

Functional Help for People Having Retinal Scotomas

The National Institute for Rehabilitation Engineering (NIRE) is a non-profit organization which operated clinics for the development and dispensing of low-vision aids (with training) from 1967 through 1987. These clinics assisted *hundreds* of people having permanent impairments of visual acuity and/or visual fields. This paper summarizes the successful clinical methods developed and used during this period for assisting individuals having RETINAL SCOTOMAS. Because the NIRE no longer operates these clinics, the information is being made available in hopes that NIRE's methods and data may be used by vision-care professionals all over, to help individuals having Retinal Scotomas. *PERMISSION is granted for the free copying and distribution of this © paper provided copies are complete and unaltered.*

Typically, for people with normal or near-normal visual acuity, multiple "scotomas" (dead spots) on the retinas may lead to: (a) lost images parts, and (b) glare problems in sunlight or when driving at night. If the person also has reduced visual acuity in the better eye or in both eyes, the problems are more complex. *This paper gives potentially helpful information on how to better live and function with retinal scotomas.*

CAUTION: Retinal scotomas can be caused by eye diseases, by systemic diseases such as diabetes mellitus, or by certain neurological conditions. This paper offers functional help, only. ***ALL PEOPLE WITH RETINAL SCOTOMAS SHOULD BE UNDER ONGOING MEDICAL CARE by appropriate physicians.***

PATIENT DISABILITY TYPES:

- a) Good Visual Acuity in BOTH Eyes; scotomas in one or both eyes.
- b) Good Acuity in ONE Eye, with scotomas; and poor acuity or blind in the other eye.
- c) Poor Acuity in BOTH Eyes; scotomas in both eyes.
- d) Poor Acuity in ONE Eye with scotomas; blind in other eye.

(a) scotoma patients often can enjoy near normal visual functioning if they have properly converged vision with both eyes, fusion of the images, and if most of the scotomas in each eye are not in the same relative retinal locations in the two eyes.

(b) scotoma patients can often be helped significantly by other means such as using eye and/or head movements for scanning, image relocation with a prism lens, planned image positioning with appropriate distancing, etc.

(c) and (d) scotoma patients have substantially reduced visual acuity in the better eye. This is known as "low-vision" and such patients are advised to visit a low-vision specialist for appropriate aids to clearer vision. Once useful low-vision aids are obtained, some of the methods discussed in this paper may be applicable.

GENERAL INFORMATION

1. Retinal scotomas sometimes improve, or worsen, or remain the same, over time. Some may be treatable and others may not. **ONGOING MEDICAL CARE IS HIGHLY RECOMMENDED** for every person having retinal scotomas.
2. Scotoma numbers, locations and sizes determine how much the person's vision is disturbed. Personalized attention is needed by each patient from his or her own eye doctor and optical dispenser. Monocular people with scotomas are usually affected much more than binocular people who have good corrected acuity in both eyes and fused, binocular vision.

MORE SPECIFIC INFORMATION

3. READING and WRITING: It has been found that scotoma patients with normal - or near normal - corrected visual acuity do better without added magnification. Many prefer slight minification of print. Patients with scotomas and significantly reduced visual acuity may require print magnification to be able to read or write at all – and then they have to deal with the increased scotoma annoyances that result from image magnification.

SOME SUGGESTIONS for coping:

- a) **READING EYEGLASSES ...** for some *monocular people*, eyeglass lenses with prism may relocate the perceived images on each retina so as to make the scotoma(s) less annoying. This can be determined only by trial and error testing in a doctor's or dispenser's office using adjustable trial lenses with prism. For most *binocular people*, both eyes must have the same amount and angle of prism so that both images continue to converge and fuse properly. Fusion of the images of the two eyes, in the brain, is vital because the two eyes do not usually have identical scotomas. Information gotten by one eye will fill in the information missed by the other eye in its scotoma areas. *This information applies to all near vision tasks.*

“Text Scanning” is a very useful technique which is always helpful to scotoma patients who do not have fused binocular vision, even with corrective lenses. Bifocals are NOT recommended for “scanners” because they limit head movements needed for “text scanning”. Single vision full, $\frac{3}{4}$ size, or half-eye reading glasses are recommended. They should have anti-reflection coatings. Tinting is not recommended although a gradient tint (from 30% at top to 0% at bottom) can be used.

“SCANNING” is the process of observing a scene or an object while constantly moving the head and/or eyes so that no image part remains in a dead retinal area, or scotoma, for more than a fraction of a second. At first, this technique requires conscious effort; after a time, it becomes an automatic, unconscious function for many people. Typically, better results are obtain when using near vision by moving the head rather than the eyes. When using far or distance vision, eye movements may suffice, or a person may find best a combination of constant scanning by moving both the head and the eyes. Some people scan from side to side. Others scan up and down or in a circular motion. Which way is best is determined by the numbers, sizes and positions of the scotomas on the retinas. Each patient needs to determine which way is best for himself by experimenting.

- b) TYPE SIZE and DISTANCE ... can make a difference. When preparing or selecting documents for use, a patient can try a small type size, 10pt or 12pt., and use a dark type that is neither too light nor too bold. If a larger type size is used, the patient will probably see it with less data loss when it is farther from the face.
- c) DESKTOP ELECTRONIC DISPLAYS might be a computer monitor or the display of a “closed circuit TV magnifier” (used by people with reduced visual acuity). Many scotoma patients seen in NIRE’s low vision clinics chose to use a larger screen, farther from the face. On a PC, they often preferred a 17” display farther from the face over a 14” display closer to the face.

Scotoma patients having normal visual acuity did not need image magnification for reading and writing. However, some of them used desktop CCTV print magnifiers because they could flip a switch and reverse the image from positive to negative. Some patients used it this way, without image magnification, solely for image reversal.

THE REASON: When one reads black print on a white background (positive image) the scotomas appear as black spots or holes and this is annoying. With the image reversed (negative), one sees white print on a black background. When scotomas are present, part of a letter, like the foot of an “L”, might be missing. However, with white print on a black background, the scotomas are not visible.

NOTE: a computer running almost any version of Windows can be set up to give reversed or negative images for the same purpose.

- d) DELIBERATE HEAD MOVEMENTS often help greatly. Instead of moving one’s eyes to scan a page, when reading or writing, keep the

eyes fixed and move the head. Many scotoma patients report this helps greatly because, as the head moves to scan, each particular point, letter or character moves across the retinas – out of a scotoma and onto a good retinal area. *This technique can help a patient to reassure himself that he has not missed a number or word.*

- e) GOOD DESK LIGHTING WITHOUT GLARE is important. One should probably use a desk lamp that has an incandescent bulb and a variable brightness control. Fluorescent lights were not liked by most of our scotoma patients because of their flicker and the lack of variable brightness control.
- f) COMPUTER SPEECH OUTPUT is an option if one often reads text from a computer screen. Commercial software is available for this purpose. With it, one highlights the text to be read, clicks on a button, and the text that was highlighted is spoken aloud. This may be useful for reading other people's text or for proofing one's own for content and meaning. It is often inadequate to proof text this way, for punctuation, spelling or typographical errors.

4. DRIVING VISION can be helped, day and night, *assuming normal enough visual acuity to qualify for a driving license.* (Note: It might be wise to take a defensive driving course, on the road, with a professional driving instructor before driving alone.)

For driving, day or night, we recommend one get in the habit of making constant head movements – scanning movements – as described above. This ensures that a small object never remains in a scotoma long enough to be missed. We also urge the patient to make certain the eyeglasses are adjusted for fully converged and fused binocular vision, if this is possible. This way, one eye will fill in information missing from the other at any instant.

For daytime driving, we recommend Rx eyeglasses with any prism needed for convergence and fusion – and that it be BROWN gradient tinted. Scotomas are black, not brown, so we recommend brown instead of gray so that the brown is not mistaken for a scotoma. The glasses should be single vision and coated for anti reflection. The tint should be GRADIENT BROWN, possibly from 70% at the top to 0% two thirds down. These glasses will be useful if, on a bright sunny day, one suddenly drives into a shaded area or a dark tunnel. The observed brightness can be changed instantly simply by moving the head. *Ordinary sunglasses would leave a driver almost blind in a dark tunnel or sudden shade.*

For nighttime driving, we recommend similar glasses - but without the tint. If glare from the headlights of oncoming cars is a major problem, it is possible to custom make for you a clip-on device that will lessen glare on your left

side, but not straight ahead or to your right.

5. SPORTS VISION is another frequently asked question. Some doctors recommend against engaging in vigorous sports to people with retinal problems. If one needs vision for active sports, this information may help.

For playing a fast game with a small ball - such as TENNIS - it is useful to have sharp, binocular vision. For a person with scotomas in both eyes, it is probably best to be certain the eyes are converged and the images fused for the necessary sighting distances. This will enable one eye to provide information to the brain that is momentarily missing from the other eye when the ball may momentarily be in a scotoma area of one eye. Binocular fusion is also helpful for judging distances to better hit and place the ball. The lenses should be shatterproof plastic, single vision, anti-reflection coated and lightly tinted (20% to 30%) if desired ... for use outdoors in sunlight. Solid, not gradient, tinting is recommended.

Head movement scanning is also recommended so that any object in a scotoma is quickly seen out of the scotoma. This is a habit that can be developed and maintained. Some people with scotomas continue to play tennis, handball or other such games fairly well. Some, however, elect to switch to slower, easier to follow games such as badminton or volleyball.

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