Welcome to Bausch and Lomb’s monthly research update.

With our background in clinical ophthalmic research, mainly of the anterior eye, Bausch and Lomb have asked us to produce an independent report of some of the interesting findings coming out of the research journals each month. As a busy practitioner, this should allow you to keep more up-to-date with cutting edge clinical research and allow you to locate the articles when you want to know more about a topic highlighted.

The following key clinical peer reviewed journals are reviewed in this update:

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Professor James Wolffsohn is Professor of Optometry, Deputy Dean of Life and Health Sciences at Aston University. James’ research and teaching interests mainly revolve around intraocular lenses, contact lenses, low vision and the measurement of accommodation. He has published over 100 peer reviewed academic papers, written books on Low Vision and Imaging and has given numerous international presentations. James is also a past President of the British Contact Lens Association.

After graduating with a 1st-class B.Sc. (Hons) degree in Optometry from UMIST in 2004, Amit successfully completed the College of Optometrist’s professional qualification examinations in 2005. Amit has worked as an Optometrist in several clinical capacities, including within the field of corneal refractive surgery. He has recently completed a Ph.D. at the University of Manchester researching optical quality in patients with Keratoconus. He is currently working with Prof. Wolffsohn in a post-doc position at Aston University.
Dryness in Soft Contact Lens Wearers

Young and colleagues investigated the demographics and wearing patterns of 226 soft contact lens (SCL) wearers with significant lens-related dryness symptoms, as defined by the contact lens dry eye questionnaire. The results revealed that almost one-quarter of symptomatic wearers showed no clinical signs of ocular dryness. The authors concluded that effective management of contact lens-related dryness requires a comprehensive range of clinical assessments and the use of a diverse range of management strategies.

*Optometry and Vision Science 89 1125-1132*

Comparing RGP and Soft Contact Lenses in the Management of Corneal Ectasia

This study compared soft silicone hydrogel KeraSoft IC (KIC) lenses (n=94 eyes) versus Rose-K rigid gas-permeable (RGP) lenses (n=77 eyes) in the optical management of non-surgical corneal ectasia. Although corneal staining was significantly worse for the Rose-K lens wearers (p<0.0001), no significant differences in contact lens-corrected acuity or lens wearing time were found between groups. The authors concluded that the KIC lens provided a successful alternative to Rose-K RGP lenses in the optical management of corneal ectasia.

*Contact Lens Anterior Eye 35 175-179*

Evaluation of the Oculus Keratograph

Best et al. investigated the validity and repeatability of corneal curvature and non-invasive tear break-up time (NITBUT) measurements made using the Oculus Keratograph (n=100 eyes). The results showed that the Keratograph device required a calibration off-set to show comparability to other instruments. Although the Keratograph’s current software detected early disruptions in the tear film, the NITBUT results were found to be significantly lower than conventional subjective assessment. Further improvements in the software are therefore required to enhance the value of the Keratograph’s measures in clinical practice.

*Contact Lens Anterior Eye 35 171-174*
Measuring Dynamic Visual Acuity

Quevedo et al. evaluated a novel, computer-assisted instrument (DinVA 3.0) for measuring dynamic visual acuity (DVA) in 33 healthy subjects. The authors investigated both construct validity and test-retest reliability. The results showed that the DinVA program provided valid results. Additionally, Bland-Altman plots revealed good test-retest reliability, however a small, insignificant learning effect was observed. In summary, the DinVA program appears to be a useful research tool for measuring DVA.

*Journal of Optometry* 5 131-138

Changes in Corneal Biomechanics in Patients with Keratoconus

Wolffsohn et al. used the Reichert Ocular Response Analyser (ORA) to measure corneal deformation profiles in keratoconic patients (n=37) and normal control subjects (n=37). The results showed that with increasing keratoconus severity, the speed of concave corneal deformation (past applanation) was faster. This finding demonstrates a substantial reduction in biomechanical strength with increasing disease severity. However, the ORA metrics evaluated only slightly improved the severity prediction and detection of keratoconus above traditional keratometry and pachymetry.

*Cornea* 31 849-854

Long-Term Effect of Scattering and Glistenings of Intraocular Lenses on Visual Function

Hayashi et al. investigated the long-term effect of surface light scattering and glistenings of hydrophobic acrylic, silicone, or polymethylmethacrylate (PMMA) intraocular lenses (IOLs) on visual function and optical aberrations (n=35 eyes). The light scattering intensity of the surface and internal matrix of the lens optic was measured using Scheimpflug photography. Higher-order aberrations (HOAs) were also measured with Hartmann-Shack aberrometry. The results showed that at >10 years after surgery, contrast sensitivity and ocular HOAs were comparable among eyes implanted with acrylic, silicone, and PMMA IOLs.

*American Journal of Ophthalmology* 154 240-251
Refractive surgery in patients with topographic superior corneal steepening

Kymionis et al. evaluated refractive surgery outcomes of patients with topographic superior corneal steepening. Twenty-two eyes were treated with PRK, and a further 7 eyes treated with LASIK. No intra- or postoperative complications were noted; specifically, no patients developed postoperative ectasia. The results revealed that corneal refractive surgery in these patients provided acceptable refractive and visual outcomes.

*Journal of Refractive Surgery 28* 462-467

Repeatability of the Sirius Imaging System and Agreement with the Pentacam HR

Nasser et al. evaluated the repeatability of corneal curvature, corneal thickness, and anterior chamber depth measurements obtained with the Sirius imaging system, and assessed their agreement with measurements made using the Pentacam HR device. Forty-five eyes from 45 patients were recruited. The results showed that the Sirius device showed good to excellent repeatability for all measured parameters. However, Bland-Altman analysis suggests that Sirius and Pentacam should not be used interchangeably.

*Journal of Refractive Surgery 28* 493-497

Penetrating Keratoplasty versus Deep Anterior Lamellar Keratoplasty

Sari et al. compared best-corrected visual acuity, contrast sensitivity (CS) and higher-order aberrations (HOAs) in keratoconic patients treated with either penetrating keratoplasty (PK) or deep anterior lamellar keratoplasty (DALK). One-hundred-and-seventy-four eyes of 140 patients were evaluated. Although no significant differences in HOAs and photopic CS were found between groups, mesopic CS was significantly higher in the DALK group. Nonetheless, DALK provides an alternative treatment option to PK for patients with moderate to advanced keratoconus.

*British Journal of Ophthalmology 96* 1063-1067
Keratometric Estimation of Corneal Power in Normal Eyes

Pinero et al. validated an algorithm to correct for errors in the keratometric estimation of corneal power (CP) in 92 healthy, normal eyes. The results showed that the imprecision in calculating CP using Scheimpflug photography (Pentacam), can be minimised by using a variable keratometric index which depends on the radius of the anterior corneal surface. However, the potential benefit of using this algorithm in IOL power calculations in order to optimise refractive outcomes still remains untested.

*Journal of Cataract and Refractive Surgery 38* 1333-1338

Effect of Corneal Aberrations on Intraocular Lens Power Calculations

Canovas et al. used ray-tracing to model the effect of including corneal aberration measurements in the prediction of the optimum intraocular lens (IOL) power for implantation in healthy normal eyes and post-LASIK eyes. In the normal eyes, incorporation of corneal aberrations did not impact on the prediction of IOL power. In the post-LASIK eyes, however, inclusion of corneal aberrations generated the most accurate predictions, primarily due to elevated magnitudes of corneal spherical aberration in these patients. These findings suggest that corneal aberrations should be included when determining the optimal IOL power for post-LASIK eyes.

*Journal of Cataract and Refractive Surgery 38* 1325-1332

Tear Osmolarity in Non-Sjogren and Sjogren Syndrome Dry Eye Patients

Szalai et al. evaluated tear osmolarity using the TearLab system (TearLab Corporation) in patients with non-Sjogren syndrome dry eye (NSSDE), Sjogren syndrome dry eye (SSDE) and in healthy normal subjects. The results showed that tear osmolarity differences could not distinguish between dry eye patients and healthy subjects. The authors concluded that the TearLab device should not be used in isolation, but should be combined with other dry eye tests.

*Cornea* 31 867 -871
Risk Factors for Microbial Keratitis in Daily Wear Contact Lens Users

Stapleton et al. compared 90 cases of microbial keratitis (MK) related to daily wear contact lens (CL) use, versus 1090 control subjects also using daily wear CLs. The results revealed that moderate and severe cases of MK were associated with contamination of CL storage cases (frequency of storage case replacement, hygiene, and solution type). Other causative factors included occasionally sleeping in CLs, smoking, and socioeconomic class. The authors concluded that disease burden may be considerably reduced by attention to modifiable risk factors related to CL storage case practices.

_Ophthalmology 119 (8)_

Most fascinating research article of the month...

Iribarren et al. investigated changes in crystalline lens power during refractive development in 1747 Singapore-Chinese children aged between 6 and 9 years, over a five year period. Children were classified into 5 refractive error groups: persistent hyperopia, emmetropising hyperopia, persistent emmetropia, newly developed myopia, or persistent myopia. The results revealed that newly developed myopes showed a significantly greater decrease in lens power than other refractive groups, which may be linked to rapid changes in axial length and refraction that occur around the onset of myopia.

“Changes in Lens Power in Singapore Chinese Children during Refractive Development”
_Investigative Ophthalmology and Visual Science 53 5124-5130_

Most intriguing journal title of the month...

“Comparison of measurements of time outdoors as a risk factor for myopia in young Singapore children”

Dharani et al. evaluated time spent outdoors as a possible risk factor for the development of myopia in 117 Singaporean children aged between 6-12 years. Measurements were recorded using diaries (filled in by the parents) and light-meter pendants, which were worn by the children. The results showed fair to poor agreement between the diaries entries and light meter readings. However, the authors postulated that both instruments could still prove valuable in measuring the risk of developing myopia.

_Eye 26 911-918_