Treatment of non-central diabetic macular edema: therapeutic options

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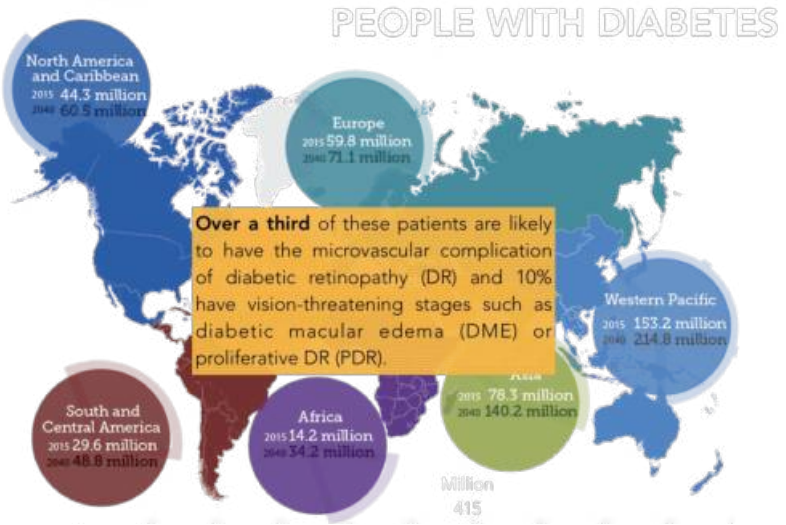
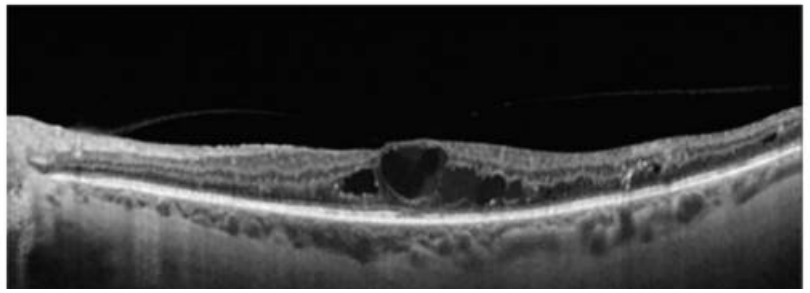
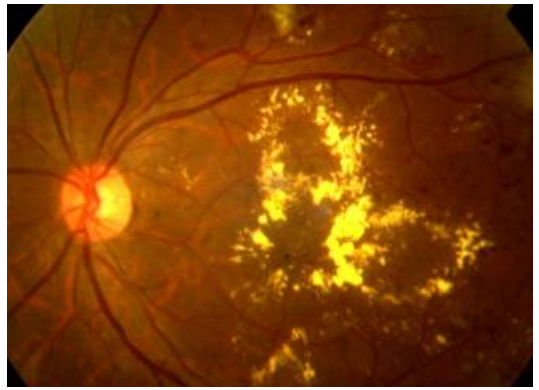
Diabetic Retinopathy and diabetic macular edema

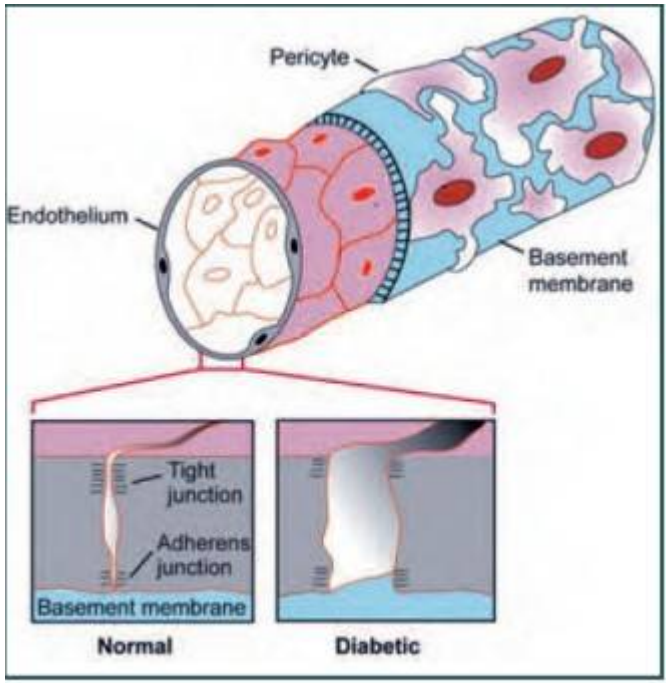
- Diabetic retinopathy (DR) is a leading cause of vision loss among adults, affecting millions of people worldwide.
- On a global scale, the prevalence rate is estimated to be 34.6%, encompassing approximately 93 million people.
- **Diabetic macular edema** causes visual impairment in diabetic retinopathy
- 1 in 10 diabetic patients suffers from DME

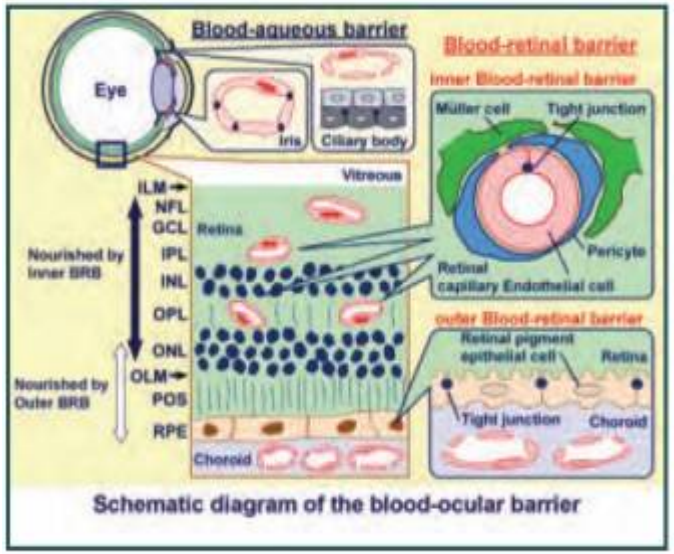


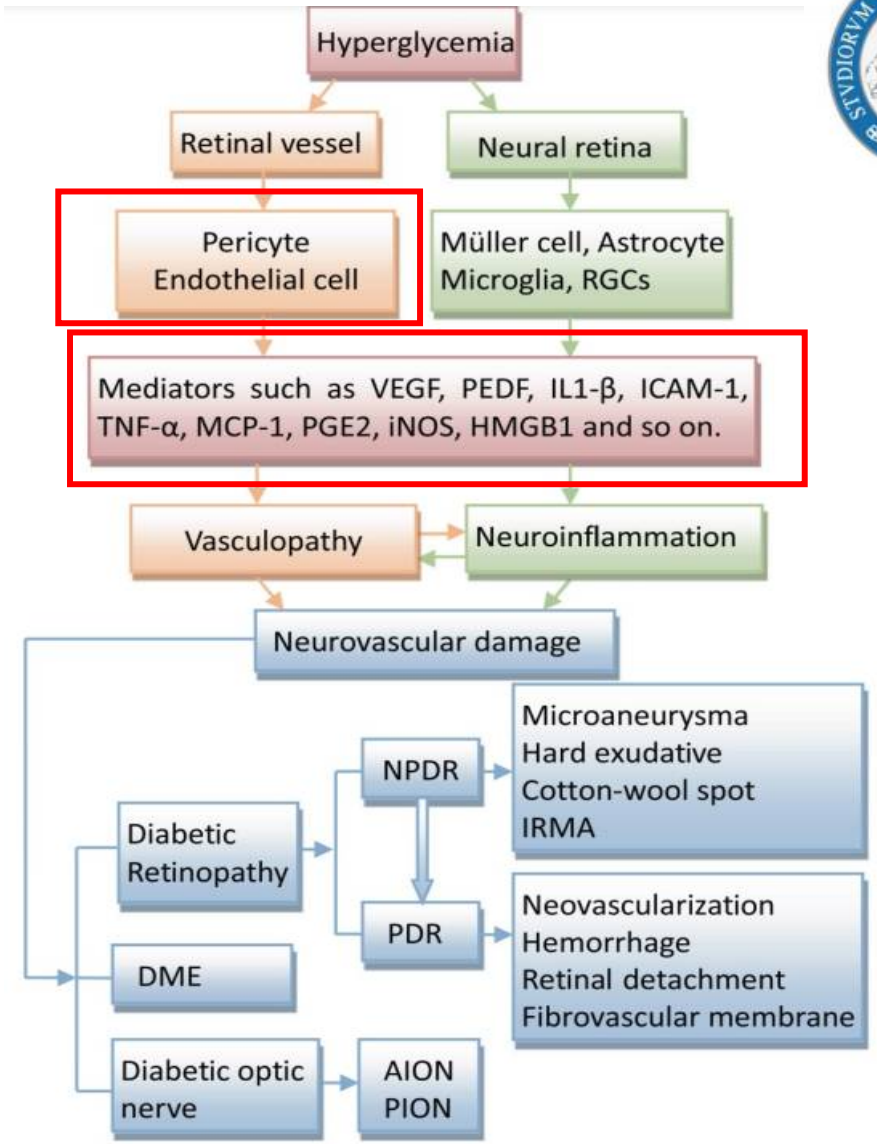




Biochemical Pathways





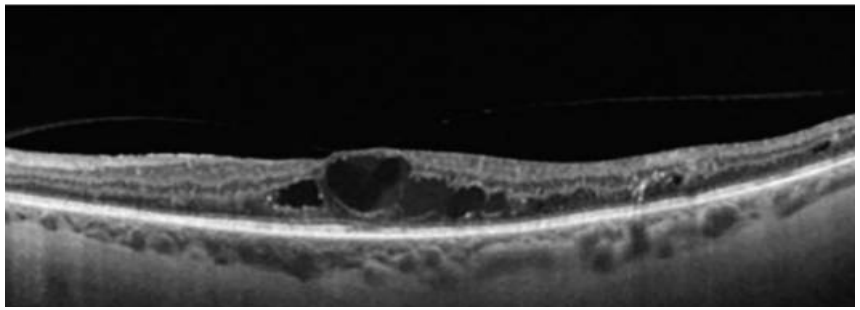


Chan et al. Optimizing treatment for diabetic macular edema during cataract surgery. 2023

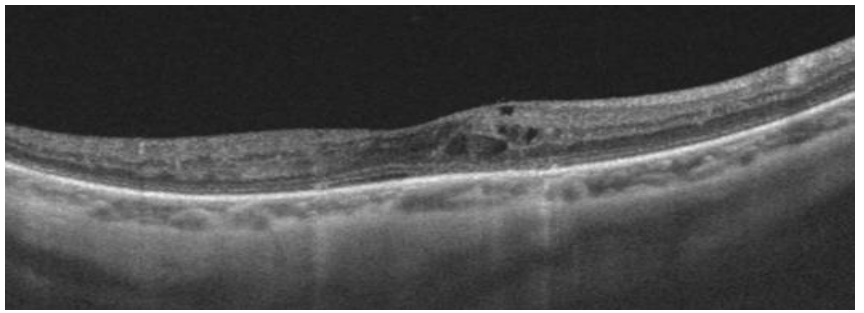
The role of OCT

- Optical coherence tomography (OCT) is a noninvasive instrument, which provides cross-sectional images of the retina and a quantitative assessment of retinal thickness.
- The updated classification identifies two distinct entities:

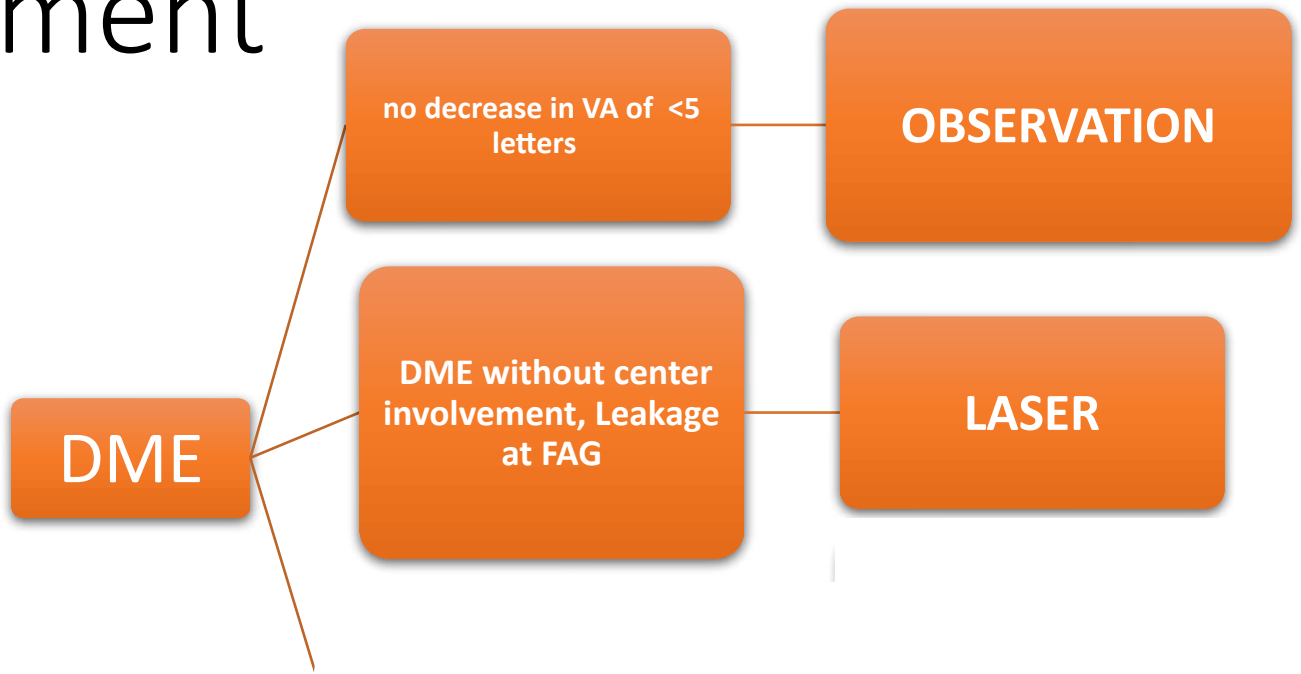
Center-involving diabetic macular edema (CI-DME)



Non-center-involving diabetic macular edema (nCI-DME)

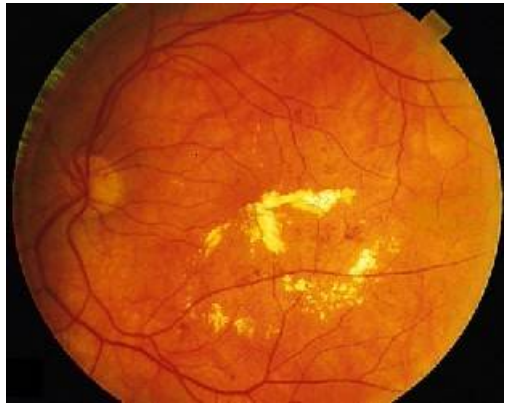


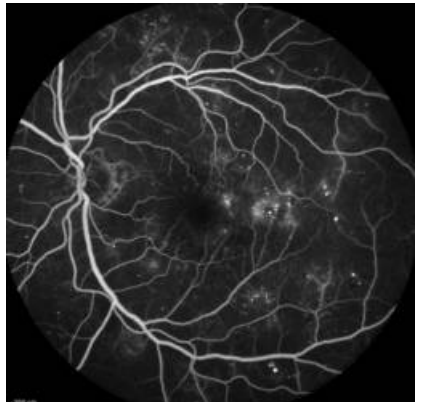
DME Treatment

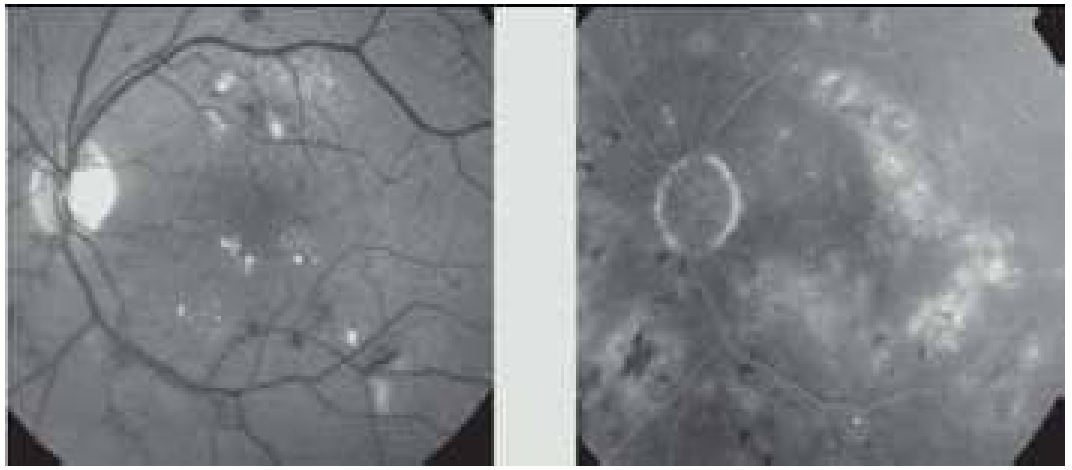


Management of diabetic Retinopathy and diabetic macular edema: Euretina 2017 guidelines

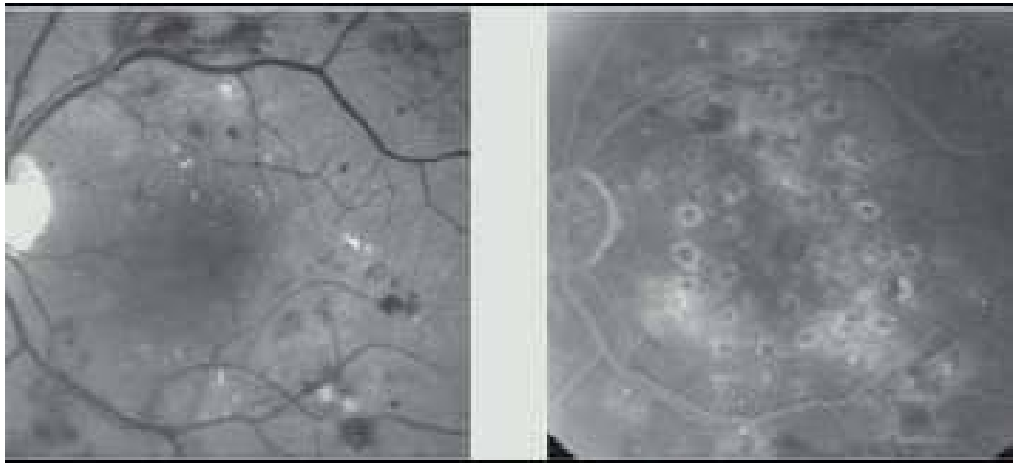
Non-center-involving DME





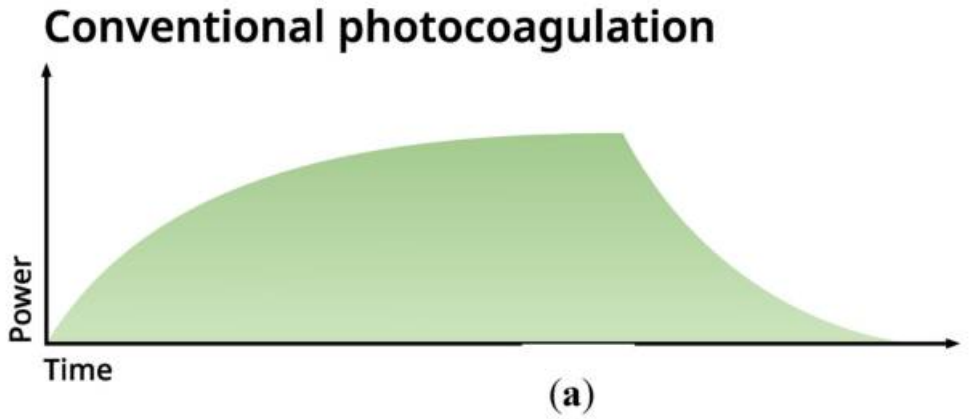


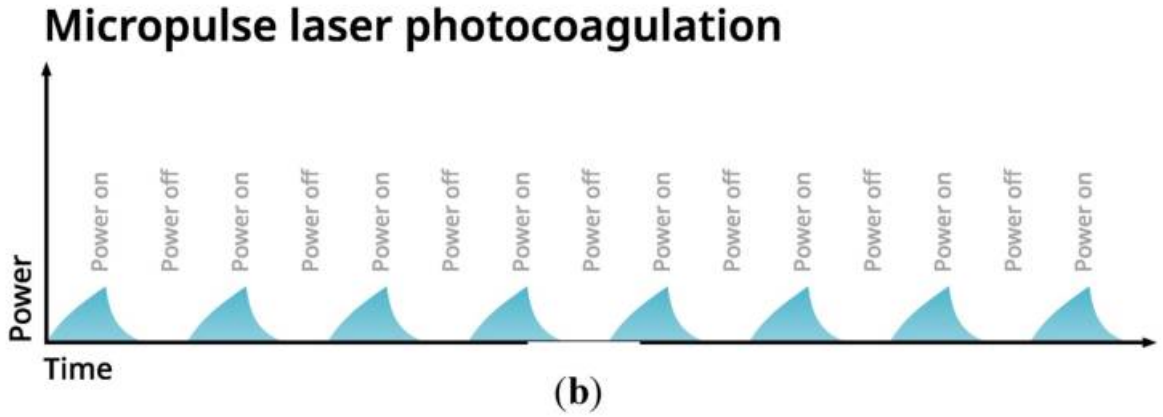
Before laser treatment

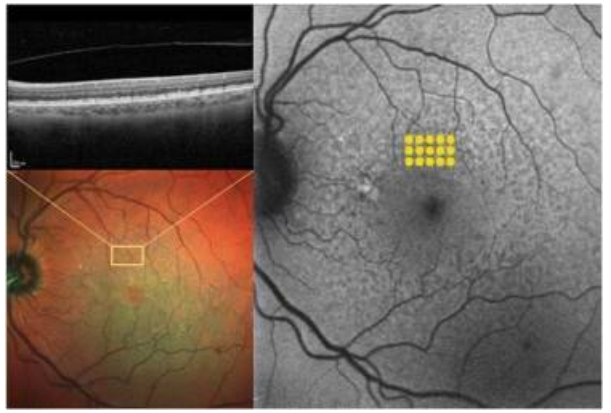


Post laser treatment

Micropulse subthreshold laser

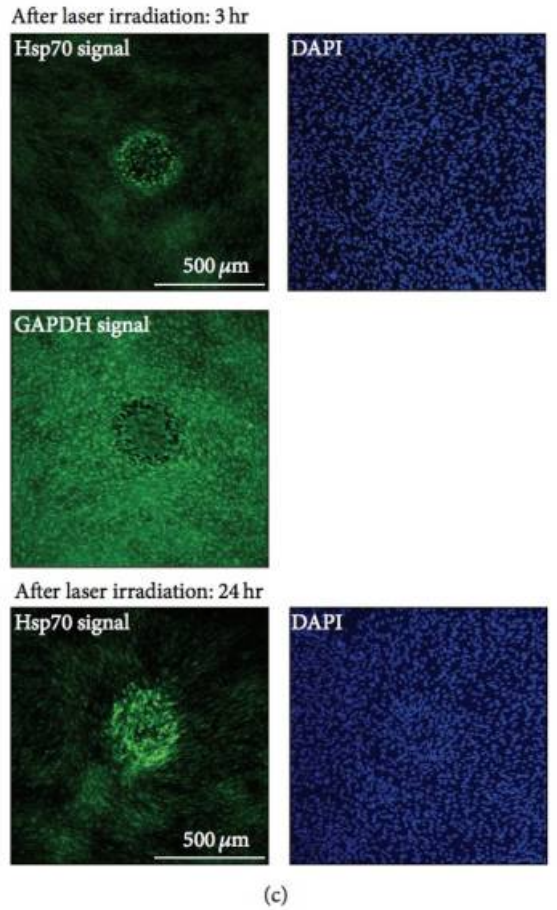






Micropulse subthreshold laser

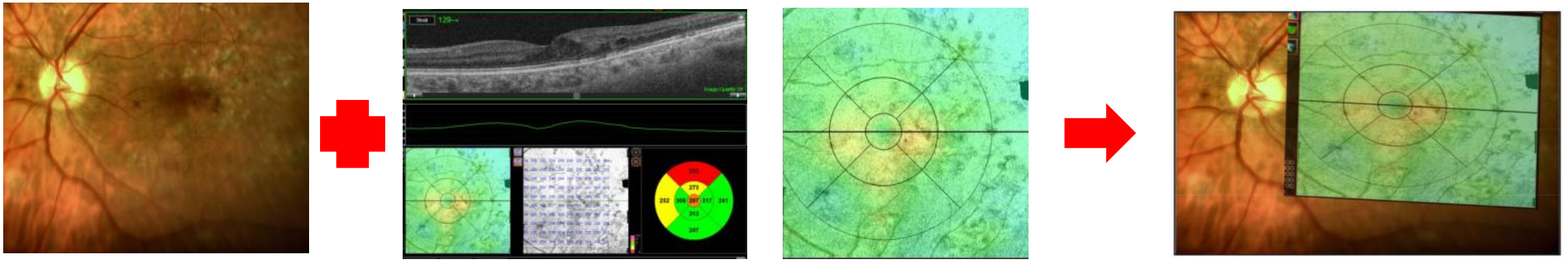
- SMPL targets the retinal pigment epithelium (RPE)
- Release of heat shock proteins (Hsps), particularly Hsp 70 in response to the treatment
- This stress-induced response leads to **immunomodulation of retinal cells**, activation of repair processes, and a **decrease** in the production of inflammatory cytokines, VEGF, and matrix metalloproteinases
- SMPL has also been reported to **reduce the concentration of inflammatory cytokines** in the aqueous humor secreted by retinal glial cells, including Müller cells and microglial cells, in eyes with DME.



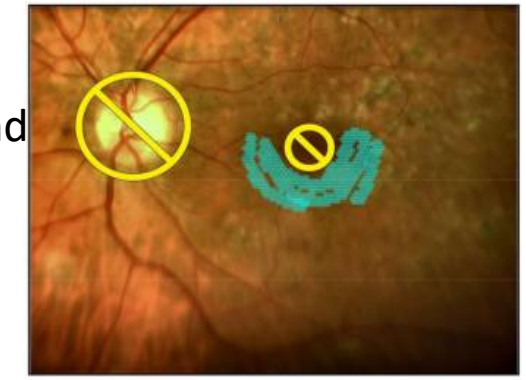
Subthreshold Micropulse Laser Treatment

Treatment planning:

Color fundus photography of the retina and OCT 3D map with 9 ETDRS grid circles



An external software allow us to introduce images, and the OCT map were introduced and are overlaid onto the fundus image for indication-focused treatment planning



Purpose of the study

To assess the safety and efficacy of subthreshold micropulse laser for the treatment of non-center-involving diabetic macular edema

Patients

38 eyes of 38 diabetic patients diagnosed with treatment-naïve non-center-involving DME, treated with subthreshold micropulse laser

Inclusion criteria:

- Age > 18 years
- DME with central macular thickness < 400 micrometers,
- Best corrected visual acuity ≥ 78 letters Early Treatment Diabetic Retinopathy Study (ETDRS) score

Exclusion criteria:

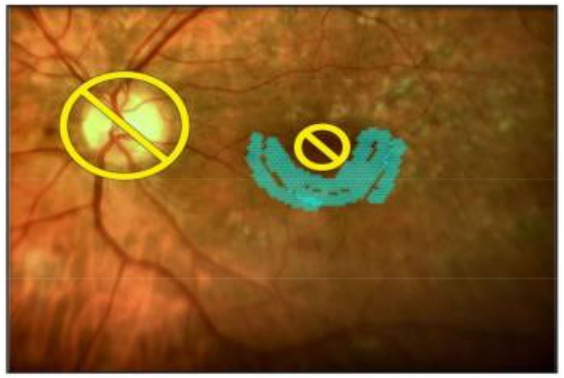
- History of glaucoma
- any retinal condition other than diabetic retinopathy
- proliferative DR
- cataract surgery performed within the last 6 months
- any systemic neurodegenerative diseases

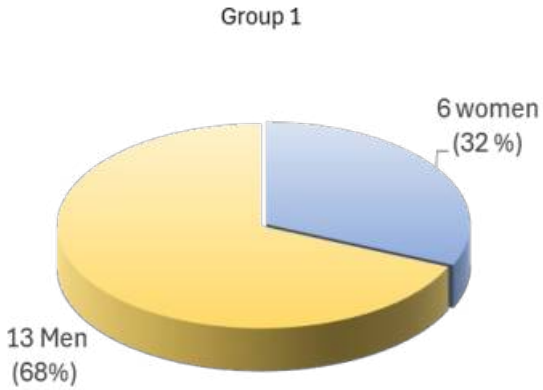
Treatment

comparison between two groups of patients:

Group 1

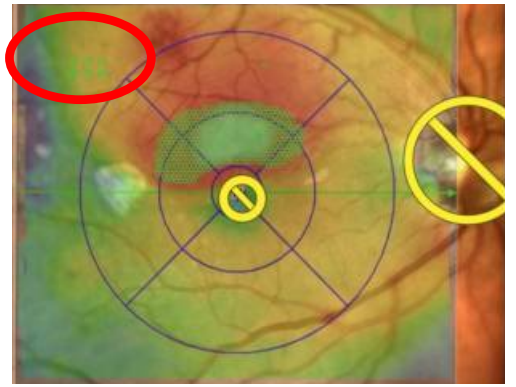
the standard treatment parameters were:
100 µm spot size, 5% duty cycle, and 250 mW power, confluent spots

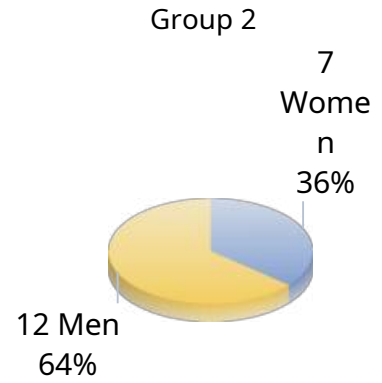




Group 2

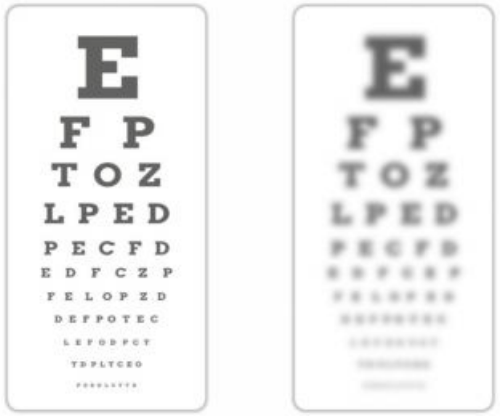
a titration test in a non-edematous retinal area located outside the vascular arcade, utilizing a 100 µm spot size.





Personalized laser parameters determined through titration testing
Start power at 70mW and increased by 10–20mW
Achieved a burn that was just barely visible.

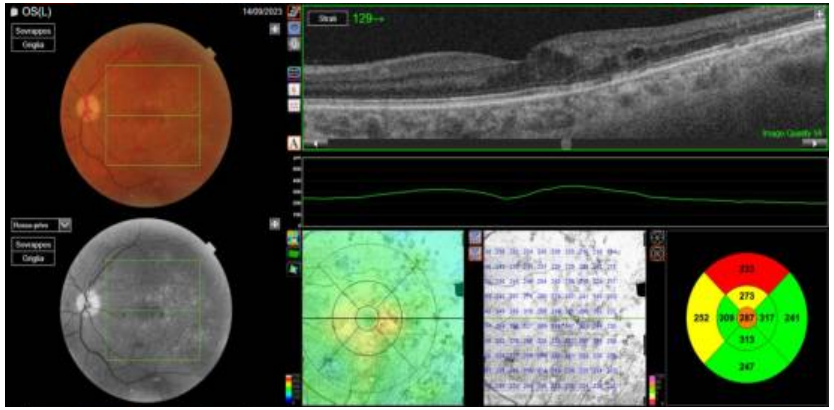
Methods



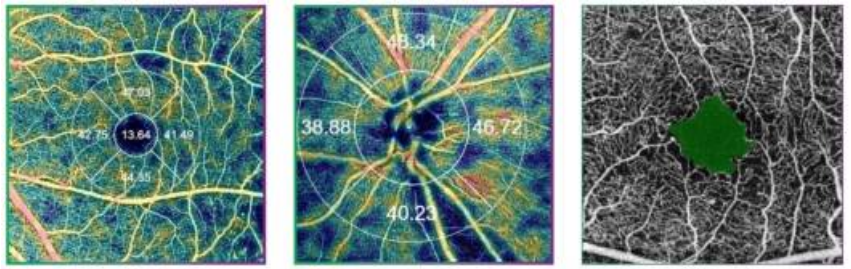
Ophthalmologic assessment

- BCVA
- Microscopic anterior segment evaluation
- IOP
- OCT
- OCT-A

- CMT
- CT
- VMT, ERM, VMA
- SRD
- DRIL
- EZ disruption
- HRS
- **FAZ area**
- **Vessel density**



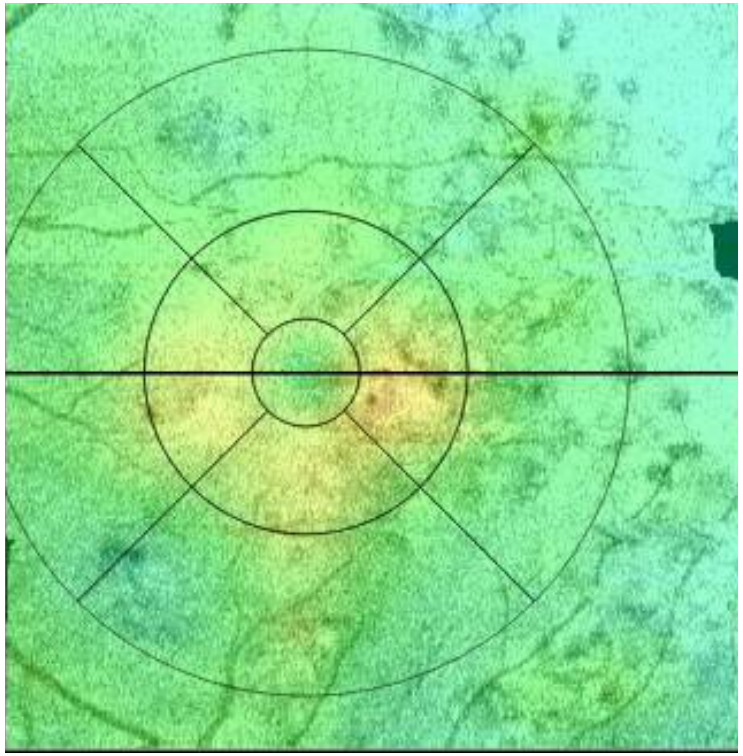
3D macula 7x7mm OCT scan centered on the fovea

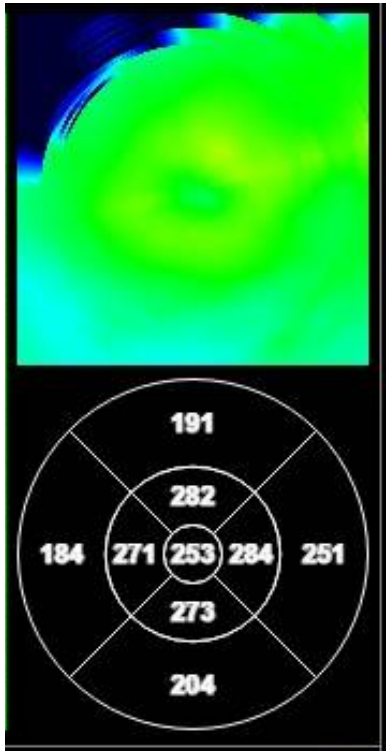


OCTA 6x6 mm scan centered on the fovea

Results

Retinal thickness in the central zone of the treatment area





Group 1:
293.5 ± 13.5 µm vs 271 ± 12.1µm p= 0.02

Group 2:
295.2 ± 12.9 µm vs 272.3 ± 13.2µm p= 0.03

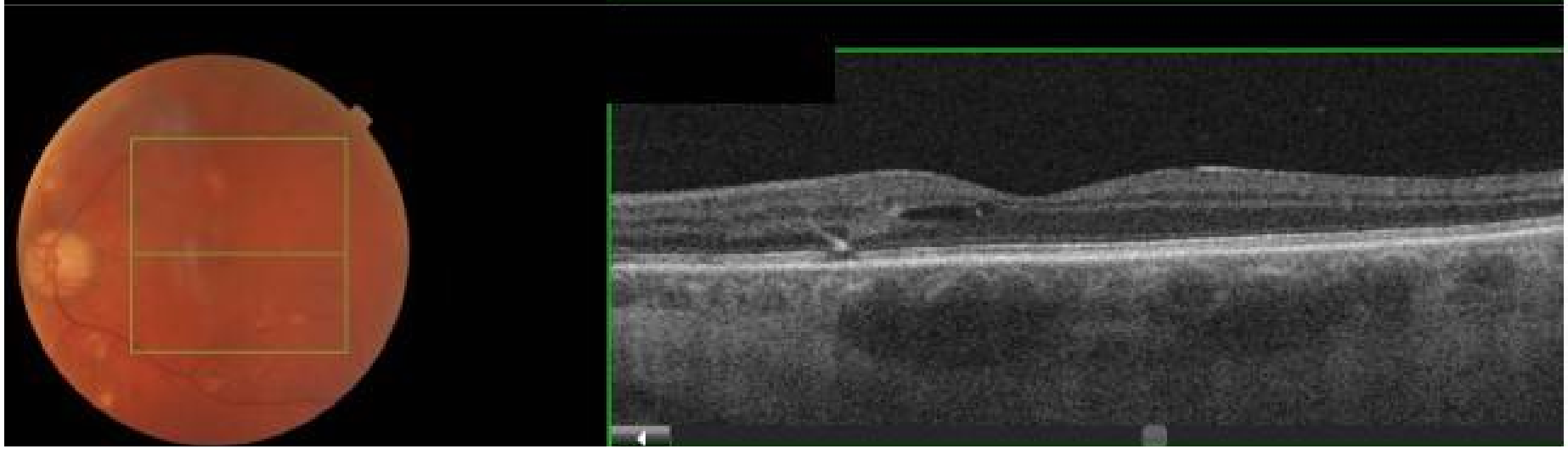
At 6 months: Group 2 vs Group 1 (p=0.69)

Results

BASELINE

BCVA 79 letters

6 MONTHS



BCVA 86 letters

Discussion

- Promising development in the treatment of non-center-involved diabetic macular edema and mild center-involved DME
- Reduction in intra-retinal fluid and hard exudates in the treated area
- Mitigate the potential side effects associated with traditional laser photocoagulation
- Our study confirmed the safety of this SMPL procedure by showing no discernible structural changes in the outer and inner retinal layers, choroidal structure, and retinal vascular plexi
- A fixed treatment strategy in SMPL offers several advantages
- The main limitations of this study include the small sample size and the relatively short

Thanks for your attention!