New Hypothesis, New Ideas and Questions in *Ophthalmic Research*

Is Presbyopia the First Stage of Nuclear Cataract?

McGinty and Truscott, Sydney, Australia
Ophthalmic Res 2006;38:137–148

This hypothesis is raised by an Australian group postulating that hardening of the lens nucleus may be linked with the development of lens barriers and subsequent age-related nuclear (ARN) cataract formation. The authors postulate that penetration of small molecules, such as preventive anti-oxidants into the centre of the lens, might be altered leaving lens proteins susceptible to oxidation and post-translational modification. Findings such as coloration of the lens nucleus and protein oxidation are hallmarks of ARN cataract and support this idea. If this hypothesis is correct, a better understanding of the molecular basis of presbyopia may also allow to develop strategies to prevent the onset of cataract formation.

Can Optical Coherence Tomography Be Useful to Investigate Posterior Capsule Opacification?

Elgohary et al., London, UK
Ophthalmic Res 2006;38:116–124

Posterior capsular opacification (PCO) remains the most frequent complication of otherwise successful cataract extraction. Several factors including intra-ocular lens (IOL) material and design have been shown to influence the migration of lens epithelial cells and subsequently the rate of PCO. In particular, acrylic implants have been found to be associated with lower rates of PCO than silicone implants, planoconvex and square-edged IOLs. Indeed, the concept 'no space, no cell, no PCO' is appealing, and it is of interest to follow the morphology of the capsular bag postoperatively in patients. Optical coherence tomography (OCT), an easy to use, non-contact, in vivo imaging technology provides a high resolution that might be suitable for this purpose. Elgohary et al. conducted a pilot study to follow this idea. Two questions were raised. First: is OCT able to show the intra-ocular morphology of the capsular bag and the localization of different IOLs? Second: is there a difference in the relationship between the posterior surface of the optic and the posterior capsule that could be attributed to their variable design and/or material?

The results demonstrate that OCT might be a useful tool to demonstrate the structural relationship between IOLs and the lens

capsule in vivo. In addition, this technique is able to support previous clinical observations. Whereas all acrylic IOLs showed a 'close apposition' between the optic and the posterior capsule, all silicone implants demonstrated a distinct optically empty space between the peripheral parts of their optic and the capsule. The authors conclude that future studies have to address advantages and limitations of OCT to investigate this interesting tool for the follow-up of PCO.

How Does the Light Cycle Affect the Phagocytic Activity of Retinal Pigment Epithelial Cells?

Irschick et al., Innsbruck, Austria
Ophthalmic Res 2006;38:164–174

Daily phagocytosis by the retinal pigment epithelium (RPE) of spent photoreceptor outer segment fragments is critical to the maintenance and normal function of the retina. Irschick et al. investigated the question whether inhibitors of the cytoskeleton affect phagocytosis and whether this underlies the diurnal rhythm. In addition the authors studied a possible connection of cell volume regulation and its effect on phagocytic function in primary RPE cells and a permanent cell line (ARPE-19). Interestingly, the latter question was investigated by using commonly applied antiviral agents known for their impact on cell-volume-regulating mechanisms.

The results clearly show that even in vitro the diurnal rhythm of phagocytosis is preserved. Phagocytosis of microspheres occurred predominately during dark intervals, whereas light exposure led to a significant reduction. Inhibitors of cytoskeletal function had a profound influence on the kinetics of particle uptake in RPE and blocked the observed diurnal rhythm, indicating that diurnal phagocytosis might be influenced by microtubule-dependent mechanisms. In addition, antiviral substances and hypo-osmotic swelling affected phagocytosis. Interestingly, marked differences were observed. Acyclovir was found inhibitory in ARPE-19 cells whereas ganciclovir was inactive in primary RPE and ARPE-19 cells. The finding that these commonly used drugs influenced RPE phagocytic activity is of particular interest. The authors consider that application of these agents may worsen macular edema due to the swelling process and controls during long-term treatment might be appropriate.

Uwe Pleyer, Editor-in-Chief