Dark adaptation in retinal abnormalities

A common complaint is that of abnormally reduced vision in dark conditions. Whether this refers to visual acuity, glare, or other aspects of visual function must be determined in order to understand the cause of the complaint and if any alleviation of these symptoms can be considered. One aspect to investigate is whether the complaint refers to a delay in adjusting to a dark environment. This may reflect underlying retinal changes which result in slowed recovery of sensitivity following exposure to light. Of particular interest are the recent findings that patients with age-related macular degeneration and other retinal abnormalities can have severe delays in recovery of sensitivity in the dark. In other cases of funduscopically visible change, however, normal rates of dark adaptation have been found. Interestingly, severe delays in both rod and cone dark adaptation have been found in Sorsby's fundus dystrophy in regions of the fundus with visible yellow deposit at the level of Bruch's membrane. In other regions of the same fundus with ophthalmoscopically normal appearing retina dark adaptation can be normal. The rate of regeneration of rhodopsin in the corresponding retinal locations showed, similarly, changes in kinetics suggesting abnormal metabolic exchange across a thickened Bruch's membrane as the basis for the slowed dark adaptation.

A fuller understanding of the abnormalities of dark adaptation in different forms of retinal abnormalities may explain some symptom reports of reduced vision and may lead to better understanding of the underlying pathophysiological mechanisms. The relation between funduscopically visible structural changes and the manner in which dark adaptation abnormalities lead to later loss of visual acuity and visual field loss may provide earlier indications of pathology. These in depth investigations may lead to better understanding of the fundamental mechanisms of visual loss in common conditions such as age-related macular degeneration and provide a framework for devising new therapies.

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