

## GLAUCOMA

# SLT or Drops? Take Your Pick

BY MIRIAM KARMEL, CONTRIBUTING WRITER

INTERVIEWING L. JAY KATZ, MD, MARK A. LATINA, MD, SIMON K. LAW, MD, SHAN C. LIN, MD,  
AND MILDRED M. G. OLIVIER, MD

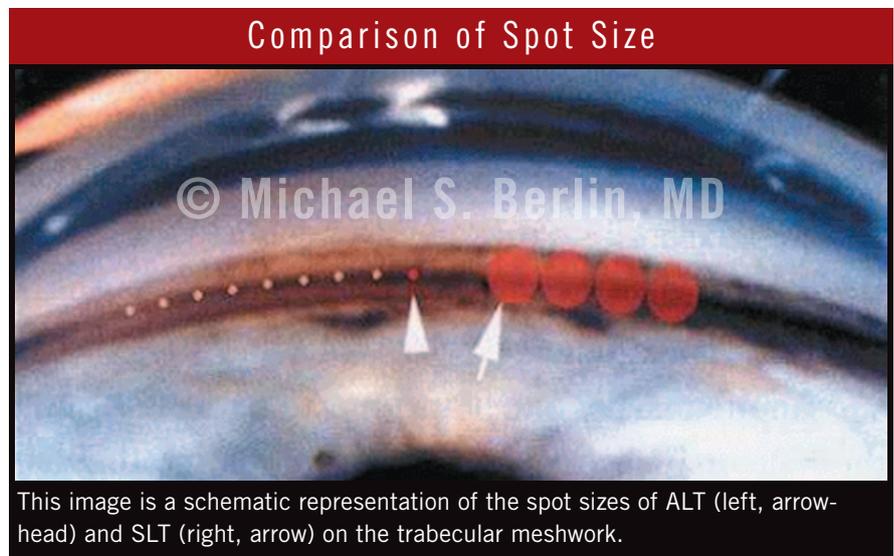
**M**ildred M. G. Olivier, MD, remembers how glaucoma specialists were slow to abandon beta blockers in favor of prostaglandin analogues, when they were first approved in 2001. “Then they got used to prostaglandins,” said Dr. Olivier, founder and president of Chicago’s Midwest Glaucoma Center.

In 2002, Mark A. Latina, MD, inventor of selective laser trabeculoplasty (SLT), predicted that it “has the potential to evolve as an ideal first-line treatment in open-angle glaucoma.”<sup>1</sup> Indeed, numerous studies have found SLT roughly equivalent in safety and efficacy to medication with one drug. These same studies report that SLT has few side effects, eliminates many compliance issues and saves money.

But even though SLT, like the prostaglandin analogues, has been FDA approved for about 10 years, eyedrops remain the most common initial treatment for open-angle glaucoma.<sup>2</sup> Why?

**Old habits die hard.** “We’re comfortable with medical therapy,” said L. Jay Katz, MD, director of the glaucoma service at Wills Eye Institute in Philadelphia. “Doctors are conservative. They’re happy to try medications first. Then, if that doesn’t work, they try laser.”

Dr. Latina, associate clinical professor of ophthalmology at Tufts University in Boston, agreed. “We’re used to giving medication. We think patients’ perception is that they should be get-



ting a medication. It’s just a matter of our habit.” He added that physicians may feel they need to know a patient better before suggesting surgery. Yet patients ask for LASIK all the time, he said. “Patients now are very comfortable with laser.”

But Shan C. Lin, MD, professor of clinical ophthalmology at University of California, San Francisco, said that laser may appear more daunting than an eyedrop. “If you say ‘laser,’ it sounds like surgery. That’s a significant barrier.” Besides, Dr. Lin added, “Quite honestly, prostaglandins are effective, arguably more so [than laser].”

### Data on Laser Effectiveness

The effectiveness of prostaglandin analogues as a first-line treatment is widely accepted. What do the data say about lasers?

**Glaucoma Laser Trial.** More than 20 years ago, the Glaucoma Laser Trial (GLT) found that argon laser trabeculoplasty (ALT) was as effective as medication for treating newly diagnosed OAG.<sup>3</sup> Dr. Katz, who had participated in the GLT, noted that its study design had drawn some criticism. Nevertheless, he said, “The basic message [of the GLT] was sound—that lasers are a reasonable first-line option.” According to the Academy’s recent *Ophthalmic Technology Assessment* on laser trabeculoplasty, ALT remains an acceptable treatment and demonstrates similar efficacy to SLT.<sup>4</sup>

**SLT efficacy.** A number of studies have looked at the efficacy of SLT since its introduction. Although the data on SLT’s effectiveness vary by study, Dr. Lin, who coauthored the Academy’s assessment, was comfortable saying that

SLT is effective around 80 percent of the time and that it lowers IOP by 20 to 25 percent.

**Comparable results between SLT and drops.** Dr. Katz was the lead author on the recently published SLT/MED study, a prospective, randomized trial that found similar efficacy between SLT and eyedrops as initial therapy.<sup>5</sup> Sixty-nine patients (127 eyes) with OAG or ocular hypertension were randomized to SLT or prostaglandin analogue treatment. At the one-year final follow-up, mean IOP was 18.2 mmHg in the SLT group (6.3 mmHg reduction) and 17.7 mmHg in the medication group (7 mmHg reduction). By one year, 11 percent of the SLT eyes received additional laser, while 27 percent of the prostaglandin group required additional medication. There were no statistically significant differences between the treatment groups. Dr. Katz said, “Simply put, SLT stacks up pretty well against prostaglandin analogue use for up to one year, which is the longest follow-up we have.”

**Duration of laser effect.** Laser treatment effect, though, is often not long lasting. The GLT found that, at five years, 32 percent of eyes treated with ALT were still controlled with no additional IOP-lowering interventions.<sup>3</sup> Smaller studies suggest that SLT wears off over time as well. However, Dr. Latina said that, in his experience, success rates have been as high as 50 to 60 percent at five years.

If the effect wears off, some theorize that because SLT appears not to cause any histological damage (see “How Does SLT Work?”), treatment may be repeated, which is relatively contraindicated with ALT. But with only 10 years’ experience, the data are sparse, although a retrospective chart review study found that a second SLT procedure was safe and effective.<sup>6</sup>

### Other Factors to Consider

**The cost equation: laser versus drops.** The handful of analyses that compared laser and medication favor laser as being more cost-effective. Because costs for laser treatment are incurred early,

## How Does SLT Work?

SLT was designed as a kinder, gentler alternative to ALT. Dr. Latina, SLT’s inventor, said he was seeking a way to reduce IOP without photocoagulating the trabecular meshwork (TM). “There’s no histological thermal damage with SLT,” said Dr. Latina.

SLT delivers short bursts of low-fluence laser energy to selected melanin-containing cells in the TM, causing intracellular targeting of the pigmented TM cells without damage to adjacent nonpigmented cells or structures. The fluence level is several thousand times less than that of ALT, and the pulse duration is much shorter.

Trabeculoplasty, the application of laser in a repetitive fashion to the TM, was first reported to treat glaucoma in 1972. Even now, 40 years later, trabeculoplasty’s mechanism of action remains uncertain. Originally, it was presumed to lower IOP by puncturing holes through the TM to facilitate outflow. Today, this mechanical theory has been replaced by one favoring a complex cellular and biomechanical cascade.

This latter concept proposes that laser energy recruits macrophages to the TM by increasing the expression of biological cytokines and cellular mediator activities. Macrophages remove obstructive proteins and remodel the TM, thus improving aqueous humor outflow to reduce IOP.<sup>1</sup> The Academy’s *Ophthalmic Technology Assessment* noted that these biological changes may take four to six weeks to occur.<sup>2</sup>

1 Stein JD, Challa P. *Curr Opin Ophthalmol*. 2007;18(2):140-145.

2 Samples JR et al. *Ophthalmology*. 2011;118(11):2296-2302.

while those for medication accumulate over time, the duration of a study influences the assessment of cost-effectiveness.

A Canadian team found the six-year cumulative cost savings from SLT over one-, two- and three-drug therapy to treat OAG in patients 65 years and older were (in Canadian dollars) \$581, \$2,043 and \$3,367, respectively.<sup>7</sup>

In a U.S. cost study, laser trabeculoplasty prevailed in a comparison of medication, laser (adjunctive after two medications failed) and filtering surgery. Over five years, the costs, respectively, were \$6,571, \$4,838 and \$6,363.<sup>8</sup>

**Laser overcomes compliance hurdles.** Laser treatment may also eliminate the ophthalmologist’s concern about compliance, which is a problem, especially in the aging population. “The laser gives me the assurance they’re treated,” Dr. Olivier said.

But compliance is about more than taking drops. “It’s also about patients keeping their follow-up appointments,” said Simon K. Law, MD, associate clinical professor of ophthalmology at University of California, Los Angeles. Because laser loses its effect over time, patients still need lifelong monitoring.

### What the Experts Tell Their Patients

All of the experts interviewed say that they present patients with the option of SLT as a first-line treatment but that most patients opt for drops.

Dr. Lin, who mentions laser but doesn’t push it, tells patients that most people choose drops and that prostaglandin analogues probably are slightly more effective than SLT for lowering IOP. By the time he adds that the effect of laser often wears off, most patients choose drops.

Dr. Law tells patients that if one medication doesn’t work, others are available. The downside is that medication needs to be taken long term and has potential side effects. SLT, he tells patients, may lower IOP enough to avoid the need for eyedrops, but it’s not 100 percent effective; and, for about 25 percent, it’s “not effective at all.” Also, SLT takes four to five weeks to kick in, which may be inadequate for treating high pressures. Finally, he warns that SLT may induce a pressure spike (see “Pearls for Avoiding Pressure Spikes With SLT”).

Dr. Latina’s message to patients: “We can do a laser on your eye in the office, which helps to improve drainage of fluid to lower pressure. It can

last between two and five years. If SLT is successful, you don't have to take medications. Or you can take medication every day, and you pay for it. Somebody pays for it."

The bottom line, said Dr. Law, is that SLT is an effective primary treatment, but "treatment has to be individualized." The patient's type of glaucoma, IOP and preference all come into play.

### Will Clinical Practice Change?

What will it take to win converts to SLT? "I don't think it's going to catch on quickly unless there's a lot of information for doctors and also for lay people," Dr. Katz said. "People hear lasers and think 'invasive.' They don't realize the relative risks of laser versus surgery versus medicine."

Dr. Latina suggested a different mindset. "You have to begin to think 'laser first.' You have to change your behavior. The best way is to do some of these patients early as primary therapy and understand how well they do. Then you begin to do more. It's not a panacea, but it's a good tool."

1 Latina MA et al. *Curr Opin Ophthalmol*. 2002;13(2):94-96.

2 American Academy of Ophthalmology Glaucoma Panel. *Preferred Practice Pattern*

*Guidelines*. Primary Open-Angle Glaucoma. Revised 2010. Available at: [www.aao.org/ppp](http://www.aao.org/ppp).

3 The Glaucoma Laser Trial Research Group. *Am J Ophthalmol*. 1995;20(6):718-731.

4 Samples JR et al. *Ophthalmology*. 2011; 118(11):2296-2302.

5 Katz LJ et al. *J Glaucoma*. 2011 May 3 [Epub ahead of print]. doi:10.1097/IJG.0b013e318218287f.

6 Hong BK et al. *J Glaucoma*. 2009;18(3): 180-183.

7 Lee R et al. *Can J Ophthalmol*. 2006;41(4): 449-456.

8 Cantor LB et al. *Curr Med Res Opin*. 2008;24(10):2905-2918.

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## Pearls for Avoiding Pressure Spikes With SLT

With SLT, said Dr. Olivier, "you never know who's going to have a pressure spike." She added that she is less concerned about eyes with a healthier optic nerve than she is when cupping is advanced. If there are red flags, she will treat only 90 degrees of the trabecular meshwork (TM) at a time.

**Dr. Olivier** generally avoids unpredictable spikes by using the lowest power setting—0.4 to 0.5 millijoules (mJ) for more heavily pigmented tissue, and 0.8 mJ in most other cases. In addition, she uses pilocarpine preoperatively, or apraclonidine both before and after surgery. While acknowledging pilocarpine's side effects, she uses it (low doses in eyes with light irides) because it pulls the iris forward and constricts the pupil, which allows better visualization of the TM. Pilocarpine also reduces IOP by increasing outflow. Finally, she checks IOP after every procedure.

**Dr. Latina** urged caution with pigmentary glaucoma. Highly pigmented trabecular meshwork absorbs more of the laser's energy, so overtreatment may lead to a sustained pressure spike. He treats such eyes only 180 degrees at a time.

**Dr. Law**, like Dr. Latina, treats eyes with a heavily pigmented TM 180 degrees in one session. He also administers brimonidine or apraclonidine immediately before and after every procedure. If the IOP is still high, he gives oral acetazolamide to patients who are not allergic to sulfa drugs.

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