

Vision science highlights from the world's leading journals of medicine and science

Accommodating progress

Intraocular lenses with accommodative abilities have been billed as a potential treatment for presbyopia. While different accommodating IOLs are now on the market, there are lingering questions about their mechanisms of action and overall efficacy. The Dec. 2004 issue of the *Journal of Cataract and Refractive Surgery* updates readers on the subject.

Nick Mamalis MD starts off the issue with a commentary that contrasts multifocal IOLs and accommodative IOLs. He discusses the currently available accommodative IOLs and reviews the unresolved clinical issues surrounding them. He predicts that issues of measuring postoperative results will be resolved, and that improved lens design will appear that will help achieve the goal of providing patients with the optimal uncorrected near and distance vision following cataract surgery or refractive lens exchange.

In an article in the same issue, Giorgio Marchini MD describes a small study in which patients who had been implanted with the CrystaLens accommodating IOL were evaluated one month and six months postoperatively by UBM during accommodation to assess the actual mechanism of action of the CrystaLens. The researchers detected a mean reduction in the anterior chamber depth as well as a mean narrowing of the sclera-ciliary process angle during accommodation. The study also found that the displacement of the IOL and rotation of the ciliary processes were proportional to the patient's accommodative capacity.

In another study, Jorge Alió MD and colleagues prospectively followed a group of patients who underwent bilateral refractive lens exchange with the multifocal AMO Array, the Acritec Twinset or the accommodating CrystaLens IOL. They report that at one year, patients in all three groups showed improvements in uncorrected near visual acuity and best distance-corrected near visual acuity. The CrystaLens provided the least amount of postoperative visual phenomena and gave favourable near vision. The Twinset IOL provided faster recovery of near vision than the other two IOLs. The multifocal Array lens achieved "the most comfortable distance and near vision." They conclude that the study supports the utility of refractive lens exchange, but emphasise that more research is required.

A letter from Drs Hoffman, Fine and Packer asks 'Are 3 dioptres of accommodation adequate for accommodating IOLs?' They warn against dogmatic acceptance of the idea that 3.0 D might be sufficient, noting that five or six dioptres may be closer to the mark. David Miller MD responds in another letter arguing that a reasonable range for an accommodating IOL should equal the power of the lenticular component of accommodation for reading, which would be 2.5 to 3.0 D.

JCRS, N. Mamalis, 'Accommodating intraocular lenses', December 2004, Vol. 30, Issue 12, 2455-2456.

Melanopsin heritage

Melanopsin goes way back. New research supports the idea that the light receptor in retinal neurons that regulates the body's nonvisual light responses, including circadian rhythms and constriction of the pupils traces its family roots well beyond the mammalian branch. Researchers at the Salk Institute found that when melanopsin was expressed in developing frog eggs, it led to the light-dependent activation of membrane current through a G protein signalling pathway. This pathway is the same one that is active in

invertebrate eyes, which are constructed completely differently than mammalian eyes. Melanopsin thus appears to be the first mammalian opsin to be found that signals more like an invertebrate opsin than the classical mammalian opsins found on rods and cones. This suggests that the non-image light-sensing system of the mammalian eye is derived from the same ancient photoreceptors that evolved into invertebrate eyes.

Science, S. Panda et al., 'Illumination of the Melanopsin Signalling Pathway', January 28, 2005, Volume 307, Number 5709.

LASIK spares the RNFL

Researchers at UC San Diego report that the retinal nerve fibre layer (RNFL) is not affected by LASIK, contrary to past studies. Previous studies have indicated reductions in the retinal nerve fibre layer following LASIK surgery when using the GDx Nerve Fibre Analyzer with fixed corneal compensation (FCC). The researchers compared RNFL thickness measurements in 20 LASIK patients and 14 normal controls. They measured RNFL thickness before LASIK and three months after surgery in one eye each of 20 patients using a scanning laser polarimeter (GDx Nerve Fibre Analyzer) with fixed corneal compensation, and in one eye with variable corneal compensation (GDx VCC), and optical coherence tomography (OCT). In both LASIK and control groups, there were no significant changes between baseline and follow-up examinations in GDx VCC and OCT RNFL thickness measurements. They did note significant reductions in LASIK patients when using the GDx FCC system. The researchers conclude that apparent reductions in RNFL after LASIK using that system were measurement artefacts, most likely due to erroneous compensation for corneal birefringence. They advise that with scanning laser polarimetry, it is mandatory to compensate individually for change in corneal birefringence after LASIK to ensure accurate RNFL assessment.

Ophthalmology, L. Zangwill et al., 'Scanning laser polarimetry retinal nerve fibre layer thickness measurements after LASIK', February 2005, Volume 112, Issue 2, pp 200-207

Quinolone comparison study versus endophthalmitis

Not all quinolones are equal, a news study by University of Utah investigators suggests. The researchers compared endophthalmitis rates between topical quinolone antibiotics among 9,079 cataract patients over a four-year period in a university setting. Approximately half of the patients received ciprofloxacin post-operatively, while half received ofloxacin. During the study period, 26 cases of bacterial postoperative endophthalmitis occurred, a rate of 0.286%. However, 22 of the patients with complicated endophthalmitis (85%) had received ciprofloxacin and only four patients (15%) had used topical ofloxacin. The difference in infectious rates between antibiotics was highly significant ($P < 0.00026$). For uncomplicated cases, 14 patients received ciprofloxacin and four patients received ofloxacin. This difference was also significant ($P < 0.015$). The researchers comment that differences in pharmacokinetic and pharmacodynamic properties exist among quinolone antibiotics, which may affect endophthalmitis incidence following cataract surgery.

AJO, MK Jensen et al., 'A retrospective study of endophthalmitis rates comparing quinolone antibiotics', January 2005, Vol. 139, Issue 1, pp. 141-148.

Brain sees fear in the eyes

The human brain is hard-wired to recognize fear, new imaging studies indicate. Paul Whalen MD and colleagues at the University of Wisconsin used functional magnetic resonance imaging to monitor the brain activity of volunteers who were shown a series of faces. Before each face appeared, an image of either wide eyes or smaller eyes from a happy expression appeared so rapidly that the volunteers weren't aware of it. Nonetheless, the activity in the volunteers' amygdala showed a response to the wide-eyed images.

Science, P. Whalen et al., "Human Amygdala Responsivity to Masked Fearful Eye Whites", Dec. 17, 2004, 306: 2061.