CORRESPONDENCE

Contrast sensitivity testing in clinical practice

EDITOR,—Moseley and Hill have written a review in the *BJO*[1] on 'Contrast sensitivity testing in clinical practice'. Since several colleagues seem to believe that their views represent a consensus I would like to offer a different opinion for discussion.

WHEN TO USE?

The claim that '. . . there appears to be no benefit in the testing of contrast sensitivity for clinical management *except where acuity is found to be normal or near normal*' (italics in the original text) would mean that contrast sensitivity had no place in low vision assessment. However, my experience is that it is a particularly relevant measurement in most cases of less than normal visual acuity.

Figure 1A shows contrast sensitivity curves of three people with the same visual acuity, one person functions as normally sighted (A), the second as a person with moderate low vision (B), and the third is severely visually impaired (C). These three people have different visual abilities and needs in visual communication, orientation, and mobility and even for low vision aids. This should be understood by the clinician and reported to both the patient and all involved with the care of the patient.

The contrast sensitivity curve typically changes in one of the following ways (Fig 1B): (1) the curve moves towards the left without change in the declination of the slope (type I); (2) the curve does not change its maximum but the declination becomes steeper (type II), or (3) the high contrast end does not move but the declination becomes less steep (type III). In clinical work the most common is type I. Type II occurs, for example, in mild cases of retinoschisis and type III in mild cases of retrobulbar neuritis.

Measurement of contrast sensitivity is of special importance in occupational evaluations in type II loss of contrast sensitivity because these people may function well in many occuptions.[2] On the other hand type II loss prevents working in several occupations even if visual acuity is still within the normal range. In choosing people for tasks where small, low contrast objects are important, visual acuity alone does not indicate the most suitable workers. In Figure 1C the declination of the slope of a worker with 6/5 visual acuity is much steeper than that of a worker with 6/3 visual acuity, therefore at the working level of 1–5% contrast the former has better resolution of low contrast details – that is, better functional vision with poorer VA.

OPTOTYPE VERSUS GRATING

Since we measure visual acuity with optotype tests and much of the low contrast information resembles optotypes it is feasible to measure the slope of the contrast sensitivity curve by using optotype tests, preferably using the same optotypes as in the high contrast chart. The measurement is quick and easy for both the patient and the tester. An additional examination time of less than 1 minute is not 'costly'.

Grating tests require a much deeper understanding of psychophysics than optotype tests, especially in low vision because the threshold is a function of both spatial frequency and stimulus area.[3] This fact is rarely taken into account in clinical reports which therefore may not depict the conditions correctly. The most common error is to use only one small grating stimulus, printed or presented on a computer screen.

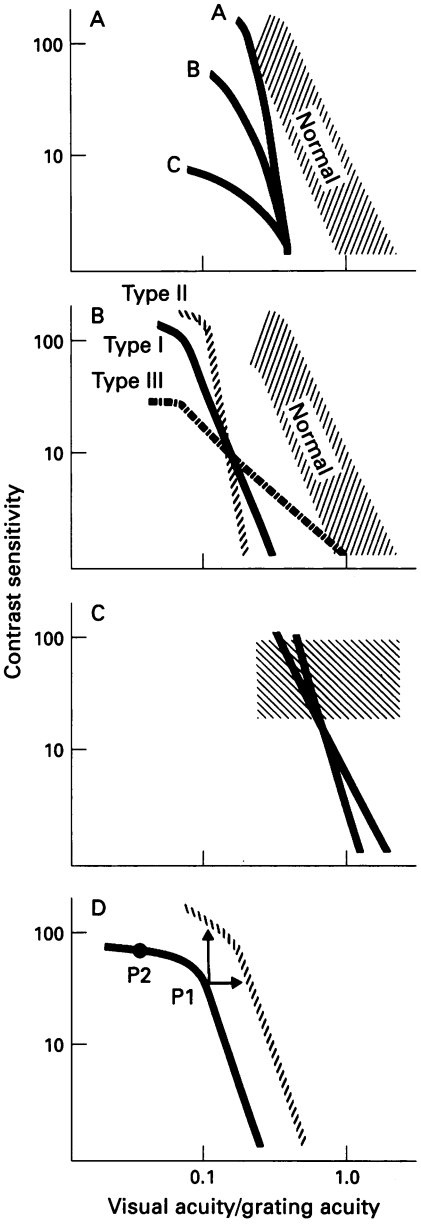

Figure 1 (A) Contrast sensitivity curves of three people (A, B, C) with the same visual acuity 6/15 (shaded area=normal range). Visual acuity is in decimal values, 0·1=6/60, 1·0=6/6. (B) Typically contrast sensitivity may change in three ways: type I, the curve has moved to the left without a change in declination; type II, the maximum is in its usual place but the declination of the slope is steeper than normal; type III, visual acuity has not changed but the declination is less than normal. (C) A person with 6/5 visual acuity may have better resolution at 1–5% contrast level (shaded area) than a person with 6/3 visual acuity. (D) Time saving evaluation of both optotype and grating curves: measurement with optotype test (solid curve, based on measurement of two points, P1 and P2) is followed by estimation of the place of the contrast sensitivity curve for grating information (hatched curve) by measuring grating acuity at the upper end of the optotype slope (→) and/or the place of the point of the grating slope above this point (↑).

In normal and near normal vision the slope measured with an optotype test and that measured with a grating test are so close to each other that there is no need to do the more difficult and time consuming measurement with grating tests.

In low vision the two slopes can be quite far from each other.[3–5] Although the declination of the 'optotype slope' and that of the 'grating slope' are not exactly equal, for clinical evaluations they can be assumed to be parallel. Therefore the location of the grating curve can be estimated quickly by measuring grating acuity at the contrast where the optotype curve bends down to its nearly straight part (Fig 1D). The high frequency end of the contrast sensitivity curve – that is, the lower end of the 'grating slope' is grating acuity which, however, is often difficult to measure, except when using uncomfortably long viewing distances. If a second measurement on the grating slope is felt to be important, it could be at 10% contrast. If the maximum contrast sensitivity is important to measure then additional measurements at lower frequencies are necessary. In clinical cases the most informative parts of the curve are the slope, its location, and declination.

LOW CONTRAST TESTS FOR INFANT VISION

During the first year of life the most important visual function is visual communication with the carer. Since it uses low contrast vision, tests like 'Hiding Heidi' are useful in demonstrating the distance where the infant can respond to low contrast facial features.

CONCLUSION

Visual function at low contrast is an essential part of visual capability. Since it may change independently of visual function at high contrast, both areas of function should be investigated. Neither visual acuity nor contrast sensitivity losses are specific findings, they depict loss of certain kind of visual information somewhere in its long optical and neural processing path. Optotype tests are easy to use and therefore a good choice in assessment of normal and near normal vision. In low vision, both optotype and grating tests are needed for characterisation of central visual functions. The present tests measuring spatial resolution should be complemented with tests that measure temporal aspects of visual transfer when these tests become available. The tests should not be used in 'the darkened consulting room' but at luminance levels corresponding to normal everyday use of vision. They are now emerging as standard procedures so some time will pass before their value in clinical evaluations is agreed upon but they certainly have a place.

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1 Moseley MJ, Hill AR. Contrast sensitivity testing in clinical practice. *Br J Ophthalmol* 1994; 78: 795–7.
2 Hyvärinen L. Kontrastempfindlichkeitstests und Verkehr. Unfall- und Sicherheitsforschung Strassenverkehr. Kongressbericht 1993 der Deutschen Gesselschaft für Verkehrsmedizin eV. Bremerhaven: Bundesanstalt für Straßenwesen, 1993: 70–1.
3 Hyvärinen L, Laurinen P, Rovamo J. Contrast sensitivity in evaluation of visual impairment due to macular degeneration and optic nerve lesions. *Acta Ophthalmol (Copenh)* 1983; **61**: 161–70.

4 Hyvärinen L. Measurement of visual acuity in visually impaired children. *Transact V Int Orthoptic Congr* 1983: 91–5.
5 Hyvärinen L, Laurinen P, Rovamo J. Contrast sensitivity in evaluation of visual impairment due to diabetes. *Acta Ophthalmol (Copenh)* 1983; **61**: 94–101.

BOOK REVIEW

The Onchocerciasis Control Programme in West Africa. An example of effective public health management. By E M Samba. Pp 107. $20.70. Geneva: World Health Organisation, 1994.

Written by Dr E M Samba who, from 1980 to 1995, was director of the programme now well known as 'the OCP', this book provides an excellent summary of progress in a great field campaign which, over the past 20 years and in 11 west African countries, has protected 30 million people from river blindness and has freed some 250 000 km^2 of fertile land for resettlement and agriculture.

Part 1 covers programme operations, including the public health and socioeconomic impact of onchocerciasis and the logic and effects of controlling transmission by means of prolonged and widespread larviciding against the vector, *Simulium damnosum* sl, supplemented recently by mass treatment with ivermectin. It describes the genesis of the programme, its structure, functional organisation, and operations; its planning, implementing, reporting, and evaluation systems; and lists its impressive achievements in the fields of health, socioeconomic development, training, and research.

Part 2 deals with the management structure and with plans for the devolution, over the next 5 years, of responsibility for surveillance and the prevention of recrudescence onto the health services of the participating countries. Annexes include a list of donors to the programme, and a summary of the 1994 budget (US $28 336 million).

The account of the OCP is clearer from 1980 onwards, when the author became a witness to events, than in the earlier years. Sadly, the two main visionary instigators of the 1968 Tunis meeting, which decided on the feasibility of the OCP, namely Dr N Ansari of the WHO Parasitic Diseases Programme and Médecin-Général P Richet of the OCCGE, are not mentioned. Nor, in the siting of the programme, does the book make clear the importance of the finding that the *Onchocerca-Simulium* complexes in the sub-Saharan savanna regions are different from those in the more southerly forest regions. This discovery permitted the OCP to be confined to the savanna zones where aerial spraying of larvicides was alone possible. The choice of the Volta river basin as the savanna site depended on two issues: firstly, that much epidemiological and entomological data from that area were already available from the OCCGE; and, secondly, that in all the countries further east in the savanna belt there was insufficient political stability to permit the establishment of an international cross border operation.

This book is a timely reminder of the public health and socioeconomic value of onchocerciasis control and may help to promote the World Bank's newly established African Programme for Onchocerciasis Control, which aims to cover all the other countries in Africa that are afflicted by this disease.

BRIAN DUKE

NOTICES

Glaucoma Group

DAVID COLE TRAVEL FELLOWSHIP

The David Cole Travel Fellowship, instituted by Merck Sharp & Dohme in memory of Professor David Cole, will assist a visit to a hospital or research centre during the academic year starting 1 October 1995. The award will be equivalent to £2000. The purpose of the award is to enable the successful applicant to gain experience and knowledge in pursuit of a specific project related to glaucoma.

Wellcome General Overseas Travelling Research Fellowships 1994–95

The purpose of these fellowships is to allow postdoctoral scientists and medical graduates to gain further research experience by working in leading laboratories in the UK or the Republic of Ireland. Applications are invited from such workers who wish to undertake a research project in any branch of the natural or clinical sciences, which has a bearing on human or veterinary medicine, with the exception of cancer.

Applicants may be from any country outside Europe, with the exception of New Zealand and the USA for whom special schemes are available. Awards will be made on the basis of the research proposal. The research proposed should be relevant to the research interests of the candidate in his/her own country. Awards are made for one year in the first instance, although requests for an extension may be considered. Fellowships provide a stipend within the range from £13 941 to £27 869 per annum, depending on age and experience. They also include the cost of research, attendance at scientific meetings, and return travel.

Candidates must be nominated by a sponsor in the UK or the Republic of Ireland, through whom all initial inquiries should be made. A preliminary proposal should include a one or two page outline of the research proposed, the curriculum vitae of the candidate, and a letter indicating that he/she has a position to return to at the end of the fellowship. There are no special deadlines for this scheme and applications may be submitted at any time during the year.

Requests for application forms should be addressed to: Dr J M Wilkinson, The Wellcome Trust, 183 Euston Road, London NW1 2BE. Tel: 0171-611 8407.

Candidates from New Zealand and the USA should contact the Health Research Council of New Zealand, Auckland, NZ or the Burroughs Wellcome Fund, Morrisville, NC 27560, USA, respectively, for details of appropriate schemes.

European Strabismological Association

The 22nd meeting of the European Strabismological Association (ESA) will be held in St John's College, Cambridge, UK on 6–8 September 1995. Application papers, including abstract forms, can be obtained from: Mr J S Elston, MD, FRCS, Oxford Eye Hospital, Radcliffe Infirmary, Woodstock Road, Oxford OX2 6HE, UK.

X Tübingen Detachment Course: Retinal and Vitreous Surgery

The X Tübingen Detachment Course on retinal and vitreous surgery will be held on 16–17 September 1995 at Jekaterinburg (Ekaterinburg), Russia.

Further details: Professor Khristo P Takhchidi, IRTC 'Eye Microsurgery', Ekaterinburg Center, Bardin Strasse, 4a, 620149 Ekaterinburg, Russia. (Tel: 007 3432 286292; Fax: 007 3432 283370.) *Or* Office Professor Kreissig, MD, Univ Augenklinik, Schleichstrasse 12, 72076 Tübingen, Germany. (Tel: 07071 294758; Fax: 07071 293746.)

Care of the Elderly

A conference entitled 'Eye disease in the elderly: assessment, treatment and rehabilitation' will be held on 22 September 1995 at the Forte Crest Hotel, Birmingham, UK. Further details: Deborah Gardner, Conference Office, 4 Little Essex Street, London WC2R 3LF. (Tel: 0171-836 6633; Fax: 0171-379 4202.)

British and Eire Association of Vitreo-Retinal Surgeons

The next meeting of the British and Eire Association of Vitreo-Retinal Surgeons (BEAVRS) will be held at Cameron House, Loch Lomond, Glasgow on 5–6 October 1995. Members will be contacted with further details in due course; any other doctors wishing to attend should contact Dr H M Hammer or Dr T Barrie, Glasgow Eye Infirmary, 3 Sandyford Place, Glasgow G3 7NB. (Tel: 0141-211 6767; Fax: 0141-211 6770.)

European Programme of Continuing Education

A symposium on angiography and laser will take place at the University of Créteil on 6–7 October 1995. Further details: Professor Gabriel Coscas, Clinique Ophtalmologique Universitaire- Hôpital de Créteil, 40 Avenue de Verdun, 94010 Créteil Cedex, France. (Tel: 45 17 52 24; Fax: 45 17 52 27.)

First Congress of Surgery of Bosnia and Herzegovina

The first congress of surgery of Bosnia and Herzegovina with international participation will be held at the Congress Hall of the Holiday Inn hotel, Sarajevo from 8 to 11