

# WIDE-ANGLE VIEWING FOR VITREORETINAL SURGERY

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*Prior to when Oculus developed the imaging system that became the Binocular Indirect Ophthalmic Microscope (BIOM), there was no noncontact wide-angle viewing system available for vitreoretinal surgery. At that time, contact lens systems were being used to achieve a wider field of view inside the eye for retina surgery. In the earlier period of this innovation, the contact lens was placed onto the eye by an assistant and sutured to the surface. The surgical contact lens was a significant advancement in retina surgery because it was the first technology to provide a wider interface.*

*The system that Oculus was developing, however, was a noncontact system that hung over the eye and provided a similar, if not better, view into the eye. This was a particularly exciting development because it relieved surgeons of the cumbersome suturing process of a contact lens system and they were able to see farther out into the retina than before.*

*The contact lens systems still exist and are still preferred by surgeons who trained using them or feel that they offer a better view for close macular work; however, noncontact technology accounts for approximately 95% of the market.*

*The wide-angle capabilities of the Oculus SDI/BIOM has allowed surgeons to use this technology to dissect membranes more safely and efficiently because of the view that it offers in the peripheral retina. In many complicated cases, such as patients who are diabetic, it is possible to peel a membrane off the retina in 1 area without realizing that the retina is being pulled elsewhere, which can cause a detachment. Having the ability to see how 1 surgical action affects the rest of the retina is important. A wide-angle view is also important when using laser because it can help the surgeon see more areas that require laser without scleral depression.*

*The following is a discussion moderated by David R. Chow, MD, FACS(C), with John W. Kitchens, MD, and Jorge A. Fortun, MD, that focuses on the latest developments in wide-angle viewing systems for modern vitreoretinal surgery.*

## CONTACT VS NONCONTACT VIEWING SYSTEMS

**David R. Chow, MD, FACS(C):** There has been an evolution in our viewing systems for vitreoretinal surgery over the last 20 years. In the past, vitreoretinal surgeons had only contact lenses for visualization, which did not offer a wide-angle view of the retina. Most fellowship programs in North America currently use wide-angle visualization technology, but interestingly, there are still a handful of programs that train fellows using contact lens-based viewing systems.

**Dr. Fortun,** is there any indication in 2013 for using a contact lens viewing system?

**Jorge A. Fortun, MD:** The only time I use a contact lens is when surgery requires high magnification. Other than this scenario, I use a noncontact wide-angle viewing system for most of my cases.

**Dr. Chow:** As recently as 15 years ago, the majority of wide-angle systems being used were contact lens based. The shift to noncontact wide-angle systems has been gradual but steady to the point where over that past 5 years, noncontact dominates the market. Roughly 70%

of all retina fellowship graduates in North America have been trained using noncontact wide-angle viewing systems. What are the advantages of noncontact vs contact?

**Dr. Fortun:** Contact wide-angle viewing systems require an assistant to stabilize the lens or at least manipulate the lens to achieve an optimal view, whereas noncontact systems do not require an assistant.

**John W. Kitchens, MD:** The argument that I hear from surgeons who are resistant to converting to noncontact is that they have good assistants who can hold the contact lens systems well and that the view is sharper. In my opinion, we are at a point now at which the resolution on the noncontact systems rivals the contact systems.

**Dr. Chow:** The higher resolution is a consistent argument that I hear also for contact lens-based systems. Dr. Fortun, do you agree that the noncontact technology provides a view comparable to contact lens-based systems?

**Dr. Fortun:** Yes. In the past, I think that the superior quality of the contact lens-based viewing systems was most evident in surgical video footage, but now, when

I am viewing videos taken using noncontact systems, I am impressed with the amazing quality, so I no longer see any advantage in regard to resolution with a contact lens viewing system.

**Dr. Chow:** Another argument that I have heard for contact lens systems is that they offer a wider field of view. What are your thoughts on this?

**Dr. Fortun:** My experience with the majority of these noncontact systems, particularly my recent experience using the SDI/BIOM 5 (Oculus; Figure 1) with the HD Disposable Lens (Oculus; Figure 2), has shown me that I can see everything that I need to under air. Adding chandelier illumination frees up my hands so I can use scleral depression to see even farther into the periphery of the retina. I am not limited at all with a noncontact viewing system. In fact, the BIOM has such a wide angle of view that I often do not need to sclera depress to see as far as needed.

**Dr. Chow:** Without a doubt, the older noncontact systems did have a limited field of view, but the newer machines are able to offer a wider angle.

I like to have the freedom to rotate the globe and use counter movement with the BIOM. The dynamic field of view with the noncontact SDI/BIOM 5 is comparable, or even better, in my opinion than that of contact systems, which are glued to the primary position. This stationary

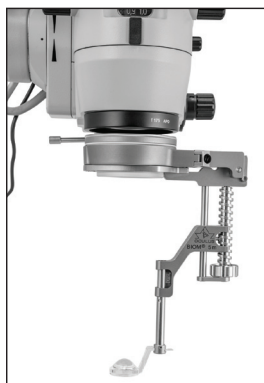


Figure 1. The BIOM 5 from Oculus.



Figure 2. The new Oculus BIOM HD Disposable Lens.

positioning of a contact lens system also requires the surgeon to rotate instrumentation around the sclerotomies, which many of us are not comfortable doing.

**Dr. Kitchens:** Being able to dynamically move the eye and perform scleral depression with the SDI/BIOM 5 makes vitrectomy easier because I don't lose the view of the surgical field at any step.

There is also greater depth perception with the BIOM HD Lens. With a contact lens system, it can be disorienting when you encounter the multiple sclerotomies and cannulas. I believe that this is the reason that there is not as steep a learning curve for noncontact systems as com-



I have been utilizing the Oculus BIOM HD lens for my vitrectomy cases during the past several years. It offers a superb view of the peripheral retina in a noncontact system. This is important because one can achieve good control of visualization without the requirement of an assistant.

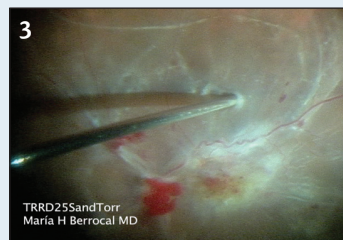
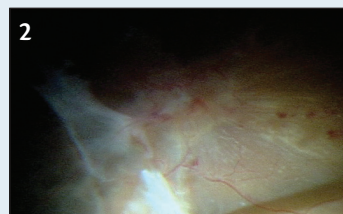
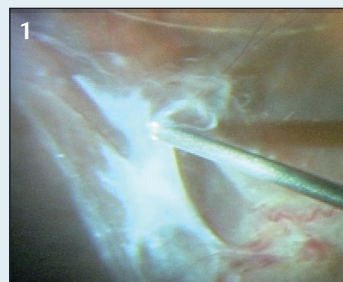
The HD lens allows me to see the far periphery up to the ora serrata and at the same time, it offers an excellent view of the posterior pole at high magnification. This allows for a superb view during vitrectomies for macular pathologies.

I have recently utilized the new Oculus BIOM HD Disposable Lens. The lens offers a very comparable view vis-à-vis the glass BIOM HD lens, with the advantage of not requiring resterilization. This prevents scratches on the surface and provides the surgeon with the crispest view during every case.

—Mariá H. Berrocal, MD, Assistant Professor, University of Puerto Rico School of Medicine, and Director of Berrocal and Associates in San Juan

Figure 1 shows the fine detail that the HD BIOM Lens offers of the small structures of the fovea and the posterior pole. Figure 2 demonstrates the wide angle of view with the lens. Figure 3 shows how the HD BIOM Lens allows Dr. Berrocal to distinguish the ischemic retina from the membranes on the surface.

To view a video of Dr. Berrocal performing 25-gauge traction rhegmatogenous retinal detachment surgery, scan the QR code, adjacent, or follow the shortened url.



pared with contact lens-based systems.

I also think the risk of epitheliopathy is lower with a noncontact system—I have had cases where the contact lens compromised the cornea.

## NONCONTACT VIEWING SYSTEMS

**Dr. Chow:** Which noncontact viewing systems have you used?

**Dr. Kitchens:** We have used everything. Currently we are using the BIOM 4m (mechanically focused) with the new HD Disposable Lens (Oculus).

**Dr. Chow:** Was this a conscious decision or just a buying decision by the ambulatory surgery center (ASC) in which you operate?

**Dr. Kitchens:** It was a buying decision; we have always used the BIOM.

**Dr. Chow:** The reason I ask this question is in regard to mechanical vs electronic focus. There are some noncontact viewing systems that I used in the past that had electronic focusing, and I found that these versions were not adequately precise in my hands. With the mechanical focus, I am able to titrate minute changes in focus. However, Oculus has been improved this on the new BIOM 5, and allows finer focusing on either manually or with the electronic foot pedal.

**Dr. Kitchens:** I agree. In my opinion, the automated systems undergo a certain degree of wear and tear and required more repair than a mechanical system.

An advantage to the BIOM is that once it is in focus, it stays in focus.

After I insert my lightpipe into the eye, I briefly focus the SDI/BIOM by zooming up to the nerve and getting the vessels there in crisp focus at a 30° field of view. I then zoom out and insert the cutter and start the case. The only time that I need to adjust the focus is for a phakic patient, for whom I will use air, and then I will dial the focus up slightly.

I have also used the OFFISS (Topcon Medical) and the Merlin (Volk Optical), and we recently bought the Lumera (Carl Zeiss Meditec) and the Resight (Carl Zeiss Meditec) for our satellite clinic; however, I have not used the Resight yet.

The OFFISS is big and bulky and requires dialing in a macular lens if I want to do noncontact macular work. Also, the focus is “fidgety.”

We experienced a large amount of quality control issues with the Merlin. For instance, there was too much play in the Merlin’s lens, causing the focus to be off center.

**Dr. Chow:** The Volk lenses are very sensitive to any type of movement, so you are right—if there is any play in the lens and its attachment to the body the system magnifies it. The lens itself is spectacular, but once it is slightly off center, there was a sense of distortion.

**Dr. Fortun:** We used the Resight for a brief time, and I liked the system. The downside to the Resight is that the lenses have to be flipped to achieve the full advantage between the 128 D and 60 D lenses.

I now only use the SDI/BIOM 5 with the Lumera microscope. The advantage to the SDI/BIOM 5 is that it achieves a wide-angle view with high magnification using the HD Disposable Lens. Any time there are fewer moving parts in any apparatus, it is an advantage.

One of the potential disadvantages to noncontact systems is the larger profile and the amount of space they require. The SDI/BIOM 5 was designed to be low profile so that it occupies less valuable operating space. I have no issues with my hands running into parts of the viewing system as I am manipulating around the eye.

**Dr. Kitchens:** I agree. The SDI/BIOM not only looks great, but it also has very robust functionality.

**Dr. Chow:** Dr. Fortun, you noted that you use the SDI/BIOM with a Lumera scope. Carl Zeiss Meditec markets the Resight with the Lumera as being the gold standard, but I think it is a great thing that Oculus offers surgeons an open platform with the SDI/BIOM so that we can choose which scope we want to use with it.

What has your experience been using the SDI/BIOM with the HD Disposable Lenses and the Lumera scope and why did you choose not to use the Resight?

**Dr. Fortun:** One of the reasons is that I am used to the SDI/BIOM—I used it in training. As I said, we did try using the Resight, but found no real advantage over the BIOM. The theoretical advantage is that the technologies are manufactured by the same company, resulting in fewer cumulative flaws. I have found, however, that utilizing the BIOM together with the Lumera microscope provides an excellent image quality. My staff has reported ease of use in attaching the BIOM to the Lumera.

**Dr. Kitchens:** If no cataract surgeons in a practice or ASC use the retina surgeons’ equipment, the optimal situation is to have the “best in class” for all technologies used. For example, in our ASC, we have a dedicated retina surgery room that is equipped with a Leica scope, a BIOM inverter, a SDI/BIOM 5, and the BIOM HD lenses, and I feel that we have the best of everything available to us. When I operate in an ASC that shares equipment

with cataract surgeons, I think the Lumera scope is a good option because it does not require that much adjustment between retina and cataract procedures. In general, I prefer not to have anyone making adjustments such as removing filters and inverters because over time, this degrades the optics.

**Dr. Chow:** The only caveat regarding mixing and matching technologies from different manufacturers is that one must be certain that the focal length of the viewing system matches that of the microscope. Oculus is very aware of this and considers focal length compatibility in its manufacturing process. The BIOM 5 reduces the need to refocus the microscope between viewing the retina and the limbus.

### BIOM HD DISPOSABLE LENS

**Dr. Chow:** I have had the chance to use the new BIOM HD Disposable Lens, and the view through this lens is spectacular—it has a real “wow” factor. Those who have used older technology lenses on the SDI/BIOM will definitely see a huge jump in performance with this new lens.

**Dr. Fortun:** I used the BIOM HD Disposable Lens for 5 cases and could immediately see my infusion line in the primary position even before I rotated the eye.

**Dr. Kitchens:** The depth perception that the BIOM HD Disposable Lens can achieve is excellent and allows me to zoom in and to see fine detail of the macula. For epiretinal membrane (ERM) and internal retinal membrane (ILM) peeling, I typically place a flat contact lens on the eye to peel ERM and ILM. On the first day that I used the SDI/BIOM 5 with the HD lens, I peeled 2 ERMs with no contact lens. Rather, I simply zoomed in with the SDI/BIOM and had a field of view wider than what I would have with a contact lens and with enough depth perception to ensure against iatrogenic injury to the retina.

**Dr. Chow:** Dr. Fortun, do you use a contact lens for macula work?

**Dr. Fortun:** I usually do. Although my experience with the SDI/BIOM 5 and the HD lens is limited, I have decided to make it my primary lens. I will continue to use a flat concave contact lens for unstained ILM peels, but I will use the HD lens for any cases of ERM or diabetic membrane.

**Dr. Chow:** I haven't used a macular contact lens in 5 or 6 years; however, I know I am in the minority. Probably only 5% of surgeons perform ERM and ILM peels with just a BIOM lens in place, but I believe that this new HD lens will provide surgeons the confidence to use it to work in the macular region.

What are some important considerations when choosing between a disposable vs a reusable lens?

**Dr. Kitchens:** Cost is an important consideration, and at our ASC we looked carefully at this. When I first started operating there about 1 year ago, they were using reusable lenses with the thinking that because they didn't need constant replacing, they were more cost effective. However, I was able to convince them to start using disposable lenses because the superior visualization that disposables offer makes them worth it in the long term because I was able to perform surgery with more precision and better outcomes.

There are also added costs associated with sterilization, and repeated trips through the autoclave can degrade the quality of the view through reusable lenses over time.

### THE FUTURE OF WIDE-ANGLE VIEWING IN RETINA

**Dr. Chow:** What's the future of noncontact wide-angle viewing for vitreoretinal surgery?

**Dr. Kitchens:** One of the things that these new lenses have shown us is that there is always room for improvement. I hope to continue to be wowed with newer technology with even more robust visualization. Although what we have with the new HD lens makes this hard to imagine, I honestly didn't think my view could get much better than with what I was using with the BIOM 4 SDI.

I think that the more immediate future will hold improvements in the viewing systems that we use so that they can catch up to the superior quality of the lenses.

**Dr. Fortun:** The new HD lens continues to push the envelope in terms of the quality of optics.

**Dr. Chow:** I agree. I also think that the next generation of advancement will be driven by the efforts to keep up with the most advanced technology that we now have available. ■

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