

# The Science and Art of Corneal Collagen Crosslinking

Welcome to a very interesting issue of *CRST Europe* that concentrates on corneal collagen crosslinking (CXL). This procedure, which is principally used to make the cornea more rigid, promises to completely revolutionize the care of keratoconus patients and hopefully reduce the number of corneal transplants required in the future.

There is clearly a need for such an intervention, judging by the number of corneal transplants performed each year. Recent figures demonstrate a considerable increase, with the number of transplants performed in the United States rising from 59,271 in 2010 to 67,590 in 2011, according to the Eye Bank Association of America 2011 Statistical Report. The number of penetrating keratoplasties (PKPs) performed for keratoconus—yes, PKP, rather than anterior lamellar keratoplasty—went up from 4,731 in 2010 to 7,331 in 2011. The United States, unlike the rest of the world, does not have liberal access to CXL yet.

Despite its rapidly becoming commonplace, there are still many controversies related to CXL, as you will discover in this issue. For simple concepts such as epithelium on or off, there are proponents on both sides. As practitioners of CXL will attest, epithelial removal makes this a very painful procedure for many patients. Moreover, the removal of epithelium poses a risk to the cornea and produces phenomenal levels of inflammation within the cornea and the anterior chamber. Any maneuver that can reduce discomfort for patients is to be welcomed. We developed an epithelial disruption technique, a hybrid of epi-off and epi-on, in which the epithelium is pockmarked, allowing riboflavin to enter. Our results (yet to be published, but presented at several meeting venues) demonstrate an arrest in the progression of keratoconus along with the described demarcation line

and recovery within 48 hours.

Other controversies include whether to combine CXL with excimer laser or not, and if so, how? A. John Kanellopoulos, MD, describes the Athens Protocol, and Leopoldo Spadea, MD, describes his method using the iVis Technologies excimer laser. The goal of both approaches is to regularize the cornea to improve vision and to apply

CXL to prevent further ectasia and instability. This tactic is certainly worthwhile for patients who are contact lens-intolerant and rapidly heading toward a corneal transplant.

Should CXL be performed in children? Personally I see no issues, as there is no question that early-onset keratoconus increases the likelihood of requiring a corneal transplant. We have regularly performed CXL in children, and it has been gratifying to see the disease progress arrested. While the procedure can be beneficial for children, concerns regarding risks to the cornea are

valid, as discussed by Mahipal Sachdev, MD, and colleagues. To manage this risk, increased vigilance is recommended.

As a pair of articles by José Salgado-Borges, MD, PhD, FEBO, and Mirko R. Jankov II, MD, PhD, makes clear, CXL has the distinction of being efficacious against post-LASIK keratectasia as well as keratoconus. In either condition, these authors explain, CXL can delay or prevent the need for keratoplasty.

Finally, to all those who have contributed to the discovery and science of this revolutionary procedure, stand up and take a bow. Patients with keratoconus, as well as those in the future who will be identified and treated at a preclinical stage, will take a different course in terms of their visual prognosis thanks to you and your efforts! ■



Sheraz M. Daya, MD, FACP, FACS, FRCS(Ed), FRCOphth  
Chief Medical Editor