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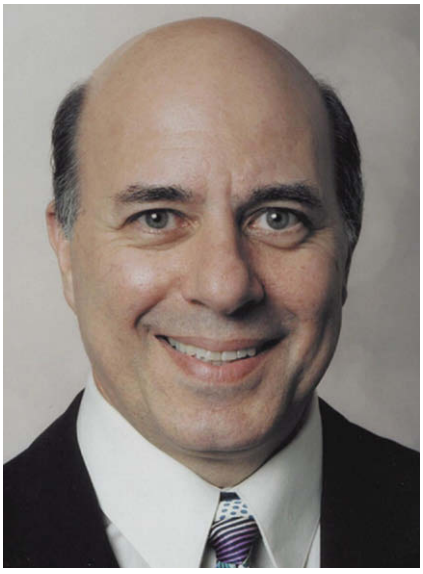
Steady as she goes

In the winter months in cold climates, we hear about a silent phenomenon: black ice. Black ice refers to a nearly invisible, precariously thin coating of ice over paved surfaces, potentially creating an untenable condition where injury can occur. This could result in a slip and fall with a twisted ankle, a fracture, a head injury, or other serious injury that could ultimately lead to the worst case scenario—death. What is most frightening is that black ice creates an "environmental impairment," which is independent of "normal vision." The good news, however, is that in time, this ice melts, and any safety issue it created will be environmentally resolved. Beyond such environmental hazards, there are also visual risk factors that can be implicated in falls, some of which can be addressed easily and some of which require more thought and effort to modify. Identifying visual risk factors can be, for the most part, straightforward. Fortunately, optometrists are well poised to identify those conditions most likely to increase the chances of falling. Some of these can be attributed to simply a refractive correction that is not current (for anyone at any age), not viewing through the correct part of a (multifocal) lens, or simply getting used to a new lens prescription. For the aging population, natural decrements in physiology (i.e., a small pupil, brunescence of the crystalline lens, or the natural decrease in contrast sensitivity) and visual processing (such as "impairment in visually divided attention/processing speed"[1]) can increase the risk of falling. Add to that ocular conditions like age-related macular degeneration, cataracts, vascular retinopathies, glaucoma, optic nerve dysfunction, or trauma such as acquired brain injury (to name but a few), and the need for good eye health and vision care becomes obvious. Consequently, evaluations of vision and ocular health should include and address conditions causing decreased central vision (either caused by a disease or simply an uncorrected refractive error), diplopia, visual field loss (especially inferiorly), delayed adaptation time to changing lighting conditions, loss of depth perception, and contrast sensitivity loss.[2,3]

Some remedies are seemingly straightforward. For example, the interference of a multifocal lens when walking (either inappropriately viewing through the bifocal or the bifocal being positioned too high) is something that can be readily resolved.[4] We must be aware that the confusion that some can have with the use a multifocal lens may be related to the aging process in general, cognitive dysfunction, dementia, or the physiologic inability to move the eyes up and down, as with Parkinson's disease. The solution and resolution can be accomplished with 2 pairs of glasses, or a clip-on lens (for specific activities) that can be placed over a distance prescription (a.k.a., "walking-around glasses"). However, even without a multifocal correction, simply acclimating to a new pair of glasses can be disorienting, especially if the lenses have not been changed for awhile, the lens or frame change is dramatic, or the prescription is asymmetric.

Other solutions for risk management of falls can be a bit more complex. For example, an overall normal decrease in contrast sensitivity caused by aging or the need for increased lighting in general can be worsened by a cataract or glaucoma. Likewise, an inferior contrast sensitivity loss (or an inferior visual field loss) exacerbated by optic nerve ischemia can make lighting and contrast detection more significant. Decrements in contrast sensitivity can essentially create a "white out" in the environment, especially where contrast is naturally poor. (Interestingly, patients experiencing this may have been told that they have no change in their sight. This dichotomy between symptoms and diagnostic results is attributable to the fact that standard visual acuity measurements are done with maximum contrast in letters or numbers and may mask a contrast sensitivity deficit.) Add to this the possibility of one's overall awareness of spatial relationships and (mis)perceptions of distance within the environment primarily because of diminished stereo vision or reliance on monocular cues of depth perception (especially related to general lighting, blur interpretation, and shadows), and the visual basis for falls



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increases. Examples of the interaction of contrast loss and decreased depth perception can be seen readily in any city environment in which there is a sidewalk with no contrasting border (such as grass), or sidewalks that slope or suddenly fall off to the street without warning (such as wheel chair ramps at street corners).

Fortunately, environmental precautions (specifically designed for those with visual impairments) have been forthcoming, especially in perilous areas such as subway station platforms. For example, the Washington D.C. Metro, in an effort to prevent serious injury, has not only addressed lighting to some degree, but has added visual contrast as well as tactile contrast to help delineate surfaces and drop-offs.

For some conditions that can lead to contrast sensitivity deficits, there is medical/surgical and/or optical help. For cataracts, there are surgical options, and for glaucoma there are medical and surgical options. Unfortunately, for optic nerve ischemia, there is very little that can be done. However, for all of these lighting and contrast issues, there are filters that can modify light transmission to increase contrast awareness, which can ultimately help enhance the detection of low contrast environmental features.

In addition (especially with the elderly), there can be complicating (comorbid or environmental) circumstances that can increase the odds of falling. Along with the ocular conditions previously mentioned, there can be balance problems from physical factors such as frailty, arthritis, Parkinson's disease, diabetes, postural unsteadiness, and/or inner ear diseases; mental issues such as Alzheimer's, general dementia, cognitive dysfunction, depression, delayed reaction time, deficits in simultaneous information processing, and fear of falling[5,6]; environmental characteristics (along with the previously mentioned lighting) such as visually or physically cluttered areas, uneven walking surfaces (both indoors and outside), or traction issues (i.e., slippery areas such as ice, polished surfaces, and rugs); and medication effects including those that can create sedation or dizziness, medications that can weaken the bones or muscles, or multiple medication interactions that can create visual vestibular imbalances. Clearly all of these factors can be interwoven into the visual risk for falling, creating a complex problem-solving paradigm for any eye care practitioner who takes on the responsibility for assessing a patient's risk profile. Minimizing this risk profile, especially because of the multifactorial nature of falls, especially in the elderly demographic, requires that all of the critical underlying issues be addressed by an interdisciplinary approach and shared among the patient's health care providers.

As the population ages, not only will the number of falls and fractures increase, but the personal and medical impact of those results will increase as well. It is incumbent upon health care professionals who interact with the aging population to not only evaluate those physical, physiological, cognitive, and psychologic components within their areas of specialty that can be the basis for falls, but also to clearly identify those dangerous environmental conditions that can increase the risk for falls. The improved quality of life, medical cost savings, and decreased care giving expenses can go a long way to preserving the concept of the "golden years" for everyone.

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