Stellaris PC: Improved Illumination and Visualization for Retina Surgery

Improving the View for Small-gauge Vitrectomy
By Carl C. Awh, MD

Improving Surgeon Choice for Enhanced Visualization of the Retina
By Ramin Tadayoni, MD
Since the worldwide launch of the Stellaris PC (Bausch + Lomb, Aliso Viejo, CA), retina surgeons have had access to an advanced, elegant, state-of-the-art system focused on improving patient outcomes and safety. The Stellaris PC includes an ultra-high-speed vitreous cutter and a brighter and safer light source, in a dual-function (anterior and posterior segment surgery) compact system with a user-friendly interface.

IMPROVED ILLUMINATION

The Stellaris PC was launched with the essential elements needed by retinal surgeons to perform most cases.

Figure 1. The new Stellaris PC wide-field light pipe provides 115° illumination (A) compared to the 50° that is delivered by the standard light pipe (B).

Figure 2. An illustration of the expanded view of the retina that the wider angle of light allows.

Figure 3. A schematic of the Stellaris PC wide-field light pipe demonstrating the taper to the tip. The optimized fiber tip eliminates shadows and hot spots.

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The open architecture of the Stellaris PC allows surgeons to use disposable products from other manufacturers. Understandably, Bausch + Lomb has worked to expand its own portfolio of accessories for surgery, and recently introduced a wide-field light pipe for the Stellaris PC. The new wide-field light pipe for the Stellaris PC offers a 115º field of illumination compared with the standard focal light pipe, which illuminates a 50º field (Figures 1 and 2).

The Stellaris PC wide-field light pipe has an optimized fiber tip (Figure 3) that eliminates shadows and “hot spots.” The beveled sheath on the tip (Figure 4) blocks glare. The light pipe is available in 25, 23, and 20 gauge (Figure 5).

A wide-field light source allows a significantly better view of the peripheral retina, for procedures like retinal detachment repair, panretinal photocoagulation, or any procedure where a panoramic view of the entire retina is useful. Figure 6 shows a macular hole case in which I performed a fluid-air exchange. The illumination is diffuse and uniform and the beveled sheath prevents glare. In Figure 7, I have rotated the light pipe to expose the light fiber in order to demonstrate the glare that would be present without the beveled sheath.

OPTIMIZED SAFETY

A diffusion light pipe is less potentially phototoxic than a comparably powered focal light pipe. Phototoxicity risk is related to irradiance, or the amount of light per area of retina illuminated, so by spreading the light over a wider area, the potential toxicity is reduced. Additionally, the tip of the Stellaris PC wide-angle light pipe is tapered to reduce thermal output.

The wide-angle light pipe connects to the Stellaris PC Illumination module, which offers two lamp types (mercury-xenon and xenon) and three tissue-differentiating color filters. I typically use the mercury-xenon light source for my light pipe. When I use the xenon source I typically use the green or yellow color filter.

Finally, for conventional 20-gauge cases, the beveled tip is easier to insert through a sclerotomy.

SUMMARY

I operate bimanually for more complex cases, and in these cases I prefer to use chandelier illumination. However, for cases that do not require bimanual technique, such as a simple diabetic vitreous hemorrhage, I employ the new wide-field light pipe with the Stellaris PC because it provides a far better view of the entire retina than a standard light pipe. Although wide-field illumination is nothing new to retinal surgeons, Bausch and Lomb has made useful incremental improvements to this essential addition to the portfolio of accessories for Stellaris PC.

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Visualization is of the utmost importance in retina surgery and has posed a challenge for quite some time. As retina surgeons, we cannot fall prey to the old adage, “out of sight, out of mind,” as we are well aware that many of what we cannot see remains important to the overall success in the procedures that we perform.

Visualization depends on three key factors that interact with one another: (1) the optics of the microscopes and lenses we use in surgery; (2) the object itself (often enhanced with visualization agents); and (3) the incoming light source.

**MICROSCOPES AND LENSES**

The quality of the microscopes that we use, including the resolution of the optics and the reduction of light loss, has a significant effect on what we are able to see in the posterior segment. Higher resolution allows us to view the fine details to perform the most delicate procedures. Just as a better lens in photography does not rely on an exterior flash, the better optical system in a microscope for retinal surgery has reduced illumination. The optimal optical system should have a wide-field lens and a wide-field light source.

The goal of illumination is to enhance tissue illumination while maintaining safety.

**VISUALIZATION AGENTS**

Over the years, there have been major improvements in the dyes and visualization agents that we use to highlight the internal limiting membrane, epiretinal membrane, and the vitreous in highly myopic eyes, both in terms of how these agents interact with light and reduced toxicity.1,2

**ILLUMINATION**

Lighting for small-gauge surgery was previously inadequate because the halogen lighting reduced for the instruments was inadequate. Xenon and mercury light sources, both available on the Stellaris PC (Bausch + Lomb, Aliso Viejo, CA), have solved this concern with brighter light. Xenon lighting produces a bright white light with a primary cut off filter of 435 nm (Figure 1) and mercury vapor lighting offers a bright light that is safer for prolonged procedures (Figure 2). The angle of
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small-gauge illumination has also been improved with the wide-field light pipe that is now available on the Stellaris PC.

COLOR FILTERS

Safety is also enhanced by the available color filters on the Stellaris PC: amber, green, and yellow. Figure 3 shows the safety levels of the xenon light filtered through green, yellow, and amber. The surgeon can choose the color of filter based on his or her needs.

The green filter is absorbed by red pigment and provides a darker view of the fundus, which may be better for seeing contrast in the vitreous (Figure 4), and is considered the best filter for peeling membranes. The yellow filter is absorbed less by xanthophyll pigment in the macula and provides a warm color when used with blue dye (Figure 5). The amber filter is considered the safest for the unstained eye (Figure 6A) and is absorbed by blue dye (Figure 6B). Amber is considered the best filter for viewing peripheral vitreous.

SUMMARY

In summary, better visualization of the retina can be achieved with better optical systems, dyes, and
improved light sources. The Stellaris PC offers two safe and powerful illumination sources with xenon and mercury vapor light and a choice of illumination profiles with the color filters.

The goal of illumination is to enhance tissue illumination while maintaining safety. The Stellaris PC offers the retina surgeon a wide array of choices in visualization for optimized surgical outcomes.

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Figure 6. The amber filter is considered the safest for the unstained eye (A) and is absorbed by blue dye (B). Amber is considered the best filter for viewing peripheral vitreous.

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