

## New Technologies for the Developing World

Brad H Feldman, MD

*Ophthalmologist, Wills Eye Hospital, Philadelphia, US*

### Abstract

Ophthalmic innovation is nearly always driven by wealthy nations, and poorer populations with higher rates of blindness are rarely the targets or recipients of such advances. A symposium at the 2014 American Academy of Ophthalmology's annual meeting addressed this mismatch of innovation and need by looking at the various approaches being taken to create solutions specifically aimed at the developing world.

### Keywords

Medical technology, innovation, developing world, ophthalmology

**Disclosure:** Brad H Feldman, MD, has no conflicts of interests to declare. No funding was received in the publication of this article.

**Open Access:** This article is published under the Creative Commons Attribution Noncommercial License, which permits any noncommercial use, distribution, adaptation, and reproduction provided the original author(s) and source are given appropriate credit.

**Received:** January 18, 2015 **Accepted:** January 22, 2015 **Citation:** *US Ophthalmic Review*, 2015;8(1):68–9 DOI: 10.17925/usor.2015.8.1.68

**Correspondence:** Brad H Feldman, MD, Wills Eye Hospital, 840 Walnut Street, Philadelphia, PA 19107, US. E: bradhfeldman@gmail.com

Technologic advances have transformed ophthalmology over the past several decades—from vastly improving cataract surgical outcomes to offering ever-expanding arsenals of drugs and devices to control glaucoma. However, nearly 90 % of the 285 million people suffering worldwide from severe vision loss or blindness are not benefiting from this progress because they live in the developing world where such advances are typically neither available nor affordable.<sup>1</sup> Eighty percent of those suffering in the developing world could be helped if medical innovation could reach them. But, the crux of the problem is this: with few exceptions, medical innovation occurs in and for the developed world rather than where it is needed most, in the developing world. This problem was the focus of a recent symposium at the American Academy of Ophthalmology's 2014 annual meeting.

This mismatch between the targets of medical innovation, wealthy populations, and the place of most pressing need for such innovation, lower-income populations, has to be addressed. Dr Ivo Kocur, of the World Health Organization (WHO), spoke first of the need of determining which existing technologies can be successfully adopted by the developing world. In pursuit of this answer, WHO has put together guidance to evaluate the suitability of medical devices, drugs, and diagnostics in lower-resource markets.<sup>2</sup> WHO has also created advice for best practices in the regulation and management of these technologies in order to make them more readily accessible.<sup>3</sup> Dr Kocur emphasized the need for governments to give priority to eye care so that resources can be properly allocated to allow appropriate and emerging technologies to be accessible.

Universities and biotechnology companies are often the incubators of innovation, and fortunately, both have shown interest in designing technologies for the developing world. Dr Matthew Glucksberg,

Northwestern Professor of Biomedical Engineering and Director of the Center for Innovation in Global Health Technologies, described how different infrastructure, disease prevalence, and social structure, in addition to the markedly different business environment of the developing world, require novel approaches to technology design and development. The process requires responsibility and accountability from a variety of stakeholders including the national Ministries of Health, non-governmental organizations (NGOs), hospitals, clinics, and international agencies. It is encouraging that centers across the US, such as Northwestern, are focused on creating solutions geared toward the problems and circumstances of the developing world.

Once a technology is developed, it is required to be tested to gauge if it achieves its anticipated impact, and this requires committed and unbiased research. Dr Nathan Congdon of Zhongshan Ophthalmic Center, Guangzhou, China, explained his evaluation of self-refractable glasses in children as a means to tackle the 12.8 million children worldwide who are visually impaired by refractive error, half of whom live in China. A major barrier to overcoming refractive error in China has been the lack of access to well-trained refractionists in rural areas. In his review of recent research, including his own, Dr Congdon reported that self-refractable glasses perform nearly as well as auto-refractors in achieving proper correction of spherical error, but that a major factor limiting their acceptability was the unstylish appearance of the adjustable lenses.<sup>4</sup> His recommendations and future studies will consider how children accept newer designs of these lenses, and how to create models for their dissemination and proper use.

The final question addressed in the symposium was the business model for producing and delivering affordable medical technologies. Sriram Ravilla

Duraisami, Managing Director of Aurolab, Madurai, India—well-known for its low-priced intraocular lenses (IOLs)—described how applying the principles of affordability for all and self-sustenance can create different incentives in pricing that allow for maximal societal benefit rather than for maximal corporate profit. With this approach, he explained how Aurolab has been able to expand their offerings beyond low-priced IOLs, to include pharmaceuticals, sutures, blades, cameras, and lasers, all while maintaining

the lowest price possible to keep developing the business. In fact, Aurolab now creates an entire kit of all consumables needed for cataract surgery for just \$12. Looking ahead to new innovations, Duraisami emphasized that affordability must always be part of the equation. With some of the outrageous prices at which drugs and devices hit the US market and how this affects our rising healthcare costs, this point applies not just to the developing world, but here at home as well. ■

1. Universal Eye Health: A Global Action Plan 2014–2019, WHO, 2013. Available at: [http://apps.who.int/iris/bitstream/10665/105937/1/9789241506564\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/105937/1/9789241506564_eng.pdf) (accessed January 23, 2015).
2. Medical Devices: Managing the Mismatch, WHO, 2010.

Available at: <http://apps.who.int/iris/handle/10665/44407> (accessed January 23, 2015).

3. Compendium of innovative health technologies for low-resource settings: assistive devices, eHealth solutions, medical devices. WHO, 2014. Available at: <http://apps.who.int/iris/>

[handle/10665/108781](http://apps.who.int/iris/handle/10665/108781) (accessed January 23, 2015).

4. Zhou Z, Kecman M, Chen T, et al., Spectacle design preferences among Chinese primary and secondary students and their parents: a qualitative and quantitative study, *PLoS One*, 2014;9:e88857.