

Outsmarting the Defective RPE

The retinal pigment epithelial cells (RPE) of the Royal College of Surgeons rat have a phagocytic defect that contributes to the degeneration of photoreceptors similar to some aspects of hereditary human retinal diseases. Studies show that the RPE of these rats bind rod outer segments normally *in vitro*. However, the RPE in this strain do not produce IP_3 , a second messenger molecule that normally accompanies outer segment binding. Heth and colleagues (p. 984) demonstrated that the RPE of these rats will ingest rod outer segments if an increase in IP_3 is produced by treatment with the cholinergic agent, carbachol. This suggests that the ability to initiate intracellular transmembrane signaling is abnormal in the rod outer segment receptor in these rats.

Nitric Oxide and Ciliary Muscle

The tone of the ciliary muscle affects accommodation and aqueous humor dynamics. This tone is known to be affected by acetylcholine and adrenaline released from autonomic nerve terminals. Recently, cytokines including prostaglandins have been studied for effects on ciliary muscle. Goh et al (p. 1188) demonstrated that the relaxation of ciliary muscle produced by prostaglandin is dependent on cyclic adenosine monophosphate. In addition, a similar relaxation was produced by nitric oxide. The effects of both agents on fluid movements in the eye are of great interest in normal aqueous physiology and glaucoma therapeutics.

Ethambutol Toxic to Cones

Ethambutol frequently is used in tuberculosis therapy and is known to produce optic neuropathy and deficiency in color vision as a side effect in some persons. Kohler and coworkers (p. 1046) injected ethambutol into the vitreous cavity of carp eyes and found toxic changes in the cone pedicles that led to cone pedicle degeneration. The rods of the fish retina were not affected. Moreover, changes in synaptic connections between horizontal cells and cones occurred in a dose-related fashion.

Antigen Produces Uveitis Model

The most common form of intraocular inflammation is acute anterior uveitis. Bora and colleagues (p. 1056) produced an experimental model of autoimmune anterior uveitis induced by systemic immunization with a protein associated with melanin from the iris-ciliary body of cows. An ocular disorder resembling anterior uveitis develops in Lewis rats after immunization with this material but not in mice and some other rat strains. The investigators hope that studies of this type will lead to the development of antigen-specific therapy for anterior uveitis.

Growth Factor Levels in Chick Experimental Myopia

When chick eyes are occluded, ocular elongation occurs, and active investigation continues into the mechanism of this experimental myopia and its implications for human ametropia. Cytokines might be regulating scleral cell behavior. Seko and coworkers (p. 1183) found that transforming growth factor-beta 2 is higher in the retina, pigment epithelium, choroid, and sclera of experimental chicks than in controls. Levels of basic fibroblast growth factor were decreased in "myopic" sclera.

Measuring Optic Nerve Tissue Pressure Gradients in Dogs

The difference between the tissue pressure inside the eye and in the retrobulbar optic nerve can be important in a number of disorders, including glaucoma, papilledema, and ischemic optic neuropathy. Morgan and coworkers (p. 1163) measured the optic nerve tissue pressure with microelectrodes in anesthetized dogs. They concluded that the tissue pressure gradient is maximal in the anterior-most portion of the nerve, within the optic nerve head. As expected, the retrobulbar optic nerve tissue pressure was dependent on the cerebrospinal fluid pressure.

Cataract in Transgenic Mice Expressing Non-Lens Protein

To produce a model of immunologic tolerance in the eye, Martin and coworkers (p. 1144) generated transgenic mice that express a highly immunogenic non-lens protein within the lens. The structural gene for a major histocompatibility class I molecule was fused with the promoter sequence from the lens αA -crystallin gene, generating seven lines of transgenic mice. Among these animals, some had no lens abnormality, others had mild cataract, and a few had opaque lenses whose capsules ruptured, indicating that these mice might provide a useful model for cataract. The release of lens material leading to major histocompatibility complex-specific inflammation might be of interest as a model to study immune privilege in the eye.