BIG DATA, SMALL DATA

Big data is dominating the headlines and the lecture circuit at major meetings all around the world, and rightly so. At the American-European Congress of Ophthalmic Surgery (AECOS) Aspen meeting in February, I learned that, through big data, Steve Schallhorn, MD, calculated that patient satisfaction with multifocal IOLs was equal regardless of whether the patient's angle kappa was small or large. The data set of 814 patients was five times larger than the number of eyes previously published cumulatively. I also learned that surgically induced dry eye occurs just as frequently—if not more frequently—after cataract surgery and refractive lens exchange as it does after LASIK and that PRK causes more dry eye than LASIK.

The dry eye big-data exercise, based on 21,312 patients who completed patient-reported outcomes questionnaires preoperatively and at 3 months postoperatively, also showed that age did not influence the incidence of dry eye. How would we have known this, when smaller series have sometimes showed us different perspectives?

Big data certainly has value in medicine—big value, I dare say. Some projects are enormous, including sample sizes unheard of before, such as the National Institutes of Health's Precision Medicine Initiative, which is enrolling 1 million individuals, and the public database of Stanford Medicine's Radiology Informatics Lab, which has almost 4.5 million anonymous images in its repository. The latter is helping to develop machine learning that would allow computers to make diagnoses that rival those of top radiologists.

Big data can also be revealing in the consumer space. When choosing where to have dinner in a foreign city, for instance, I often consult Yelp or Trip Advisor—two well-known and well-respected resources to provide us with information that would otherwise be more difficult to obtain. Imagine my surprise when Shanahan's on the Green, a Dublin 5-star restaurant, was rated identical to the McDonalds on Grafton Street in Dublin. If you do the same exercise in a city that you are familiar with, you will be astounded: Sometimes big data does not tell *your* truth, but it will tell you *the crowd's* truth.

Multifocal IOLs work well: Big data says that more than 90% of patients are happy with these lenses and would recommend them to friends and family. How can we make that number 100%? Can big data help? Or is small data of more value—very small, as in a sample size of 1? Imagine the response from your patient to the following:

> "Mrs. Smith, I am so intent on choosing the right IOL for you that I am going to accompany you to work and spend time with you at home and out and about, watching how you interact with the visual world. By doing so, I will learn your preferred distance for reading and for the computer, be it laptop or desktop, and I will learn how much time you dedicate to these activities. If I can accompany you for 3 to 7 days (your choice), we will both be able to make a better-informed decision about which multifocal IOL or other refractive solution is going to suit you best."

Even if there was demand for this type of white-glove service, there would be no time for this ophthalmologist to see other patients. So how do we achieve this level of information and objective data, which would allow a better-informed choice of a refractive solution? Introducing Vivior,* the vision-behavior sensor, which patients can wear on their own glasses or in a frame with no lenses. Vivior measures working distance on an ongoing basis, ambient light conditions, the position of the patient's head, and more to provide more information than a surgeon would have from directly observing the patient over several days. Imagine the informed consent process with knowledge of the patient's personal defocus curve and temporal requirements and the ability to match this to big data defocus curves of different multifocal, trifocal, and extended depth of focus IOLs; of corneal inlays; and of various forms of monovision and blended vision. It would be a different discussion, with both the patient and surgeon made infinitely more aware of the patient's visual behavior. This could only enhance our ability to select the best refractive solution for each patient's personal preferences and habits.

So, what about that meal—Shanahan's or the burger place? Introducing TasteBudd,** an app for foodies that uses the same small-data approach. Would you trust a friend's recommendation more than TripAdvisor's? If so, download TasteBudd and never have a poor meal again. Time is too short to eat bad meals. Time is too short to spend chair time with dissatisfied patients who have been disappointed by their IOL or refractive solution.

Big data has big value, no doubt about it. But, for you and you alone, small data may have even greater value. ■

— Arthur B. Cummings, MB ChB, FCS(SA), MMed(Ophth), FRCS(Edin)
Associate Chief Medical Editor

* Dr. Cummings is a member of the medical advisory board for Vivior.
** TasteBudd is an app developed by Dr. Cummings' youngest son, Keagan Cummings.