

Two Lasers for Refractive Surgery

Faster treatment times promote success.

BY STEPHEN G. SLADE, MD

The most recently released lasers for refractive surgery in the United States are the WaveLight FS200 and the WaveLight EX500 (both from Alcon Laboratories, Inc.). Together, they have dramatically increased the speed of refractive surgery.

FEMTOSECOND LASER

I have had the FS200 in my clinic for nearly 2 years. My short list of qualities for the ideal femtosecond laser is as follows:

- fast treatment times
- reliable suction
- management of the opaque bubble layer
- adjustability and ability to create angled flaps
- clear visualization and comfortable ergonomics
- user-friendly design
- versatility in terms of other treatment modalities

The FS200 addresses all of these criteria well. Perhaps its most gratifying feature is its speed: at 200,000 shots per second, it is the fastest laser available in the United States. This speed translates to faster treatment times, less chance of breaks in suction, improved comfort for patients, lower energy levels, and smoother stromal beds.

My standard flap takes about 6 seconds to create. The suction and patient interface are both reliable and easy to use. The platform uses an automated vacuum control rather than a syringe to provide consistent suction. The laser intelligently adjusts for any variation in the patient interfaces and compensates for shifts in temperature. In my experience, the opaque bubble layer is minimal, due to the finely tunable line spot and energy levels.

The laser offers a wide range of choices for the LASIK flap—round or elliptical, various positions for the hinge, and different angles for the edge. I have found all of these options to produce smooth beds and precise flap edges. The versatility of the laser allows its use for sub-Bowman keratomileusis; the creation of channels for the placement of intracorneal ring segments; and a full variety of lamellar, perforating, and penetrating keratoplasties.

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EXCIMER LASER

When the company launched the 200-Hz laser in 1999, it was the fastest unit available, as was the 400-Hz laser (WaveLight Allegretto Eye-Q) upon its release. Today, no laser in the United States matches the treatment times of the EX500 at 1.9 seconds for each diopter of a 6.5-mm treatment, my preferred diameter. A 6-mm treatment only takes 1.4 seconds. The eye tracker is equally quick, synchronized at 500 Hz with a 2-millisecond latency timing.

At our clinic, my colleagues and I are treating more and more baby boomer patients to “touch up” premium IOLs, and they especially appreciate a fast treatment. Of course, for all patients, the speedy ablation reduces stromal hydration and leads to less shrinkage of the flap as well as better fixation by and less fatigue for the patient. I should emphasize that it is a safe speed; proprietary technology maintains the high pulse frequency while minimizing the thermal load by monitoring and controlling the placement and overlap of treatment spots.

The EX500 has the same ablation profile as the Eye-Q. The standard ablation profile for both platforms is wave-front optimized, which is what we use for a majority of our primary procedures. There are several more options in the pipeline—many already available in Europe—including topographically based ablations, asphericity-guided ablations, and ray tracing.

On the EX500 platform, the Topolyzer Vario gives more than just topographic data. It also provides information on the pupil and pupil centroid shift for all pupillary sizes measured during the examination. Additionally, data are obtained from the iris and limbus to aid the cyclorotational tracker in actively and passively ensuring that the ablation is delivered to the intended location. The Oculyzer II, also known as the Pentacam HD (Oculus Optikgeräte GmbH), provides more high-definition data than the previous Oculyzer. The software, graphical user interface, and general usability have all been improved as well. In addition, the laser has several new, unique features:

- Online optical pachymetry increases patients' safety, because the surgeon immediately knows the flap's thickness and residual corneal thickness prior to starting the ablation using the no-touch technique for pachymetry.
- On the heads-up display in the microscope, the right ocular contains the patient's name, date of birth, eye to be treated, ablation profile to be used, strength of the eye-tracker signal, and progression of the ablation as a percentage.
- The microscope is cataract surgery quality and can be programmed to automatically zoom in or out at different stages of the procedure.
- The new eye tracker will ultimately engage six dimensions, namely x and y, passive and active cyclorotation, tilt (eye roll), and dynamic pupil centroid shift.
- Hardware advances include a sealed, nitrogen-flushed beam pathway supplied by an onboard nitrogen generator and a laser head designed for a longer life expectancy and fewer service calls.

CONCLUSION

The final benefit that I would like to discuss is that the FS200 and EX500 lasers compose a suite. They communicate, fit together, and are

styled alike. To my mind, this is the best configuration for taking advantage of future advances as well as the most practical system. I find that, together, the lasers impress my patients, who can see that the technology I use is state of the art. ■

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