What Is New in *Ophthalmic Research* – Focus on Glaucoma

Molecular Dissection: The Trabecular Meshwork in Steroid-Induced Glaucoma

Shinzato et al., Okinawa, Japan

Ophthalmic Res 2007;39:330–337

Glucocorticoid administration can lead to increased intraocular pressure in more than 90% of patients with primary open-angle glaucoma, compared with 30–40% of the general population. The molecular mechanisms for increased steroid responsiveness among patients with glaucoma are unknown. One such part, the trabecular meshwork (TM), has been analyzed with a proteomic approach in a rat model of steroid-induced ocular hypertension. Steroid-induced ocular hypertension results from increased outflow resistance across the TM. However, the mechanisms for this remain unclear and could be similar to that for primary open-angle glaucoma. So far 4 TM proteins have been identified that exhibited a more than 2-fold up-/down-regulation in ocular hypertensive rats. Two down-regulated proteins were processing by-products of fibrillar collagen, C-propeptides of collagen type I $\alpha 1$ and $\alpha 2$ chains. The presented results support the long-suspected link between increased outflow resistance and impaired TM collagen turnover. Furthermore the study underlines that proteomics will continue to be a powerful and essential tool in ophthalmic research.

The Role of Matrix Metalloproteinases in Glaucoma Filtration Surgery Wound Healing

Shima et al., Ishikawa, Japan

Ophthalmic Res 2007;39:315–324

Glaucoma filtration surgery creates a fistula, enabling aqueous fluid to escape the anterior chamber and subsequently reducing intraocular pressure. Extracellular matrix deposition, during wound healing processes, mediated by matrix metalloproteinases (MMPs) has implications for the success of glaucoma surgery. This study investigated the role of MMPs in the degradation of the extracellular matrix including protein and mRNA expressions, gelatin-degrading activity and the site of activity. We found that MMPs, especially MMP-2/MT1-MMP, play an important role and may represent very important targets for therapeutic intervention following such surgery. The authors elucidated which specific MMPs enhance or inhibit fibrosis and pinpoint to the site

of action in the wound tissue in more detail. Further identification of the steps in wound healing following glaucoma filtration surgery and the role of MMPs in particular may result in a more successful outcome of glaucoma filtration surgery.

Analysis of Reproducibility of Three Perimetric Techniques

Gonzalez-Hernandez et al., Madrid, Spain

Ophthalmic Res 2007;39:338–343

A procedure for early diagnosis must be sensitive and specific but also reproducible and easy to apply. Reproducibility depends on diverse factors, one of which is the 'learning effect'. In clinical practice, the learning effect is considered to be irrelevant after the second perimetric test, but beyond this point it may persist at a moderate level. In this study the authors tested the limits of this problem and how experience in a particular type of perimetry reduces, but does not eliminate, the need for training. In the case of the new Pulsar perimetry, which studies the descending phase of the contrast curve in the visual field, the test-retest reproducibility was greater than that of standard automatic perimetry and frequency doubling technique. This occurred despite the fact that the learning effect of Pulsar perimetry was slightly greater.

Precise Corneal Toxicity Evaluation: A Novel Method

Uematsu et al., Nagasaki, Japan

Ophthalmic Res 2007;39:308–314

Safety to the ocular surface is an important aspect in the development and use of ophthalmic drugs. The authors developed a novel method to evaluate the corneal toxicity of ophthalmic agents by measuring changes in corneal barrier function quantitatively and continuously within a very short period. Moreover, the authors consider their technique superior to previous methods of corneal toxicity evaluation, since the experimental conditions are similar to clinical drug instillation. It was found that 0.05% benzalkonium chloride reduces more than half of corneal barrier function within only 10 s in a live intact cornea. This new method looks promising to further evaluate clinically often used agents such as glaucoma medication.

Uwe Pleyer, Editor-in-Chief