SUMMARY

Gene therapy is a powerful and promising tool for replacement or inactivation of abnormal genes in some reported ocular diseases.

The ideal gene delivery vector would efficiently and specifically transfer the gene to target cells and obtain high level of gene expression. In addition, the vector would not evoke an immune response and would be non toxic to the recipient ***(Zack, 1993)***.

Improving the transfer efficiency and prolonging the duration of transgene expression will be accomplished through a better understanding of the mechanisms by which vectors gain access to cells, what factors influence their access, and what factors can tribute to the loss of transgene expression ***(Feuerbach and Crystal, 1996)***.

Vector used to deliver the specific genes to the target cells include viral and non viral vectors reaching the target cells by in vivo, ex vivo or in situ approaches ***(DaCruz et al., 1997)***.

To date most of the studies aimed at developing gene therapy for inherited retinal degenerations have focused on the treatment of photoreceptor cell defects.

In conclusion, the experiments demonstrate that photoreceptor cell death occurs through caspase-3 mediated apoptosis. So alleviation of apoptotic photoreceptor cell death by inhibition of

caspase-3 activity provides a strong rationale for anti-apoptotic strategies in the treatment of retinal degenerative diseases. In particular, anti-apoptotic therapies may be useful in halting the progression of retinitis pigmentosa in Usher patients ***(Yoshizawa et al., 2002)***.

In 2003, Smith and his associates have demonstrated gene replacement therapies in these animals using AAV-2 and lentiviral vectors and have observed correction of the phagocytic defect, slowing of photoreceptor cell loss and preservation of retinal function ***(Smith et al., 2003)***.

In ***2000, Chevez-Barries and his associates*** used herpes simplex virus thymidine kinase (HSV-TK) gene delivered by retroviral vector to suppress tumorgenesis The patient was referred to Texas Children's Cancer Center for evaluation for gene therapy. Enucleation was recommended to the patient and was performed six weeks after the viral vector injection. Gross examination of the inferior calotte showed acalcified, regressed tumour and no active tumour on the nasal side of the globe where the AdV-TK was injected.

Choroidal neovascularization was inhibited in a recent study by ***Mori et al. (2004)*** a gene was injected which causes the body to produce endostatin, a substance which has been reported to inhibit abnormal blood vessel growth in tumors. The endostatin reduced retinal neovascularization in the mice by about 50%, and the more

endostatin in the blood stream, the lower the amount of neovascularization. More study is needed to determine if any organs are adversely affected by the procedure.

The final common outcome of glaucoma is RGC death, but several strategies to block RGC apoptosis are available, repeated intraocular injections of neurotrophic factors temporarily rescue RGCs from axotomy-induced death ***(Klöcker et al., 1998)***.

Ad-mediated intravitreal delivery of brain-derived neurotrophic factor (BDNF) has been shown to protect RGCs in a rat optic nerve transaction model. MCs are transduced by Ad and enhancement of RGC survival is due to secretion of BDNF from these cells ***(Cheng et al., 2002)***.

The scarring process following glaucoma filtration surgery is one of the best examples of the importance of being able to control healing in all patients having a particular procedure. Advanced molecular techniques also permit the creation of type of "magic bullet" by facilitating the selection of immunoglobulin genes and the synthesis of highly specific human antibodies to TGF-β2. These antibodies have been shown to be effective in preventing scarring in a model of filtration surgery ***(Cordeiro et al., 1999)*** and resulted in reduced final intraocular pressures in a pilot human study without the thin cystic blebs seen in eyes treated with anticancer agents ***(Siriwardena et al., 2002)***.