Old Questions – New Answers

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Is Uniformity of Fibrillar Diameter Essential to Corneal Transparency?

Doughty and Bergmanson: Assessment of the Apparent Intra- and Inter-Sample Variability of Collagen Fiber Diameter in the Posterior Corneal Stroma of Rabbits

Ophthalmic Res 2006;38: 335–342

The authors utilized transmission electron microscopy to assess stromal collagen fibril diameters both in the same cornea and between separate corneas in particular to examine how uniform (or otherwise) the fibril diameters are. The reason for undertaking this research was that optical modeling of the corneal transparency assumes that the collagen fibrils are of constant and uniform diameter. The results are presented as further evidence that such a constancy in fibril diameter is not apparent and that, even within the same posterior central region of the cornea, there can be subtle differences. A large number of fibrils must be assessed for an accurate calculation of the average fibril diameter. From a practical perspective, the present results indicate that corneal fibrillar morphology is more complex than generally assumed, especially where the assembly or maintenance of this unique structure or its changes in various disease states, such as keratoconus, are concerned. The authors also conclude that uniformity of fibrillar diameter is not essential to corneal transparency.

Can We Predict the Safety Range of Femtosecond Laser Treatment?

Djotyan et al.: Finite-Element Modeling of Posterior Lamellar Keratoplasty: Construction of Theoretical Nomograms for Induced Refractive Errors

Ophthalmic Res 2006;38:329–334

Lamellar keratoplasty is undergoing a resurgence in popularity as a result of new surgical techniques, such as deep anterior or posterior lamellar keratoplasty (deep lamellar endothelial keratoplasty) and other endothelial replacement methods (e.g. Descemet's stripping endothelial keratoplasty). Our LASIK clinical experience has taught us that an excessively thin residual cornea resulting from lamellar cutting may induce corneal ectasia with topographical steepening and myopia. We applied our previous mathematical LASIK model to lamellar keratoplasty in order to theoretically predict myopic shifts in corneas weakened by lamellar excision. Our mathematical model predicts the minimum safe residual corneal thickness for maintaining refractive stability. When used in conjunction with clinical experience, it may assist in the development of clinical safety guidelines.

Can We Safely Implant an IOL in Children with Juvenile Idiopathic Arthritis-Associated Uveitis?

Kotaniemi and Penttilä: Intraocular Lens Implantation in Patients with Juvenile Idiopathic Arthritis-Associated Uveitis

Ophthalmic Res 2006;38:318–323

IOL implantation in children with JIA-associated uveitis has been controversial.

A series of 25 JIA patients with cataract associated with chronic uveitis in 36 eyes is described by this Finnish group. While uveitis and arthritis were strictly controlled with immunosuppressants and/or new biologic drugs, IOL implantation by experienced cataract surgeons gave good visual results in the majority of the operated eyes. IOL implantation in capsular bag after anterior capsulorhexis and phacoemulsification or aspiration of the cataract was performed in 35 eyes, and secondary implantation in 1 eye. In half of the operated eyes a 4-mm posterior capsulotomy and core vitrectomy was performed at pars plana in order to prevent contact between the IOL and vitreous and formation of secondary membranes.

The authors conclude that IOL surgery in JIA-associated uveitis should not be postponed too far. Well-timed IOL surgery in experienced hands seems to be an important alternative in the visual rehabilitation of JIA patients with chronic uveitis and cataract.

New Insights into Ontogenic Expression of Estrogen Receptor- α

Kato et al.: Ontogenic Expression of Estrogen Receptor- α in Female Rat Corneas

Ophthalmic Res 2006;38:361–365

Interestingly, estrogens are present in aqueous humor and vitreous and are metabolized in the cornea. Since the morphology of the human cornea changes in thickness and/or curvature during the menstrual cycle and pregnancy, further investigations are needed.

Estrogen plays important roles in the target organs via its receptors, especially estrogen receptor- α (ER- α). At this time the detailed function of ER- α in the corneas remains unknown. As part of larger group of studies to elucidate the mechanism(s) of estrogens on the biology of the cornea, this report looks at the ontogenic pattern of ER- α expression in the corneas of female rats.

The ontogenic expression and localization of ER- α in female rat corneas were successfully determined using quantitative reverse-transcribed polymerase chain reaction methodology and immunohistochemistry. This report also revealed an ontogenic expression of ER- α mRNA and ER- α protein in the rat cornea and that expression increases with advancing age. It is evident that ER- α appears after birth and its expression is increased during corneal development, although the role of estrogens in the eye is still obscure.