**A New Method for Oxygen Supply to Acute Ischemic Regina,** by J. Ben-Nun, V.A. Alder, S.J. Cringle, and I.J. Constable. *Invest Ophthalmol Vis Sci 29:*298–304, 1988

This paper introduces a method for supplying oxygen directly to ischemic retina using an oxygen source in the vitreous. Acute retinal vascular occlusion was created in cats by direct pressure on the optic disc and its margins with a glass probe. Satisfactory occlusion of the retinal vessels was documented by direct observation and by ERG recordings. Vascular occlusion caused a large decrease in the size of the B-wave of the electroretinogram with no change in the A-wave amplitude.

The oxygen source was a catheter made of strands from an oxygen permeable membrane which was inserted into the vitreous cavity. After successful vascular occlusion was documented, 100% oxygen was perfused through the catheter while recording the electroretinogram. In response to the perfused oxygen the B-wave amplitude was seen to partially recover. Ventilating the animal with 100% oxygen when the retinal vessels were occluded also caused recovery of the B-wave amplitude. Termination of the vitreal oxygen source caused a decrease in B-wave amplitude to the level previously observed prior to its administration. When the retinal circulation was restored by the removal of the glass probe, the B-wave recovered.

The authors suggest that these results show that it is possible to supply adequate oxygen to the retina via the vitreous to replace oxygen normally supplied via the retinal circulation. (Author's address: Joshua Ben-Nun, Department of Ophthalmology, Tel Aviv Medical Center, 6 Wiseman Street, Tel Aviv, Israel.)

## Comment

Previous investigators have shown that inhalation of 100% oxygen can increase the oxygen tension in the choroid sufficiently to supply the inner retina and maintain an ERG B wave in the presence of retinal arterial occlusion. The authors demonstrate in cats that the ERG B wave can similarly be maintained by oxygen delivery to the vitreous via a catheter. They state that this method avoids the possible dangers of systemic oxygen toxicity. At this stage the catheters are large and, thus, the surgical technique produces too much risk of retinal detachment to be considered clinically applicable. The concept of supplying oxygen to ischemic inner retina through the vitreous has been proven valid, however, and it is not inconceivable that future advances in delivery systems to the vitreous, combined with advances in thrombinolysis for retinal vascular occlusions, might make this a clinically useful technique.

ALEX IRVINE, M.D.
SAN FRANCISCO, CALIFORNIA

**$^{123}$I Metaiodobenzylguanidine (MIBG) Scintigraphy of Retinoblastoma: Preliminary Experience,** by J. Bomanji, J.L. Hungerford, J.E. Kingston, et al. *Br J Ophthalmol 73:*146–150, 1989

$^{123}$I metaiodobenzylguanidine (MIBG) is a radiopharmaceutical used for imaging neural crest tumors. The possibility of using $^{123}$I MIBG for imaging retinoblastomas has been assessed in this pilot study. Ten patients were studied, nine with clinically and histologically proved retinoblastomas, and one with Coats's disease. $^{123}$I MIBG scintigraphy correctly identified the neoplasm in eight patients but gave a negative result in two, one of whom had Coats's disease and the other a retinoblastoma which proved to be extensively necrotic on histological examination. These preliminary results suggest that $^{123}$I MIBG scintigraphy may have a role in differentiating retinoblastomas from lesions that simulate them. (Author's address: Dept. of Nuclear Medicine, St. Bartholomew's Hospital, London EC1A 7BE, England.)

## Comment

Dr. Bomanji and associates have used a radiopharmaceutical $^{123}$I metaiodobenzylguanidine (MIBG) to image retinoblastoma. MIBG was previously used to image neural crest tumors, and the authors were

interested in whether or not it might be helpful in differentiating retinoblastoma from simulating lesions. The authors studied ten patients: seven with intraocular retinoblastoma; one with Coats's disease; and two with ectopic intracranial retinoblastoma. The hopes that MIBG might be sensitive and specific for retinoblastoma were not realized entirely. One of the seven patients with intraocular retinoblastoma gave a negative result with $^{123}$I MIBG scintigraphy. This tumor was the more necrotic tumor, but the clinical diagnosis was not difficult. MIBG results were also negative in the patient with Coats's disease.

I have discussed this study with the authors, who have told me that the study was investigative and MIBG is not being used routinely on a clinical basis at the present time, nor are there plans to use it clinically. It is not specific enough, in the authors' opinions and seems to add very little to the clinical diagnosis.

Because of the devastating results in patients with ectopic intracranial retinoblastoma, the authors expressed an interest in further investigation if and when a safe preparation of the radiopharmaceutical becomes available for intrathecal use. Such a route of administration might give early images of an ectopic intracranial retinoblastoma. At the present time, no such preparations are available.

LINN MURPHEE, M.D.
LOS ANGELES, CALIFORNIA

**The Multipotential Cells of the Limbus,** by R.A. Thoft, L.A. Wiley, and N. Sundarraj. *Eye 3:*109–113, 1989

Ample evidence exists that there is a centripetal movement of cells from the periphery of the cornea toward the center. While conjunctival cells have the capacity to transdifferentiate into corneal epithelial cells, the limbal region appears to act as a barrier between the conjunctival and corneal epithelia, even after large epithelial defects are created.

The existence of limbal stem cells is suggested by the apparent role of the limbus in acting as a source of peripheral corneal cells. While specific staining of limbal cells has been reported in the rabbit, there is no positive identification of such stem cells in the human. However, in the human there is negative staining for both a keratin cytoskeleton antigen and a cell surface antigen in the limbal epithelial zone. Efforts to positively identify human limbal stem cells continue, as do efforts to culture and transplant such cells. (Author's address: The Eye and Ear Institute, University of Pittsburgh, Pittsburgh, PA 15213.)

## Comment

In this thought-provoking article, the authors postulate the existence of multipotential stem cells at the corneal limbus. They hypothesize that these stem cells at the limbus may indeed be the source of all ocular surface epithelial cells during postnatal life. The authors previously coined the term "the ocular surface" to denote the continuity of the palpebral and bulbar conjunctival epithelium with the corneal epithelium.

The epithelial cells at the limbus differ from corneal and conjunctival epithelium in that they do not stain with a specific antikeratin antibody and also do not stain with a specific antibody against selected cell surface membranes. This probably means that these cells are immature and could be the source of ocular surface epithelium. However, the lack of this antigen could possibly be due to the finding that these cells do not overlie an area of Bowman's membrane. Cells peripheral and central to this area do contain these antigens.

The author's hypothesis that these limbal cells are the source of corneal epithelium in cell turnover and following injury is an intriguing one although it has been shown that the conjunctival epithelium can transdifferentiate into corneal epithelium even when limbal cells are missing. Investigational work must start with a hypothesis to be proven correct or incorrect. The authors, after much thought but without a compelling amount of scientific evidence, give the reader an excellent starting point to determine experiments for future study of these limbal cells. If indeed they can harvest a monoclonal antibody specific for the limbal epithelial cells, this will go a long way toward elucidating and validating the hypothesis. As a trigger for more thought and experimentation, the article is worth pondering.

STEPHEN WALTMAN, M.D.
ST. LOUIS, MISSOURI