

In cases where the medical treatment alone does not stop the progress or fails to improve the condition, X-ray therapy to the orbit has been found beneficial.

Angiographic examination (the study of blood vessels of the eye) has proved to be a safe and valuable method for establishing the nature of unilateral exophthalmos.

Various studies have demonstrated the promise in potential application of ultrasound when combined with other ophthalmologic techniques in dealing with the disease.

In one study, a basic problem in surgical correction of the severe limitation of elevation so frequently seen in the end stages of this disease was found to be the fibro-adhesive connections between the interior rectus and inferior oblique muscles and to the orbital floor. In a new method of surgery, these adhesions are separated with recession of the inferior rectus, and in some patients, recession of the medial rectus. Improvement was obtained in all cases.

Tumors

The more enlightened management of ocular neoplasms, based on better knowledge of their biological behavior, constitutes one of the major advances that have been made in clinical ophthalmology. Refinements in diagnosis of intra-ocular tumors, which too often lead to serious visual loss and may also create life-endangering situations, have been achieved through long-term studies by Institute scientists and grantees. The relatively benign character of certain tumors of the uvea, conjunctiva, eyelid, orbit, and lacrimal gland has become widely appreciated, and efforts are being made to develop more conservative techniques in their treatment. Other tumors are being recognized as highly malignant cancers requiring early radical surgery if the patient's life is to be saved.

As examples, characteristics of malignant tumors of the choroid may now be identified preoperatively by the use of new techniques and instrumentation. In a system developed in the ultrasonic laboratory an ultrasonic record is produced which has the appearance of an active photograph of the diseased tissue or tumor of the eye. This facilitates recognition of characteristics of different tissues.

Radiation therapy has been reported 84 percent successful in one experimental project in initial and secondary treatment of patients with retinoblastoma (tumor of the retina). This was the first time that supervoltage irradiation had been used exclusively in a uniform manner. The project was reported after patients had been observed for a period of 6 years with no deaths and with generally useful vision.

Far more sophisticated methods of diagnosis and detection of malignant tumors of the eye are urgently needed. While the new methods, using fluorescent dyes and radioactive tracers, appear to hold great promise, more specialized tumor diagnostic centers are needed. The lack of experimental models has hindered investigation of the basic dynamics of tumor growth and development.

Refractive Anomalies

This year, as part of its program to promote exchange of information and generate new research approaches, the Institute has supported a workshop on refractive anomalies of the eye. Considered by approximately 30 specialists from various parts of the world were such eye disorders as hyperopia, myopia, presbyopia, astigmatism, and anomalies of the accommodative and convergence mechanisms. Recommendations for further research into these eye conditions, which affect more than 90 percent of the Nation's population, were made regarding the mechanisms giving rise to the dysfunctions and diseases, diagnostic and therapeutic techniques available, and promising areas for future investigation.

In recent years, important advances have been made in the ability to correct errors of refraction, such as myopia (near-sightedness), which range from minor problems to serious involvements, some of which lead to severe visual impairment. So, too, has there been advancement in the design of instrumentation needed to exploit these new developments. Lasers, X-rays, and ultrasound have all been used successfully.

Several grantees are studying how the retina codes light impulses into electrical messages as well as how the brain decodes the message and produces the image we call vision.

Studies of the relation of the vision mechanism to perception of time, space, color, brightness, and form continue to receive support.