

hereditary patterns of this disease. This represents an important advance in the field of preventive medicine. It means that we may now be able to treat patients at an early stage, thereby greatly reducing the number of people blinded by glaucoma.

This great move forward has been made possible through highly significant studies such as the Collaborative Glaucoma Study and the recently discovered steroid provocative test.

The administration of anti-inflammatory steroids was found to coincide in its effect with that of the standard water-drinking provocative glaucoma test. Minimal, moderate, and maximum responses were obtained, indicating absence or presence of glaucoma. This steroid-induced glaucoma may be the result, according to one hypothesis, of increased rate of production of aqueous humor.

In addition, much progress has been made in our understanding of the basic dynamics of intraocular pressure, and in applicable diagnostic techniques.

Community-wide screening with the aid of tonometry is making it possible to find many victims of glaucoma before the disease has advanced to a stage where vision is affected—often among people who have had no suspicion that they were affected. Continued and expanded epidemiological, genetic, laboratory, and diagnostic studies are needed, however.

In addition to patient and laboratory studies, the Institute is conducting epidemiology studies of chronic simple glaucoma in selected population groups in Pennsylvania and Arizona. Variations in tonometry techniques for measuring eye pressure have been subjected to searching evaluation. Another study of 200 pairs of twins has been established to determine genetic influences in the development of glaucoma.

Cataracts

A cataract is a clouding of the lens of the eye which interferes with normal passage of light rays to the retina.

At the present time, the only known treatment is the surgical removal of the lens. This is a relatively simple operation which has been facilitated in recent years through the use of the enzyme alpha chymotrypsin to loosen the lens. At the present time it is possible for even very elderly patients to undergo cataract surgery if their general health is good.

Less well known is the fact that many children are born with cataracts. They will have the best chance to see normally if surgery is performed between the ages of 6 and 18 months, according to recent research findings of NINDB grantees. If congenital cataracts are removed in late childhood, functional results are likely to be poor, these investigators found. On the other hand, the sooner the surgery, the less likely the development of irreversible changes in the eyes.

Over a period of 5 years the case for early surgery was demonstrated in studies of the visual pathways of developing kittens with cataract or artificially induced blindness. These studies demonstrated that if vision is not permitted during the early months of life, the visual pathways do not develop fully. Even though vision is later restored, the essential functional connections may never be established, and there is permanent visual impairment. A similar situation exists if a muscle imbalance occurs which prevents the two eyes from focusing on the same object. If such a squint is permitted to persist too long, the mechanism for the coordination of eye movements is severely retarded, and there is deep-rooted impairment of the ability to develop binocular vision. Accumulated evidence suggested that children whose eyes have been similarly incoordinated since birth will have difficulty with effective binocular vision and the fusion it requires even after the incoordination is corrected.

If few binocular synapses remain in the cortex, even the most skillful balancing of extraocular muscle tensions would cause little more than cosmetic benefits. The earlier the surgery, the less likely the development of irreversible changes in the eyes. Investigators conclude that in such cases, operations between the ages of 6 and 16 months seem advisable.

Research by Institute grantees has provided valuable data on the physical and chemical properties of lens proteins. Since the formation of cataracts is associated with accumulation of insoluble proteins, these data are valuable in understanding cataracts.

Laboratory studies recently revealed the presence of the German measles virus within the cataractous lens of infants whose mothers had the disease early in pregnancy. This finding is extremely important in terms of our understanding the mode of action of this virus in producing cataracts.