Leading MicroPulse® surgeons share tissue-sparing laser techniques for the treatment of retinal disorders and glaucoma.
Quick Guide to MicroPulse Mode®
Retina - 5% Duty Cycle

To enter MicroPulse mode, turn on the laser console and select the μP button.

Note: 200 μm spot

STEP 1
Select ON and press 5%.

STEP 2
Visually verify that the duty cycle reads "5%," μP duration is "0.100" and μP interval is "1.900." Select the OK button.

STEP 3
Use control knobs to adjust duration, power, and interval. Select Σn = 0 to reset the counter. Select Treat/Standby Button to enter Treat Mode.

Example shown is based on 577 nm MicroPulse parameters for the treatment of DME used by Dr. Sam Mansour.

*Based on the software version of your laser console, the display may be slightly different. For additional operator instruction, please reference the Operator Manual of your IRIDEX laser.

**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, 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.

**The Importance of High-Density Applications**
In MicroPulse Laser Therapy, 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, MicroPulse 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.

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**577 nm**

**Sam E. Mansour, MSc, MD, FRCSC, FACS**
Warrenton, VA

**DME | BRVO-ME**

| Contact lens: | Mainster Focal Grid (1.05x) |
| Spot size on SLA: | 200 μm |
| Duration: | 200 ms |
| Power: | 400 to 600 mW based on pigmentation* |
| MicroPulse mode: | 5% duty cycle |
| Technique & pearls: | Approximately 100 - 400 spots. Place dense treatment with contiguous applications over the entire edematous area based on OCT. |

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

* For first time MicroPulse users, Dr. Mansour recommends performing a pre-treatment test burn to determine the MicroPulse treatment power. The test burn is performed in CW mode with a 200 ms duration in a mildly edematous region > 2 DD from foveal center. Start at 50 mW and titrate power upward by increments of 10 mW (moving to a new area each time) until a barely visible tissue reaction is seen. Switch the laser to MicroPulse mode and adjust the power to 4x the power achieved in the CW pre-treatment test burn. (This often equates to 400 to 600 mW.)

Quick Guide to MicroPulse Mode®
Glaucoma - 15% Duty Cycle

STEP 1
To enter MicroPulse mode, turn on the laser console and select the μP button.

Note: 300 μm spot

STEP 2
Select ON and press 15%.

STEP 3
Visually verify that the duty cycle reads "15%," μP duration is "0.300," and μP interval is "1.700." Select the OK button.

STEP 4
Use control knobs to adjust duration, power, and interval. Select Σn = 0 to reset the counter. Select Treat/Standby Button to enter Treat Mode.

Example shown is based on 532 nm MicroPulse parameters used by Drs. Ike Ahmed, David Gossage, and Steven Vold. Rather than a repeat interval, a single-shot is used until physician is comfortable with the procedure.

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532 nm - MicroPulse Laser
Trabeculoplasty (MLT)

Ike Ahmed, MD, FRCSC
Toronto, Canada

David Gossage, DO, FAOCO, FAAO
Hillsdale, MI

Steven Vold, MD
Fayetteville, AR

OPEN-ANGLE GLAUCOMA

Contact lens: Ritch 4-Mirror
Spot size on SLA: 300 μm (324 μm on TM)
Duration: 300 ms
Power: 1000 mW
MicroPulse mode: 15% duty cycle
Technique & pearls: Place confluent applications 360° around the eye. There are no visual signs of treatment intra- or postoperatively. No postoperative medication is necessary.
Follow-up & retreatment protocol: Follow-up at approximately 1 month, based on the level of severity.

David Gossage, DO, FAOCO, FAAO
Hillsdale, MI

DME
Contact lens: Mainster Focal Grid (1.05x)
Spot size on SLA: 200 μm (210 μm on retina)
Duration: 200 ms
Power: 300 mW
MicroPulse mode: 5% duty cycle

Technique & pearls: Place high-density, contiguous applications over entire edematous area based on OCT. Using the TxCell™ Scanning Laser Delivery System, use zero spacing and place a grid over the area of edema. Use the largest grid possible to maximize the efficiency of the treatment. There is no visible tissue reaction during laser treatment.

Follow-up & retreatment protocol: Retreat at 3 to 4 months if needed. If no resolution is noted, then increase the power to 400 mW. Retreatment is guided by OCT using initial treatment protocol.


1. Personal Communication, October 2014.

*Based on the software version of your laser console, the display may be slightly different. For additional operator instruction, please reference the Operator Manual of your IRIDEX laser.
810 nm

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 & retreatment 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.

MicroPulse Laser Therapy

Pre-treatment 1 Year Post-treatment

Prospective, Masked, Randomized Clinical Trial
- 62 eyes (50 patients)
- Untreated, center-involving CSME
- Randomized to mETDRS or 810 nm MicroPulse

1 Year Results
- MicroPulse was as effective as mETDRS in
  - stabilizing VA
  - reducing macular edema
- With added benefits of
  - no tissue damage detectable at any time point posoperatively
  - significant improvement in retinal sensitivity