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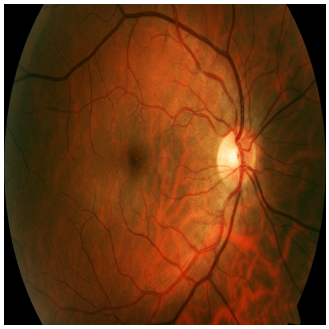
Retinal Vascular Fingerprint to Predict Stroke Risk



A vascular fingerprint on the retina, the light-sensitive tissue at the back of the eye, can predict stroke risk with the same accuracy as traditional risk factors but without the need for multiple invasive tests, according to research published in *Heart*.

This fingerprint, consisting of 29 indicators of vascular health, offers a practical and accessible method for stroke risk assessment, particularly suited for primary care and resource-limited settings, the researchers conclude.

Stroke affects approximately 100 million people worldwide annually, claiming 6.7 million lives. Most cases stem from modifiable risk factors such as high blood pressure, high cholesterol, smoking, and poor diet.

The retina's intricate vascular network shares similarities with the brain's vasculature, making it an effective indicator of systemic health issues, including diabetes. However, its potential for stroke risk prediction has been underexplored due to inconsistent findings and the variable use of fundus photography, a specialised imaging technique for the retina.

Machine learning technologies, such as the Retina-based Microvascular Health Assessment System (RMHAS), are enabling the identification of retinal biomarkers that predict stroke risk accurately and non-invasively.

To investigate further, researchers analysed fundus images from 68,753 participants in the UK Biobank study, focusing on 30 vascular indicators across five categories of retinal architecture: calibre (length, diameter, ratio), density, twistedness, branching angle and complexity.

The analysis accounted for demographic, socioeconomic, and lifestyle factors, as well as health parameters like blood pressure, cholesterol, blood glucose (HbA1c), and BMI.

Of the 45,161 participants included in the final analysis (average age 55), 749 experienced a stroke during an average 12.5-year follow-up. Those who had a stroke were generally older, male, smokers, diabetic, heavier, and had higher blood pressure and lower good cholesterol levels —known stroke risk factors.

The study identified 118 measurable retinal vascular indicators, with 29 significantly associated with first-time stroke risk after adjusting for traditional risk factors. These included 17 density indicators (each change associated with a 10-19% increased stroke risk), eight complexity indicators (each decrease linked to a 10.5-19.5% increased risk), three calibre indicators (changes associated with a 10-14% increased risk) and one twistedness indicator (decreases linked to a 10.5-19.5% increased risk).

This retinal vascular fingerprint, combined with just age and sex, was as effective at predicting stroke risk as traditional risk factors.

The researchers conclude that with age and sex readily available and retinal parameters obtainable through routine fundus photography, this model offers a practical, easily implementable tool for stroke risk assessment, particularly in primary care and low-resource settings.

Source: BMJ Group

Image Credit: iStock

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