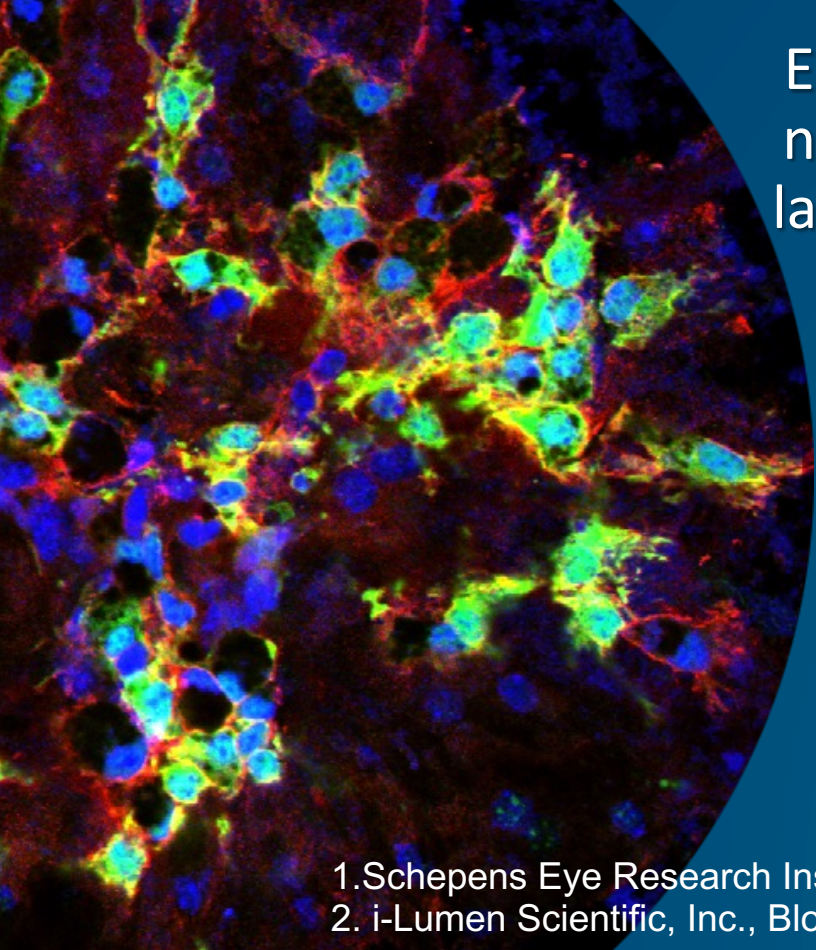




Electric stimulation ameliorates choroidal neovascularization and improves vision in laser-induced mouse model of age-related macular degeneration

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Commercial Relationships Disclosure:

Anton Lennikov: Code P (Patent):Schepens Eye Research Institute; Code F (Financial Support):i-Lumen Scientific, Inc.

Farris ElZaridi: Code F (Financial Support):i-Lumen Scientific, Inc.

Conor Minogue: Code C (Consultant/Contractor):i-Lumen Scientific, Inc.

Dongfeng Chen: Code C (Consultant/Contractor):i-Lumen Scientific, Inc.;Code P (Patent):Schepens Eye Research Institute



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Prevalence of the AMD in the United States

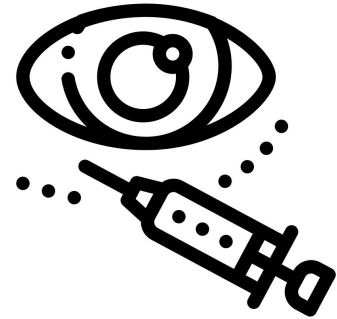


Approximately **one in 10** Americans
ages **50 and older** have the early form
of age-related macular degeneration

<https://preventblindness.org>

VEGF Therapy

- Current therapy of nAMD involves anti-VEGF agents that block pathological angiogenesis, however, less than 40% of patients achieve significant improvement in vision.



Mettu, P. S., Allingham, M. J. & Cousins, S. W. Incomplete response to Anti-VEGF therapy in neovascular AMD: Exploring disease mechanisms and therapeutic opportunities. Prog Retin Eye Res 82, 100906, doi:10.1016/j.preteyeres.2020.100906 (2021).

Background Publication Electric Stimulation

Electrical Stimulation Induces Retinal Müller Cell Proliferation and Their Progenitor Cell Potential

Sam Enayati ^{1 2 3 4}, Karen Chang ¹, Hamida Achour ^{1 4}, Kin-Sang Cho ¹, Fuyi Xu ⁵, Shuai Guo ¹, Katarina Z Enayati ¹, Jia Xie ¹, Eric Zhao ¹, Tytteli Turunen ¹, Amer Sehic ⁶, Lu Lu ⁵, Tor Paaske Utheim ^{1 2 3 6 7}, Dong Feng Chen ¹

Non-invasive electrical stimulation as a potential treatment for retinal degenerative diseases

Chang, Karen; Enayati, Sam; Cho, Kin-Sang; Utheim, Tor P. MD, PhD; Chen, Dong Feng MD, PhD*

Author Information 

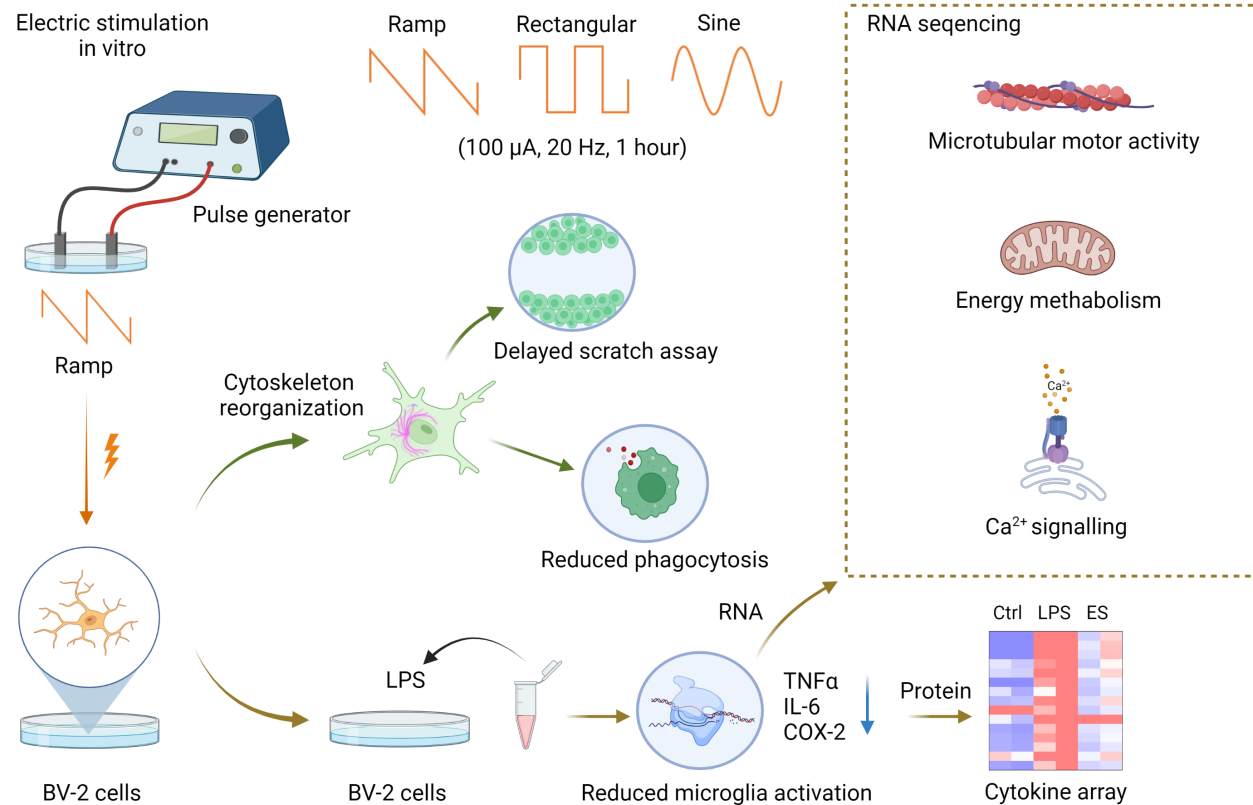
Neural Regeneration Research 16(8):p 1558-1559, August 2021. | DOI: 10.4103/1673-5374.303015

> Invest Ophthalmol Vis Sci. 2020 Apr 9;61(4):5. doi: 10.1167/iovs.61.4.5.

Noninvasive Electrical Stimulation Improves Photoreceptor Survival and Retinal Function in Mice with Inherited Photoreceptor Degeneration

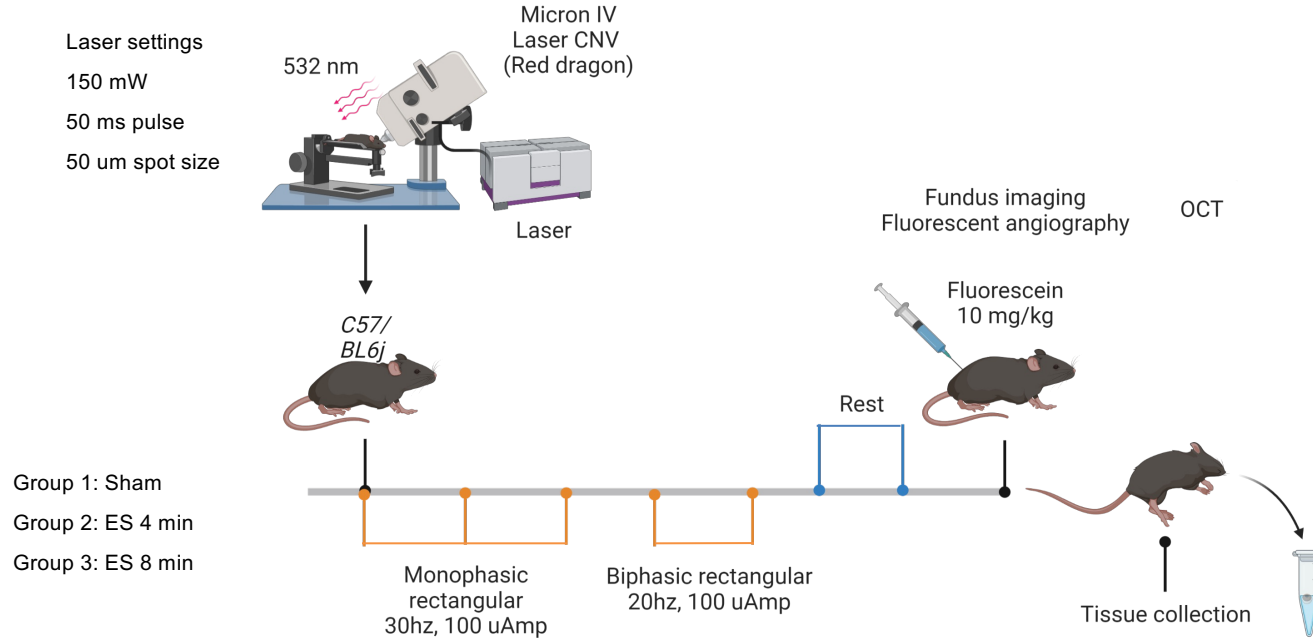
Honghua Yu ^{1 2}, Sam Enayati ^{1 2 2}, Karen Chang ¹, Kinsang Cho ^{1 1}, Seung Woo Lee ¹, Mays Talib ², Katarina Zihlavinikova ¹, Jia Xie ¹, Hamida Achour ^{1 1}, Shelley I Fried ¹, Tor Paaske Utheim ^{1 2 2 1}, Dong Feng Chen ¹

Direct modulation of microglial function by electrical field



Could a non-invasive therapeutic have beneficial
effects on CNV?

Experiment Design

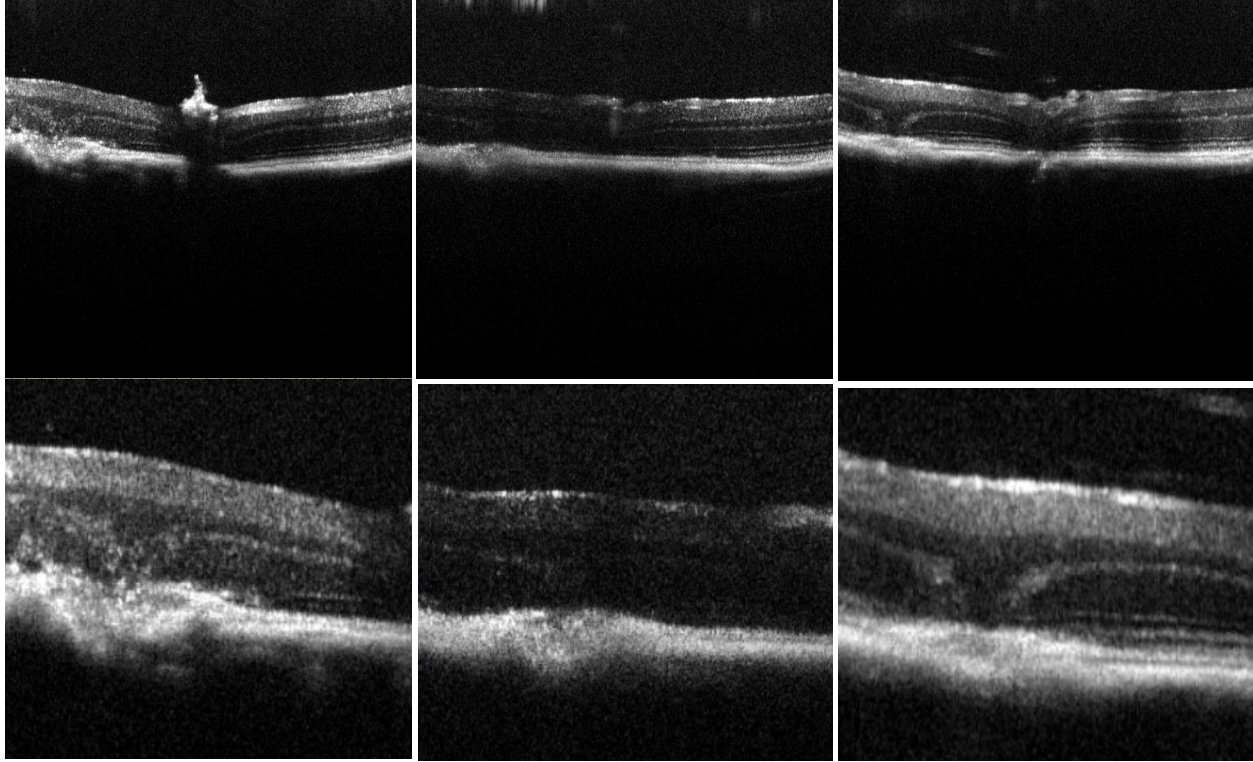


OCT Results

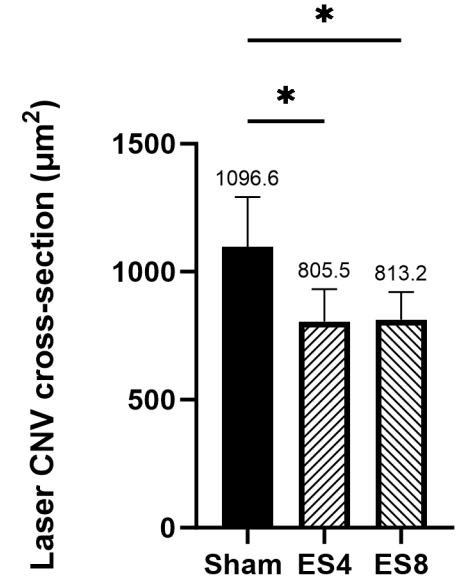
Sham

ES4 min

ES8 min

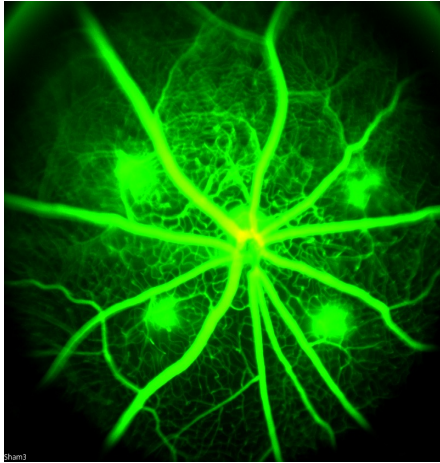


Electric stimulation reduce inflammatory response in Laser CNV

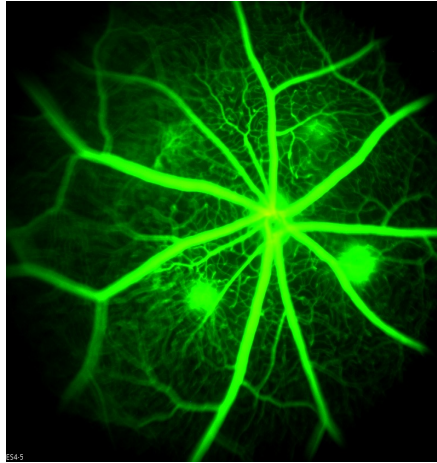


Fluorescent Angiography

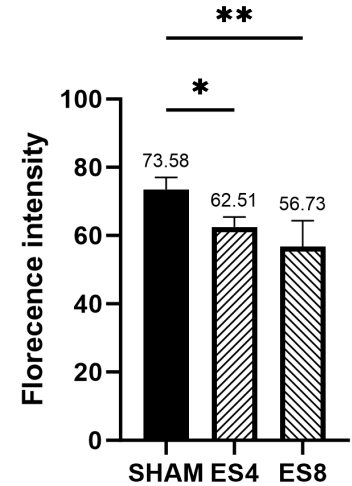
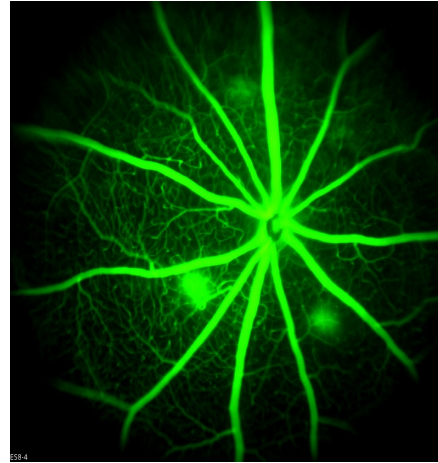
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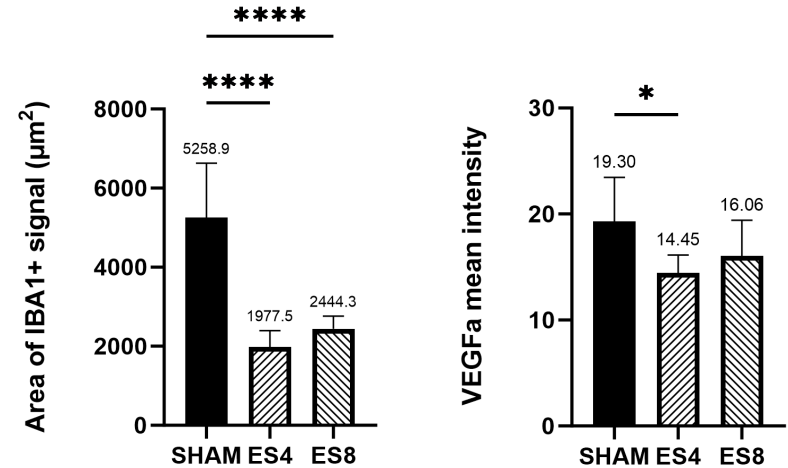
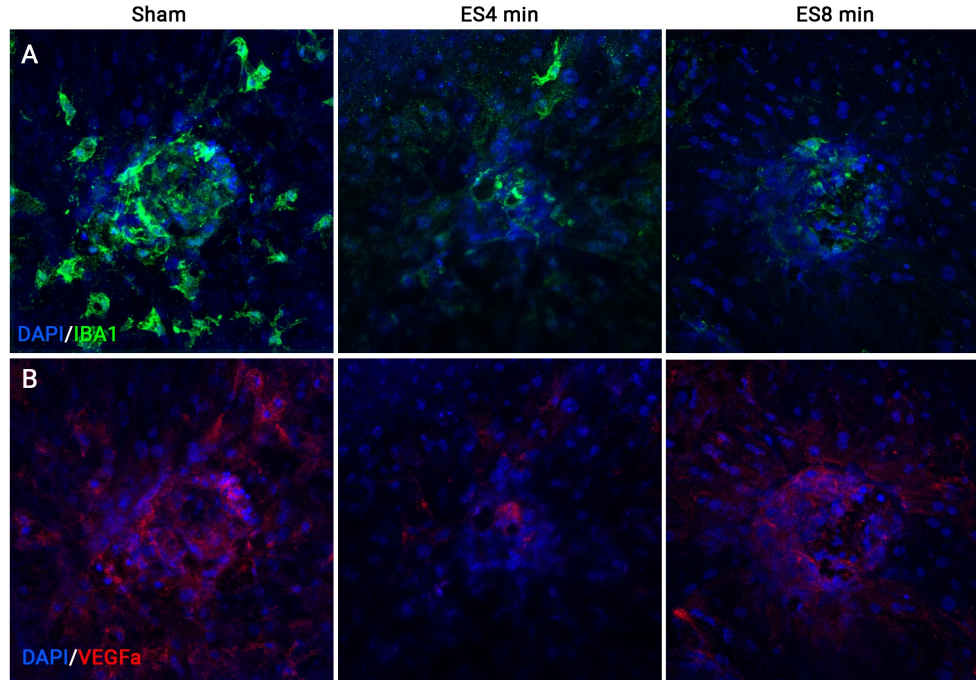


ES8

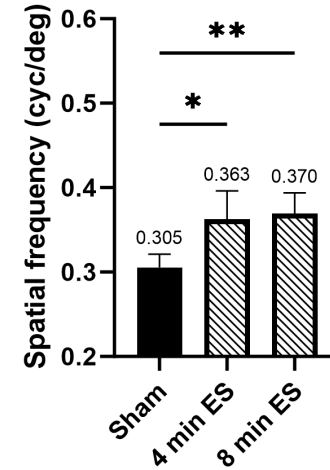
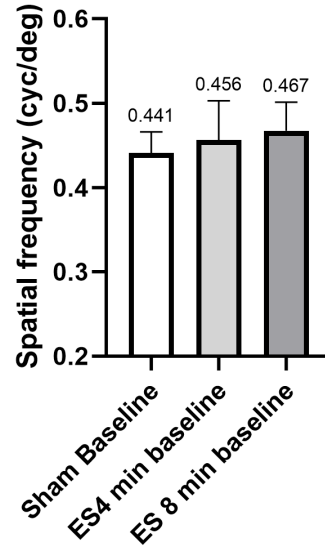
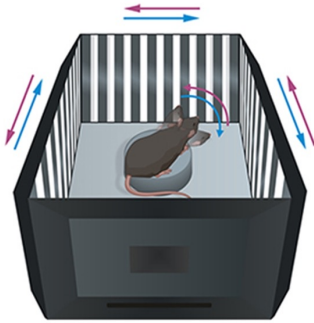


Electric stimulation reduce FA leakage in Laser CNV

RPE/Choroidal Wholemount Immunostaining (IBA-1, VEGF)



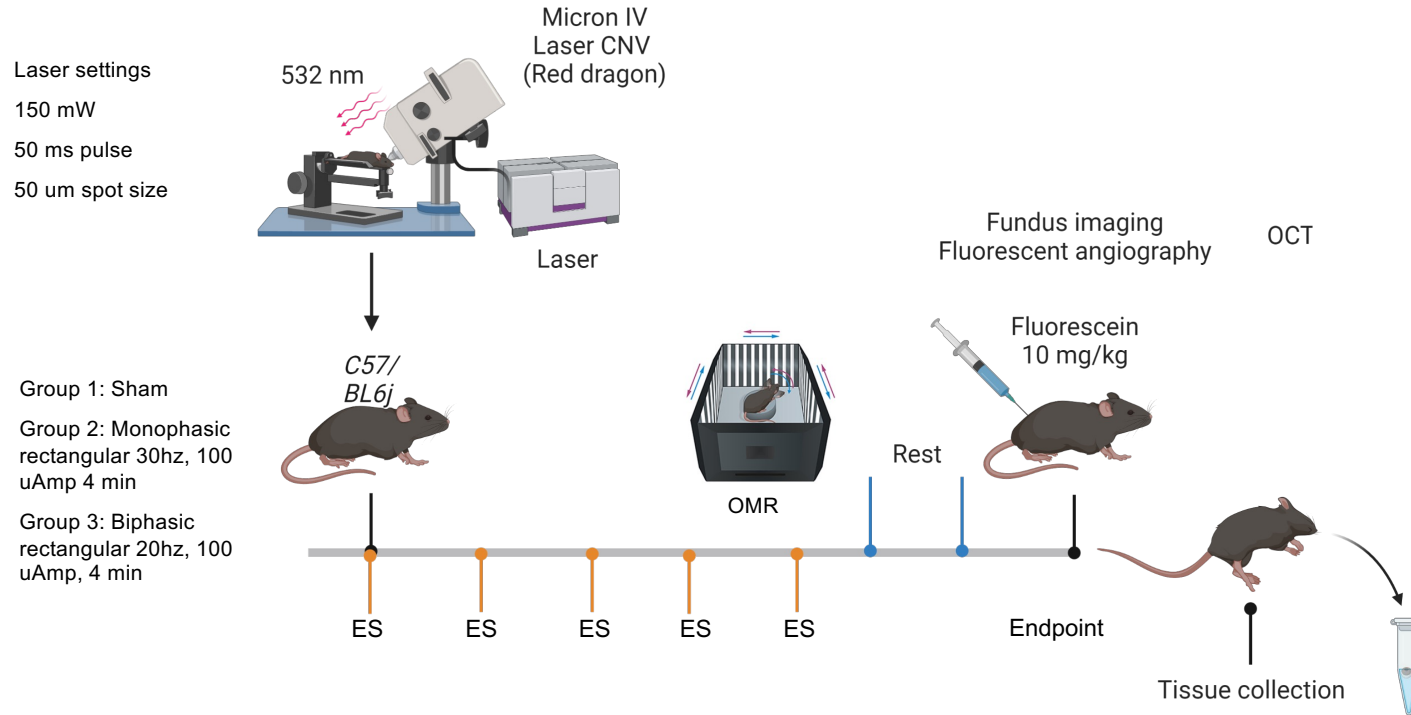
Optomotor Response (OMR) Results



Laser CNV reduce visual acuity, the electric stimulation ameliorates this effect

What are the benefits of the repetitive ES treatment sessions in Laser CNV?

Experiment Design

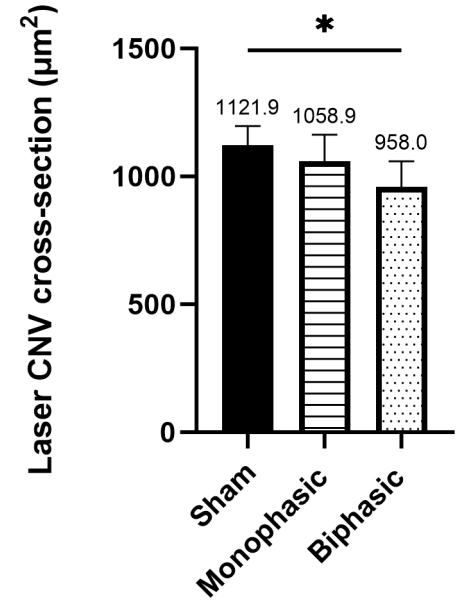
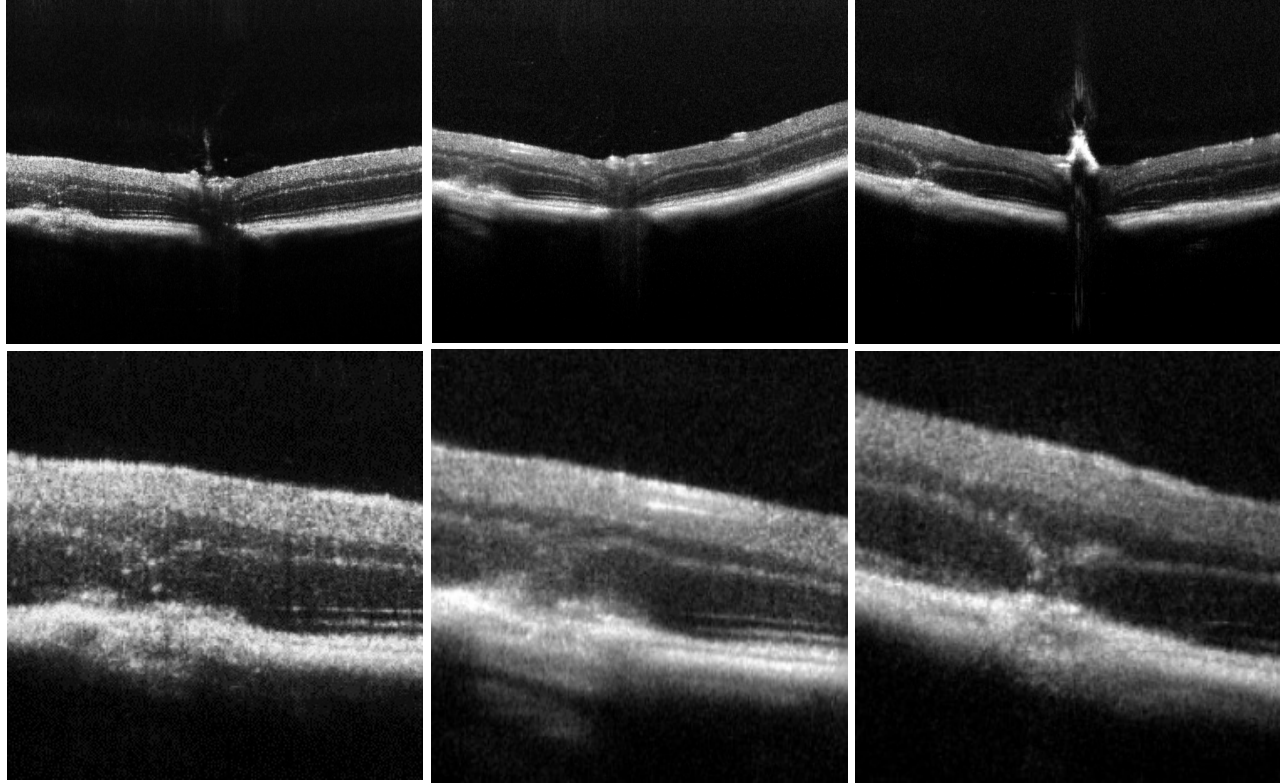


OCT Results

Sham

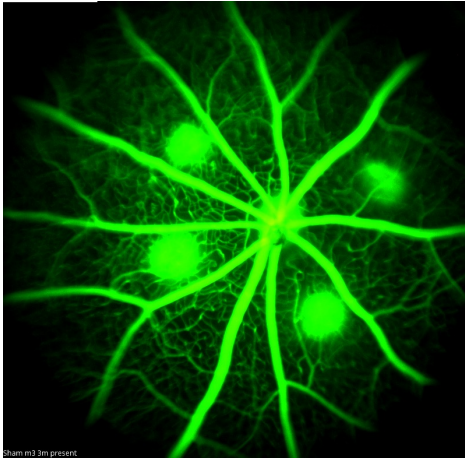
Monophasic

Biphasic



Fluorescent Angiography

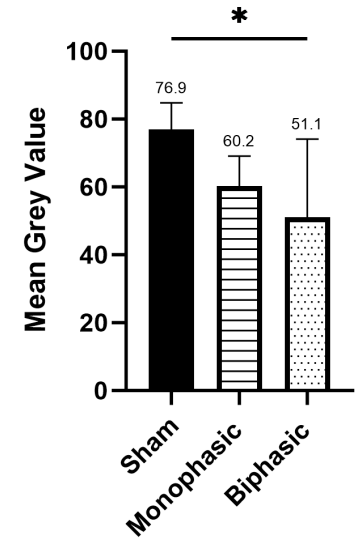
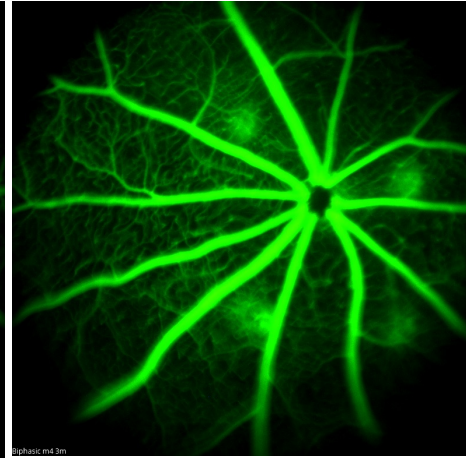
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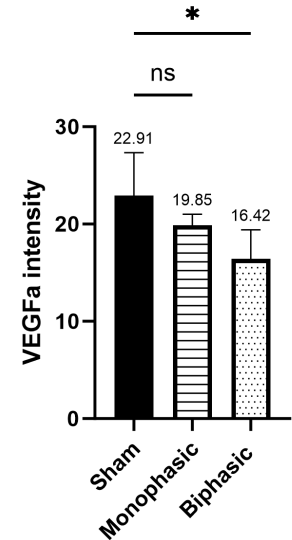
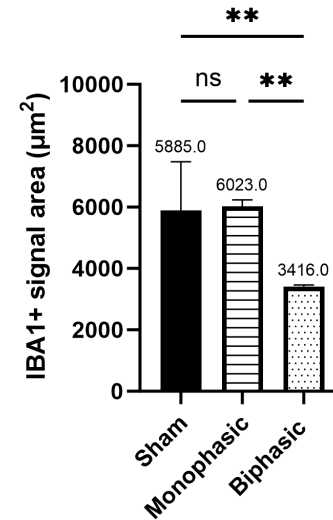
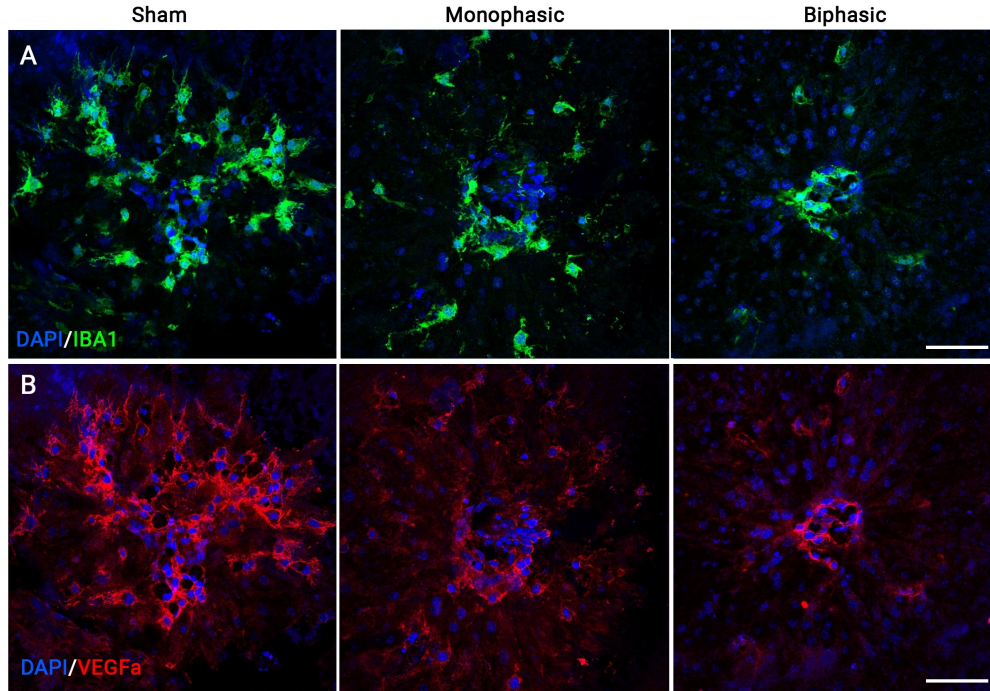
Monophasic



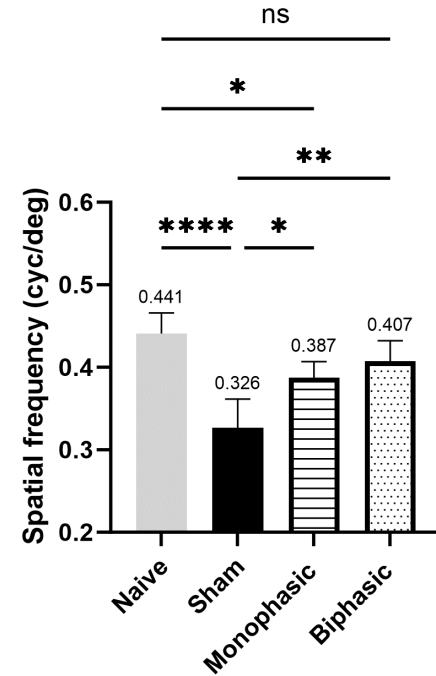
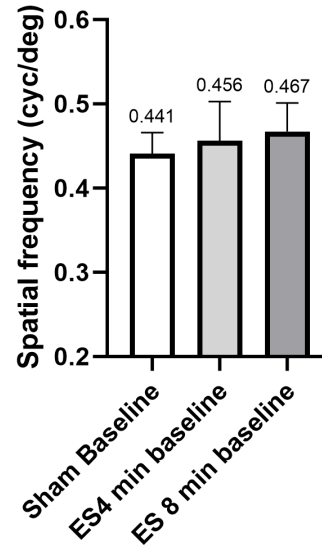
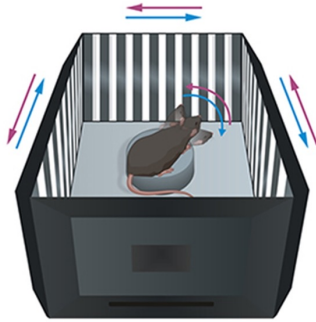
Biphasic



RPE/Choroidal Wholemount Immunostaining (IBA-1, VEGF)



Optomotor Response (OMR) Results



Laser CNV reduces visual acuity, the electric stimulation both monophasic and biphasic ameliorates this effect

Conclusions

- Laser CNV reduces visual acuity with electric stimulation, ameliorating this effect
- Repetitive ES has beneficial changes to effects on Laser CNV
- Significant reduction of the spot size on OCT results with electric stimulation
- Significant reduction of the Fluorescent angiography leakage intensity
- Electric stimulation negatively modulates microglia infiltration
- Electric stimulation reduces VEGF expression
- Electric stimulation demonstrates beneficial anti-inflammatory effect in Laser CNV

Take home message:
*Electric stimulation non-invasively ameliorates inflammation
and angiogenesis in laser CNV*



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i-Lumen Scientific, Inc. provided financial resources for this study and suggested ES stimulation paradigms, however at no point of the study i-Lumen Scientific had any influence on experimental performance, acquisition of scientific data or interpretation of the results.

