Glaucoma: fielding progressive disease

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The aim of glaucoma management is to prevent the development of clinically significant visual damage within the patient's lifetime, or to prevent significant worsening if damage has already occurred. In order to do this an estimate of the *rate* of visual deterioration must be made. This should be done using numerical analysis of a series of automated visual field tests, as human observers, even experienced ones, are not able to detect visual field progression reliably using clinical judgement alone.¹ This measure of rate is a prerequisite if prevention of clinically significant visual damage is to be achieved, since it is through knowledge of the speed of deterioration that the degree of future loss of visual function may be anticipated. If the rate of visual field loss suggests that the patient will be visually disabled within their lifetime appropriate therapeutic measures should be instituted: effective lowering of intraocular pressure retards visual impairment² even in normal-tension glaucoma.^{3,4} If, however, the rate of loss is close to the normal age-related decline in retinal sensitivity (about 1 decibel per decade⁵) then the potentially sight-threatening complications of surgery and life-threatening complications of topical treatment may be avoided pending further review of the patient's visual function.

Methods of analysis that rely on detecting a significant change from baseline (event-type analyses) such as the Statpac 2⁶ and Delta⁷ programs do not provide a measure of rate of field loss and so only indicate that some deterioration has occurred in the past. It has been demonstrated that the most reliable estimates of progressive glaucomatous visual field decay are obtained by using a linear fit, i.e. postulating a constant reduction of sensitivity over time for each retinal location tested.⁸ This technique has been used for several years to investigate glaucomatous visual field change^{9,10} and has recently been re-examined.¹¹⁻¹³ Pointwise linear regression detects visual field progression sooner than event-type analyses such as Statpac 2,¹⁴ demonstrates field loss undetected by summary measures of sensitivity (such as the mean defect value) and is a good predictor of the future behaviour of the field.^{3,8,15}

Even sensitive, reliable methods such as pointwise linear regression are critically dependent on the frequency with which visual field tests are performed: progressive visual field loss cannot be detected unless it is adequately sought. When considering how often to measure the visual field of a glaucoma patient, factors such as the type of glaucoma, the number and results of previous tests, the age of the patient, recent changes in glaucoma therapy and the ability of the patient to produce reliable tests must be borne in mind. However, one of the commonest and most important reasons for repeatedly measuring visual fields is in order to detect progressive damage as early as possible. A recent study¹⁶ examined whether performing visual field tests once a year rather than three times a year would lead to a clinically significant delay in the detection of progressive glaucoma. The results were striking. Fewer than half the areas of visual field progression were detected when visual field tests were analysed only once a year. Furthermore, the 'once a year' strategy entailed a delay in recognition of progression of more than 1 year over a 4 year study period.

The advent of new perimetric strategies, such as the SITA algorithm, designed to reduce the time taken to perform a visual field test offers the prospect that glaucoma patients may be tested at each clinic visit rather than receiving an incomplete examination as they often do at present. This, coupled with assessments of the rate of visual field deterioration, the patient's age and general medical condition, the contribution of pathology other than glaucoma to visual impairment, and the patient's visual requirements will enable those who require treatment to obtain it promptly and those who do not to be spared unwanted side effects. Even with present-day perimetry, the increased use of resources implicit in performing visual field tests at least three times per year must be set against the wider financial, social and moral cost of allowing a potentially blinding disease to progress undetected.

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