Combining optical coherence tomography with visual field data to rapidly detect disease progression in glaucoma: a diagnostic accuracy study

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Plain English summary

Imaging technology to detect glaucoma disease progression

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Plain English summary

Glaucoma is an eye disease in which progressive damage to the optic nerve causes loss of vision in parts of the eye's field of vision and may eventually lead to blindness. The loss of vision is measured with the visual field (VF) test. The measurements are, however, very variable, so that identifying whether or not an eye continues to lose vision is challenging. The damage to the nerve can also be measured with imaging techniques, one of which is called optical coherence tomography (OCT), which measures the thickness of the layer of nerve fibres entering the optic nerve. It is possible that combining measurements from the VF and OCT results in less variability, making it easier to identify worsening of glaucoma.

In this work we compared statistical methods that combine VF and OCT measurements with the method used in routine practice (the reference method), which is based only on VF measurements. We aimed to establish the relative ability of the methods to identify worsening (enlarging or deepening areas of vision loss) in eyes at risk, while ensuring that most stable eyes were not flagged as worsening. We also measured the time taken to identify worsening, the accuracy of the rate of worsening measurements and the ability, in a clinical trial, of methods to distinguish eyes on treatment from those not on treatment.

We found that a method that combines VF and OCT measurements identified more patients as worsening than the reference method, and it identified worsening sooner. This method was also more accurate than methods based only on the VF in measuring the rate of worsening. However, methods combining VF and OCT measurements were not better at distinguishing eyes on treatment from those not on treatment.

The results suggest that combining measurements would be helpful for detecting worsening sooner in clinical practice, but not yet for evaluating treatment effects in clinical trials.

Optical coherence tomography technology is rapidly advancing and newer OCT technologies may be more advantageous.

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