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AI-enabled Imaging of Retina Can Specify Heart Disease Risk

A recent study demonstrated that AI-enabled imaging of the retina's network of veins and arteries can accurately predict the risk of cardiovascular disease and death, without measuring blood pressure or needing blood tests. The findings are published in the *British Journal of Ophthalmology*.

The findings highlight the potential for a highly effective and non-invasive test for people at medium to high risk of circulatory disease, without needing to attend a clinic.

Research has already indicated that the width of the arterioles and venules of the retina may serve as an early indicator of cardiovascular disease. However, it is still uncertain as to whether the findings apply consistently and equally to men and women.

A team of researchers created a fully automated AI- enabled algorithm, known as QUANTitative Analysis of Retinal vessels Topology and siZe, or QUARTZ for short, which will examine the potential of retinal vasculature imaging combined with known risk factors to accurately predict vascular health and death.

The team used the tool to scan the retinal images from 88,052 UK Biobank participants, aged 50-69, in order to develop prediction models for stroke, heart attack, and death from circulatory disease. They specifically assessed the width, vessel area, and degree of curviness of the arterioles and venules in the retina.

Following this, they applied the tool to scan the retinal images of 7411 participants, aged 48-92, of the European Prospective Investigation into Cancer (EPIC)-Norfolk trial. Its performance was compared with the Framingham risk scores framework.

The health of all the participants was monitored over seven to nine years. During this period, there were 201 circulatory deaths among 5862 EPIC-Norfolk participants and 327 circulatory disease deaths among 64,144 UK Biobank participants.

Findings demonstrated that arteriolar and venular width, width variation and curviness were found to be critical predictors of death from circulatory disease in men. Whereas in women, arteriolar and venular area, width, width fluctuation and vein curviness emerged as risk predictors.

As the study concluded, "these predictive models, based on age, smoking, medical history and retinal vasculature, captured between half and two thirds of circulatory disease deaths in those most at risk".

The retina data calculated by Quartz was notably linked to cardiovascular disease, deaths and strokes, with similar predictive performance to the Framingham clinical risk score.

The team added, "it could be used as a non-contact form of systemic vascular health check, to triage those at medium-high risk of circulatory mortality for further clinical risk assessment and appropriate intervention".

Source: BMJ

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