

## 24<sup>th</sup> of November, 2010

*I realized that it's going to be a little tough to talk about all this at Thanksgiving dinner since I don't think my family has ever really understood how serious my sight problem is. And I think that comes from the general belief that Glaucoma is a benign disease. ... I am realizing how the diminished vision had lessened the fun of doing many things like seeing a museum or gallery. Taking our nephew to an exhibition on Sunday was so much fun because I could read all the information. That ability had been diminishing for years ... and now it's back!*

*I feel so lucky, I can't believe it..."*

### Countries of origin of our patients:

Germany, Austria, Italy, Malta, Turkey, United States of America, Canada, Dubai/Arab Emirates UAE, Russia, Ukraine, Vietnam, China

### Publications of clinical studies\*:

Gall, C., Schmidt, S., Schittkowski, M.P., Antal, A., Gergely Ambrus, G., Paulus, W., Dannhauer, M., Michalik, R., Mante, A., Bola, M., Lux, A., Kropf, S., Brandt, S.A., Sabel, B.A. (2016). Alternating Current Stimulation for Vision Restoration after Optic Nerve Damage: A Randomized Clinical Trial. Plos One, 11(6).

Bola, M., Gall, C., Moewes, C., Fedorov, A., Hinrichs, H., Sabel, B. A. (2014) Brain functional connectivity network breakdown and restoration in blindness. Neurology, 83(6):542-51

Sabel, B.A., Fedorov, A., Henrich-Noack, P. and Gall, C. (2011). Vision restoration after brain and retina damage: The "residual vision activation theory". Progress in Brain Research 192: 199-262.

Sabel, B.A., Fedorov, A.B., Naue, N., Borrmann, A., Herrmann, C. and Gall, C. (2011). Non-invasive alternating current stimulation improves vision in optic neuropathy. Restorative Neurology and Neuroscience 29, 497-510.

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### Treatable diseases:

- Glaucoma
- Optic nerve damage and retinal trauma
- Vision loss after stroke or brain trauma
- Macular degeneration (AMD)
- Amblyopia and cortical blindness
- Diffuse vision loss of unknown origin

### Diseases not treatable:

- Optic problems (cornea/ lens/ cataracts)

### Side effects: rare cases of mild headaches

### Effect size (on average):

- 24% larger visual field size
- 60% better vision in impaired visual field sector
- 70% of patients report subjective improvements
- But 1/3 of the patients show no changes
- Note: return to normal vision is not expected

### Subjective reports from patients:

- Faster reaction time and better reading ability
- Improved acuity (often new glasses needed!)
- Less glare
- Clearing of "foggy vision" ("dirty glasses")
- Enlargement of field of vision

## Treating vision loss with non-invasive current stimulation after retina and brain damage

Procedure and results of a 10-day electric current stimulation course

Joe's story on YouTube:

<https://www.youtube.com/watch?v=g8p3mWslVAI>

For **subtitles** in different languages:

left click on captions button and select a language (German, English, Spanish, Italian, French, Arabic, Chinese, Russian)



**Patient Joe Lovett and Prof. Bernhard Sabel**

### Contact

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## Background

Joe, a film producer from New York City (USA) heard 2010 about a novel method to treat vision loss after optic nerve lesions, which was developed in Magdeburg (Germany). He has glaucomatous optic neuropathy and hoped that it might help him. His doctor thought it was a waste of time and money. Yet, Joe wanted to try it out anyhow and decided to receive the „non-invasive alternating current stimulation“.

## Diagnostics

When Joe arrived in Magdeburg, extensive ophthalmological and neuropsychological examinations were performed that lasted two days. The same diagnostic procedures were repeated when the stimulation treatment was completed 2 weeks later.

## Treatment

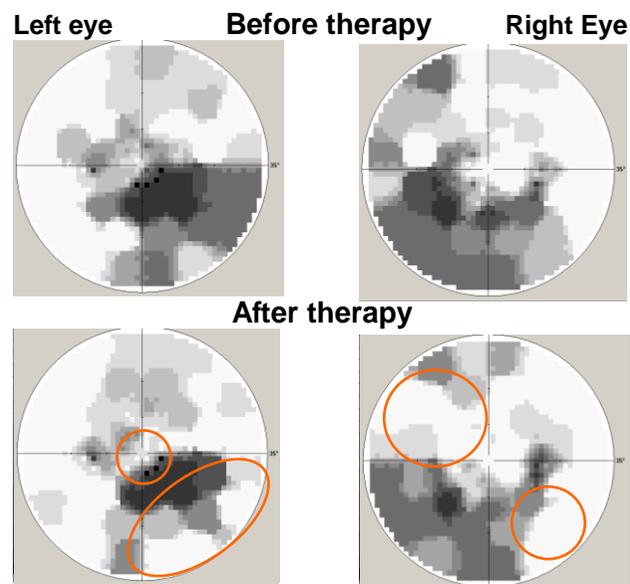
During this two week period, Joe visited the SAVIR (Sabel Vision Restoration) Center to receive the electric current stimulation treatment. Two electrodes were attached above the eyes. Current pulses were delivered through these electrodes. They were so weak that he hardly felt them. The currents excite the brain's visual system, leading to an improvement of residual vision and during treatment he also noticed bright light flashes, called "phosphenes".



## Results

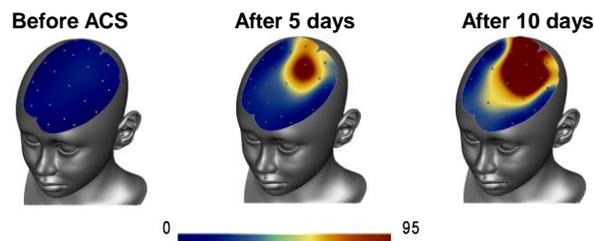
Joe's visual detection performance notably improved after the therapy.

Left eye: improvement in the lower left and right quadrant, some improvement in the upper right quadrant. Right eye: improvement in all quadrants. Note the enhancement of vision in his central visual field, which is important for reading and fixating.



The visual fields show how well a patient can detect small light dots. White= area of full vision, black = blind areas, and grey=areas of partial functions. Red circles indicate regions that improved.

This figure shows how treatment improved Joe's brain activity with "good" alpha waves.



## Joe's vision diary

When Joe returned to the US from treatment in Germany, he recorded the change in his subjective experience of vision in a diary:

**New York, 14<sup>th</sup> of November, 2010 (5 days after returning from Germany):**

*"...It's 6 o'clock in the morning and still dark here in New York City. I'm reading the NY Times with light reflected off a painting. In the past, I needed a task light over the page for me to read the print.*

*Riding my bike in our riverfront park to the gym yesterday, the colors of the trees were enhanced by the bright sun to a degree I hadn't seen in years. The pool seemed cleaner and clearer as did the area around it. Riding back from sun into shadow I realized that I was expecting to see detail on the street in front of me ... and I did! Even if it doesn't last, to know this can happen for a while means it can happen.*

**23<sup>rd</sup> of November, 2010**

*Today I first saw my optometrist for refraction tests and my acuity had improved about a diopter in each eye. Plus I could read the entire lines – no drop out in the center from my left eye. Then Dr. R. (a world-known glaucoma specialist) came in and when he got what had happened he said:*

*"well, I'm impressed". When I asked him "are we making medical history?" he said: "looks like it".*

*I went straight out and got the lenses in my glasses changed! I now needed weaker lenses in my distance glasses. Happiest 150 \$ I ever spent!*