Efficacy of Micropulse 532 nm Green Laser in Diabetic Macular Edema

Sousa K., Ferreira C., Mendonça L., Gentil R., Mendes J., Leite R., Vaz F., Gomes N.
Hospital de Braga, Portugal
September 2014

The authors have no financial interest in any of the materials discussed.
Micropulse (MIP) Treatment

• Pioneer treatment by Thomas R. Friberg and associates in the late 1990s.
• Several published articles for medical application in DR, RVO and CSC.
• Divides the laser emission into a “train” of short, repetitive pulses that persists for 0.1 to 0.5 seconds in a “on-off time” interval between successive micropulses: duty-cycle.
• Treatment until 100 μm from fovea?
• Possibility of undertreatment is a concern.
• Not well established. No standards or dose-response clinical studies.

The authors have no financial interest in any of the materials discussed.
MIP Clinical Studies Available

- Treatment in areas **not suitable for conventional** laser.
- **Continuous** wave-emission.
- Power is titrated **upward** for a barely visible tissue.

- 577 nm or 810 nm laser:
  - Spot ~ 125 μm
  - Variable duty-cycle: 0.5-10%
  - Different power: 50-70%
The authors have no financial interest in any of the materials discussed.
Material and Methods

• Retrospective, non-comparative study.
• Micropulse laser treatment data since June 2012 until March 2013.

• Diabetic Macular Edema:
  • Not suitable for conventional laser treatment
  • Lack of response to intravitreal therapy (anti-VEGF or corticoid)

• 10% duty-cycle time, 200ms
• Spot diameter 50μm
• 70% of the power that causes mild whitening of the RPE on peripheral retina.
## Demographic Results

<table>
<thead>
<tr>
<th>Total Sample</th>
<th>140 eyes. 24 eyes excluded.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Included</strong></td>
<td>116 eyes 89 patients</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>58 (50%) RE. 58 (50%) LE.</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>61 male (52.6%) 55 female (47.4%)</td>
</tr>
</tbody>
</table>

### Average spots number
- 49

### Average Power
- 622±176 mW

### Follow-up Time Range
- 4-18 months

### DR type
- PDR = 20 (17.2%)
- NPDR = 96 (82.7%)
Previous Treatments

- Previous PPV: 7 (6%)
- Previous BVCZ IVI: 78 (67.2%)
- Previous TA IVI: 36 (31%)
- Previous LASER Treatment: 99 (85.3%)
## Previous Treatment and Treated Area Thickness

<table>
<thead>
<tr>
<th>Previous PPV (7)</th>
<th>Previous BVCZ (78)</th>
<th>Previous TA (36)</th>
<th>Previous Laser (99)</th>
<th>N</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>5</td>
<td>0.325</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>21</td>
<td>0.160</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>3</td>
<td>0.465</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>7</td>
<td>0.034</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>34</td>
<td>0.572</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>2</td>
<td>0.195</td>
</tr>
<tr>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>24</td>
<td>0.3111</td>
</tr>
<tr>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>2</td>
<td>0.895</td>
</tr>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>2</td>
<td>0.690</td>
</tr>
</tbody>
</table>
Visual Acuity – at first visit after mip

$p = 0.281$
Macular Thickness Variation

- Previous CMT: 333±94,5
- Post CMT: 329±110,4
- p>0.05

- Previous Treated Area Thickness: 353±54,1
- Post Treated Area Thickness: 351±72,2
- p>0.05
Previous OCT

3,21±0,84 months

Post-OCT
FA and FAF findings

- No visible LASER spots
- No RPE changes
- Decrease on leakage area

Previous FA
N=105
5.68 ±1.32 months

Post-FA
N=105
1.24±1.08 mm²

\[ t\text{-}paired \text{ test: } p=0.002 \]
Retreatment

- n=39 (32.8%)
- n=78 (66.7%)
Retreatment

New MIP: 52.1%, N=61
New BVCZ: 29.9%, N=35
New IVTA: 18.8%, N=22
New Conventional LASER: 19.9%, N=21
Limitations

- Retrospective and non-comparative study
- Non-naïve patients
- Difficult metabolic control
- Multiple variables involved
- More follow-up controlled time
- No published clinical trials with 532 nm
- Correct parameters?
Efficacy of Micropulse 532 nm Green Laser in Diabetic Macular Edema

Sousa K., Ferreira C., Mendonça L., Gentil R., Mendes J., Leite R., Vaz F., Gomes N.
Hospital de Braga, Portugal
September 2014

The authors have no financial interest in any of the materials discussed.