

## Google Glass—Possibilities and Pitfalls in Eye Care

BY OMAR OZGUR, MD

**I**n December of last year, I became a Google Glass (GG) Explorer. This is the term that Google uses for people who buy the beta version of its wearable computer. After several months of using the device during my daily work routine, reading about its applications in medicine, and thinking about potential uses for it, I am excited about the possibilities.

### A Primer on Google Glass

**What is it?** GG is an eyeglass frame housing a computer, a built-in camera, and a mini-projector that can beam a translucent image into your eye. It fits just like a regular pair of glasses.

**What can it do?** Right out of the box, GG can do a number of tasks, such as taking pictures; recording video; searching the Web; and serving as a wireless communication headset, allowing hands-free audio and video communication. Much of the potential power of GG is in its computer interface. Just as apps enhance your smartphone, apps uploaded to your GG can give it new capabilities.

**How do you control it?** GG is controlled with head tilts and voice com-

mands; it also has a touchpad on the right side near the wearer's temple and a camera button on top.

**How do you get your own Google Glass?** GG is expected to go on sale to the public late this year. Until then, U.S. residents can apply to join the Google Glass Explorer program ([www.google.com/glass/start](http://www.google.com/glass/start)).

### Google Glass in Medicine

A news article in the *Canadian Medical Association Journal* outlines a number of uses for GG in medicine, including real-time surgical video streaming.<sup>1</sup>

**Sharing video in real time.** It strikes me that video streaming via GG could spur collaborative efforts in medicine. In addition to providing a surgeon's first-person view to others—including the scrub nurse, residents, and students—inside and outside the operating room, the GG user may be able to obtain second-party feedback. Consider one surgeon performing a procedure while another, across the country or across the globe, comments and coaches based on what's appearing in the operating surgeon's GG display. This could allow global health initiatives to reach new heights through remote education and mentoring.

In another example, streaming video to the pathology department could be beneficial by allowing the pathologist to view where the specimen comes



### GOOGLE GLASS IN PRACTICE.

Dr. Ozgur has used GG to document the eye exam, and he has attached a loupe, enabling it to be used during oculoplastic surgery.

**Got questions for Dr. Ozgur about his experience with GG?** Go to [www.eyenet.org](http://www.eyenet.org) and post your queries in the "Comments" section of this article.

from and what the gross in vivo tissue looks like. Potentially, a pathologist can view a photomicrograph from that specimen and project it back to the operating surgeon to point out features of the tissue intraoperatively.

**Preload images for reference.** Another intraoperative use for GG: A surgeon could preload images—let's say CT scans—onto the GG before a procedure and then refer to the images in the operating room.

**Review EHRs unobtrusively.** It seems to me that using GG to review

electronic health records during the patient encounter could be more efficient and less intrusive than it is currently with a desktop computer or a tablet. This use of GG is being put to the test during a pilot project at Beth Israel Deaconess Medical Center (BIDMC) in Boston. The emergency department has placed a QR code—which is a type of bar code—on the wall by each bed. When GG-equipped physicians look at that code, they have real-time access to a patient's clinical information, which they can view without looking away from the patient.

### My Experience in Ophthalmology

Over the last few months, I have used the GG camera to video several aspects of ophthalmic practice.

**Videoing the eye exam.** Ophthalmology exams are dynamic and often require the doctor to use both hands, but GG's unobtrusive hands-free camera and video recorder allow me to capture many stages of the exam.

**Videoing surgery.** GG also provides a convenient way to film minor procedures in the office or microsurgery in the operating room, where the sterile field necessitates a hands-free approach to filming by the eye surgeon.

**SmartLoupes.** I purchased clip-on surgical loupes to see how they would work with GG. They were a bit unstable at first, but the fit improved after I bought a Google "clear shield," which resembles clip-on sunglasses without the tinting. The fit was better yet when I tried them with an official prescription Google Glass frame. With my frames, I was even able to attach an additional surgical headlight. One drawback is that although the surgical loupes magnify my view, the GG camera does not look through the magnified lens. Furthermore, sometimes the bright surgical field gets bleached in the video recordings. Hopefully, later versions of GG will have camera capabilities allowing for magnification, as well as for contrast and brightness enhancement.

**Patient response.** So far, patients have reacted positively to my use of GG. They appreciate the fact that new

technologies are being used to help improve patient care.

### Future of GG in Ophthalmology


Currently, GG is available to a limited number of people. Once the consumer version of GG becomes available, its use—along with the number of GG apps—should grow quite rapidly.

### Future apps for ophthalmologists.

Some developers are hard at work creating apps that may specifically benefit ophthalmologists. Apps may provide tools to assist with certain parts of the ophthalmic exam.

**Education and evaluation.** GG can potentially make training more efficient and less disruptive. For example, my residency program requires each resident to periodically undergo Ophthalmic Clinical Evaluation Exercises (OCEX), in which an attending ophthalmologist observes while a resident performs a history and physical. Having an attending observe these patient encounters remotely with the help of GG—either in real time or after the fact—might be less disruptive to the natural patient-physician interaction. Indeed, reviewing my own videos has helped me to discover areas to improve on in my own patient encounters.

### Limitations and Pitfalls

**Camera limitations.** Currently, it is not possible to use GG's camera function through the ocular of a slit-lamp or through a direct or indirect ophthalmoscope. This is because the camera is located superior and lateral to the user's visual axis. Further, GG provides only a monocular view; it has no stereo capability yet. Also, GG battery life allows for only 30 to 45 minutes of video recording, or longer with less power-intensive applications. I've bypassed this by using a supplemental portable battery pack not officially endorsed by Google. Finally, for video recording, the current version of GG requires the user to manually override the default 10-second limit on recording by pressing the camera button or touchpad on the frame. For instance,  in the videos that accompany this article online, I physically

pressed the button to allow unlimited recording.

**HIPAA pitfalls.** Under the U.S. Health Insurance Portability and Accountability Act, physicians must safeguard the privacy of their patients' health information. Furthermore, physicians must ensure that business associates with access to that information also follow HIPAA rules. This can present a problem to GG users because GG streams its data through Google's servers. This includes videos and images captured with its camera as well as any information that the user provides to it.

**Privacy solutions.** At BIDMC, the hospital has been able to sidestep the HIPAA problem by developing a Web-based app for GG that keeps all the data within the BIDMC firewall, sending nothing to Google's servers. I took a different approach. I disconnected GG from the Internet at work. By not allowing it to connect to my work Wi-Fi, there is no way for it to upload photos to Google's servers. Instead, I keep data locally on the GG hard drive, which has about 12 GB of memory available to the user. Later, I can transfer the files locally to a secure, encrypted computer. Although this is not as convenient or seamless as the approach taken by BIDMC, it is free and therefore affordable on a resident's or fellow's salary. ■

1 Glauser W. *CMAJ*. 2013;185(16):1385.

*Dr. Ozgur is starting a two-year fellowship in orbital and reconstructive surgery and oncology at the University of Texas MD Anderson Cancer Center in Houston. Financial disclosure: None.*

## More at the Meeting

### Google Glass in the Practice of Ophthalmology

will be presented by Dr. Ozgur at this year's meeting in Chicago. **When:** Saturday, Oct. 18, 12:30-1:30 p.m. **Where:** Technology Theater (Booth 165). **Access:** Free.

