



بسم الله الرحمن الرحيم
"وما أوتيتم من العلم إلا قليلا"
الإسراء ٨٥

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Research Institute of Ophthalmology

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ROYAL MAXIM PALACE KEMPINSKI, CAIRO

**Unexpected improvement of
Electrophysiology tests in a
case of traumatic optic
neuropathy after
photobiomodulation therapy**

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Traumatic Optic Neuropathy (TON) is typically caused by blunt head or orbital trauma, resulting in indirect injury (shearing of axons, ischemia, and secondary apoptosis) to the optic nerve.

Prognosis: Visual outcomes are often poor, with limited efficacy for standard treatments (high-dose corticosteroids or surgical decompression).

This report describes the case of a patient with severe visual loss on the left eye from TON who showed unexpected improvement in electrophysiology tests following treatment with photobiomodulation a year after a head trauma

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Patient Profile

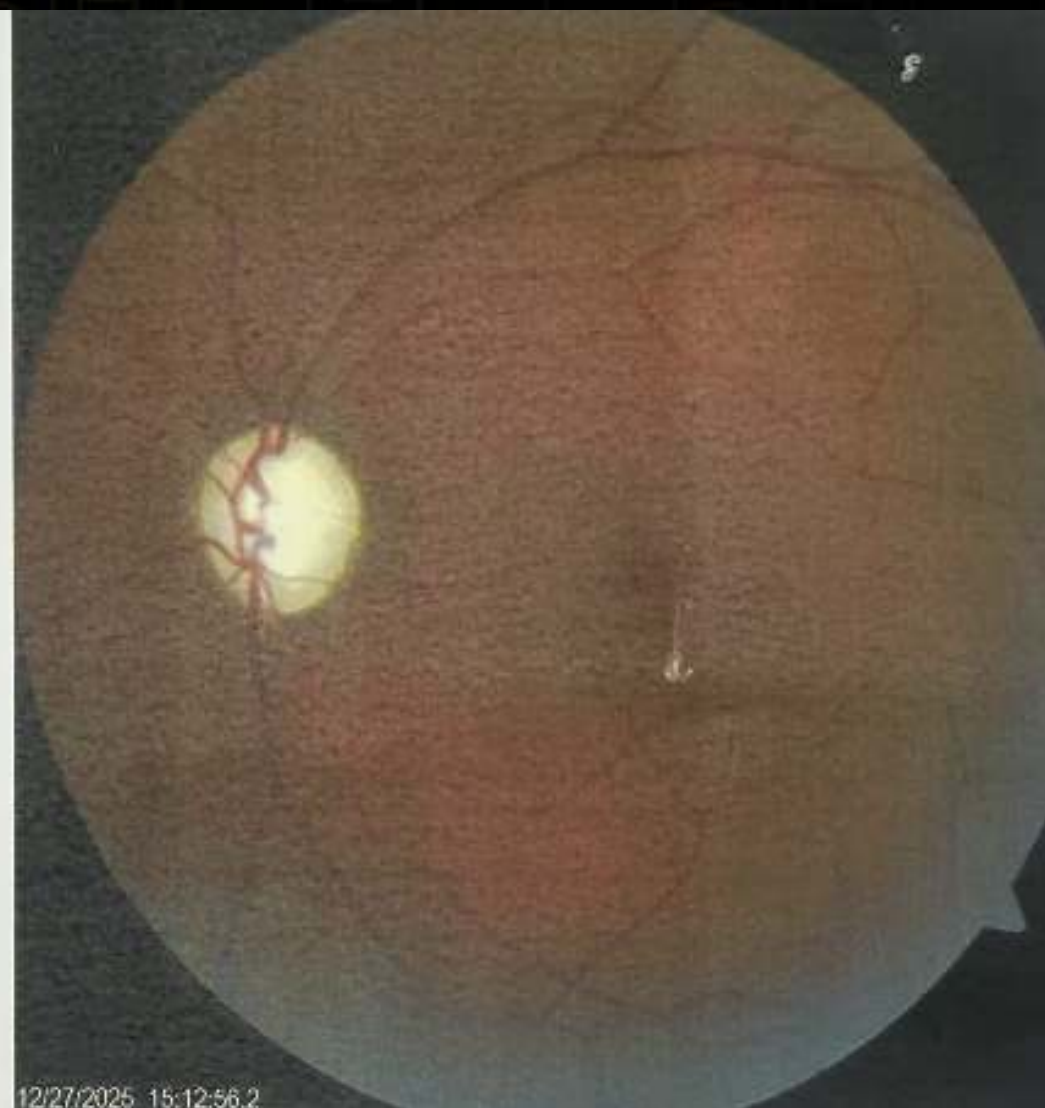
- A 30-year-old male
- History of a high-speed motor vehicle accident with closed head injury, occurring approximately 1 year ago.
- Visual Acuity : 20/20 OD, No light perception OS
- Pupillary reaction : APD OS
- Ocular motility : Normal
- Fundus examination : Optic atrophy OS, WNL OD

Investigations

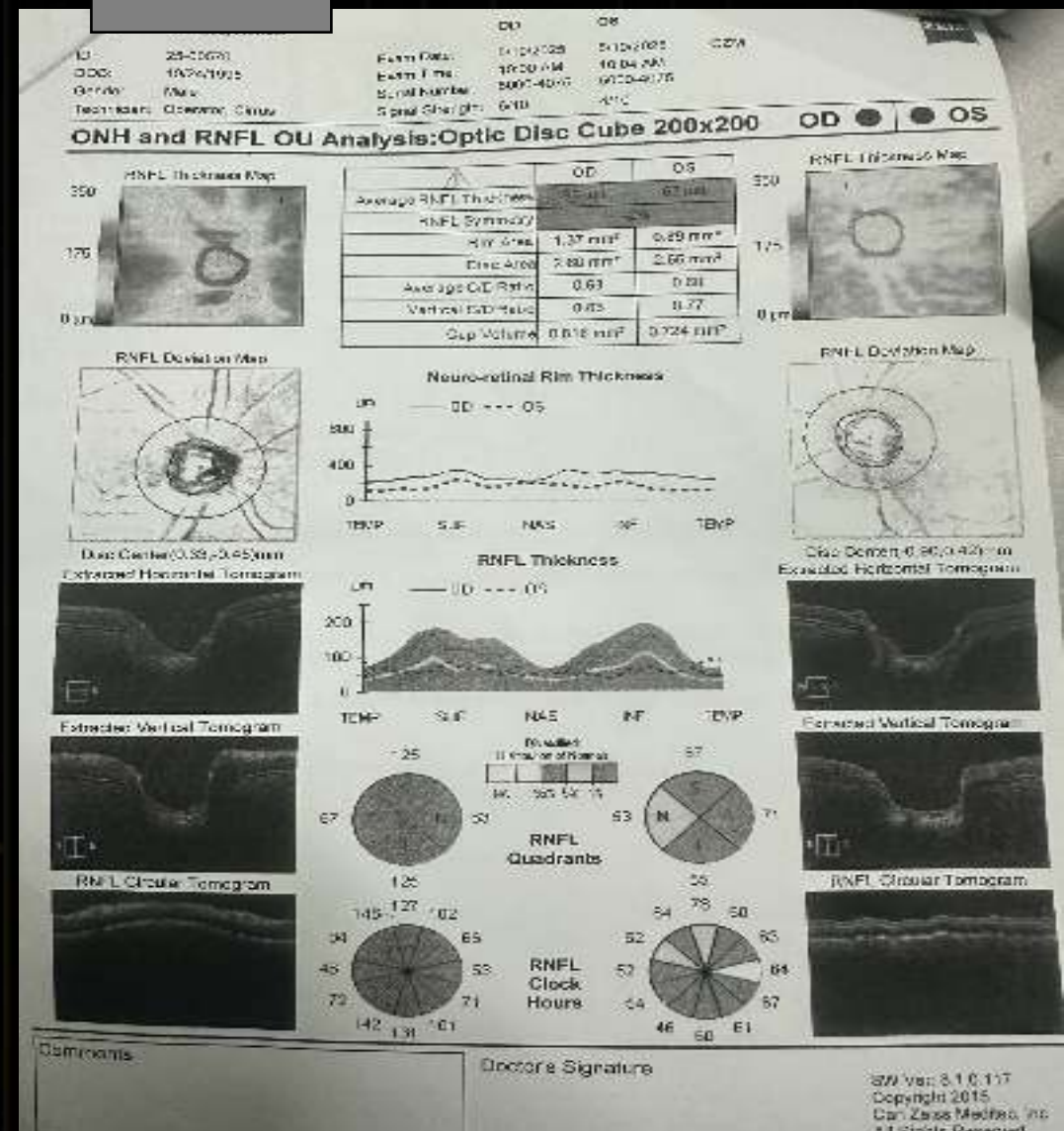
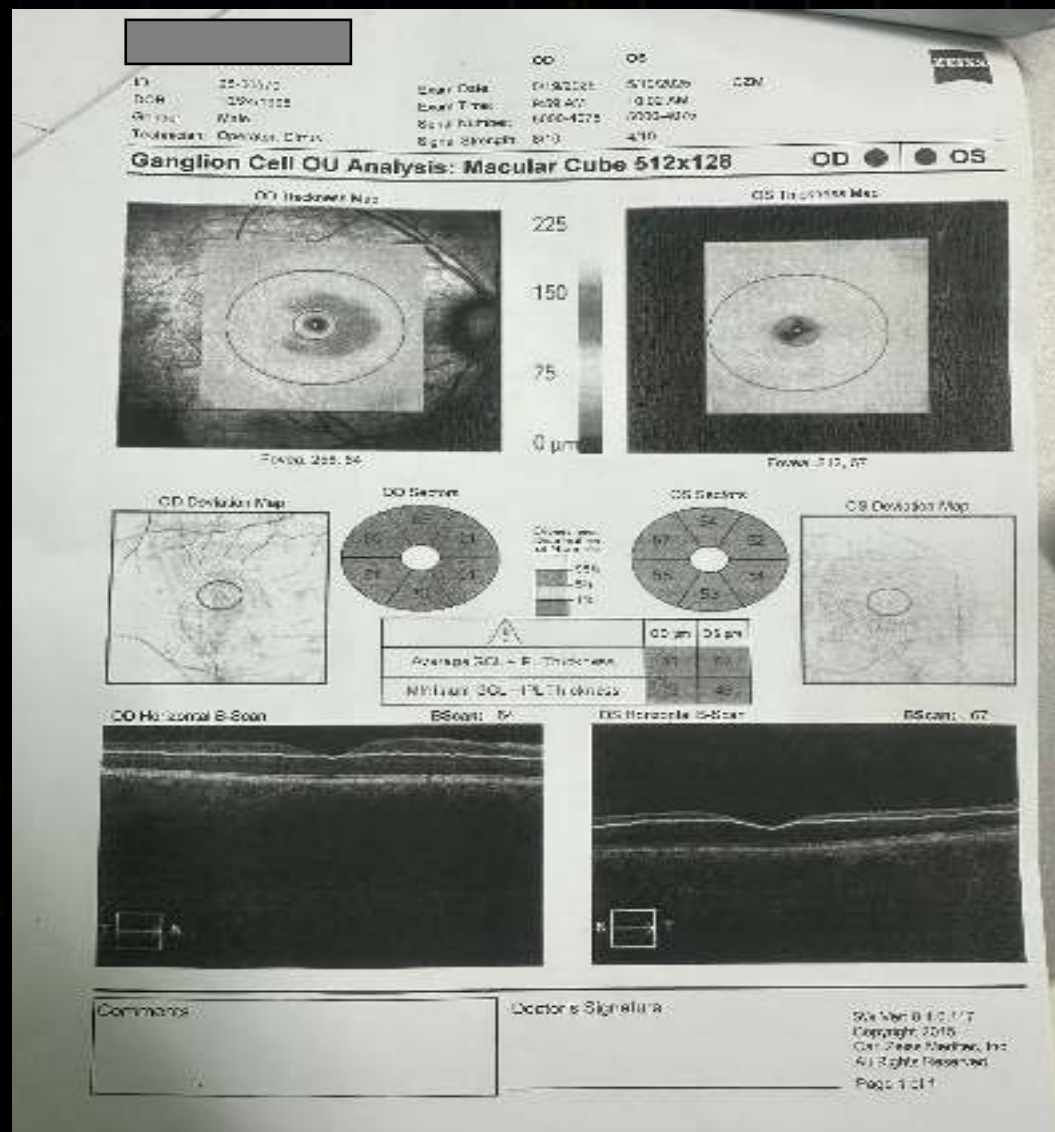
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MRI :
was done at the time of injury
revealed no gross orbital
lesion

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Bilateral OCT show:
OD : Normal RNFL thickness and Ganglion cell layer
OS : Diminished average RNFL and ganglion cell layer thickness

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Visual Filed OD

Mild generalized depression of the retinal sensitivity.

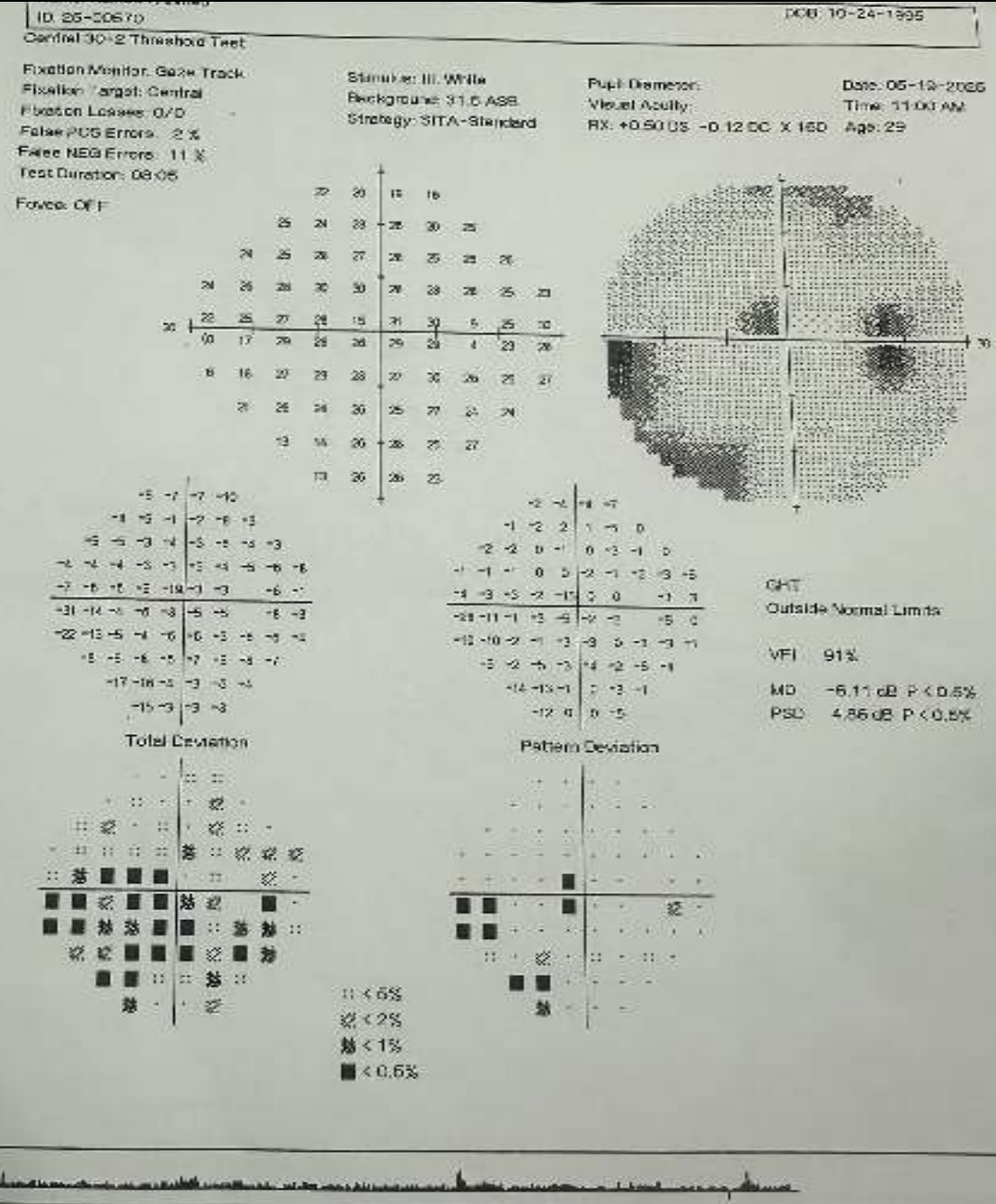
A relative inferior nasal step and inferior arcuate scotoma

VFI 91%

MD -6.11 dB $P < 0.5\%$

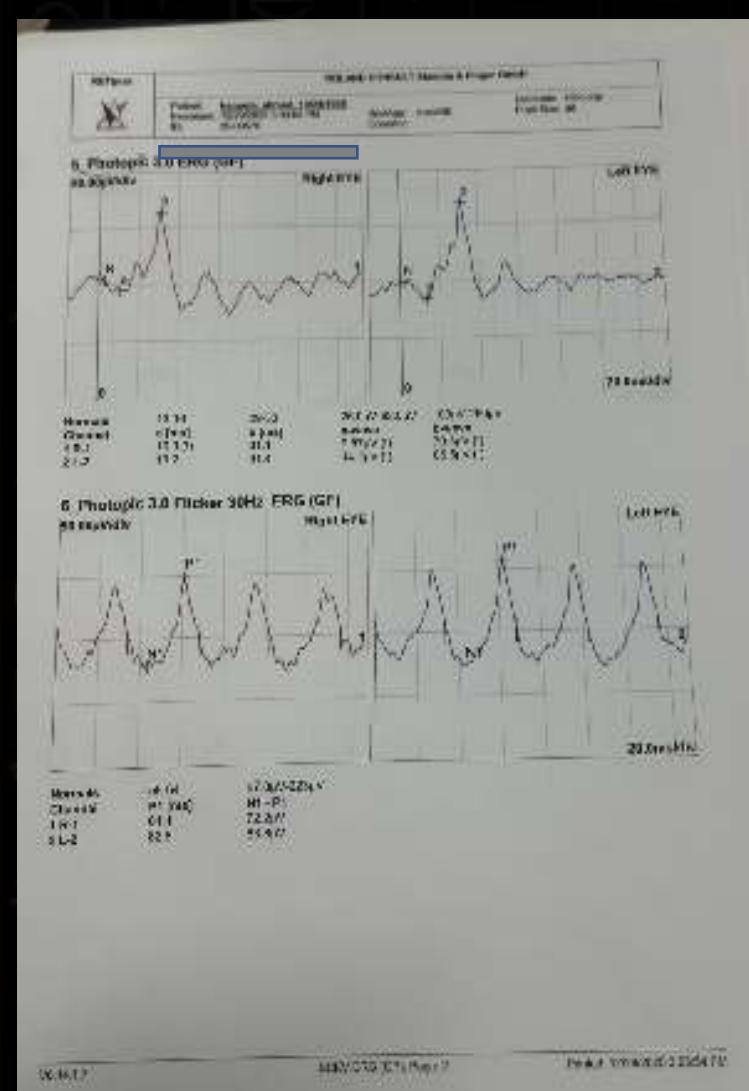
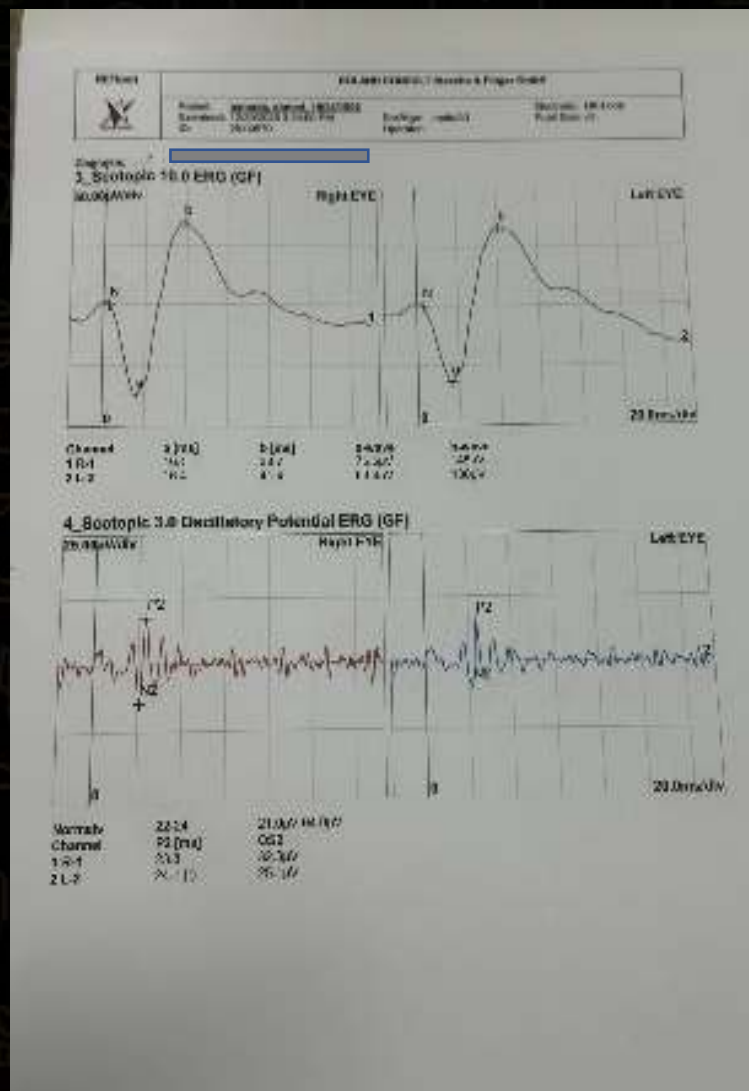
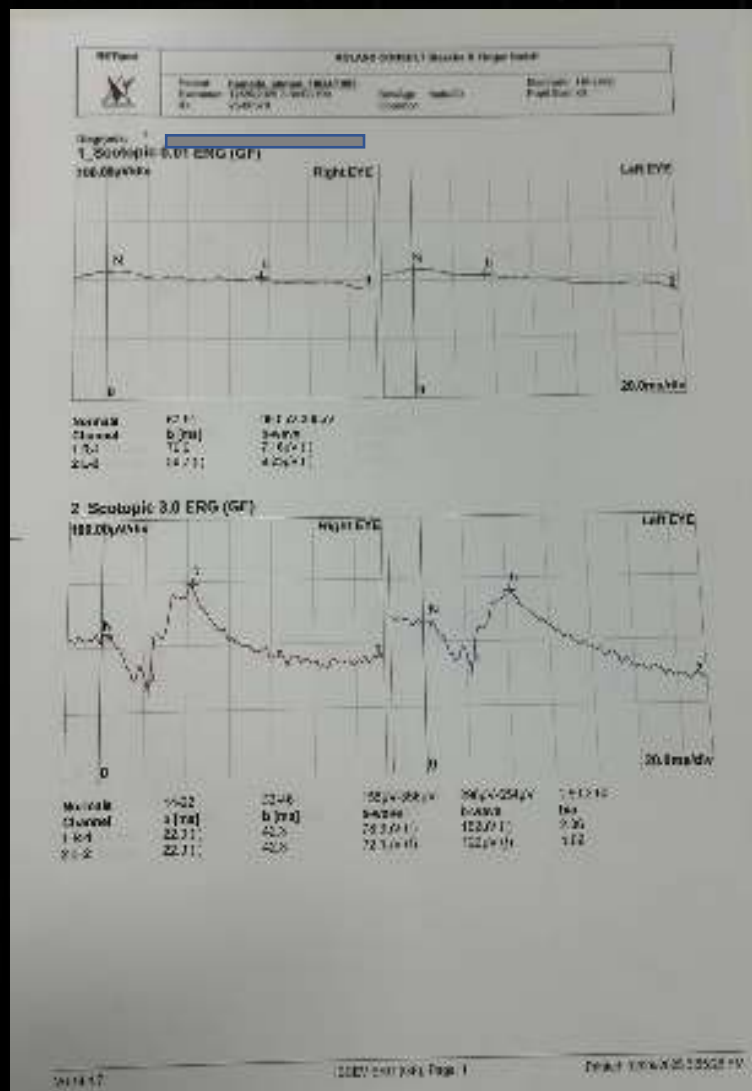
PSD 4.86 dB $P < 0.5\%$

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ELECTROPHYSIOLOGY

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Bilateral ERG of both eyes were done to exclude any retinal cause of visual loss. : revealed well formed scotopic and photopic responses indicating normal retinal mass function of both eyes .

Flash VEP

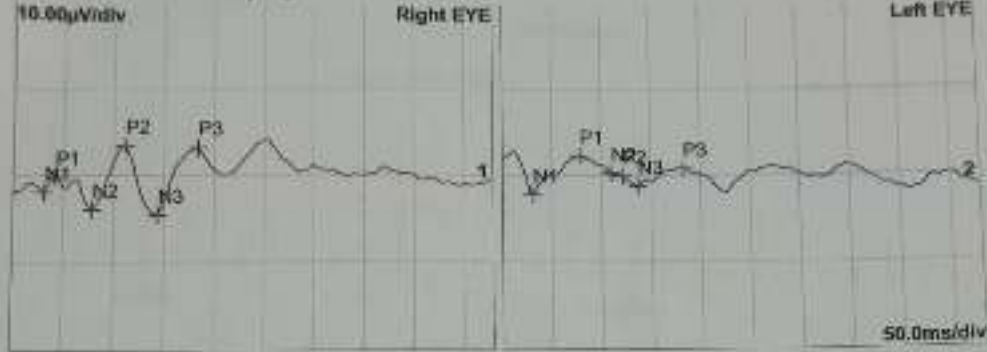
showing

- Normal response in the right eye and
- Prolonged latency and Reduced amplitude in left eye

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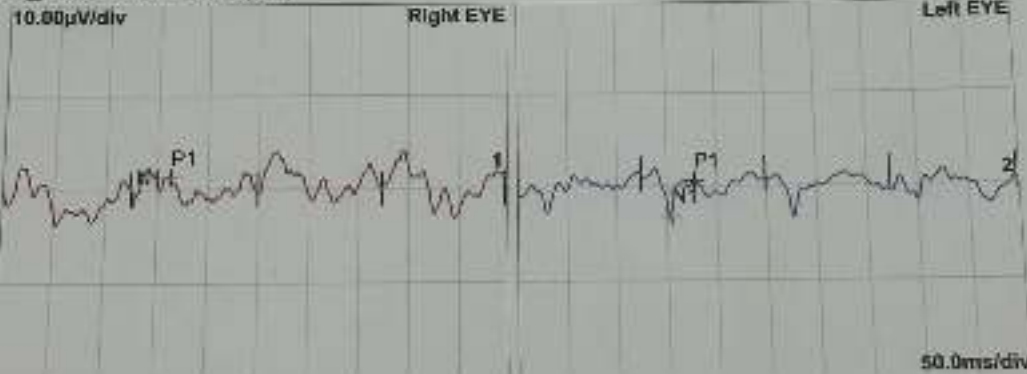
RETEX	ROLAND CONSULT Masche & Finger GmbH		
Examined: 16/02/25 12:47:45 PM	Doc/Agc: mas428	Electrode: EEG-GelCap	
ID: 25-00370	Operator:	Pupil Size: normal	

Diagnosis:
1_Flash-VEP 1.4 Hz (GF)



Channel	N1 [ms]	P1 [ms]	N2 [ms]	P2 [ms]	N3 [ms]	P3 [ms]	N1-P1	N2-P2	N3-P3
1 R-1.4 Hz	121.0	41.3	78.0	110.8	143.7	184.1	1.78µV	7.37µV	1.75µV
2 L-1.4 Hz	181.0	78.0	109.9	121.2	137.1	163.2	4.53µV	301nV	2.04µV

2_Flash-VEP 12 Hz (GF)



Channel	N1 [ms]	P1 [ms]	N1-P1
1 R-12 Hz	128.2	162.4	2.04µV
2 L-12 Hz	154.8	178.1	3.83µV

Treatment

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Method:

Photobiomodulation therapy using subthreshold micropulse laser (SMPL) was initiated on 26/10/2025, approximately one year after the injury, at the patient's request.

Diode laser 810 nm

Setting

- Power: 700 μ W
- Duty cycle: 10%
- Duration: 0.2 s
- Interval: 0.2s
- Shots: 400
- Every week



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Results

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Unexpected Improvement

6 weeks following the Photobiomodulation treatment,
Electrophysiology unexpectedly improved for both eyes.

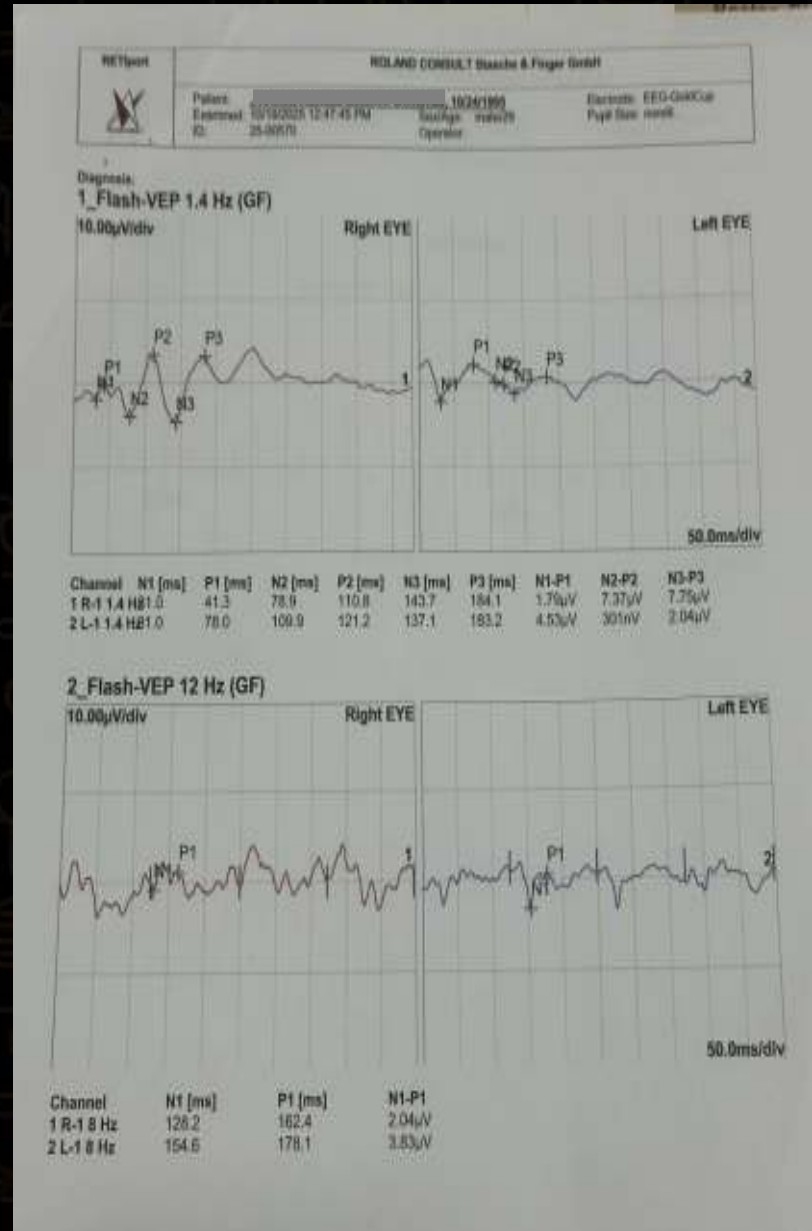
Furthermore, the Visual Field test showed improvement for the
right eye.

Before

Flash VEP OS

Latency: 121.2 ms

Amplitude: 0.301uv



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Before

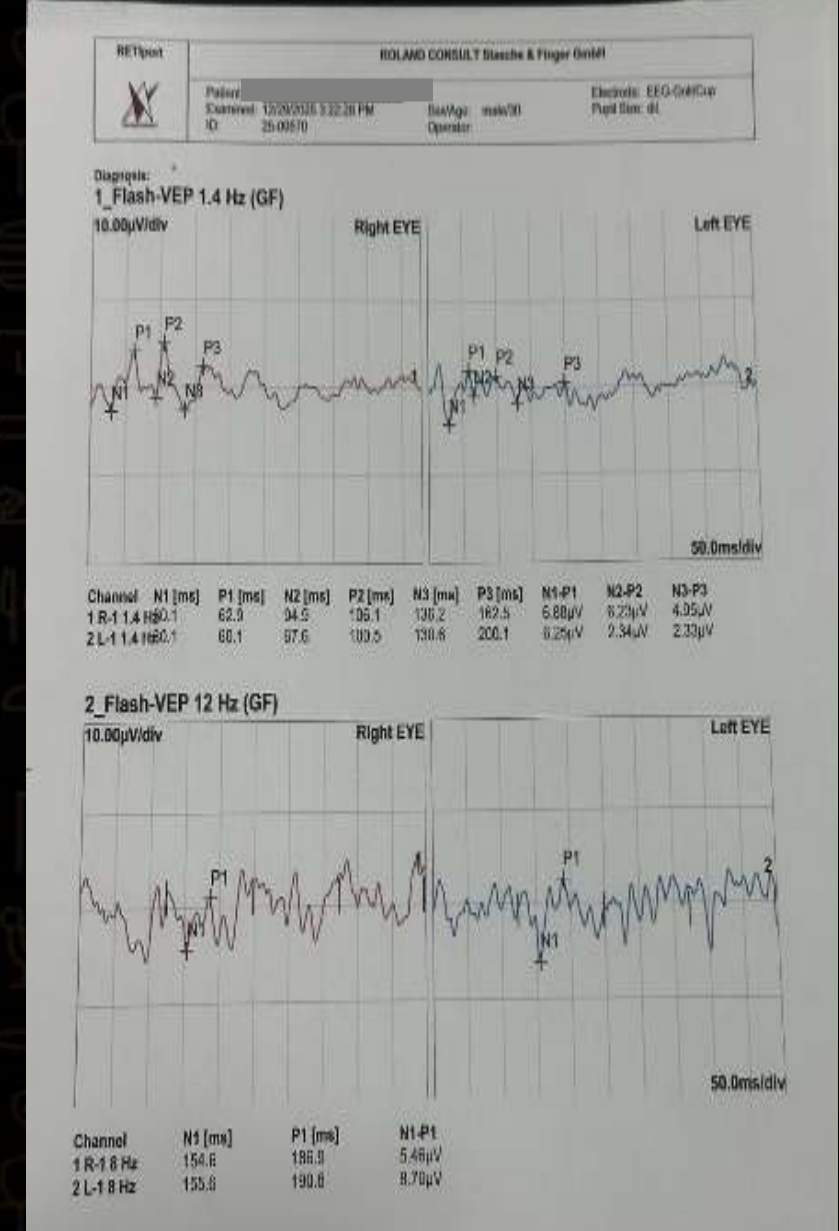
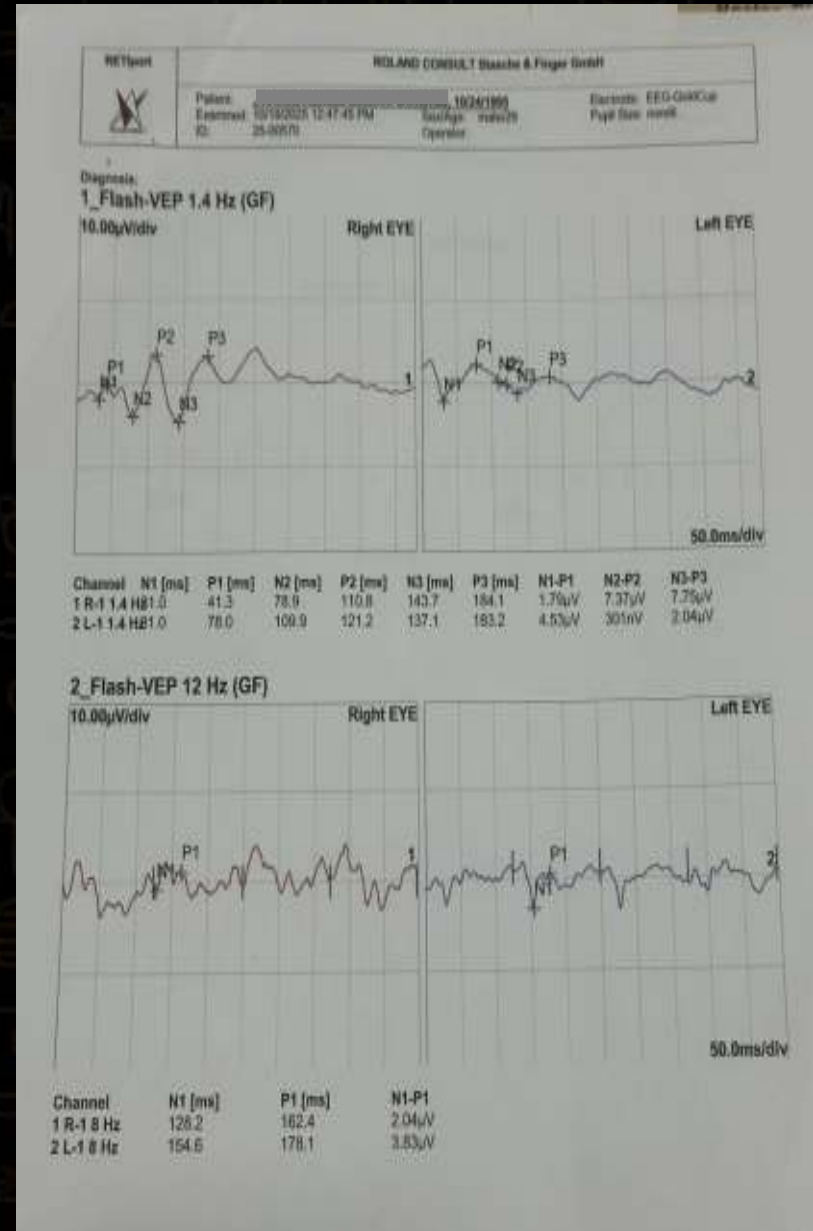
After

Flash VEP OS

Latency: 121.2 ms → 100.2 ms
(17%)

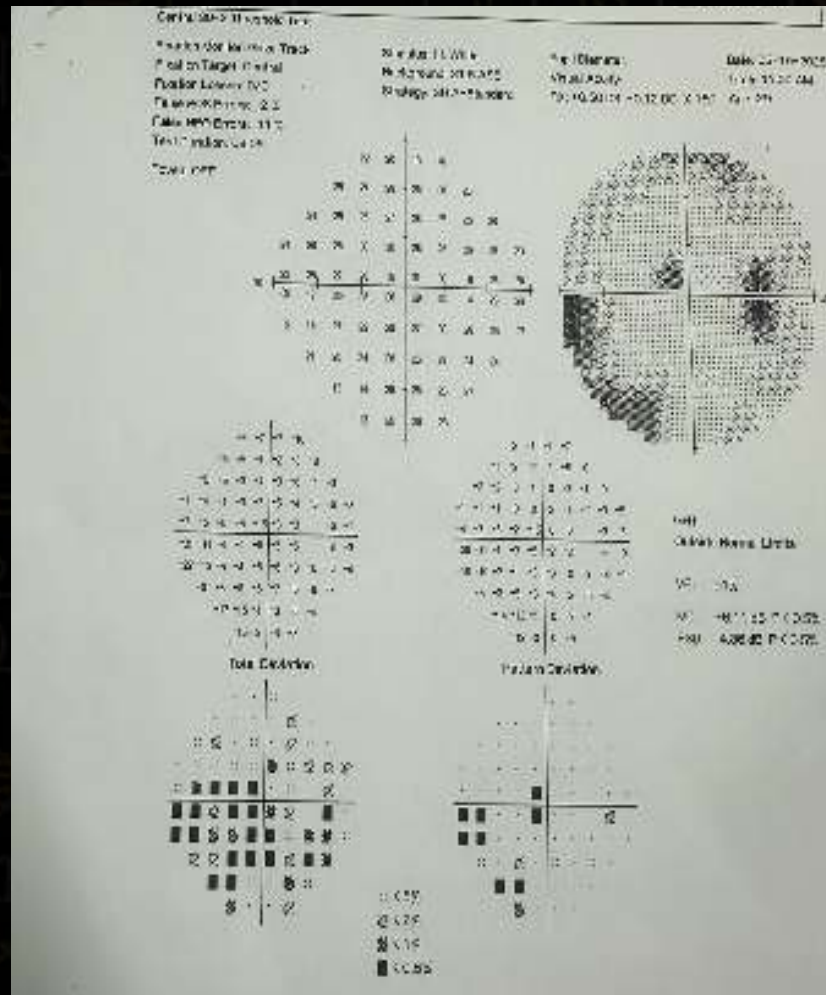
Amplitude: 0.301 μ V → 2.34 μ V
(70%)

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VF OD

Before



VF 91%

MD -6.11 dB P < 0.5%

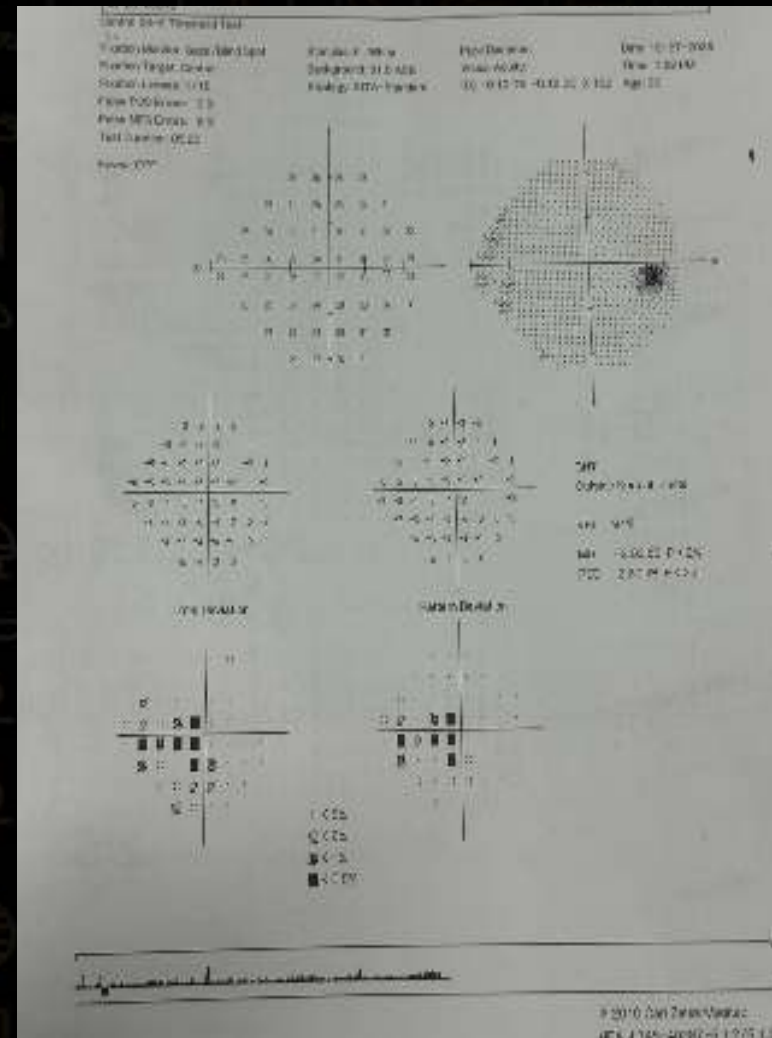
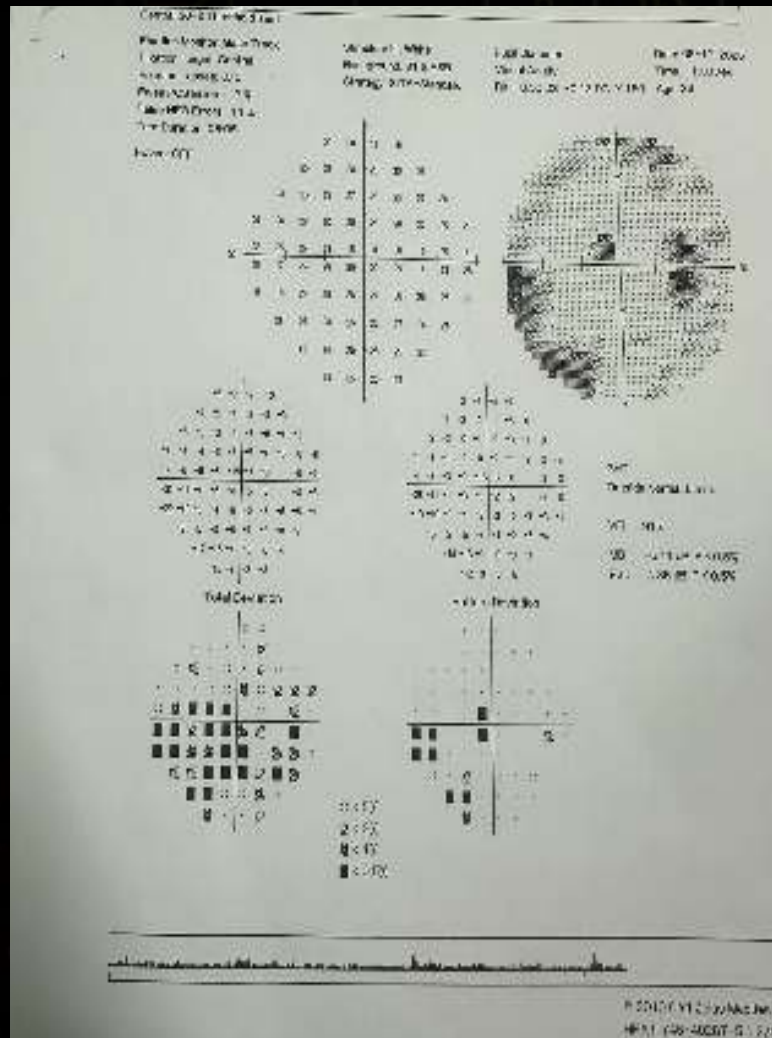
PSD 4.86 dB P < 0.5%

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VF OD

Before

After



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VFI 91%
 MD -6.11 dB P < 0.5%
 PSD 4.86 dB P < 0.5%

Improvement 50%

VFI 94%
 MD -3.03 dB P < 2%
 PSD 2.60 dB P < 2%

Mechanism of action of Photobiomodulation

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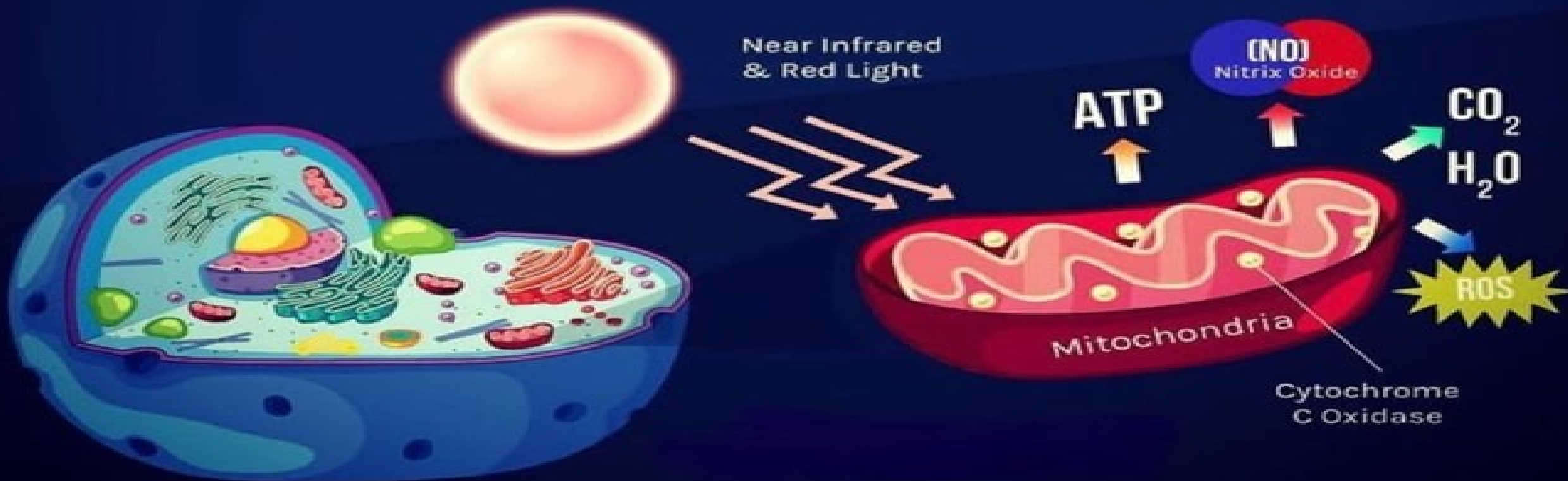
PHOTOBIOIMODULATION

Photobiomodulation is like jump starting a dead car battery. It improves the function of mitochondria within the cell, which increases ATP production.

SHINING LIGHT ON TISSUE
(Red light or Near-infrared)

IMPROVED TISSUE FUNCTION

- Anti-inflammatory Effects
- Improved Energy Metabolism



Conclusion

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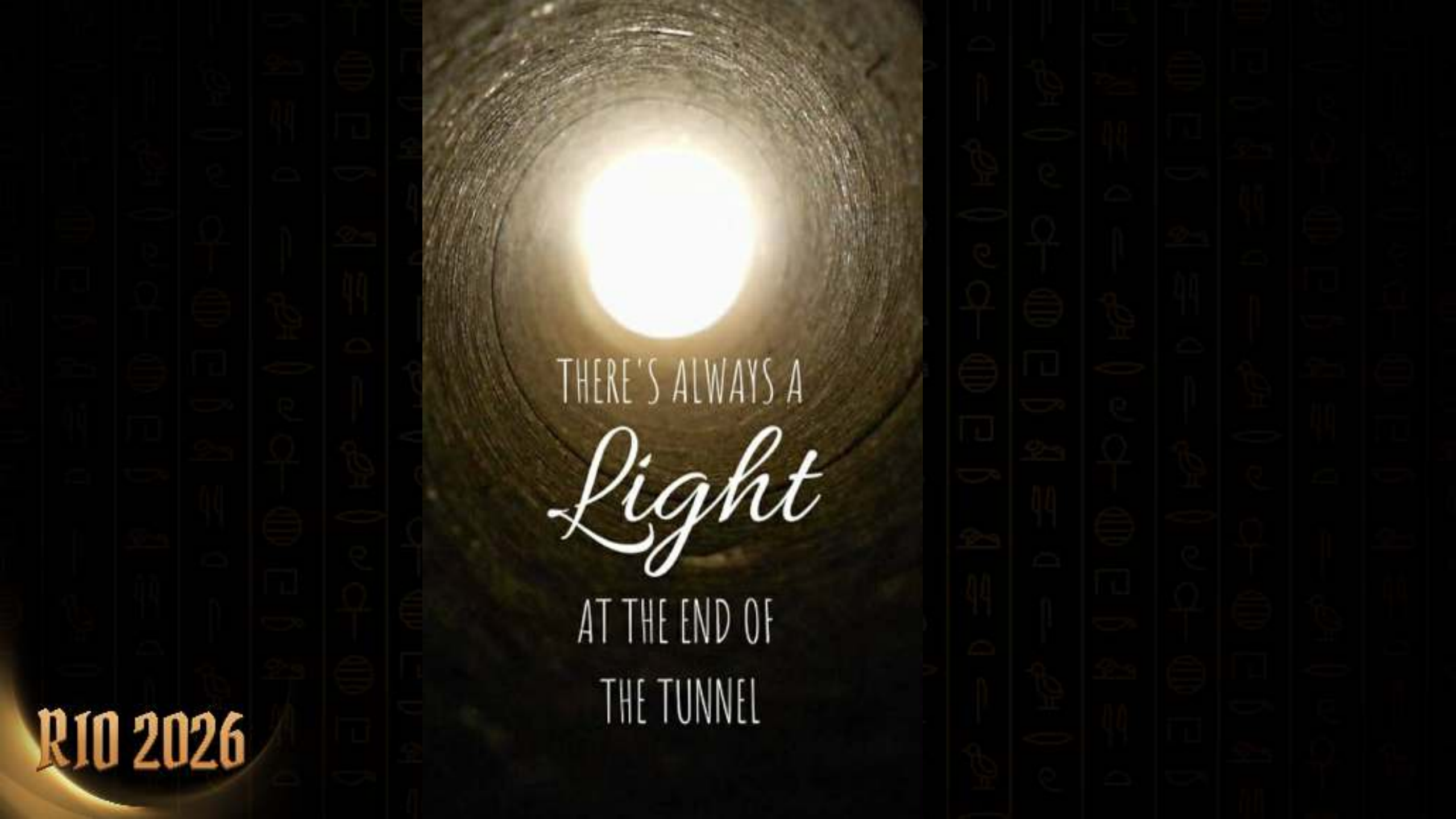
Conclusion

- Photobiomodulation has positive effect on visual pathway recovery when it is not permanently severed.

Take Home Message

This case suggests that Photobiomodulation may represent a novel, non-invasive therapeutic approach for TON.

Further research and randomized controlled trials are warranted to investigate this unexpected finding.



THERE'S ALWAYS A
Light
AT THE END OF
THE TUNNEL

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Thank you



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