline and silent brain infarct at 10 years follow-up in a middle-aged multi-ethnic sample identified by Cheung *et al.* suggests that eye changes might be able to predict development of ‘silent strokes’ many years later. As silent brain infarcts are associated with clinical stroke, “eye imaging may therefore offer an opportunity to investigate the pathogenesis of and new therapeutic strategies for stroke,” suggests Wong.

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