# Femtosecond Laser Features: My Rankings

Before acquiring a new cataract surgery laser system, identify your top priorities, and get real-world feedback from other users.

**BY CARY M. SILVERMAN, MD, MBA**

In our busy surgery center, my colleagues and I perform more than 200 laser cataract procedures each month. There is no doubt in my mind that laser cataract surgery has been a great addition to our practice, both clinically and financially. Getting more than 20 partners in the surgery center to agree on a laser platform was a major challenge, however—so great that we ended up with two, the Catalys Precision Laser System (Abbott Medical Optics) and the LenSx Laser (Alcon). This flexibility is a luxury that smaller centers or practices might not be able to afford.

Every laser platform has pros and cons, and frankly, the array of features and supposed advantages of competing products can be bewildering. When trying to make my own decision, I found it helpful to rank systems' features in order of importance. Your rankings may differ from mine. The point is to figure out what you want. Then, I strongly recommend visiting experienced users to see the lasers in action and asking hard questions about your highest-ranked features. When one system excels (or fails) in a key area, it can instantly bring clarity to an otherwise confusing decision.

I realized early on that what I cared about most were

- A laser's ability to significantly presoften the lens so that phaco time and power could be reduced
- Capsulotomies that were consistently superior to manually created ones

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I did not really care how well a laser could make the primary cataract incision, so this was a low priority for me. Other features fell somewhere in between.

## LENS SOFTENING

I think it is important to explore how well a laser softens the nucleus, especially in eyes with dense cataracts. All of the available systems provide some benefit, but if I am going to invest in an expensive new tool, I think there ought to be an appreciable difference from manual cataract surgery. Moving toward zero phaco is likely to have the biggest impact on my outcomes.

I use the Catalys for more than 90% of my laser cataract procedures because of the system's ability to

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fragment and soften the lens. This platform allows users to segment the nucleus into four (my preference), six, or eight pieces and to soften the nucleus in a cubic or waffle pattern with varying grid spacing depending on nuclear density.

I have preset parameters for dense nuclei (350-µm grid), average nuclei (500-µm grid), and refractive lensectomy with a very soft lens (segmenting into quadrants without softening). In my hands, presoftening with this laser makes complex cases involving hard cataracts much more routine and often allows me simply to aspirate soft nuclei with no phaco power at all.

My experience is reflected in the literature. For example, Abell and colleagues reported a reduction in mean effective phaco time of 83.6% to 96.2% with the Catalys.[1] Dick and Schultz reported that their use of phacoemulsification has dropped steadily, as settings and instrumentation have evolved, to zero in 91% of their last 200 cases.[2]

## CAPSULOTOMIES

A selling point of femtosecond lasers is that they create consistently shaped and sized capsulotomies[3] that have the potential to facilitate IOL centration, decrease stress on ocular structures, and reduce the risk of radial tears. At first glance, capsulotomies created by any of the lasers look beautifully round and symmetrical. Nevertheless, it is worth asking experienced users about their actual rates of tags, partial capsulotomies, and radial tears.

I have found the Catalys laser to perform very well in this area. After hundreds of cases, I have not had any radial tears and only two incomplete capsulotomies; the latter were early cases in which I inadvertently took my foot off the pedal during the capsulotomy. My experience may reflect, in part, the speed with which this laser creates the capsulotomy. In just 1.5 seconds, there is little opportunity for patients to move or for anything else to interfere with the capsulotomy.

## OTHER HIGH-PRIORITY FEATURES

To my list of high priorities, I would add arcuate incisions, because they are the source of surgeons' reimbursement for the use of the laser in most cases. In my experience, the arcuate incisions created by the Catalys and LenSx are of high quality. I prefer intrastromal arcuate incisions. I create intrastromal cuts at 8.5 mm with 20% of both the anterior and posterior cornea left intact. I use the Donnenfeld nomogram for arc length, although I make the arcs at an optical zone of 8.5 mm instead of 9 mm.

Another priority for me, although one of which I was unaware when choosing a system, is the impact of laser energy on the intraoperative pupil. At our center, patients undergo the laser portion of the cataract procedure first. They are then moved to a preoperative area before going to the OR for the phacoemulsification and cataract extraction. Too much dispersed laser energy can cause miosis, making cataract surgery more difficult and wreaking havoc with the schedule. I do not encounter miosis when operating with the Catalys.

## SECONDARY CONSIDERATIONS

Secondary considerations include the user interface, ergonomics, docking, imaging, automation, and treatment speed.

I find the Catalys system's touch screen to be intuitive and easy to navigate. I like that I can do everything while in a comfortable seated position. I also like the touch navigation feature as opposed to a roller ball and buttons off screen. The platform's fixed bed is a slight disadvantage. Although it accommodates most patients, others occasionally do not fit easily under the laser such as large, barrel-chested men.

I find docking is quickly accomplished with no discomfort to the patient. More importantly, I prefer a liquid interface, because it does not compress the cornea; what I see on the screen is a high-quality image without distortion or artifact. I also find docking the liquid interface easier and faster than docking the laser directly to the eye.

Many surgeons disagree on the degree of automation they want from a laser system. The Catalys automatically sets the "gates" or the anterior and posterior limits of the cornea, the anterior capsule, and the lens. These structures are all identified with an overlay on the optical coherence tomography image (Figure). Some of my partners prefer to set these gates manually, but I would argue that clicking and dragging each one manually increases the potential for error. I can evaluate the accuracy of the automated gates as well as if I had placed them myself, and I can adjust them if needed (less than 5% of my cases).

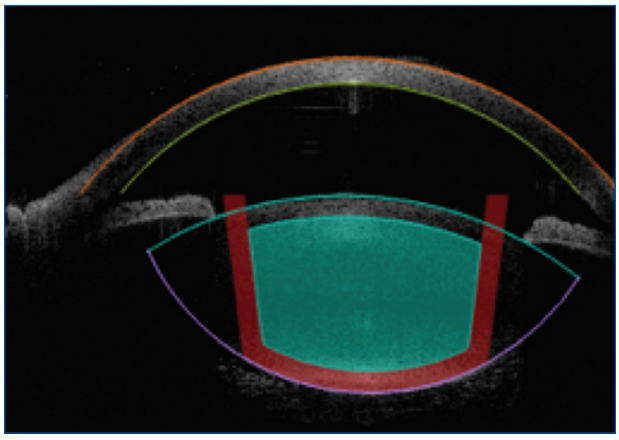

**Figure. The Catalys Precision Laser System automatically sets the limits for the cornea, anterior chamber, and lens. It identifies those in an overlay on the optical coherence tomography image, which the author finds facilitates evaluating accuracy and making adjustments, if needed.**

Treatment time is a misleading point of comparison among the different lasers. Rather than compare the "pedal down" time, I think it is more useful to assess the total treatment time in the room, because differences in docking and setup can negate an otherwise faster laser speed. In any case, speed, which amounts to a few seconds between lasers, is less important to me than clinical performance.

Finally, I recommend asking experienced users if they have had complications and, if so, whether they were able to review the case and identify what went wrong and why.

## CONCLUSION

There are very real differences among the available laser platforms, but only some of them have great clinical relevance. I recommend determining which features are of highest importance to you and focusing on them when evaluating the systems. Technological advances will continue to improve the platforms. ■

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1. Dick HB, Schultz T. On the way to zero phaco. *J Cataract Refract Surg*. 2013;39(9):1442-1444.
2. Abell RG, Kerr NM, Vote BJ. Toward zero effective phacoemulsification time using femtosecond laser pretreatment. *Ophthalmology*. 2013;120(5):942-948.
3. Friedman NJ, Palanker DV, Schuele G, et al. Femtosecond laser capsulotomy. *J Cataract Refract Surg*. 2011;37(7):1189-1198.