

## EXPERIMENTAL MODEL OF ACUTE GLAUCOMA ON RABBIT. HISTOLOGICAL STUDY

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**Key words:** acute glaucoma, experimental model, histological modifications.

**Abstract:** The study was conducted on an experimental model of acute glaucoma on rabbit and investigates the histological modifications determined by the sudden increase of the intraocular pressure at the level of the retina. The histological analysis shows that under conditions of the experiment there are discrete alterations at the level of the retinal layers, without a general modification of the retinal architecture.

### INTRODUCTION

All types of glaucoma are characterized by increased pressure within the eyeball, and therefore all can cause progressive damage to the optic nerve and other parts of the eye. Acute glaucoma is caused by a shift in the position of the iris of the eye that suddenly blocks the exit of the aqueous humor fluid. This causes a quick, severe, and painful rise in the pressure within the eye.

### MATERIAL AND METHOD

For the study we used 15 rabbits, white, male, with a body weight between 1200/1600g. The right eye of each animal has been considered a sample and the left eye a control.

Animals have been anesthetized with chloroform and the intraocular pressure on the two eyes it has been measured with a Schiotz tonometer, the values being approximately the same for all animals. For each animal, on the right eye, after the extraction of the 0,15ml of UA by a puncture of the anterior chamber, it was introduced 0,1ml water solution of  $\alpha$  chymotripsine and 0,1 ml hydroxypropylmethylcellulose.

After 24 hours from the beginning of the experiment, the animals have been sacrificed by decapitation. Immediately afterward the intraocular pressure was measured on the right eye and the average value has been 32 mmHg, and then on the left eye where the average has been 16mmHg. The ocular globes have been enucleated.

For the microscopy samples there have been used 10 eyes from 5 rabbits. The retina has been sectioned together with the wall of the ocular globe and the fragments of iris and retina have been fixed in glutaraldehyde 2% and postfixed in osmium tetroxide 1%.

The sections for the optical microscope were stained with toluidene blue and for electron microscope counterstained with uranyl acetate.

### RESULTS AND DISCUSSIONS

The conditions of the experiment simulate an experimental model of acute glaucoma where the anterior ocular segment has similar alterations as for humans when the intraocular pressure increase suddenly. This model is associated with an initial stages of acute glaucoma.

In acute increase of the intraocular pressure in irian tissue lead to some inflammatory phenomena associated with the dilatation of the blood vessels (fig.1), with invasion of the irian tissue by the inflammatory blood cells (fig.2) and the appearance of vacuoles in the posterior irian epithelium (fig.3).

Discrete alterations have been found in the external nuclear layer. The cellular bodies of the photoreceptors have small intracellular vacuoles suggesting the accumulation of water due to the lesions of the membranes (fig.4). The vacuoles in the bipolar neurons are obvious and suggests the infiltration of the water in these cells (fig.5 and 6).

The cellular organelles in the cytoplasm are affected at different levels, significant alterations being noticed in the endoplasmic reticulum which has small, spheric vesicles (fig.7). It is known that due to its multiple membranes, this intracellular organelle is first to be altered in the presence of free radicals.

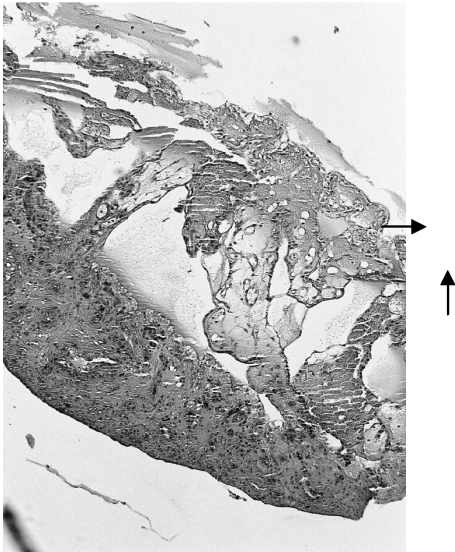


Fig.1 Iris, arrows- dilatation of the blood vessels MO, HE, 10x/0,25

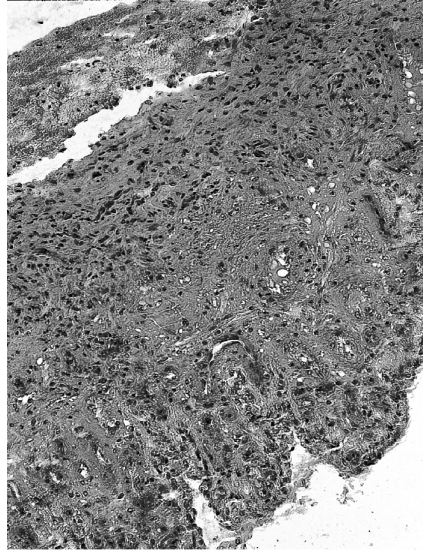


Fig.2 Iris, inflamatory process, MO, HE, 20x/0,45



Fig.3 Iris, arrow- posterior epithelium, MO, HE, 40x/0,75



Fig.4 Retina, external nuclear layer, arrows- vacuoles, ME, x20000





Fig. 5 Retina, arrow-water infiltrations, MO, TB,100x/1,25

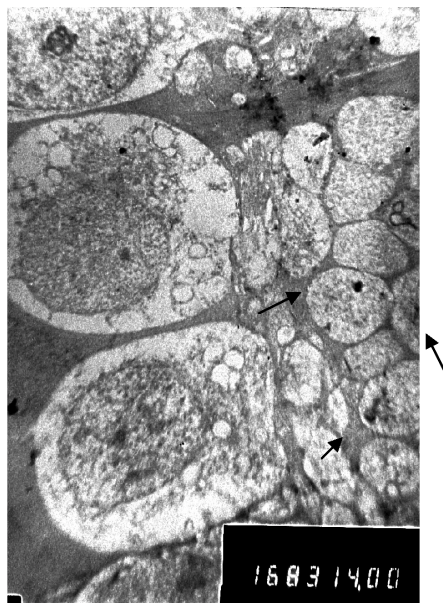


Fig.6 Retina, arrow-water infiltration, ME, x20000

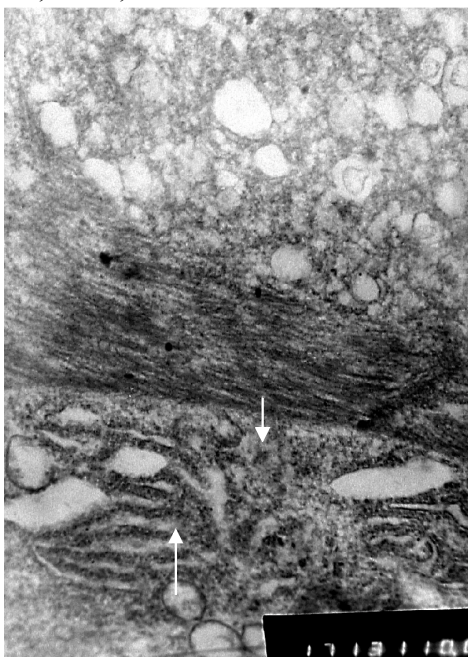


Fig.7 Retina, arrows-endoplasmic reticule dilatation, ME, x30000

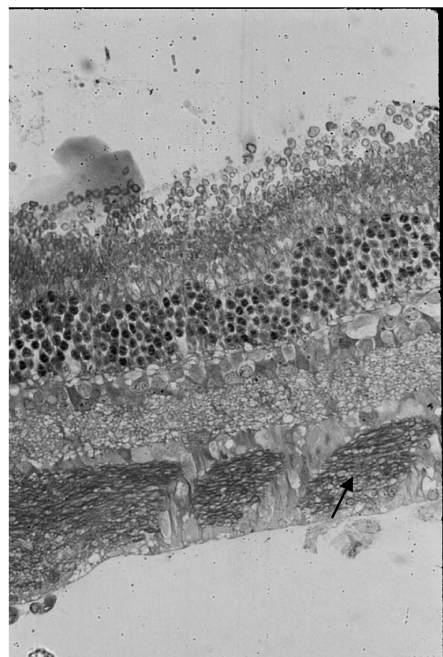


Fig.8 Retina, ganglionar cells and optic nerv, MO, TB, 100x/1,25

In ganglionar cells layer there are some spaces between axons and larger cells present small vacuoles (fig.8).

## CONCLUSIONS

In this glaucoma model the structural changes are not major and the general architecture of the eye are not changed.

The alterations are most obvious in retina and the main component of the tissue affected are the membranes of the cells and the intracellular organelles with membranary structure. Most affected are ganglionar cells, specially large one, in which can observe small vacuoles.

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