

Focus



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Visual rehabilitation of patients with macular diseases

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Despite new treatment, macular diseases remain the leading cause of severe sight impairment in the UK. For untreatable macular diseases such as geographic atrophy or Stargardt macular dystrophy, visual rehabilitation provides the only means by which visual function can be improved.

Table 1 summarises some of the most frequent complaints of people with macular disease and suggests possible mechanisms for ameliorating them. Whilst some of these rehabilitation options will require referral to a low vision clinic or local society for the blind, useful advice can be provided in a clinical setting or by advising the patient to visit their own optometrist.

Optical aids for low vision

Spectacle refraction should not be overlooked in people with poor vision. Even when the distance visual acuity cannot be improved significantly, it is important to have the best possible optical correction for intermediate or near tasks. Any spectacle prescription with more than a +4.00DS addition (i.e. one which focuses closer than 25cm from the eye) will provide magnification and can be issued on loan from some hospital low vision clinics.

Optical alternatives to high reading addition spectacles include hand and stand magnifiers such as those illustrated in the top left panel of the Figure. As magnification increases, the lens diameter and field of view gets smaller: therefore, the lowest magnification consistent with best vision is generally the level prescribed. As a rule, hand magnifiers are held just above the object of interest and can be used with any refractive correction, whilst stand magnifiers rest against the page and require reading spectacles to be worn by presbyopes. LED illumination is now widely used in these magnifiers due to its increased brightness and better battery life compared to tungsten bulbs.

Hand-held telescopes can be used for spot-reading tasks such as looking at airport departure boards or street names. Telescopes of up to about 4x magnification can also be spectacle mounted for prolonged tasks such as watching a play or football match, although they



Figure. Top left: A selection of optical magnifiers. Top right: CCTV magnifiers. Bottom left: Samples of normal and giant print. Bottom right: Portable electronic magnifier.

cannot be used when walking due to their effect on the vestibulo-ocular reflex: small head or body movements are magnified by telescopes such that they appear much larger, severely affecting the patient's balance.

Electronic aids for low vision

Electronic magnifiers offer a high and variable amount of magnification over a relatively large field of view, and the contrast, colour and brightness of the observed text can be manipulated to suit the observer. Conventional desktop closed circuit television systems (CCTV) (Figure, top right panel) consist of a camera mounted above a moveable table, whilst a screen displays an enlarged image of whatever is placed on the table. The advent of flat panel LCD screens means that these systems are less bulky than before, but they are still reasonably heavy and difficult to move around. All-in-one desktop CCTV magnifiers generally cost in excess of £1,000. A cheaper alternative is to use a camera which plugs directly into an existing television or computer monitor, such as the Monomouse (Figure, top right panel, left hand screen). In this system, the camera is mounted within a computer mouse and is moved over

the page of text by the user. The Monomouse is available in two fixed magnification levels and provides either normal or reversed contrast. It costs around £100 (plus the cost of the television).

Computer users can use Accessibility Options in Windows (or Universal Access Preferences on a Mac) to magnify or reverse the contrast of the computer screen. Third-party software such as Zoomtext, JAWS or Magic can be added to read text aloud or to provide advanced magnification and contrast manipulation options. A simple approach for people with minor vision loss is to buy a larger monitor, and to ensure that the correct refractive correction is worn for the screen distance.

Most CCTV manufacturers now offer portable, hand-held CCTV systems (Figure, bottom right) which exploit new developments in screen and battery technology to provide portable magnification in systems which are often aesthetically pleasing, looking like a personal digital assistant or games console rather than a rehabilitative device. These devices vary in their ability to cope with text on a non-flat surface (such as a price label on a supermarket shelf) but the best of them can be used for a variety of everyday tasks. They cost around £300-£600.

Head-mounted electronic magnifiers have been available for some years yet remain unpopular, perhaps due to their cost, weight and cosmetic appearance. They also suffer from the same problems as head-mounted telescopes in that they cannot be worn whilst walking. Current research in head-mounted devices includes the augmented presentation of an enhanced image over a correctly sized background image, to avoid balance difficulties if worn whilst mobile.

All types of electronic magnifiers can present text in reversed contrast (white on black) or altered contrast formats (e.g. blue on yellow) formats. Whilst people with corneal or media opacities frequently find reversed contrast text more useful, there is no general rule as to which format is preferred by people with macular disease.

Non-optical advice for patients

Having good lighting for detailed tasks is extremely important. As luminance decreases exponentially with increasing distance from the light source, using a simple desk lamp is of far more benefit for reading than increasing the power of a ceiling light. There is no clear evidence that any particular type of light bulb is any better than any other, so general advice should be to use whatever bulb gives the most light on the task at hand.

Contrast manipulation is also of benefit: for example, it is far easier to cut fish when it is placed on a dark chopping board than against a white background. Similarly, telephone numbers and notes will be easier to read when written in a thick black ink on plain white paper, rather than in a blue biro on purple writing paper.

Large print and giant print books are readily available from public libraries and can significantly improve reading speed even in those who are still able to discern smaller writing. Examples of these are shown in the bottom right panel of the Figure, with a standard magazine for comparison. Utility companies and banks are obliged to issue correspondence in large print on request, and for people who have difficulty entering their PIN when shopping "chip and sign" bank cards are available.

A multitude of non-optical aids to help with daily living tasks are available from the Royal National Institute of the Blind and local partially sighted societies.

Eccentric viewing

Eccentric viewing refers to the technique of observing a scene with the peripheral retina, by moving the damaged fovea away from the object of interest. Due to the lower density of photoreceptors and greater number of photoreceptors per ganglion cell in the peripheral retina, visual acuity will be far worse as that in the fovea. This strategy can, however, provide an unobstructed view of the scene.

To improve patients' ability to make this adaptation, eccentric viewing training is widely used in Scandinavia and some centres in the USA. The benefit of this training remains controversial: although some authors have reported encouraging results, no rigorous randomized controlled trials have yet been performed in the use of eccentric viewing training. It is known that many patients use eccentric viewing techniques without any intervention, and often without being aware of using non-central viewing.

Vision rehabilitation following anti-VEGF therapy

The widespread use of anti-VEGF therapy for neovascular AMD will have significant effects on low vision rehabilitation strategies for macular disease. Some preliminary evidence suggests that patients are less likely to be referred to low vision services if they have received anti-VEGF treatment. Anecdotal experience suggests that even people with relatively good visual acuity who had received anti-VEGF therapy often have large regions of relative scotoma. They require very large amounts of lighting to perform visual tasks. The potential benefit of low vision rehabilitation in this patient group should not be underestimated.

The management of patients with macular disease is one of the key challenges in modern ophthalmology. Co-ordinated, multidisciplinary vision rehabilitation provides an important adjunct to clinical therapies to maximize the quality of life in this group of people.

Table 1

Presenting complaint	Possible rehabilitation options
Difficulty in reading	Refraction; Lighting; High reading add spectacles; Hand/stand magnifiers; CCTV; Large print/talking books
Difficulty in recognizing faces	Refraction; Fixation advice/training; Lighting
Difficulty in watching TV	Refraction; Changing viewing distance; Fixation advice/training; Telescopic magnifiers
Difficulty in navigation/mobility	Orientation and mobility training; Refraction; Telescopic magnifiers (for street signs)
Difficulty in using computer screens	Text enlargement software; Screen reading software; Refraction
Difficulty in kitchen/household tasks	Lighting; Contrast advice; Hand magnifiers
Difficulty in shopping	Hand magnifiers; Portable lighting; Handheld CCTVs
Difficulty in hobbies (reading music, gardening, painting)	Refraction; Galilean telescopes; Text enlargement

General reading

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