Leading MicroPulse™ surgeons share tissue-sparing laser techniques for the treatment of retinal disorders and glaucoma.
OVERVIEW

MicroPulse™ Technology
In conventional continuous-wave (CW) photo-coagulation, a rapid temperature rise in the target tissue creates blanching and a high thermal spread. MicroPulse technology finely controls thermal elevation by “chopping” a CW beam into a train of repetitive short pulses allowing tissue to cool between pulses and reduce thermal buildup.

MicroPulse Laser Therapy
With subthreshold MicroPulse laser therapy (MPLT), the temperature rise induced in the target tissue remains sub-lethal and no visible lesion is produced (subvisible-threshold). Because of this, both directly targeted and surrounding tissues remain viable and capable of creating a stress response which induces beneficial intracellular biological factors that are anti-angiogenic and restorative.

In MPLT, the low temperature gradient re-equilibrates to baseline temperature within a short spreading distance, limiting and confining the therapeutic photothermal effect around the tissue directly targeted by the laser. For this reason, and conversely to conventional laser that must be applied in grids with spaced burns, MPLT is normally performed with the high-density placement of confluent applications, made possible by the absence of chorioretinal laser damage and risk of iatrogenic scotoma.
Sam E. Mansour, MD, MSc, FRCS, FACS¹
Warrenton, VA

DME | BRVO-ME

Contact lens: Mainster Focal Grid (1.05x)
Spot size on SLA: 200 µm (210 µm on retina)
Duration: 200 ms
Power: 4x power determined in test burn performed in CW mode with 200 ms duration in a mildly edematous region > 2 DD from foveal center. Start at 50 mW and titrate power upward in 10 mW increments (moving to a new area each time) until a barely visible reaction develops.

MicroPulse mode: 5% duty cycle

Technique & pearls: Dense treatment with contiguous applications over the entire edematous area based on OCT. I never recommend a higher than 5% duty cycle with the yellow laser for macular applications. There is no visible tissue reaction during laser treatment.

Follow-up & re-treatment protocol: Wait 3 to 4 months. Retreatment, if needed, is guided by OCT using the same treatment protocol.

Victor Chong, MD, FRCS, FRCOphth
Oxford, UK

DME

Contact lens: Area Centralis (.94x)
Spot size on SLA: 100 µm (94 µm on retina)
Duration: 200 ms
Power: .7x power determined in test burn performed in MicroPulse mode using a 5% duty cycle.

MicroPulse mode: 5% duty cycle

Technique & pearls:
Dense treatment — contiguous pattern with the laser over the edematous area based on OCT. Microaneurysms are not deliberately treated, but will be hit with the pattern. It’s most important to focus during the entire treatment because there is no color change. An extra safety margin exists with the MicroPulse technique, allowing the spots to be closer to one another. There is no visible tissue reaction during laser treatment.

Follow-up & re-treatment protocol:
6 months follow-up if no foveal involvement or smaller areas of edema; 3 months if treating a large area of edema. Retreatment is guided by OCT. Protocol is the same as initial treatment.

Jeffrey K. Luttrull, MD
Ventura, CA

DME | BRVO | CSR

Contact lens: Mainster Macular (1.03x)
Spot size on SLA: 125 µm (129 µm on retina)
Duration: 300 ms
Power: 950 mW
MicroPulse mode: 5% duty cycle
Technique & pearls: Confluent treatment of macular thickening up to FAZ. About 600 spots/macular quadrant. There is no visible tissue reaction during laser treatment.

Follow-up & re-treatment protocol: 2–4 months with OCT. Retreat if worse, or not better by 4 months. If at all improved, observe.

Edoardo Midena MD, PhD
Padova, Italy

DME

Contact lens: Mainster Focal Grid (1.05x)
Spot size on SLA: 125 µm (131 µm on retina)
Duration: 200 ms
Power: 750 mW
MicroPulse mode: 5% duty cycle
Technique & pearls: Laser spots are delivered in multiple and high density, continuous fashion up to 250 µm to 300 µm from the FAZ. There is no visible tissue reaction during laser treatment.

Follow-up & re-treatment protocol: Follow up is 3 months after any laser session. Consider retreatment if central subfield OCT macular thickness is ≥ 250 µm, reduction of central subfield OCT macular thickening is < 50% from baseline, and BCVA decrease is > 5 letters (ETDRS). If needed, retreatment is performed according to the same protocol.

810 nm

Privatdozent Dr. med.
Michael Janusz Koss, FEBO
Frankfurt am Main, Germany
University of Southern California, Los Angeles, CA USA

CSC

Contact lens: Volk (.94x)
Spot size on SLA: 125 µm (118 µm on retina)
Duration: 200 ms
Power: 2x power determined in test burn performed in the nasal mid-periphery using the CW mode and adjusting upward the power until a light grayish visible burn was noted.

MicroPulse mode: 15% duty cycle

Technique & pearls: Laser spots are delivered in a multiple and high density, continuous fashion up to 250 µm to 300 µm from the FAZ. 3 repeated applications delivered at leakage site, paying attention to subtle RPE color changes during laser treatment that would have prompted the immediate cessation of the laser treatment. There is no visible tissue reaction during laser treatment.

Follow-up & re-treatment protocol: Retreat in case of persistent, equal, or increased leakage determined by FA with the presence of equal or more subretinal fluid compared with baseline.

532 nm

David Gossage, DO, FAOCO, FAAO¹
East Lansing, MI

**DME**

**Contact lens:** Mainster Focal Grid (1.05x)

**Spot size on SLA:** 100 µm (105 µm on retina)

**Duration:** 200 ms

**Power:** 2x the power determined in test burn performed in CW mode using a 100 ms duration delivered in a non-edematous area of the retina. Start at 100 mW and titrate power up in 10–50 mW increments (moving to a new area each time) until a threshold burn is noted.

**MicroPulse mode:** 5% duty cycle

**Technique & pearls:** High density grid (painting back and forth) treatment over edematous area. There is no visible tissue reaction during laser treatment.

**Follow-up & re-treatment protocol:** Retreat at 3 to 4 months if needed. Retreatment is guided by OCT using initial treatment protocol.

Aaron Appiah, MD¹
Tallahassee, FL

DME

Contact lens: Mainster Focal Grid (1.05x)
Spot size on SLA: 100 µm (105 µm on retina)
Duration: 200 ms
Power: 4x the power determined from test burn performed in CW mode with 100 ms duration in a non-edematous area. Start at 50 mW and titrate power up by increments of 10 mW (moving to another area each time) until a barely visible burn is achieved.

MicroPulse mode: 5% duty cycle

Technique & pearls: Dense treatment with contiguous applications over the entire edematous area based on OCT. There is no visible tissue reaction during laser treatment.

Follow-up & re-treatment protocol: Retreat at 3 to 4 months if needed. Retreatment is guided by OCT using initial treatment protocol.

AAO/Ophthalmic Technological Assessment (OTA) on Laser Trabeculoplasty

OPEN-ANGLE GLAUCOMA

Contact lens: Latina Laser Gonio Lens (1.0x)
Spot size on SLA: 200 µm (or 300 µm in darker pigmented TM)
Duration: 300 ms
Power: 2,000 mW
MicroPulse mode: 15% duty cycle
Technique & pearls: 200 µm spot – 100 confluent applications in 180° (200 in 360°).
300 µm spot – 66 confluent applications in 180° (122 in 360°).
There is no visible tissue reaction during laser treatment.

David M. Dickman, MD
Rolesville, NC

OPEN-ANGLE GLAUCOMA

Contact lens: Goldman Three Mirror Lens (1.08x)

Spot size on SLA: 300 µm (324 µm on TM)

Duration: 300 ms

Power: Same power in MicroPulse emission as the CW threshold power determined in the tissue reaction test performed in CW mode with a 50 µm spot and 100 ms duration. Start at 500 mW and increase the power in increments of 50 mW, each time moving to a new location until a slight blanch or bubble is noted.

MicroPulse mode: 15% duty cycle

Technique & pearls: 120 adjacent spots to cover 360° of TM. Anti-inflammatory drugs before or after treatment are not recommended unless needed. There is no visible tissue reaction during laser treatment.

Avoid eye or skin exposure to direct or scattered radiation. Class 4 laser product (IEC 60825-1:2007).

Do not stare into beam. Class 2 laser product.

\[ \begin{align*} 
\lambda &= 810 \text{ nm} & P_o &= 4 \text{ W} \\
\lambda &= 630 \text{ nm} & P_o &= 5 \text{ mW} \\
\lambda &= 632 \text{ nm} & P_o &= 5 \text{ W} \\
\lambda &= 635 \text{ nm} & P_o &= 2 \text{ mW} \\
\lambda &= 577 \text{ nm} & P_o &= 5 \text{ W} \\
\lambda &= 635 \text{ nm} & P_o &= 2 \text{ mW} 
\end{align*} \]

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