

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

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Declared competing interests of authors: David Garway-Heath has received consulting fees from Aerie Pharmaceuticals Inc., Alcon, Alimera Sciences, Inc., Allergan, CenterVue Inc., Pfizer Inc., Quark Pharmaceuticals, Quethera Ltd, F Hoffman-La Roche Ltd, Santen Pharmaceutical Co., Ltd, Santhera Pharmaceuticals and Sensimed AG, a grant from Pfizer Inc. and lecture fees from Heidelberg Engineering Ltd, Santen Pharmaceutical Co., Ltd and Topcon Corporation and his institution has received equipment loans from Carl Zeiss Meditec AG, Heidelberg Engineering Ltd and Optovue, Inc. He is also a member of the HTA Clinical Evaluation and Trials Board. David P Crabb has received lecture fees from Allergan, F Hoffman-La Roche Ltd and Santen Pharmaceutical Co., Ltd and consulting fees from Allergan and his institution has received unrestricted research funds from Allergan, CenterVue Inc., Novartis UK, F Hoffman-La Roche Ltd and Santen Pharmaceutical Co., Ltd. He has also provided expert testimony for the Driving and Vehicle Licensing Agency. Tuan-Anh Ho has received salary from the National Institute for Health Research (NIHR) Biomedical Research Centre at Moorfields Eye Hospital and UCL Institute of Ophthalmology and consultancy fees from Allergan. David Garway-Heath, David P Crabb, Qian Cheng and Haogang Zhu have a patent application filed for ANSWERS (a method of data analysis evaluated in this work).

Published January 2018

DOI: 10.3310/hta22040

Plain English summary

Imaging technology to detect glaucoma disease progression

Health Technology Assessment 2018; Vol. 22: No. 4

DOI: 10.3310/hta22040

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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.

ISSN 1366-5278 (Print)

ISSN 2046-4924 (Online)

Impact factor: 4.236

Health Technology Assessment is indexed in MEDLINE, CINAHL, EMBASE, The Cochrane Library and the Clarivate Analytics Science Citation Index.

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This report

The research reported in this issue of the journal was funded by the HTA programme as project number 11/129/245. The contractual start date was in December 2013. The draft report began editorial review in June 2017 and was accepted for publication in October 2017. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

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