Study will enable researchers to better understand how short or long-sightedness can affect such eye measurements

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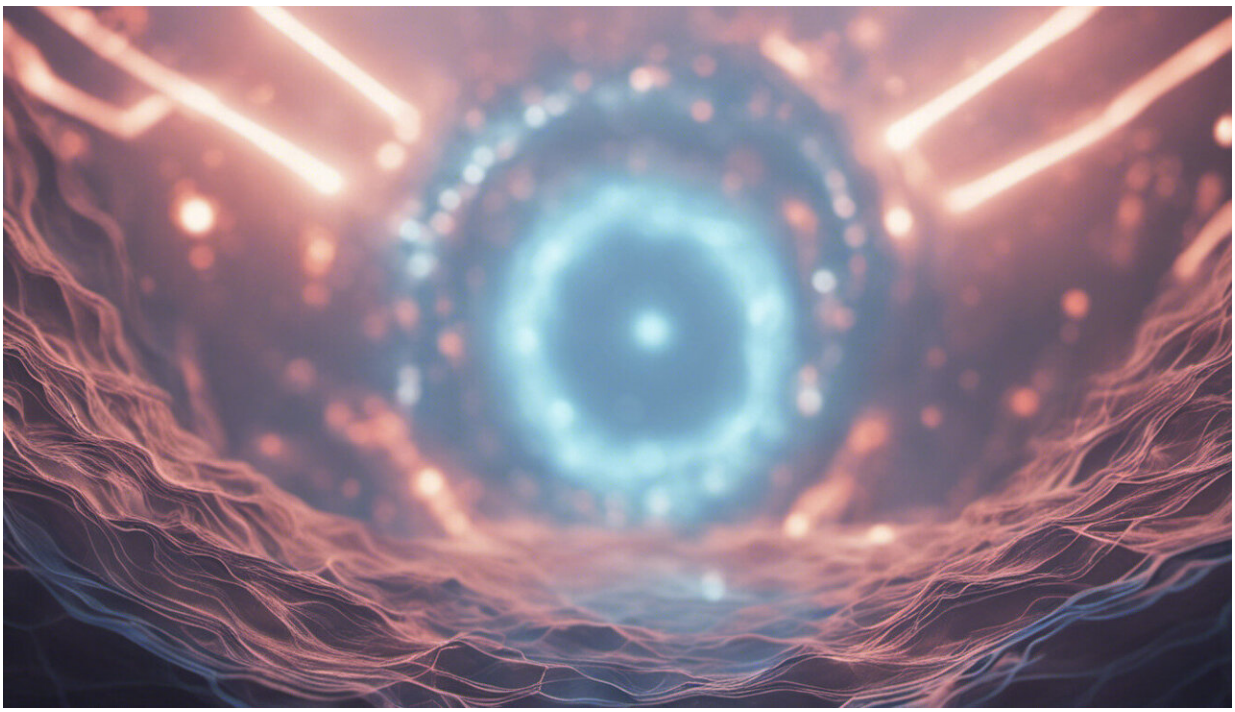

Credit: AI-generated image (disclaimer)

Researchers have measured and produced detailed characterisations of the eye's retinal surface area using three dimensional MRI scanning.

The study, involving academics from City, University of London, Aston

University and the University of Bristol, is important as the measurements will enable researchers to better understand how short or long-sightedness can affect such eye measurements and may provide clues to eye growth.

Short-sightedness is a global problem, it is predicted that in the year 2050 almost half the world's population will be shortsighted (Holden et al 2016). Prevalence is particularly high in urbanised areas of East Asia. In short-sightedness the eye grows longer, and the difference between not needing glasses and being reliant on them might just be 1mm. As the eye is longer and larger in myopia, there is an increased risk of retinal tears and breaks. It is therefore important to characterise changes in eye shape and predict eye growth patterns.

Earlier attempts at determining retinal surface area and surface area of the whole eye have been derived from mathematical calculations based upon retinal photographs, schematic eyes and retinal biopsies of donor eyes.

While three-dimensional MRI has been used previously to determine surface area in Singaporean-Chinese newborn and young children's eyes, this study is the first to measure both retinal surface area in White European and South Asian populations using the technique. The study was published in the *Journal of Anatomy*.

In this study, the team also specifically wanted to look at the variation between different regions of the retina and see whether these biometrics varied with respect to axial length (eye length) and with respect to the level of short or long-sightedness.

To investigate these aspects of the eye, the researchers recruited 73 adult participants and scanned them using an MRI scanner which provided images for the whole eye.

Measurements from custom-made software were used to calculate total internal ocular surface area, retinal surface area, and quadrant retinal surface areas (e.g. retinal surface area of the superior-nasal, superior-temporal, inferior-nasal, and inferior-temporal retina).

The researchers found that the mean retinal surface area for the eye was 1363±160mm2, and more myopic eyes and longer axial lengths were associated with larger surface areas. They also found retinal surface area was largest for the superior-temporal quadrant and smallest for the inferior-nasal.

Dr Manbir Nagra, lead author of the study, said:

"In the past, in vivo surface area could only be estimated from photos, mathematical modelling or other similar non-invasive techniques, but in our new study we used a 3-dimensional MRI to produce a detailed characterisation of retinal surface area. While the technique has been used to determine ocular surface area by others, our approach provides more detailed information, particularly with respect to retinal quadrant surface area."

More information: Manbir Nagra et al. Determination of retinal surface area, *Journal of Anatomy* (2017). DOI: 10.1111/joa.12641

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