Background and epidemiology: Age-related macular degeneration (ARMD) is a leading cause of legal blindness (best vision below 20/200) among older people in North America. A degenerative disorder of the retinal pigment epithelium and neurosensory retina, ARMD is characterized by slow, insidious central vision loss. It is strongly associated with aging, with an estimated prevalence of less than 1% among white Americans in their sixth decade of life and more than 15% in the ninth decade of life. 

Additional risk factors include female sex, white race, cigarette smoking, low dietary intake of carotenoids, increased exposure to sunlight and comorbid cardiovascular disease. 

The pathophysiologic features and development of ARMD are poorly understood. Evidence from familial aggregation, twin and case-control studies suggests that familial or genetic factors may play a role, but of the 6 or more genes studied, no single gene appears to cause even a fraction of the cases of ARMD. 

Early-stage ARMD is characterized clinically by the presence of drusen (accumulations of amorphous, acellular debris) within the basement membrane of retinal pigment epithelium. Drusen are seen ophthalmoscopically as yellow spots within the macula (Fig. 1), the portion of the central retina with the greatest concentration of photoreceptors. Whereas small drusen (<63 µm) are commonly present in the macula as a consequence of aging, numerous large drusen are associated with ARMD. 

There are 2 types of ARMD. “Dry” ARMD accounts for about 85% of cases and is characterized by areas of retinal pigment epithelial loss and a slow course of visual loss; “wet” ARMD affects about 15% of cases and involves choroidal neovascularization (CNV) and potentially precipitous loss of central vision (Fig. 1).

Clinical management: Ophthalmoscopy is used to diagnose the condition. CNV can be identified by the presence of fluorescein dye within the neovascular tissue using intravenous fluorescein angiography.

Most treatment modalities focus on slowing the progression of CNV by provoking subretinal vascular endothelial damage and occlusion. In some cases laser photocoagulation of subretinal blood vessels can reduce the ultimate extent of visual loss by confining the area of the lesion; however, the overlying neurosensory retina is also damaged, which results in some degree of immediate decline in visual acuity. Photodynamic therapy aims to occlude CNV vessels while avoiding the concomitant damage to the neurosensory retina by intravenous administration of a photosensitive drug that is activated locally upon exposure to a nonthermal light at a wavelength specific to the drug. Upon activation the drug forms singlet oxygen and free radicals that damage vascular endothelial cells and provoke occlusion. Studies are underway that look at the effectiveness of external beam radiotherapy, vitreoretinal microsurgery and medical therapy that targets vascular endothelial growth factors.

Prevention: The most important treatable risk factor for ARMD is smoking, which leads to a 3-fold increased risk of the disease. A recent randomized placebo-controlled trial of the effect of high-dose vitamins C and E, beta carotene and zinc supplementation on ARMD progression and visual acuity demonstrated no benefit among people with mild disease (i.e., visual acuity at least 20/32 and any of multiple
multiple small drusen, single or nonextensive intermediate drusen, or pigment abnormalities) but a significant risk reduction (odds ratio 0.72, 99% confidence interval 0.52–0.98) among people with more advanced ARMD. The results suggest an absolute risk reduction of 6% (29%–23%; number needed to treat, 17) in the proportion of people with more advanced disease progressing to at least a 15-letter decrease in visual acuity score over 5 years with daily zinc and antioxidant supplementation compared with placebo. Given that an estimated 8 million people at least 55 years old in the United States have more advanced ARMD, the public health impact of treating this population with supplements to avoid visual deterioration is potentially great. In light of the recent studies showing an unexpected increased risk of lung cancer among smokers taking betacarotene, physicians and patients should be reminded of the potential risks of taking vitamins.

People with loss of central vision benefit from early visual rehabilitation with aids such as magnifiers and improved illumination. Adults aged 45 and older should undergo a comprehensive eye examination that includes central acuity testing and dilated eye examination every 2–4 years to facilitate early detection of ARMD.

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References

BOOKS RECEIVED


