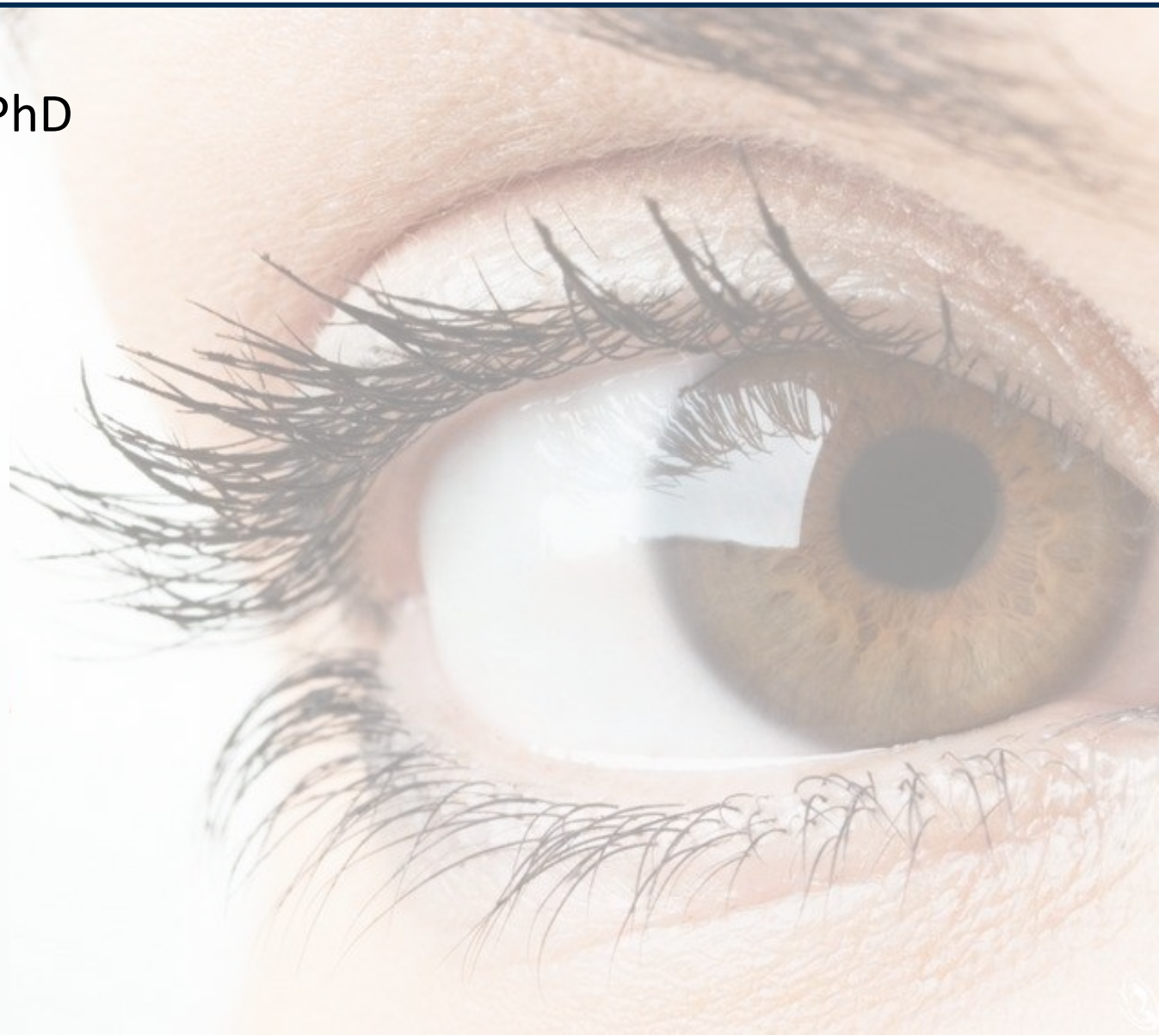
EYETRONIC® - Restoring Vision in Glaucoma

41. Workshop Glaucoma, Carl Erb, MD, PhD
20th of January 2024

eyetronic
restoring vision

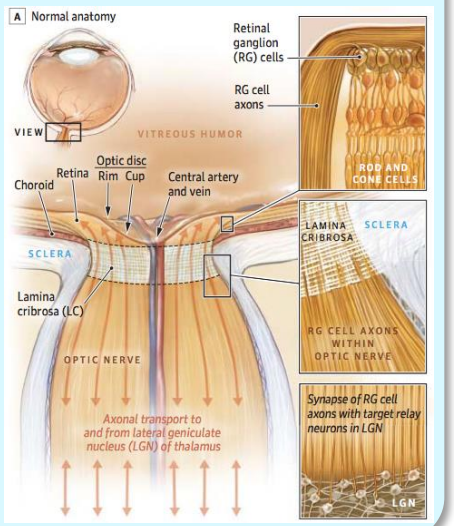


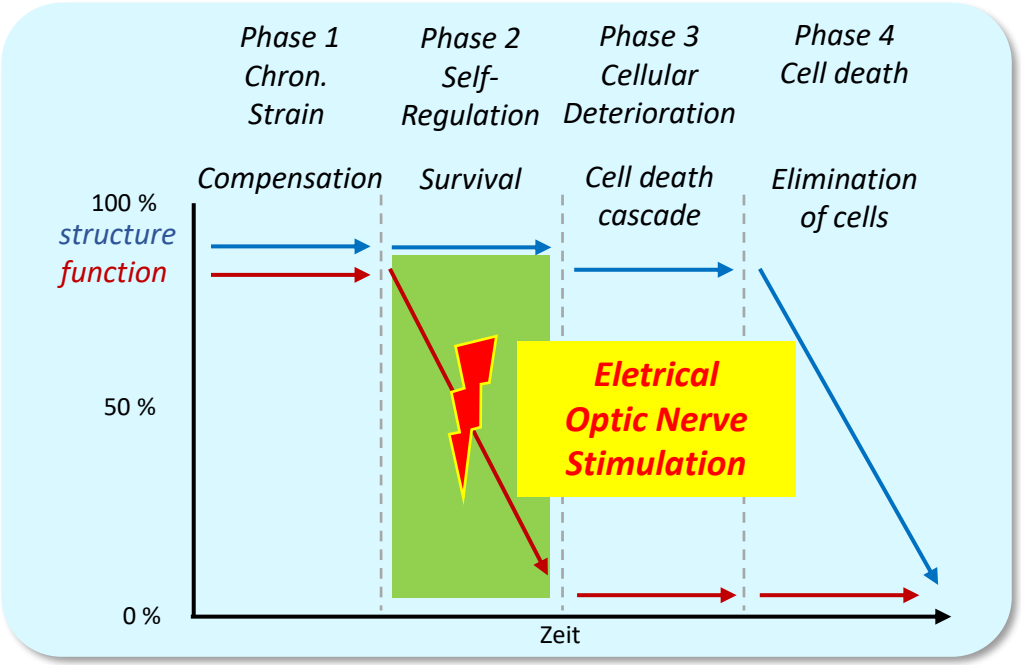
Glaucoma - a neuropathy of the optic nerve

The neuropathy of Glaucoma - Treatment of IOP is not enough

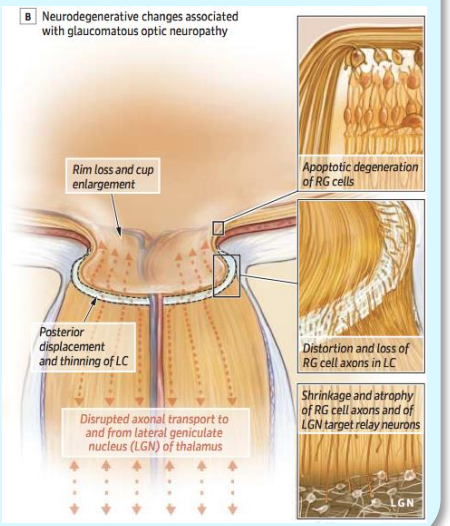
- Chronic stress leads to the termination of cell metabolism in the retinal ganglion cells and their nerve fibers.
- This leads to inactivity of the nerve cells so that their function – and Visual Field (VF) – are lost.
- Subsequently, nerve cells die causing deterioration of the optic nerve.

Healthy optic nerve





Diseased optic nerve



With structure in place function can be altered and a reactivation is possible.

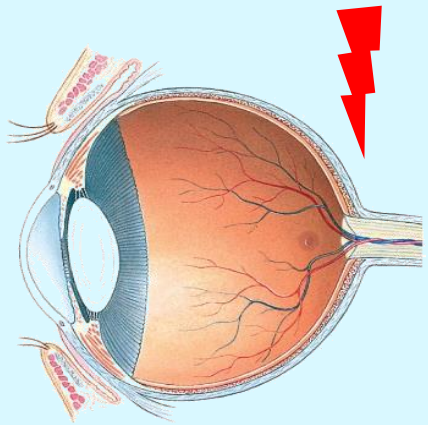
Weinreb et al., JAMA 311: 1901-11, 2014, Porciatti & Ventura, J Neuroophthalmol 32: 354-8, 2012; Cordeiro et al., Brain 140: 1757-67, 2017

Optic Nerve Stimulation - Mechanism of Action

Preclinical evidence of the effects of electrical stimulation of the optic nerve

- Reactivation of nerve cells prevent further deterioration: Neuroprotection.
- Function is restored: Functional neurorestoration.
- Degenerated nerve fibers sprout and restore: Structural neurorestoration.

Optic nerve stimulation



Mechanism

Neurotrophic Factors / Immunomodulation

IGF-1 ↑	IL-10 ↑
BDNF ↑	IL-6 ↓
CNTF ↑	COX-2 ↓
FGF-2 ↑	NF-kB ↓
TNF-α ↓	
Glutamine synthase ↑	Intracellular Ca^{2+} ↑
Caspase 3 ↑	Perfusion ↑

Effects

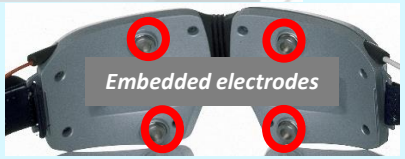
- Neuroprotection
- Functional Neurorestoration
- Structural Neurorestoration

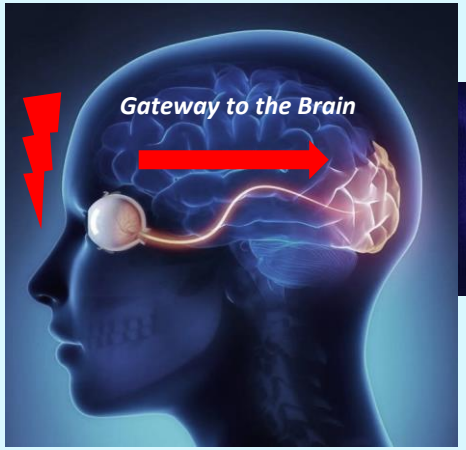
Fu et al., Trans Vis Sci Tech 7: 7, 2018; Fu et al., Graefes Arch Clin Exp Ophthalmol 253: 171-6, 2015; Yin et al., Brain Res 1650: 10-20, 2016

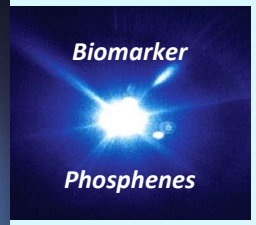
Optic Nerve Stimulation for patients with EYETRONIC®

External electrical stimulation with stimulation goggles leads to neuronal activity

- A biomarker confirms the evidence of signal transmission: the stimulation causes flashes of light, so called phosphenes.
- The cell metabolism of inactive nerve cells is reactivated and leads to the resumption of function.
- Neuronal signals are transmitted from the retina along the optic nerve to the visual cortex.







Painless, non-invasive stimulation of both eyes	10 sessions for 40 - 70 minutes each
CE certified Therapy	No serious adverse event in over 8 000 single sessions

Neuromodtronic Data, Europe, 2023

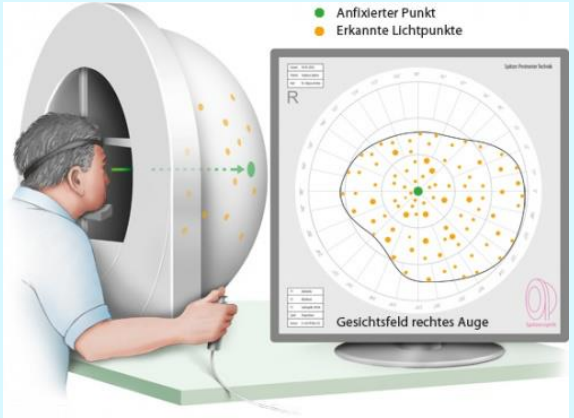
EYETRONIC® - effectiveness in clinical routine use

More than 800 patients beeing treated with EYETRONIC® in clinical routine use

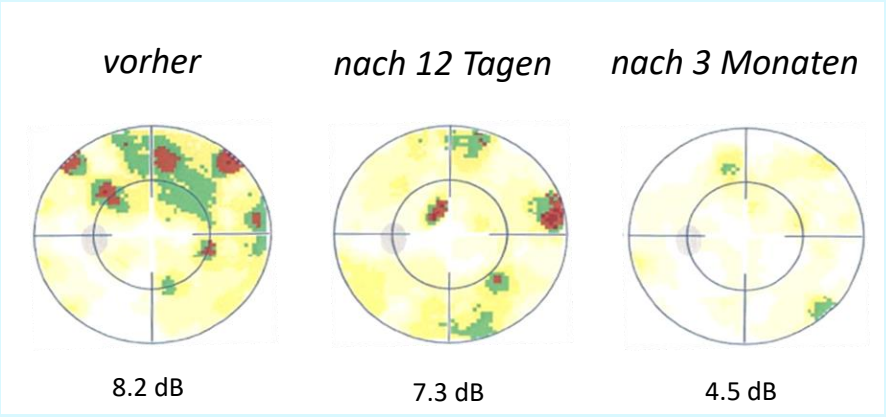
- The proof of therapy success is done via a standard perimetric examination of the visual field.
- Already three months after treatment, the visual field can improve.
- Impaired visual field areas can be restored in places.

Treatment with EYETRONIC®

Diagnosis with Standard Perimetry



Outcome: Improved Visual Field



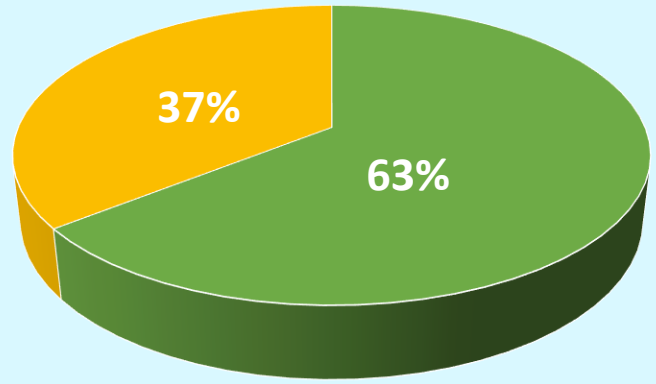
Neuromodtronic PMCF Data, Germany, 2022

Long-term data confirm EYETRONIC® efficacy

Key findings of 12-month PMCF study with 70 german glaucoma patients

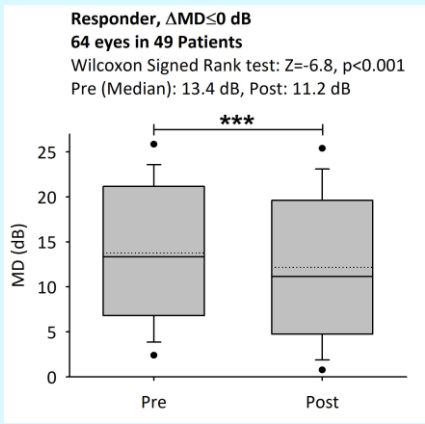
- Perimetric examination after one year of 101 eyes in 70 glaucoma patients with progressive visual field loss despite IOP management.
- In 63.4% of treated eyes a halt in the progression of the visual field loss was observed.
- Improved Mean Defect (MD) and partial visual field restoration in 59%.

Eyes treated (n=101)

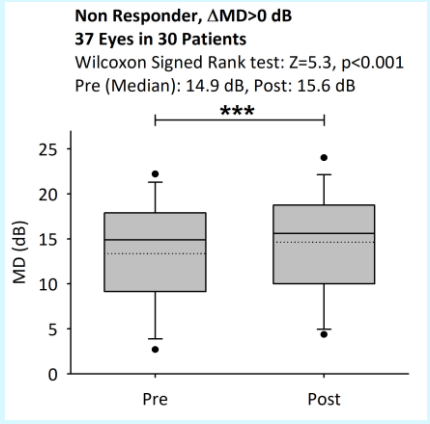


Responder, n=64 *Non Responder, n=37*

Comparison of Mean Defect (MD) (n=70)



Responder MD -2.2dB



Non Responder MD +0.7dB

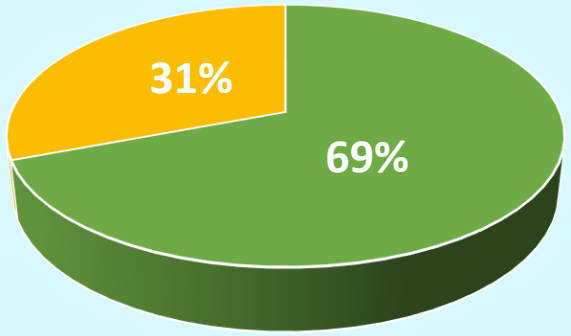
Neuromodtronic PMCF Data, Germany, 2022

EYETRONIC® - results for Normal Tension Glaucoma patients

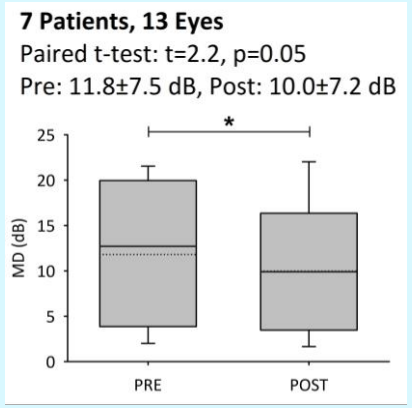
Findings of 12-month follow-up of 7 Normal Tension Glaucoma (NTG) patients in 3 therapy centers

- Halt in visual field loss progression in 9 of 13 eyes (69.2%).
- Despite a small number of patients, significant improvement of visual field.

Halt of visual field loss in treated eyes (n=13)

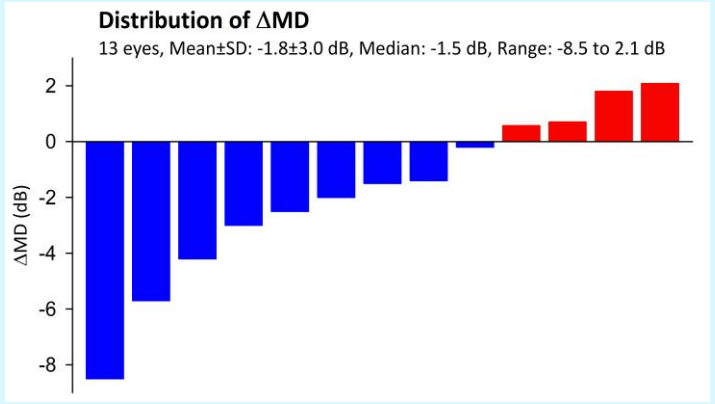


MD of all patients @ 12 month



MD improved by -1.8 dB

MD change stronger in Responders



MD of responders improved by up to -8.2 dB

Neuromodtronic PMCF data, Germany, 2023

International Interest in EYETRONIC® Data

Peer-reviewed Journal Publication and presentation at the 10th World Glaucoma Congress (WGC)

12-month data in Bioelectronic Medicine, Erb et al., 2022

Erb et al. Bioelectronic Medicine (2022) 8:6
https://doi.org/10.1186/s42234-022-00089-9

Bioelectronic Medicine

RESEARCH ARTICLE Open Access

Electrical neurostimulation in glaucoma with progressive vision loss

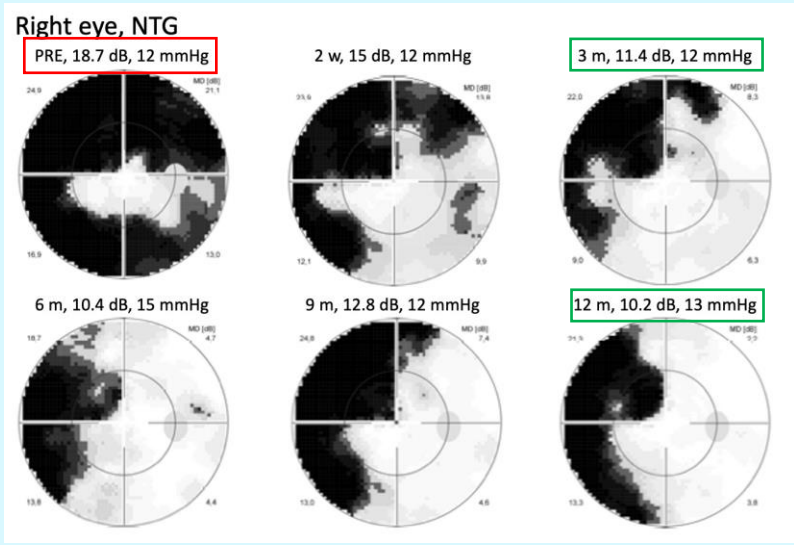
Carl Erb[1], Sophie Eckert[2], Pia Gindorf[1], Martin Köhler[3], Thomas Köhler[3], Lukas Neuhann[4], Thomas Neuhann[4], Nadja Salzmann[3], Stefanie Schmickler[5] and Jens Ellrich[6*]

Normal Tension Glaucoma (NTG) patients, WGC 2023

Electrical optic nerve stimulation in normal tension glaucoma *P-303*

J. ELLRICH[1], C. ERB[2], S. ECKERT[3], M. KÖHLER[4], T. KÖHLER[4], N. SALZMANN[4] email: glaucoma.ntg@gmail.com

[1] Medical Faculty, Friedrich-Alexander-University, Erlangen, Germany; [2] Augenklinik Wittenbergplatz, Berlin, Germany; [3] Medizentrum, Neu-Ulm, Germany; [4] Gemeinschaftspraxis Salzmann/Köhler, Hannover, Germany



EYETRONIC® - Restoring Vision

Thank you very much for your attention – contact us!

Europe
Neuromodtronic GmbH
Rosa-Luxenburg-Straße 3
D-03044 Cottbus
Germany

E-Mail: therapie@eyetronic.com

USA
Neuromodtronic Inc.
17331 Newhope Street
CA 92708-4343 Fountain Valley
USA

E-Mail: therapy@eyetronic.com

www.eyetronic.com

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