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# Low Vision and Aging

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**ABSTRACT**

**As people age they are more susceptible to various problems in the visual system. The optometrist is in the position to take care of many of the functional losses that result from age-related problems and diseases. With increased awareness of basic low vision and rehabilitation services, the practitioner can continue to care for the visual needs of the older patient.**

**Key Words: aging, low vision, rehabilitation**

The majority of the elderly are not the classic low vision patients who are legally blind or unable to read printed materials. However, when normal age-related changes in the visual system, the media, lids, and retina are considered, a significant number of elderly can benefit from conventional optometric techniques, both functional and optical. Examples include normal age-related changes in the different media that affect comfort or the effects of adventitious monocular vision on binocular function. Because of the increasing numbers of elderly it is critical for all primary care optometrists to have a working knowledge of basic optical characteristics, functional vision, and low vision. Optometrists must also be sensitive to the increased incidence of diseases associated with aging and their impact on vision.

Normal changes in the visual system with age can lead to functional difficulties. Some of the problems can be alleviated by conventional optometric intervention and modified low vision techniques. As a person advances in age, there may be reductions in acuity. Thirty-three percent of those over the age of 80 have acuities of 20/50 or less.[1] If the acuity is minimally reduced and reading is affected, modifications in the add power can be incorporated into a conventional bifocal. This, combined with patient education, can allow an older person to adapt to normal reductions in visual acuity. Special attention must also be given to the need for increased illumination as a person ages. Advice on the types and availability of different lamps is of benefit to the older patient.

As people advance in age they may experience increased difficulty with changes in illumination and situations presenting glare. Appropriate patient education can allow a person to better cope with conditions that present difficulty. A thorough understanding of their problem and knowledge of situations that may create difficulty can prevent discomfort and the potential for injury. Many falls occur in transition areas—stairwells and entry ways.[2,3] Advice on allowing time to adapt visually to the changes in light that occur in such transition areas is appropriate for the older person. Patient education regarding lighting and glare is also appropriate. This becomes particularly critical for the older driver. As a person experiences increasing difficulty with glare, minor irritations such as debris on the windshield or dirty headlights can begin to create barriers to the safe operation of a vehicle. The person with decreased functional vision, while still maintaining reasonable acuity, needs to understand the implications of reductions in function on daily activities. Adequate information allows for informed decisions about their ability to perform day to day activities as they normally would or the need to adapt the way they perform their daily activities.

There are changes in color and contrast perception as a person ages. The yellowing of the lens can affect color perception before there is an appreciable drop in acuity. Before techniques that allowed for ease of cataract extraction, the yellowing of the lens affected the sensitivity to blue and violet portions of the spectrum. In years past it was not unusual to see indications that the older person was less sensitive to blue. The moderate blue tint of a woman's hair that was once considered fashionable may have originated because the majority of older

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women putting rinses on their hair perceived the final color as white and not the blue it actually was. Contrast sensitivity may also decrease. Such decreases can have an overall impact on mobility and activities of daily living. Again proper education provided to the older patient can help them to adapt to these changes in visual function.

As people continue to age, they are more susceptible to diseases of the visual system. The primary diseases affecting the elderly are: age-related macular degeneration, glaucoma, cataract, and diabetes. For cases of legal blindness, the first three account for 42% of the vision losses, with age-related macular degeneration accounting for 18.2%, cataract 12.8%, and glaucoma 11.0%.[1] It is estimated that 16.7% of those over the age of 65 are either blind or partially sighted.[4] It is also estimated that 25% of those over the age of 85 are unable to read a newspaper.[5]

Age-related macular degeneration accounts for 9500 new cases of legal blindness each year and for those over the age of 70, age-related macular degeneration is responsible for 47% of legal blindness and 63% of low vision.[6] Acuities of 20/30 or less are found in 16.7% of those over 65 and are attributed to macular changes.[6] There are a variety of functional losses related to macular changes in addition to reductions in acuity. Depending on the severity of the problems, an older person may experience some or all of the following: central distortions, decreased acuity, central scotomas, increased sensitivity to glare, reduced contrast, and reduced color discrimination.

Glaucoma, also a leading cause of blindness in the elderly, accounts for vision loss in 3 to 5% of those over the age of 65.[7] It is estimated that 2.5 million Americans have chronic open-angle glaucoma.[8, 14] Functional losses that occur with glaucoma can include: reduced visual function in dim light, reduced contrast sensitivity, glare disability, peripheral field loss, increased light and dark adaptation time, reduced color discrimination, decreased acuity, and central field loss.

Approximately 75% of those over the age of 65 will develop cataracts; of these it is estimated that between 5 to 15% will have a significant interference with vision.[7,9] It is estimated that 30% of the elderly have cataracts that reduce acuities to 20/30 or worse.[8] Development of a cataract can lead to degradation of images, glare disability, reduced acuity, reduced contrast sensitivity, and impaired color perception.

Vision loss due to diabetic retinopathy is also prevalent in the elderly. Each year, five thousand people of all ages become legally blind due to the complications of diabetes and it is the leading cause of blindness for those between the ages of 20 to 74.[10] Functional losses resulting from diabetic retinopathy can include: reduced contrast, reduced visual acuity, glare disability, scotomas, field loss, reduced light and dark adaptation abilities, and reduced color discrimination.

Many of the functional losses an older person experiences can be offset with low vision devices. Reductions in acuity can be helped with various forms of magnification, use of large print, increases in contrast, and by controlling illumination. Field deficits can be made easier to deal with by using reading stands, typoscopes, and lined paper. In some limited cases existing field can be enhanced by using prism, inverse telescopes, negative lenses, and amorphic style lenses. Filters, antireflective coatings, selected illumination sources and control devices, visors, and photochromic lenses can all be used to help alleviate difficulty with glare and light and dark adaptation problems. Losses in contrast sensitivity can be offset by using filters, high contrast materials, and control of the environment with color and texture.

Before initiating a complete low vision examination, the practitioner should have a thorough knowledge of the patient's medical, pharmaceutical, ocular, environmental, and social history. In addition, it is important to have some clearly defined goals related to the patient's visual needs.

The low vision examination for the older patient does not differ significantly from the examination provided to the younger patient and includes the adequate monitoring of the patient's ocular health and care for the patient's ocular disease. Important factors to keep in mind when working with the older patient include fatigue and the possibility of other impairments such as hearing or orthopedic difficulties. The reported ocular history and the practitioner's own diagnosis will serve as a guide as to what functional and diagnostic tests are necessary for the particular patient.

Acuity testing and refraction are best done using high contrast print charts. Care must be taken to evaluate the need for increased illumination. Trial frame refractions allow the patient to better use eccentric viewing postures. Because a significant number of older patients have miotic pupils and media opacities, it is important to bear in mind the impact of introducing several lenses at once on the amount of light entering the pupil. It is not unusual for a patient to be unable to appreciate changes in lenses or the addition of lenses simply because the decreased illumination may have affected the quality of the image. Comparing the equivalent of a plano trial lens to the proposed lens can help the practitioner to interpret more efficiently the patient's response and to determine the appropriate lens during trial frame refractions. Using hand-held lenses or refraction clips over the current glasses helps to reduce the fatigue and distraction that can occur with a heavy trial frame. The conventional trial frame should only be worn by the patient when necessary and removed whenever the doctor is no longer involved in the refraction.

A complete functional evaluation may include tests for contrast, field, biocular vision, binocular vision, glare, and retinal integrity. Again, not all tests are necessary for each patient and the disease,

if present, will help the practitioner to determine the most appropriate tests.

A critical factor in the successful use of low vision devices is adequate and appropriate training both before the introduction of the aid and as the older person is adapting to the aid. Many low vision patients are not initially comfortable with the close working distances of high adds or microscopes. The physical postures required to use such devices can be introduced even before the lenses. Giving tasks such as having the patient place their own hands or a clipboard at the expected working distance, without reading materials, can allow the patient to appreciate better how they will need to perform in order to read with the proposed lenses.

Approximately two-thirds of the elderly suffering a vision loss have at least one other physical impairment.[11] This can have an impact on the ability of an older patient to use a device. Again, a thorough understanding of the patient's abilities and needs is critical in order to predict the potential successful use of a device. Adequate preliminary training before a final prescription is often necessary. An example is the tentative use of a telescope when a moderate amount of hand tremor is present. A small field of view combined with telescope movement can be an obstacle to successful viewing of distant objects. Training with narrow tubes (paper towel and gift wrap tubing cut into segments) will enable the patient to understand the difficulties they will encounter due to the narrow field of view. The patient would practice lifting the tube and quickly fixating large objects or lights. If paper towel tubing is used, a cover from a standard 4× monocular telescope (Walters, Selsi, or Eschenbach) will fit in the end of the tube. The training tube can then be modified further by obscuring the end with the cover and making holes in the cover that would simulate the field of view of the proposed telescope. If a bioptic is being considered, a training pair of spectacles can help the patient to appreciate the needed head movements; both lenses would be occluded and two 1-cm holes are placed in only one lens, the one the telescope is to go in. Typoscopes cut to fit into empty frames work well. The top hole is where the telescope would be placed and the second is directly over the pupil in primary gaze. The patient would then practice tilting their chin down to view through the superior hole and then tilting their chin up, returning to the primary gaze to view through the lower hole.

Other considerations before final prescription of a low vision device can include the use of loaners and training with systems using lower magnification than the final device may have. Both practices can contribute to a greater success with the final low vision device. Handouts, audio-visual materials, repeat demonstrations, and peer group advice can also be helpful for the new low vision patient.

In addition to optical systems the patient may have use for items such as typoscopes, occluders, large print, adaptive equipment for other physical limitations, specialized lamps, illumination control devices, glare control, reading stands, taped material, telephone aids, large size recreational items (cards), writing guides, felt pens, clipboards, and electronic magnification.

Complete rehabilitation of the older patient requires a multidisciplinary approach. Referrals to agencies specific to vision loss such as the State Commission for the Blind or local support groups are appropriate. The New York Lighthouse Center for Vision and Aging[12] can assist the general practitioner with literature and further information on resources specific to the older visually impaired. In recent years there are also groups addressing the diseases specific to aging; an example is the Association for Macular Diseases, Inc.[13] The low vision practitioner may also be the first to identify other health issues for the older person. It would be advisable to become familiar with other health care providers in the area. For example, the older diabetic being seen by a general internist may not be aware of the need for routine evaluations and care of their feet. A patient with a hearing deficit may not have identified who in the area can assist with the problem. In addition to health services, the older patient may benefit from services available through the Area Agencies on Aging. Such services vary from area to area but can include transportation, home health care, chore assistance, meals, and social support.

With the increasing numbers of elderly, the primary care optometrist will not only need to have a thorough knowledge of conventional practices, but will also need to have the ability and expertise to care for the older patient as their vision decreases. All optometrists should have a working knowledge of basic low vision techniques.

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#### REFERENCES

1. Melore G. Ocular and visual changes in the elderly. Workbook on Optometric Gerontology, 1985:2.
2. Bergman G. On falling and preventative measures. Connections 1986:1.
3. Tideiksaar R, Kay AD. What causes falls? A logical diagnostic procedure. Geriatrics 1986;41:32–50.
4. United States Select Committee on Aging, House of Representatives, Ninety-Ninth Congress. Blindness and the Elderly Comm pub no 99–519. Washington: U.S. Government Printing Office, 1985.
5. Nelson KA. Statistical Brief #35—Visual impairment among elderly Americans: statistics in transition. J Vis Impairment Blind 1987;81:331–4.
6. Lovie-Kitchin JE, Bowman KJ. Senile Macular Degeneration. Boston: Butterworths, 1985.
7. Greenberg D, Branch LG. A review of methodological issues concerning incidence and prevalence data of visual deterioration in elders. In: Sekuler R, Kline D, Dismukes K, eds. Aging and Human Visual Function. New York: Alan R Liss, 1982:279–96.
8. Martinez GS, Campbell AJ, Reinker J, Allan BC. Prevalence of ocular disease in population study of subjects 65 years old and older. Am J Ophthalmol 1982;94:181–9.

9. Freese AS. Cataracts and Their Treatment. Public Affairs Pamphlet no 545, American Foundation for the Blind, November 1982.
10. American Diabetes Association. Diabetes: Facts You Need to Know. Washington, DC.
11. Kirchner C, Peterson R. Statistical Brief #7—Multiple impairments among non-institutionalized blind and visually impaired persons. J Vis Impairment Blind 1980;74:42–4.
12. The New York Lighthouse Center for Vision and Aging, 111 East 59th Street, New York, NY, 10022.
13. Association for Macular Diseases, Inc., 210 East 64th Street, New York, NY, 10021.
14. Whitmore LA. Understanding and Living with Glaucoma. New York: The Foundation for Glaucoma Research, American Foundation for the Blind, 1984.

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## NOTICES

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