For 3 years the International Congress of Corneal Cross Linking was hosted in Zurich, Switzerland by its founders, Theo Seiler, Hans Peter Iseli, and Michael Mrochen. Last year, the Congress was moved to Dresden, Germany, the home of Eberhard Spoerl, where corneal cross-linking (CXL) first began. The Congress was held on December 5-6, 2008, and as with the previous 3 years, this meeting had high scientific content with a full compliment of scientists and clinicians from around the world. This is the second year in which proceedings from this meeting are being published. An invitation to submit a manuscript was made to all attendees, and the best were selected among those submitted. In response to our invitation, authors sent 17 manuscripts for peer-review to be included in these special proceedings. However, due to limited space in the Journal of Refractive Surgery, only 7 of these articles were revised and accepted for publication herein, with one other being accepted for publication in another issue of the Journal.

The first to be included is from last year’s congress organizer, Eberhard Spoerl, who outlines the influence of high-dose cortisol on the biomechanics of the cornea. In this article, fresh porcine corneas are incubated in a culture medium of hydrocortisone for 7 days and then tested for their stress–strain relationship in comparison to a control. Although the hydrocortisone-treated corneas were slightly thicker, the stress values at 10% strain were significantly less, representing a weakening in the structural integrity of these corneas. The authors recommend that cortisol status be considered in patients who develop keratectasia.

In the second article by Schrier et al, the impact of riboflavin/ultraviolet A (UVA) CXL is examined beyond that of biomechanics, specifically with regard to its antimicrobial effect. The authors demonstrate effective cell death of in vitro cultures of Staphylococcus aureus, methicillin-resistant S aureus, and Pseudomonas aeruginosa when both riboflavin and UVA radiation are applied.

In the third article, Ehlers et al study the non-biomechanical effects of riboflavin/UVA collagen CXL on patients with corneal disease. Eleven patients with chronic corneal edema and 14 patients with non-healing corneal ulcers were radiated one or more times with both reduction in corneal thickness and improvement of vision in the former, and clear healing and surface restoration in at least half of those with non-healing ulcerations. Several of this latter group included both bacterial and parasitic infections, which were effectively treated with riboflavin/UVA exposure in vivo.

The fourth article by Kymionis et al considers the combined treatment of corneal CXL and topography-guided photorefractive keratectomy (PRK) for patients with progressive keratoconus, in lieu of a corneal graft. Fourteen eyes received topography-guided PRK followed immediately by riboflavin/UVA corneal CXL with follow-up ranging from 3 to 16 months. Postoperatively, the spherical equivalent refractive error and steepest keratometry were significantly reduced with an improvement in both uncorrected (UCVA) and best spectacle-corrected visual acuity (BSCVA).

In the fifth article, Kanellopoulos compares the outcomes of combined riboflavin/UVA corneal CXL and
topographic PRK for progressive keratoconus performed sequentially (CXL first with topographic PRK 6 months later) and simultaneously on the same day (with topographic-guided treatment followed immediately by riboflavin/UVA CXL). He examines 127 eyes in the first group and 198 in the second group with mean follow-up ranging from 2 to 5½ years. As with the previous article, Kanellopoulos found reduction of spherical equivalent refraction and keratometry as well as improvement in UCVA and BSCVA in both groups. However, same-day simultaneous topographic PRK and CXL was shown to be superior in each of these areas, with a greater reduction of postoperative corneal haze, so as to recommend it as the preferred method for combined treatment.

In the last two articles, complications of riboflavin/UVA corneal CXL are examined. The sixth article by Koppen et al presents four patients who developed inflammatory keratitis in the eye within the first few days of treatment that resulted in some level of long-term corneal scarring. These four eyes were among 117 eyes treated with CXL for progressive keratoconus with a maximum keratometry ranging from 50.00 to 60.00 diopters (D). Serious allergies were noted in two of the four patients, and none had a history of keratitis. In the seventh article, Raiskup et al examined long-term scarring and haze after collagen CXL in a cohort of 163 eyes treated for progressive keratoconus; 14 (8.6%) eyes had long-term corneal haze in the subepithelial or deeper stromal layers at 1-year follow-up. Although transient haze is usually noted during the first several months, it tends to resolve within the first 6 to 8 months. Preoperatively, those eyes in the haze group had steeper keratometry, thinner central pachymetry, and greater degrees of Vogt striae than the non-haze, control group. Postoperatively, BSCVA worsened in the haze group but improved in the non-haze, control group. The authors suggest that collagen CXL may be preferred among patients with moderate keratoconus <55.00 D, and that an appropriate informed consent should indicate the risk of haze and potential visual loss in more advanced cases.

These seven articles outline new concepts and ideas surrounding corneal collagen CXL. In contrast to the enhanced rigidity of CXL, structural weakening of corneal tissue can be induced by the effects of hydrocortisone. Not only does the riboflavin/UVA exposure enhance rigidity, it is also useful in promoting programmed cell death of infectious organisms and other cells, as well as compacting edematous and ulcerated corneal tissue. Its biomechanical benefits can be augmented with laser therapy to aid in the visual rehabilitation of the irregular shape of keratoconus. Finally, despite the great success and wide-spread adaptation of corneal CXL around the world, it is not without complication, and visually significant corneal haze can be found in keratoconic eyes with higher keratometry in the late postoperative period.

We the editors would like to thank the many reviewers who willingly participated in the expedited review process of these manuscripts for these Congress proceedings: Kátia Bottós, Barbara Fant, Farhad Hafezi, Hans Peter Iseli, Cosimo Mazzotta, Darlene Miller, Rajiv Mohan, Frederick Raiskup, Heather Sheardown, Steven E. Wilson, and Gregor Wollensak.

Finally, we would like to invite the readership to join us in participating in the Fifth International Congress of Corneal Cross-linking in Leipzig, Germany, on December 4-5, 2009. We anticipate a stimulating scientific and educational program. For further information, log on to www.cxl-congress-.org. The abstract deadline is September 30, 2009, for those who wish to submit free papers and participate. We hope to see you there.

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