



# Experts Layout Guidelines for Subthreshold Laser Treatment

by Joanna Lee



**“M**any countries are unable to afford continuous unending intravitreal injections for macular diseases,” said Dr. Kenneth Fong. Building the case for the use of subthreshold laser (STL) treatment and its application for retinal diseases, Dr. Fong and two other vitreoretinal doctors presented at a symposium on behalf of The Subthreshold Ophthalmic Laser Society (SOLS) at the recently held CAKE & PIE Expo 2.0 in Da Nang, Vietnam.

Having recently published an international guideline for the use of STL in treating diseases of the retina, SOLS is a newly established international protem committee comprising international users of STL. It is currently developing protocols for different laser machines and carrying out research trials for diabetic macular edema (DME), central serous chorioretinopathy (CSCR) and dry age-related macular degeneration (AMD).

With about 20% of DME cases unresponsive to anti-VEGF treatments (according to the Protocol I of the DRCR Network study), the option to

treat with STL is a viable exploration. However, the issue remained that visible treatment parameters have been varied in publications, said Dr. Fong. “Some use a 15% duty cycle, some 5% or 10%, so it is hard to compare apples with apples,” he explained. Coupled with that, inexperienced users also tend to undertreat their patients due to fear of using higher laser power. Thus, guidelines are needed.

“There is no need to kill the RPE cells in the treatment of DME and CSCR,” he said while explaining how STL works. STL is used to awaken the RPE cells with low levels of laser power to elicit a matrix response in the stimulated zone.

## Treatment parameters

Dr. Fong uses the OCT guided (thickness map) at a 5% duty cycle as it is not advisable to go beyond a 10% duty cycle. “It’s important to titrate the laser power,” he said, explaining further how he first starts with a place outside the macular area with a 5% duty cycle burn. “Once I see a visible burn, I’ll reduce the power by 50%.” He will then proceed

to treat the large areas centered at the peak of the thickened retina (dense pattern as seen on OCT) using a spot size of 160 microns. At 12 weeks, the patient will be re-evaluated using OCT or sometimes autofluorescence. In his practice, the square pattern is often used.

## Types of DME suitable for subthreshold laser

Subthreshold laser can be used to treat clinically significant extrafoveal edema; it can also be used for treating fovea-involving mild edema (<400 microns thick) with good vision. However, Dr. Fong said that its most common use is in a combination treatment in thicker foveas: First he injects anti-VEGF and then uses subthreshold laser on the residual thickened areas.

Showing a few case studies seen on OCT scans, Dr. Fong shared how patients with extrafoveal DME and clinically significant juxtafoveal edema had their conditions resolved. “It takes from 6 weeks (for CSCR) to 12 weeks (for DME) for ST laser to show its effects,” he said. As one gains more confidence using the subthreshold laser, one could treat patients with fovea-involving edema with good vision by moving closer to the fovea. In the case of a patient with a central-involving significantly severe edema, the patient had a good response after an anti-VEGF injection — and after one month and three months, a significant improvement was seen.

He noted that it is now more common for the yellow subthreshold 577 (ST 577) nanometer laser wavelength to be used.

The PLACE study (2018) using the micropulse 810 wavelength showed there weren’t many differentiations between photodynamic therapy (PDT) and STL. Dr. Lihteh Wu’s retrospective PACORES study, (involving half-dose PDT compared to ST 577 for central serous chorioretinopathy CSCR)

showed how patients treated with STL experienced a 3-line gain from baseline compared to just 19% among PDT patients.

“Subthreshold laser is a cost-effective option and should not only be considered in rescue situations,” he said.

## Guidelines for laser settings revealed

There are several reasons for the establishing of guidelines for STL therapy. According to Dr. Chhablani, this therapy has been utilized in clinical practice for more than 30 years with numerous randomized and real-life studies proving its efficacy and safety in various retinal diseases. He and a few other founding members of SOLS have gathered expertise to establish guidelines for the application of STL in retinal diseases.<sup>1</sup>

The guidelines began with 12 experts, who gathered and deliberated on 43 questions, with the first round of answers gathered anonymously. Subsequently, two virtual meetings were held.

## STL's role in retinal diseases

The group of experts determined that there is a role for STL in both center-involving and non-center involving macular edema (DME) in conjunction with or without anti-VEGF therapy.

For DME, SOLS recommends a 5% duty cycle with 200 millisecond pulse duration, and at 150-200 microns spot size without any spaces between laser spots using an integrated pattern system. It was also recommended to titrate with 50% of the threshold power achieved with subthreshold laser. While SOLS experts recommend applying STL to edematous areas, it doesn't mandate focal treatment of microaneurysm. They don't recommend any specific structural imaging studies to evaluate laser spots, however, autofluorescence or OCT could be evaluated during follow-up visits for any laser scars, for instance.

Follow-up evaluations at six to eight weeks after the STL application are advised, and STL is suggested after two or three months of initial application in case of poor response.

STL can also be used for acute and chronic types of CSCR. For acute cases, STL can be applied at one month if there's no self-resolution. However for chronic cases, SOLS suggests STL as a first-line treatment, as well as in combination with other therapeutic treatment options. The STL settings and follow-up suggestions and durations are also similar to that for DME.

“These consensus guidelines do not suggest management of these diseases but suggest laser application guidelines using different subthreshold laser delivery systems,” said Dr. Chhablani, emphasizing that these guidelines are also general and do not support any particular laser systems.

“They are to establish standard subthreshold laser applications in clinical practice, and we hope to start future clinical trials to establish level 1 evidence,” he said.

## Comparing STL with PDT

Dr. Jose Roca from Lima, Peru, was also on hand to talk about his comparative retrospective study involving STL<sup>2</sup> as part of the Pan-American Collaborative Retina Study Group (PACORES). The investigation involved 92 eyes using yellow (577nm) micropulse laser as opposed to half-dose verteporfin photodynamic therapy in eyes with CSCR. It was found that the subliminal (subthreshold) yellow laser produced better visual acuity results than PDT. Both treatments, however, are effective in restoring macular anatomy in eyes with chronic CSCR. It was deemed that STL for CSCR is safe and efficient, with good results and cost-effectiveness. In his personal experience treating CSCR from 2014 to 2016, he found that 60% of his patients (n=62, 95% males) experienced BCVA improvement between 1 to 3 lines after being treated with STL with decrease in choroidal thickness. 🍷

## References

1. Chhablani J; SOLS (Subthreshold Laser Ophthalmic Society) writing committee. Subthreshold laser therapy guidelines for retinal diseases. *Eye (Lond)*. 2022;10.1038/s41433-022-02136-w. [published online ahead of print]
2. Roca JA, Wu L, Fromow-Guerra J, et al. Yellow (577 nm) micropulse laser versus half-dose verteporfin photodynamic therapy in eyes with chronic central serous chorioretinopathy: results of the Pan-American Collaborative Retina Study (PACORES) Group. *Br J Ophthalmol*. 2018;102(12):1696-1700.

**Table 1. Subthreshold laser consensus guideline settings for diabetic macular oedema and central serous chorioretinopathy by the Subthreshold Ophthalmic Laser Society (SOLS).**

SUBTHRESHOLD LASER SETTINGS	DIABETIC MACULAR OEDEMA	CENTRAL SEROUS CHORIORETINOPATHY
Duty cycle	5%	5%
Pulse duration	200 ms	200 ms
Spot size	150–200 µm	100–200 µm
Spacing between spots	No	No
Titration	Yes	Yes
Titration power	50% of threshold power	50% of threshold power

**Source:** Chhablani J, SOLS (Subthreshold Laser Ophthalmic Society) writing committee. Subthreshold laser therapy guidelines for retinal diseases. *Eye (Lond)*. 2022 Jun 23. [Online ahead of print.]

## Editor's Note:

The symposium on behalf of The Subthreshold Ophthalmic Laser Society (SOLS) was presented at the recently held CAKE & PIE Expo 2.0 in Da Nang, Vietnam. Reporting for this story took place during the event.