Introduction and Aim of Work

** INTRODUCTION **

An important fine balance of fluid movement normally exists across the posterior corneal surface. The corneal endothelium - a highly important monolayer cell membrane- plays an important role in this balance by acting as a barrier that limits the movement of fluid from anterior chamber into the hydrophilic stroma, and by actively removing the fluid that leaks through this barrier. Clinically, corneal oedema will develop when the rate of fluid leak exceeds the capacity of the so-called endothelial pump. The endothelial pump and barrier are responsible for the regulation of stromal hydration and corneal transparency *(GEROSKI et al., 1985)*.

Pachymetry provides a valuable index for endothelial function, as corneal thickness is a mirror for the efficiency of both endothelial barrier and pump functions. An increased corneal thickness can result from alterations in either or both of these functions. Corneal endothelium can be examined and photographed using the various types of specular microscopy, for the determination of cell density, and demonstrating cell morphology *(GEROSKI et al., 1985)*.

The use of wide field specular microscopy has made it possible to observe the contour of the endothelial aqueous interface. Recently, with the advent of fluoro-photometry, it has become possible to clinically document alterations in the endothelial barrier function *(MAYER, 1984)*.

The corneal endothelium consists of a sheet of about 350,000 - 500,000 hexagonal cells with straight sided borders, measuring 4 - 5 um thick by 18 - 20 um wide, the individual cell borders are noticeable by specular microscopy as they reflect light away from the collecting optics of the microscope. Cell division is rare in adults and has been noted in the infant cornea which shows a higher endothelial cell density. As they die or destroyed, they shed into the anterior chamber, the space overlying descement's membrane is covered by the adjacent endothelial cells which enlarge and slide over the area, for this reason, the overall cell density may fall *(MAYER, 1984)*.

Only when cell density declines to several hundreds of cells / mm^2, corneal decompensation and oedema occurs. This observation indicates that the corneal endothelium possesses a very large density of cells, that compensate for the

constant loss of cells, thus maintaining normal thickness and transparency *(GEROSKI et al., 1985)*.

An acute rise in I.O.P. presumably leads to increased leakage through the inter-cellular spaces, which up to a certain pressure level, is counteracted by the posteriorly directed pump above this I.O.P. level, corneal endothelial dysfunction and corneal oedema occurs *(KAYE et al., 1973)*. On the other hand, endothelial cell densities in far advanced open-angle glaucoma do not show such a low level of endothelial cell density *(VANNAS, SETALA & RUUSUVAARA, 1977)*.

The corneal endothelium, vital to the transparency of the cornea, is located directly on the dosage pathway of topically applied ocular drugs. Because its regenerative capacity is limited in humans, it is important to know whether it is affected by drugs used on a long-term basis, such as topically hypotensive medications *(HANNU et al., 1983)*.

There is evidence suggesting that the use of medical treatment of glaucoma can affect the structure and function of the corneal endothelium. Topical or intra-cameral admistration of ocular hypotensive medications and their

preservatives can damage the corneal endothelium in human and animal eyes *(KOREY et al., 1982)*.

Aim of work :

The work aims at studying the effect of the commonly used antiglaucoma eye drops in their commercial concentrations on the corneal endothelium of eyes suffering from 1ry open-angle glaucoma.

To exclude the effect of the preservative, we are going to compare the endothelial cell density in healthy human eyes before and after the use of the preservative. This will be done by counting central endothelial cell density, and measuring central corneal thickness using the clinical Keller-Konan contact wide-field specular microscope.

Moreover, experimental work on albino rabbit's eyes will be done including endothelial count photography and pachymetry before and after using these drugs topically on rabbits. Also histopathological examination will be studied after 6 months using high power microscope.