THE IOL OF THE FUTURE AND OTHER THOUGHTS

This issue's cover focus on the evolution of the capsulotomy calls attention to many of the historical advances that have taken place in capsulotomy creation. It also references some of the latest capsulotomy technologies to become available and those that are on the horizon. But what else does the future of ophthalmology hold?

Among the most promising current developments in ophthalmology that have the potential to change the clinical paradigm are research into the diagnosis and treatment of age-related macular degeneration, new techniques and technologies in lamellar and full-thickness corneal transplantation, and evolutions in cataract and refractive surgery. Work on stem cells and how they might be used both in ocular surface reconstruction and in macular degeneration and other degenerative retinal and optic nerve diseases holds real promise.

Each of these subjects is worthy of the colossal efforts of the clinical and laboratory researchers who are devoted to exploring and addressing these diseases. But, if I were granted a wish, as an anterior segment surgeon, I would want to see industry and clinical science converge within the next few years on development of the ideal and ultimate IOL. For a start, this IOL would more efficiently address emmetropia, astigmatism, and presbyopia—whether by multifocal optics, increased depth of focus, or even electronic means.

One can only imagine the possibilities of a miniature electronic device placed in the capsular bag. It might mimic the size of the normal crystalline lens, thus reducing all the effects of space-changing after cataract surgery, such as posterior vitreous detachment and peripheral retinal disease. It could facilitate dynamic adjustment of focus, magnification, contrast sensitivity, and even the polarity and/or wavelength of light entering the eye to reduce damage to the retina. It might process infrared light and let us see in the dark.

This device could be far more than a lens. It might monitor a number of biologic body metrics such as body temperature, blood glucose, and reproduction and metabolic hormones such as thyroxine and adrenaline, and easily relay these data to the patient and/or physician.

Further, this device might scrutinize most of the biological functions of the eye such as corneal clarity, assess light scattering in the vitreous cavity, measure IOP dynamically, and even image the retina in lieu of spectral-domain OCT. And why not incorporate a Brillouin spectrometer that could

measure elasticity of the retinal vessels and, thus, offer not only valuable prognostic information about the eye but also about the entire cardiovascular system. This tiny lens could become the cardiologist's best friend for monitoring in vivo the blood flow and elasticity of arterioles and in monitoring cholesterol, dietary exercise, and smoking habits.

We know that the capsular bag is an immune-privileged area, with significant interactions with the rest of the body. Introduction of allograft antigens in this hypothetical *super lens* could down-regulate through anterior–chamber-associated immune deviation the body's immune response to allergies and autoimmune disease and become an adjunct to transplantations and even cancer treatment. All these seeming science-fiction speculations—I promise I had no wine when I wrote this—could indeed become clinical reality. It may sound far-fetched, but why not set our sights high for what can be accomplished?

So, I take my hat off to all the visionary, talented, and hard-working contributors to ophthalmology and to our publication in particular. It is out of this kind of work that fantasies like the one described here could actually happen. ■

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