

## **Applications of Xenon and Slit Beam Illumination During Surgery**



**By Mark Packer, MD**  
*Eugene, OR / USA*

*Dr. Packer specializes in cataract, refractive and glaucoma surgery in the practice of Drs. Fine, Hoffmann & Packer in Eugene, Oregon. He also serves as a Clinical Assistant Professor of Ophthalmology at the Oregon*

*Health & Science University. His clinical research focuses on new technology, including intraocular lenses, corneal refractive surgery and glaucoma devices. He serves as Principal Investigator for multiple FDA monitored investigational studies and works as a consultant to numerous members of the ophthalmic industrial community.*

***Dr. Packer discussed the use of xenon and slit beam illumination in the Carl Zeiss OPMI® VISU 160. In his presentation he highlighted the xenon illumination as a real advantage, stating that it “provides a different view of the eye due to the changed color temperature.”***

***Dr. Packer explained that he likes the slit beam illumination, because of the increased depth and the very bright red reflex it provides. Dr. Packer also pointed out the depth of field management system feature, called DeepView.***



*A surgical microscope with the Superlux® Eye Xenon illumination*

The use of xenon and slit beam illumination in an operating microscope specifically for cataract and refractive lens surgery is something relatively new for me and my colleagues. We have been using the OPMI VISU 160 which provides that new illumination for a year but had some initial experience with it two years ago. I would like to report here about the advantages that I have found by using these new features for my daily surgery.

The microscope has several important features that I have found very useful. Beside the already mentioned xenon and slit beam illumination the depth of field management system, called DeepView is very useful. This allows you to switch from two options. Option one offers an increased depth of field and option two the highest possible light transmission. The first setting is very useful when working on the lens nucleus itself. This makes it possible to gauge the depth I'm working in, although it does reduce the illumination a little bit as the depth of field is increased. That's why I often turn off the DeepView function when doing the capsulorhexis and incisions to get the maximum illumination. While performing the chopping and nuclear removal I turn it on again. By doing so it is possible to make use of the different advantages the scope offers as we have a trade off between maximum light transmission and resolution on the one hand and optimized depth of field on the other. Utilizing these different options gives the surgeon more flexibility in the operating room to see what he's actually working on.

The xenon illumination of the microscope is a real advantage because it provides a different view of the eye due to the changed color temperature. The spectrum of a standard halogen illumination has a peak around 700 nm which is toward the red end, whereas the xenon light has a more diffused illumination spectrum which is broader and more toward the blue end of the spectrum. That causes a more natural look of the eye for the surgeon. Another interesting thing I've just realized recently: When operating with standard halogen illumination I used to get a lot

of patient complaints the first day after surgery of a pink or red glow that they would see. This afterimage is caused by the staring into the microscope light. But since switching to xenon illumination I realized suddenly that no one is mentioning that to me. Finally I had one patient complaining about a glow, but he didn't mention a red or pink but a yellow glow. That was something completely new to me which I had never heard of before. In my opinion this is caused by the different light spectrum of the xenon illumination. In conclusion the xenon illumination causes much less complaining about the afterimage.

One thing that I've become enamored of is the slit beam illumination. One of the reasons that I like this is the increased depth that you can get. It's almost like looking at the desert during at noon versus looking at sunset: During midday the desert just looks all white and blank but if the light changes to oblique illumination at sunset all of a sudden all the shapes and forms and colors come out. That's kind of what you get with the slit beam illumination. So the surgeon is actually able to utilize the red reflex and the slit beam to get increased depth and I think even better control of what he's doing. As I can always keep an eye on how far away I am from the posterior capsule the slit illumination even gives me a little bit of increased safety. And even more: If you know where the posterior capsule is and you know how far down most pieces extend that you're trying to bring up, you can grab those kind of in the middle rather than from the top. That gives me a little bit of added comfort in approaching the pieces and in addition an edge of efficiency as I can bring them out of the eye more quickly.

The other thing that slit beam illumination enables is the production of an incredible bright red reflex. As more and more presbyopia correcting IOLs and refractive lens surgery are demanded from the ophthalmologists we really want to make sure that the capsule is entirely cleaned, and no residual cortex is going to cause PCO. By using the slit beam it's very nicely possible

to remove cortex or posterior capsular plaques and thus to ensure that the capsule is polished and clean. So this illumination is really helpful in cleaning up everything in one operation to reduce patient complaints. But there is another situation where it's really nice to have that kind of illumination: If there is a complication where the capsule is broken and it's necessary to look for vitreous in the anterior chamber, even the finest strands of vitreous can be seen and removed either with a vitreous cutter or with scissors.

In summary I think that the xenon illumination gives the surgeon added flexibility in terms of optimizing transmission or depth of focus with the OPMI VISU 160. The transmission spectrum of the xenon light gives a more natural view of the eye during surgery and in my opinion also limits the kind of immediate postoperative complaints in terms of the afterimage. Also using the slit beam illumination gives us some advantages in terms of using the red reflex to see material in the eye in a new way and gives us a very nice tool to handle complications without changing the scope's configuration.

