

2145

ABBERATIONS OF EPITHELIAL CELLS AND THE EPITHELIAL-FIBER CELL INTERLACE DURING HEREDITARY CATARACT DEVELOPMENT IN RATS

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Purpose: Disturbances of the ordinary epithelial cell arrangement and the regular interdigitations between epithelium and newly differentiated fiber cells in rat cataract mutants were investigated with special attention to membrane alterations.

Methods: Embryonic, fetal and early postnatal lens development was studied light- and electron microscopically in 3 mutant strains (*cat*, *cat-b*, *cat-I*) and a non-affected reference strain. Depending on the stage of development, heads, eye balls or lenses were fixed in half-strength Karnovsky solution, stained in OsO₄ and embedded in Durcupan[®]. Serial sections were processed for light- and electron microscopy.

Results: Although *cat* and *cat-b* are recessive mutant and *cat-I* is dominant, the development of nuclear (*cat-b*, *cat-I* heterozygot) as well as mature cataracts (*cat*, *cat-I* homozygous) obviously start with irregularities in the differentiation of primary fiber cells. This is evidenced by incomplete elongation and irregular fiber membrane interdigitations. In nuclear cataract this is the only detectable alteration, whereas during mature cataract formation, epithelial malformations together with incomplete or absent interdigitations between epithelial and fiber cells are a typical feature.

Conclusion: The development of hereditary nuclear cataracts obviously is caused only by primary fiber cell malformations, whereas the development of genetically triggered mature cataracts involves the epithelium and the epithelial/fiber cell interlace.

2146

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Effects of intraocular lens implantation on ocular growth in the young rabbit eye.

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Purpose: Congenital cataract is a major cause of poor vision in children. After cataract surgery, correction of aphakia should be optimal to avoid or treat amblyopia. Long term effects of pseudophakia on the growing eye remain unknown. Few studies have described the biometric evolution of growing pseudo-phakic eyes. This study aims to prove the effect of IOL implantation in an animal model.

Materials and methods: Twenty-seven New-Zealand albinos rabbits aged 4 weeks underwent manual extra-capsular lens extraction followed by IOL implantation. Axial length (determined by echography mode A), and corneal diameter were measured before surgery and monthly for 3 months. At this age the fellow eye measures at least 90% of its adult size.

Results: Average values and standard deviations were calculated at 0,1,2 and 3 months after surgery for the operated and non operated eyes. Average curves show retarded growth of the operated eye with a difference of approximately 1 mm at the third month.

Discussion: Our study shows that lens extraction with IOL implantation diminishes eye growth in young rabbits. We discuss the roles of surgical trauma, post-operative inflammation and lens removal. These factors should be further explored before concluding upon the role of pseudophakia itself.

2147

ROLE OF TOPICAL TREATMENT WITH HEPARIN EYE-DROPS IN THE PREVENTION OF AFTER-CATARACT.

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Purpose and Methods: After-cataract is the major persisting complication of Extracapsular Cataract Extraction. In this prospective in a case-control study the efficacy of topical treatment with heparin eye-drops in the preventing or reducing the development of posterior capsule opacification (PCO) after ECCE+IOL surgery has been evaluated in a four-years follow-up.

Results: Patients and controls during the study showed no significant differences as regard as postoperative inflammation. Lower incidence of cellular precipitates in heparin-treated patients than in controls has been found during the study. Nd:YAG posterior capsulotomy was performed in 7 patients and in 14 controls showing no statistically significant difference. The life-table analysis showed a greater incidence of PCO in controls than in treated-eyes during the first year ($P > 0.01$), else at the end of the follow-up the two groups were similar. These data are related to lower incidence of fibrosis-type PCO in heparin group than in controls ($P = 0.02$).

Conclusions: Topical treatment with heparin eye drops shows good efficacy in the reducing the fibrosis-type PCO in the long term follow-up, is free from secondary effects and is well tolerated by the patients. It appears an useful treatment for the fibrosis-type PCO, else it has not efficacy on the pearl-type PCO.

2148

LENS FIBRES CONTROL HUMAN LENS EPITHELIUM MITOTIC ACTIVITY

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Purpose

A stimulation of lens epithelial cell division and migration is at the origin of after-cataract, the main current side effect of cataract surgery. The present study aimed at testing the potential of the lens capsule and the fibres to control the mitotic activity of the lens epithelial cells in human donor eyes.

Methods

Pairs of human lenses were cultured using two different experimental conditions. In the first, a small anterior capsulorhexis was made. In the other, all the fibres were removed, followed by culturing of the whole mounts. Mitotic activity was assessed by immunohistochemistry using the bromodeoxyuridine (BrdU) incorporation technique.

Results

The anterior capsulorhexis significantly ($p \leq 0.02$) enhanced the number of BrdU positive nuclei in the equatorial region but not in the wound area. Whole mounts free of fibres showed a paramount increase in BrdU incorporation in the pre-equatorial germinative region as compared to the intact control lenses.

Conclusion

Lens capsule integrity and the presence of the fibres may have an inhibitory effect on the mitotic activity of the human lens epithelium. The data recorded here could be useful for understanding lens cell biology and prevention of after-cataract.