ECRONICON OPEN ACCESS

EC OPHTHALMOLOGY
Case Report

Short review of Microcurrent Stimulation in the Treatment of Ocular Disease and a Case Presentation of 3 Stargardt's Degeneration Siblings Treated with Transpalpebral Microcurrent Stimulation

Edward C Kondrot*

Healing the Eye and Wellness Center, Florida, USA

***Corresponding Author:** Edward C Kondrot, Healing the Eye and Wellness Center, Florida, USA.

Received: July 21, 2019; **Published:** August 29, 2019

Abstract

We present a short review of the use of microcurrent in the treatment of ocular disease and a case presentation of the treatment of 3 siblings, ages 11, 9 and 7, with genetic documentation of ,Stargardt's disease and moderate to severe visual loss using Transpalpebral Microcurrent stimulation. After three days of twice a day, Transpalpebral microcurrent treatment visual acuity improved 28%, contrast sensitivity 7% and campimetric visual fields improved 68%. Patients continued once a day treatment at home. Measurements at six months showed an additional 13% improvement in acuity, an additional 8% in contrast. There was also a marked improvement in visual function, performance in school, and outdoor activities. No adverse effects were reported.

Keywords: *'Stargardt's Disease; Transpalpebral Microcurrent Stimulation; Campimetric Fields*

Introduction

Stargardt's Disease. This disease is an inherited form of juvenile macular degeneration that causes progressive vision loss, usually to the point of legal blindness. The progression usually starts between the ages of 6 years and 12 years, and it plateaus shortly after a rapid reduction in visual acuity. Several genes are associated with the disorder. Symptoms typically develop by 20 years of age and include wavy vision, blind spots, blurriness, impaired color vision, and difficulty adapting to dim lighting [1].

Stargardt's disease is the most common form of all of the juvenile-onset macular dystrophies the incidence is estimated to be 1 per 10,000. It is Inherited as an autosomal recessive trait, and it is a severe form of a bilateral progressive eye disease affecting the macula and the retina surrounding it. In individuals with Stargardt disease, specialized light-sensing cells in the macula, called photoreceptors, die off. Central or detailed, vision becomes blurry or has dark areas. It may also be difficult to see colors well [2].

Unfortunately, there is no cure for Stargardt's disease, and the American Academy of Ophthalmology has several suggestions for slowing the progression [3]. Most of the suggestions for slowing down the disease are similar to those of treatment of age-related macular degeneration except for caution in taking excessive amounts of vitamin A.

Stargardt's disease patients should not smoke cigarettes or be around cigarette smoke. Also, some studies suggest that taking an excessive amount of vitamin A could make the disease worse. While vitamin A in foods is fine, avoid taking large doses of it as a supplement.

Wearing sunglasses may help with the bright light sensitivity of Stargardt disease. Wearing sunglasses can also prevent further retinal damage from the sun's harmful ultraviolet (UV) rays.

Because the onset of Stargardt's occurs in children and young adults, this has the most significant potential of affecting the long term quality of life. The author has had a long term interest in the use of alternative treatments in macular degeneration and Stargardt's disease using IV vitamin therapy, Light therapy, oxidative treatments, and transpalpebral electrical stimulation, using low levels of current (Microcurrent) to improve vision and to slow the progression of the disease.

This is a case presentation of 3 siblings from one family who were treated solely with transpalpebral microcurrent stimulation over 6 months.

History of microcurrent in the treatment of eye disease

The history of microcurrent in the treatment of eye diseases has had 4 distinct phases of evolution that I would like to discuss.

The first phase was the use of a one-channel delivery system with 4 Nogier frequencies (292 Hz, 30 Hz, 9.1 Hz, and 0.3 Hz). These frequencies were applied peri-orbitally with a hand-held probe using 8 acupuncture points around each eye. This procedure was tedious both for the patient and administrator with the need to reset the application probe for each application point for each of the 4 frequencies utilized (Figure 1-3).

Figure 1: *Phase one microcurrent machine using 4 basic Nogier frequencies.*

Figure 2: *A probe to delivery microcurrent to specific acupuncture points.*

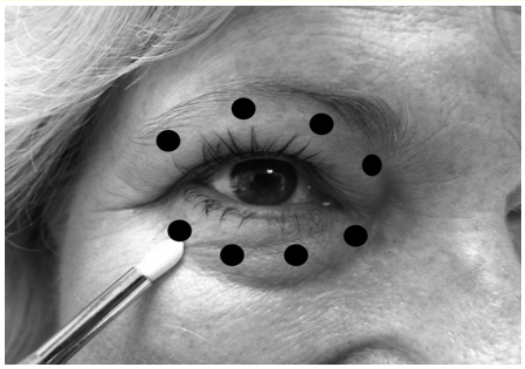


Figure 3: *Delivery to 8 peri-orbital points.*

The second phase was a Trans-palpebral approach using the same select frequencies but administered using electro-conductive gloves wrapped in a moist washcloth applied over closed eyelids. This application technique had several advantages. There was no need to change treatment points in the application of the microcurrent. During the second phase, there was another advance in the treatment, which made delivery more efficient. The microcurrent devices could now automatically delivery a sequence of frequencies, so the treatments became automated. Instead of changing frequencies after each treatment period, the frequencies were run sequentially. This sequential treatment resulted in better patient compliance since the application was simple and automated for the patient (Figure 4 and 5).

Figure 4: *Phase two microcurrent machine customized able to program frequency pairs.*

Figure 5: *Delivered transpalpebral using silver meshed gloves wrapped in a wash cloth.*

The third advance was the introduction of using customized frequency pairs in customized protocols using the Trans-palpebral approach. Instead of using only the 4 Nogier frequencies, specific customized frequency protocols were developed. These protocols were developed based on the location and type of eye pathology.

The 4th phase was the development of specific bio-modulating frequencies. Research isolated frequencies that had a specific physiologic effect on the tissue.

Let's review each phase of microcurrent development and the results in more detail.

Phase One development and results

This single-channel machine had four fixed frequencies and used a probe to treat eight acupuncture points around the eye (four points above and four below each eye). The machine treated each point for twelve seconds, using four different frequency settings (292 Hz, 30 Hz, 9.1 Hz, and 0.3 Hz). These specific frequencies came from the research of the late French neurologist Dr. Paul Nogier, who is best known for his innovative work in the development of auriculotherapy (ear acupuncture). Through his research, Dr. Nogier developed frequencies for increasing blood flow, reducing inflammation, and assisting in general healing. He suggested that the higher frequencies, 292 and 30 Hz, reduced inflammation while the lower frequencies, 9.1 Hz and 0.3 Hz, helped stimulate healing. The first use of microcurrent in Phase One was based on the mechanisms of increasing circulation, increasing cellular activity, and a neuroprotective effect. Several studies support this. Debreceni [4] in 1995 reported the results for circulatory problems. Twenty-four patients were studied who had blockage of the arteries to their lower leg, which resulted in poor circulation and pain. After treatment, twenty patients showed marked improvement. Kaada [5,6] in 1982 studies the effects of four patients with Raynaud's disease and two with diabetic polyneuropathy. Both of these conditions produce narrowing and spasm of the small blood vessels, resulting in symptoms of coldness, numbness, pain, and loss of movement. Results of his study showed increased the skin temperature and gave the patients relief from their pain. Ngok Cheng [7] in 1982 studied the effects of microcurrent on the skin of the rat. He applied different levels of current on the surface of the rat skin and then studied the changes in the cells using electron microscopy. This technique enabled him to observe the changes in cellular mechanics. His results indicated that between 50 and 500 micro-amperes would cause an increase in mitochondria and an increase of 300 to 500 percent in ATP levels. He also noted that at this level, there was an increase in protein synthesis and gluconeogenesis.

In addition to the above studies, several recent studies have shown that microcurrent can reduce intraocular pressure and have a neuroprotective effect in glaucoma [8,9].

Grace Halloran (1983-1985) was a pioneer in designing and conducting the first studies on the efficacy of Microcurrent Stimulation in reversing retinal damage. In her first study, one hundred fourteen patients were treated and independently monitored at the center for various retinal conditions. The results: Of the 114 patients that were treated, 18 patients had macular degeneration, and16 showed improvement. Seventy-eight patients had Retinitis Pigmentosa, and 62 showed improvement. The other 18 patients had various retinopathies and 16 improved. Dr. John Jarding [10] presented data on 400 eyes treated with MCS. Seventy-eight percent of the eyes showed from one to nine lines improvement on the visual acuity chart, and over 50 percent improved from two to nine lines. In his study, there were two patients with vein occlusion and swelling of the macula. Both patients had a dramatic improvement in their vision. One patient improved from 20/50 vision to 20/15. The second patient, who could only see fingers at a distance of one foot was able to read the 20/200 line.

Damon Miller, MD [11] who is also a naturopath and acupuncturist has reviewed his results using Microcurrent Stimulation in the treatment of Stargardt's Disease, retinitis pigmentosa, and other degenerative retinal diseases. His results indicate that of 120 patients treated, 83% showed improvement of greater than or equal to two lines of visual acuity in one or both eyes.

The author has published data concerning the use of Phase one protocols in 2001, in my book Microcurrent Stimulation: Miracle Eye Cure [12] and in October 2002 in the Townsend Letter [13] (a peer-reviewed journal about natural therapies).

In this publication, 66% Percent of eyes had an improvement of visual acuity with a range of 0 to 2.5 lines (5 letters a line) of vision.

Phase two development and results

The 2nd phase was a transition phase of treatment, leaving the 8 point acupuncture treatment to begin application and automation through a Trans-palpebral delivery system. In Phase one, each acupuncture point was located. One frequency ran for 15 seconds, next the frequency was changed and ran for 15 seconds. This was repeated 4 times, and the same protocol was repeated 8 times for each eye or a total of 16 times. Using the transpalpebral approach replaced this tedious method, and now microcurrent technology existed to run the 4 frequencies sequentially with stopping to change the setting.

Phase three development and results

A significant advance was in March 2006 when the FDA approved the first programmable microcurrent machine [14]. This development now enables practitioners to program target frequencies to treat specific eye disease. Instead of using fundamental, Nogier frequencies (which have a low-level effect on the diseased tissue), now, with Frequency Specific Microcurrent (FSM), we can use two different frequency channels to deliver both tissue frequency and pathology frequency.

Each tissue has a specific frequency, or vibration, as does each type of pathology. This frequency depends on the area's hydration, density, molecular structure, amounts of carbon and hydrogen, nitrogen bonding, and so forth. For example, bone tissue would have a different frequency than skin or heart tissue, while scar tissue would have a different frequency than tissue that was swollen. For comparison's sake, look at a musical tuning fork. If you have a tuning fork with a frequency of the note „C," it vibrates according to that frequency. If you have two tuning forks with „C" frequencies and vibrate them together, they support each other and vibrate in harmony. However, if you then take the same „C"-frequency tuning fork and vibrate it next to a „D"-frequency tuning fork, you have disharmony; in fact, the frequencies might cancel each other out (Figure 6).

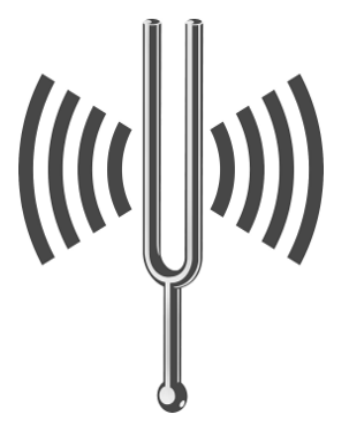


Figure 6: *Tuning fork deliveries specific frequencies.*

Now, let's look at the type of channel used to treat pathology. We don't want a frequency to harmonize and strengthen the pathology's frequency, so this machine delivers frequencies that are disharmonious to the pathology to weaken the pathology's effect. The roots of FSM treatment date back to the early 1900s and to Dr. Albert Abrams, the first physician to use calibrated instruments capable of detecting living tissue's radiations. Dr. Abrams concluded that all matter radiates electromagnetic energy and that the characteristics of each type of radiation depend upon the matter's unique molecular structure.

Dr. Carolyn McMakin [15], a chiropractor, has expanded the range of Modern FSM by studying hundreds of different frequencies within the range of .01 to 999 Hz, with varying intensities of 20 to 600 microamps. Her work supports Dr. Abrams' findings, confirming that each of the body's tissues has an individualized frequency. For example, the retina's frequency is 95 Hz, and the macula is 137 Hz. Each type of pathology also has a frequency. A hemorrhage has a frequency of 18 Hz, while edema is 14 Hz. FSM treatment is „frequency-specific" because the tissue's frequencies and the pathology's frequencies are „matched" against two frequencies in the FSM machine. For example, suppose a practitioner is treating a patient with a hemorrhage in the macula. The FSM treatment would use 18 Hz (for the hemorrhage) and 137 Hz (for the macula). This set of coupled frequencies matches the specific abnormalities present in the damaged tissue. The desired effect of the treatment is a neutralization of the frequencies that are in disharmony.

It is essential to understand that to get the best changes from microcurrent treatments, and other critical parameters must be addressed. These include proper nutrition, hydration, essential minerals, and oxygenation. The author is limited to discuss this in this chapter but for more information suggest reading Ten Essentials to Save Your Sight [16].

Results of a previously published study.

This study of treatment of 152 consecutive patients using microcurrent, along with essential supportive therapies was published in Alternative Therapies [17].

In this study, 69% had improvement of at least 1 line (i.e. 5 letters) in acuity, and 36% had improvement of at least 1 line in contrast (Table 2 and figure 1-3). The treatment modalities used were statistically beneficial to all groups treated-improving acuity, contrast, and visual fields (Table 1 and 2).

There was a subset of 6 eyes with Stargardt's Disease that was treated. There was an average improvement of 6.6 letters (over one line) on the EDTRS eye chart, an average of 3.67 letters of contrast on the Lighthouse Letter Contrast Sensitivity Test and marked improvement in visual fields (Campimetric Fields) (Table 3). In this study, Transpalpebral Microcurrent was one of 4 modalities used. The other three were IV nutrition using a Myers Cocktail, Oxidative IV therapy using hydrogen peroxide and lasting Syntonic Light Therapy.

Eye Disease	Number of Patients	Number of Eyes[a]
ARMD-Dry	70	140
Glaucoma	29	58
ARMD-Wet	20	40
Macular hole, macular wrinkling, pucker	9	10
Stargardt's disease	3	6
Cataracts	6	10
Ischemic optic nerve disease	4	6
Retinitis pigmentosa	4	8
Diabetic retinopathy	3	6
Histoplasmosis scarring	3	4
Cone dystrophy	1	2
Total	152	290

Table 1: *Ocular conditions, number of patients, and number of eyes.*

Abbreviation: ARMD: Age-Related Macular Degeneration.

[a]Some patients had disease in only 1 eye; some patients had >1 disease.

Acuity Improvement	Number of Eyes[a]	%
≥ 2 lines (10 letters)	43	15%
> 1 line (5 letters)	158	54%
> 1 - 4 letters	66	23%
No change	23	8%
Contrast Improvement	**Number of Eyes[a]**	**%**
> 5 letters	104	36%
> 1 - 4 letters	151	52%
No change	35	12%
Visual Field Expansion	**Number of Eyes[a]**	**%**
Marked	165	57%
Moderate	75	26%
Minimal	19	6%
No change	31	11%

Table 2: *Summary results of all 152 patients or 290 eyes treated.*

[a]Some patients had disease in only 1 eye; some patients had more than 1 disease.

Acuity Improvement	Number of Letters
Average acuity change	6.6
Range	2 - 13
Contrast Improvement	**Number of Letters**
Average contrast change	3.67
Range	0 - 10
Visual Field Expansion	**Number of Eyes**
Marked	6

Table 3: *Results: Stargardt's Disease[a].*

[a]n = 3 patients, 6 eyes.

Phase four development and results

In this phase, specific microcurrent frequencies are being investigated to produce a specific cellular and biological effect. Each signal has the ability both to inhibit or to stimulate a particular biological effect. Watson presented that the Arndt-Schultz Law of Biomodulation also binds electrotherapy application [18]. This law states that a low level of current can stimulate, moderate level maintain, and a high level can suppress. In 1999 EyeCell (www.eye-cell.com) published in circulation their first paper on precise bioelectric signaling based organ regeneration controlling (Vascular Endothelial Growth Factor) [19]. VEGF protein expression for the growth of new blood vessels. This signal specific for the VEGF protein based on the Arndt-Schultz Law has the potential to both stimulate new blood vessel growth when needed for tissue repair, such as in heart muscle regeneration and also be used to inhibit new vessel growth, such as in wet macular degeneration. EyeCell has conducted their first studies identifying microcurrent frequencies for controlled expression of (Stem cell Derivative Factor) SDF1 or CXCL12 [20]. During development, SDF1 plays a role in the migration of neurons. Within the CNS, it also contributes to cell proliferation, neurogenesis (nervous tissue development and growth), as well as neuroinflammation. It promotes stem cell migration to lesion sites within the brain and possibly to the eye. This has an application of mobilized stem cells to a specific area for regeneration.

EyeCell has filed over 25 precise bioelectric signaling sequences for the controlled expression of organ regeneration promoting proteins. Another possible signal is to stimulate Klotho an anti-aging protein predominantly produced in the kidney [21]. Klotho decrease with age, and a deficiency is associated with increased risk of age-related diseases.

The area of specific target frequencies has a great application in a new approach of treating disease using these specific signals.

Case Report of 3 Siblings with Stargardt's Disease

I want to report the results of transpalpebral microcurrent stimulation it 3 siblings with genetic documentation of Stargardt's Disease with visual loss. They were initially treated twice a day over 3 days under close observation. They continued with once a day treatment over 6 months.

The 3 family siblings are Havah Birthdate 7/3/08, Cruz 12/2/09, and Clara 3/14/2012. All have been diagnosed and confirmed by genetic testing to have Stargardt's disease.

Patients and their family were discussed in detail the risks and benefits of Transpalpebral Microcurrent, and they were instructed on the options of not receiving treatment. They were also instructed on the importance of proper diet, avoiding high doses of vitamin A and ocular protection against ultraviolet light.

Initial testing included Visual Acuity, contrast sensitivity, 30-2 computerized visual fields, and retinal ocular coherence tomography. Slit-lamp examination, intra-ocular tensions, and fundus examination were performed.

The initial acuity using the Early Treatment Diabetic Retinopathy Study (ETDRS) eye chart:

- Havah Right eye: 14 Left eye: 25
- Cruz Right eye: 21 Left eye: 19
- Clara Right eye: 35 Left eye: 43
- Lighthouse Letter Contrast Sensitivity Test.
- Havah Right eye: 0.92 Left eye:1.24
- Cruz Right eye: 1.24 Left eye: 1.36
- Clara Right eye: 1.56 Left eye: 1.52

Campimetry is one way to test the kinetic or motion visual field. It is used for central testing fields for white, blue, green, and red and also is used to assess subtle changes in awareness and visual fields. It has been reported that this method is very sensitive to measure the function of the red, blue, and green cone function. (22-23) In the analysis of the campimeter, we measure the total area of 4 visual fields (Motion, Red, Green, and Blue) using Image J software

Campimetry in Sq cm (some of the white motion, red, green and blue)

Havah Right eye: 535.6 Left eye: 601.5

Cruz Right eye: 559.6 Left eye: 391.1

Clara Right eye: 210.1 Left eye: 148.2

Treatment protocol for 3 days using an Inspirstar IS02BA Stimulator

Patients were treated with a trans-palpebral of 30 minutes duration twice a day for 3 days. The microcurrent protocol used was a series of 46 proprietary frequency pairs, each pair running 40 seconds with a current of 40 microamperes. These frequency pairs have been developed to be specific for rejuvenating retina.

After the 3 days of treatment, the testing was repeated. The patients were discharged and instructed to use the Microcurrent machine daily.

Post-treatment after 3 days of trans-palpebral treatment

Havah Right eye: 17 Left eye: 29

Cruz Right eye: 28 Left eye: 26

Clara Right eye: 47 Left eye: 44

Lighthouse Letter Contrast Sensitivity Test

Havah Right eye: 1.16 Left eye: 1.24

Cruz Right eye: 1.24 Left eye: 1.24

Clara Right eye: 1.72 Left eye: 1.64

Campimetry in sq cm

Havah Right eye: 732.2 Left eye: 963.8

Cruz Right eye: 1012.8 Left eye: 827.1

Clara Right eye: 368.9 Left eye: 217.4

Patients returned after daily treatments at the 6 months for reexamination. Here are the results of the 6-month exam

Havah Right eye: 24 Left eye: 31

Cruz Right eye: 28 Left eye: 27

Clara Right eye: 50 Left eye: 50

Lighthouse Letter Contrast Sensitivity Test

Havah Right eye: 1.20 Left eye: 1.48

Cruz Right eye: 1.36 Left eye: 1.20

Clara Right eye: 1.72 Left eye: 1.72

Campimetry was not done at 6 months.

Results

After 3 days, there was a significant change in acuity, contrast, and campimetric visual fields. At the 6 month visit, the improvement achieved at the 3-day measurement was maintained, and an additional improvement was documented

Average acuity changed from 24.8 letters to 31.8 letters at day 3 a 28% improvement. There was an additional 13% at 6 months.

	Acuity		
	Pre	Day # 3	6 months
Cruz	21	28	28
	19	26	27
Clara	35	47	50
	43	44	50
Havah	14	17	24
	17	29	31
Average	24.8	31.8	35.0

Figure 7

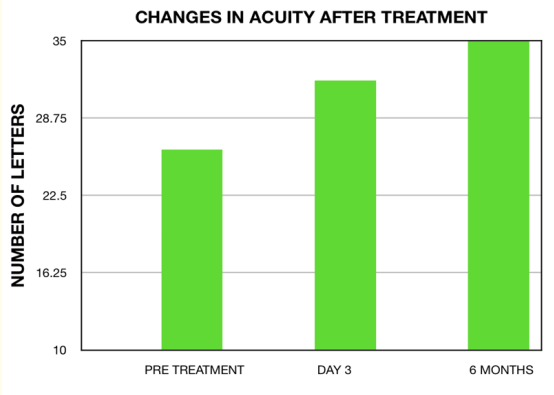


Figure 8

Average contrast changed from 1.3 units to 1.4 units at 3 days a 7% improvement. There was an additional charge of 8% at 6 months.

	Contrast		
	Pre	Day #3	6 Months
Cruz	1.24	1.24	1.36
	1.36	1.24	1.20
Clara	1.56	1.72	1.72
	1.52	1.64	1.84
Havah	0.92	1.16	1.20
	1.24	1.24	1.48
Average	1.3	1.4	1.5

Figure 9

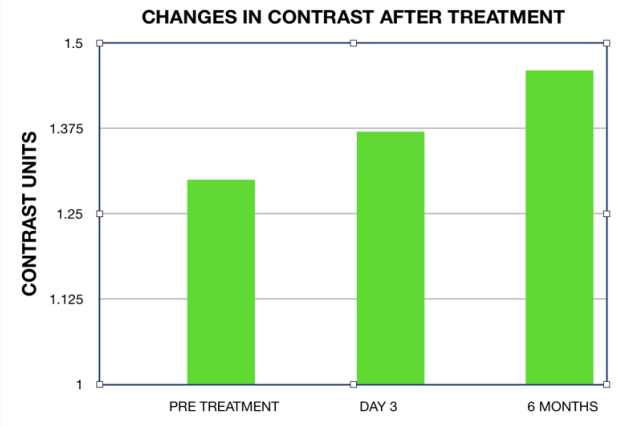


Figure 10

Average campimetric fields improved from 2446 sq cm to 4122 sq cm a 68% improvement.

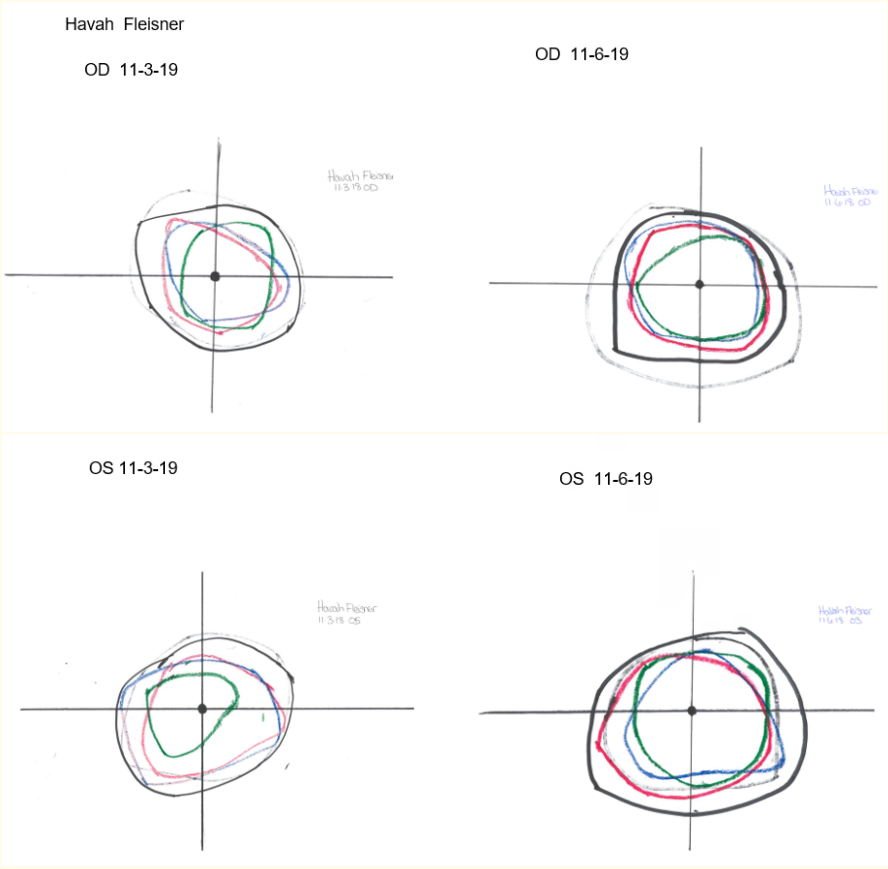
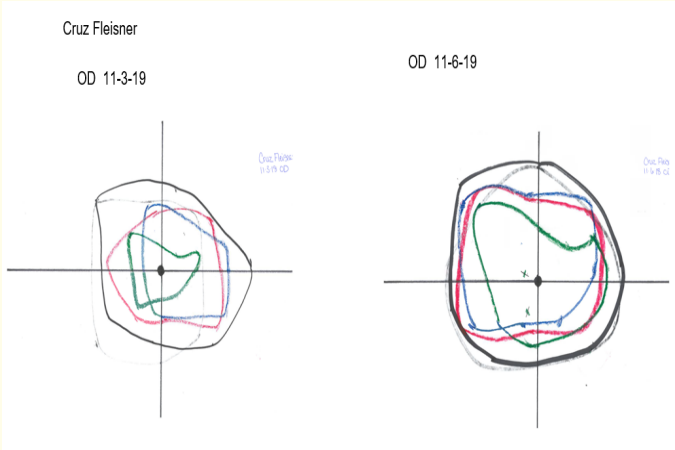


Figure 11



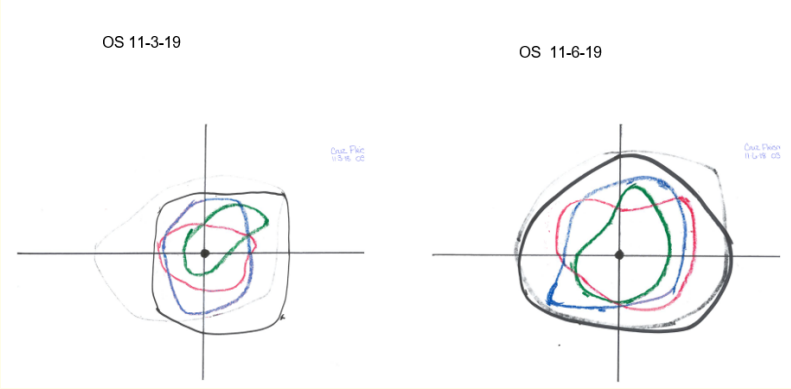


Figure 12

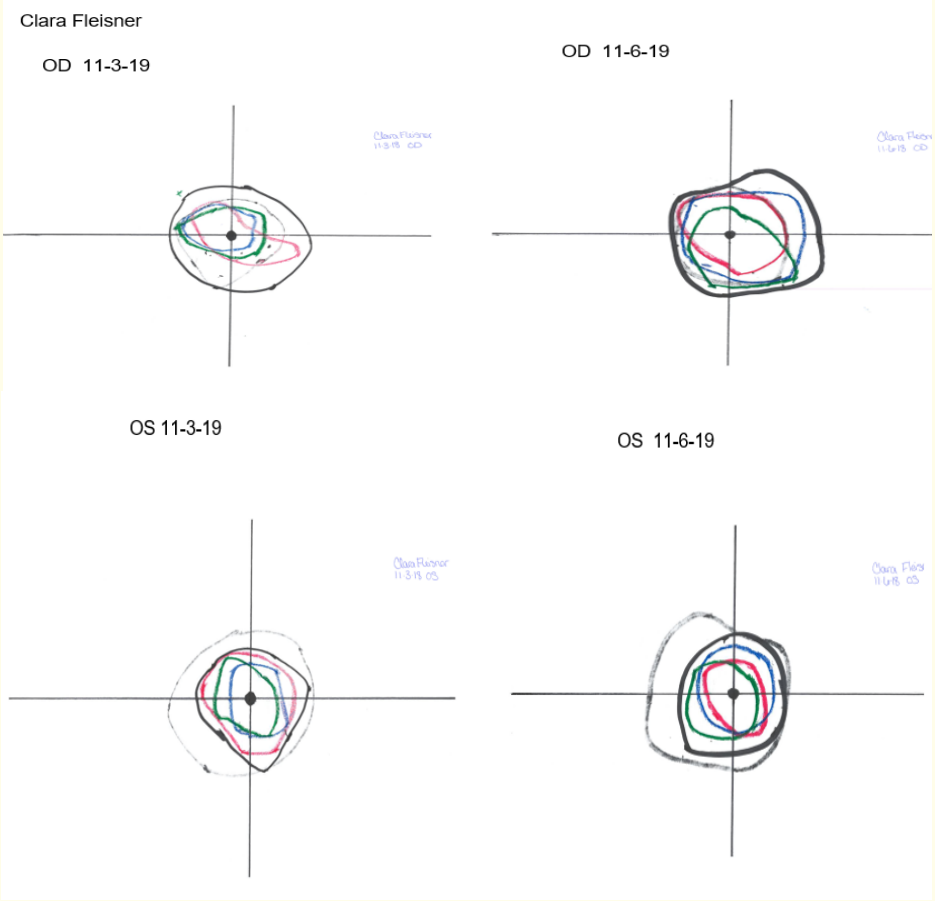


Figure 13

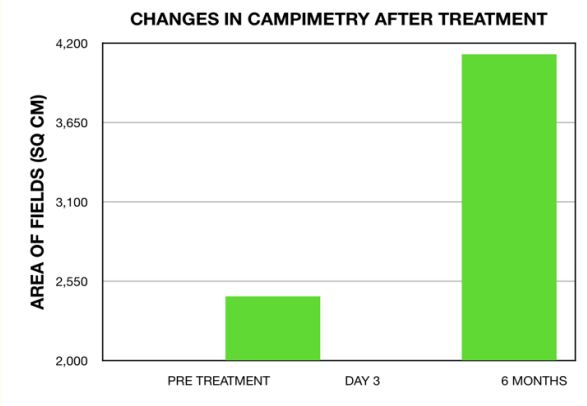


Figure 14

confidence in schoolwork, sports, and all other activities since beginning the treatment.

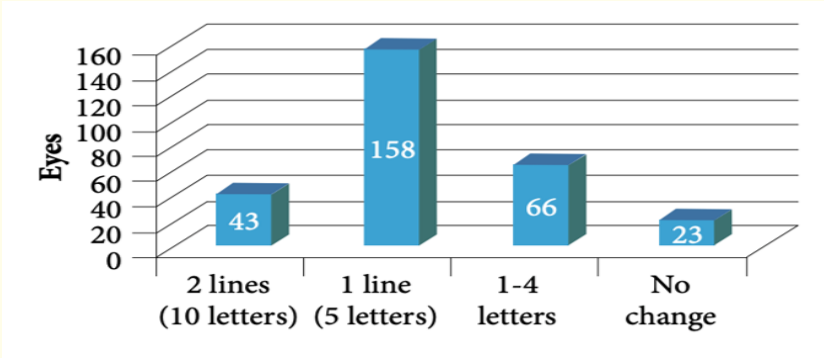


Figure 15: *Summary results for acuity improvement.*

Figure 16: *Summary results for contrast improvement.*

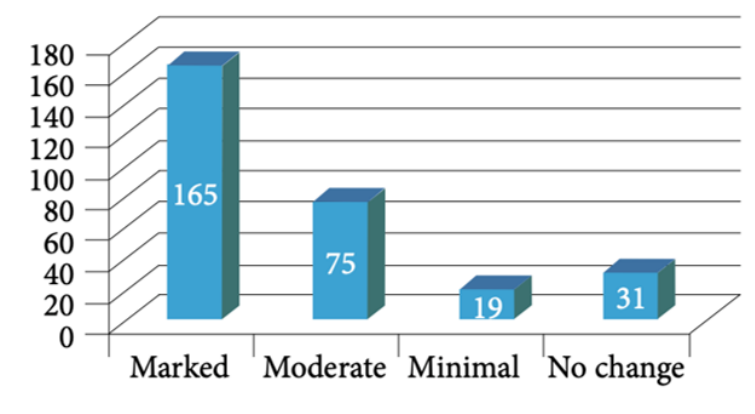


Figure 17: *Summary results for visual field expansion.*

	Campimeter	
	Pre	Day 3
Cruz	559.6	1012.8
	391.1	827.1
Clara	210.1	368.9
	148.2	217.4
Havah	535.6	732.2
	601.5	963.8
Average	2446	4122

Figure 18

Discussion

It is very frightful to be diagnosed with a chronic progressive eye disease like Stargardt's disease and more disheartening to be told that nothing can be done. This is especially discouraging in children and young adults when they are told that nothing can be done to save their vision.

Patients are becoming more proactive and are searching for solutions to delay their vision loss and possible restore lost vision. Microcurrent using a transpalpebral approach is now documented to improve acuity, contrast sensitivity, and campimetric visual fields. These improvements have resulted in an improvement in the quality of life in these three children. Although this study only reported benefits over 6 months, longer follow-ups are needed to document the long term effects of microcurrent in the treatment of Stargardt's disease.

Microcurrent treatment protocols should be considered part of a treatment program for all ocular disease process. The study and isolation of specific frequencies signals are changing the potential of microcurrent. Specific signals can now alter critical pharmaceutical pathways to result in the visual system. All vision practitioners should incorporate this treatment in their practice to give patients the best visual outcomes.

Eye health needs to be repositioned within an assessment of general health. Vision decline represents a general diminishment in overall health and results directly from toxicity from both external sources such as air and water and the internal accumulation of toxic metals; poor nutrition; and other life exposures and habits. The metabolism of the eye is such that this organ is very likely the first part of the body to signal overall health problems. Once this is accepted, a protocol for integrating eye health assessment can become part of an overall health evaluation rather than compartmentalized to specialists, and preventive strategies can be introduced at a time when they will be most effective.

Conclusion

Transpalpebral Microcurrent Stimulation was successful in improving the acuity, contrast sensitivity, and campimetric visual fields of 3 siblings with the genetic confirmation of Stargardt's disease. This improvement was significant after three days and continued at the six months follow up. Transpalpebral Microcurrent stimulation should be considered a viable treatment for ,Stargardt's. More long term studies are needed.

Bibliography

1. Rupert W., *et al*. "The Natural History of the Progression of Atrophy Secondary to Stargardt's Disease". *Ophthalmology* 123.4 (2016): 817-828.

2. Tanna P., *et al*. "Stargardt disease: clinical features, molecular genetics, animal models, and therapeutic options". *British Journal of Ophthalmology* 101.1 (2017): 25-30.

3. American Academy of Ophthalmology recommendations.

4. Debreceni L., *et al*. "Results Of Transcutaneous Electrical Stimulation (TES) In Cure Of Lower Extremity Arterial Disease". *Angiology* 46.7 (1995): 613-618.

5. Kaada B. "Vasodilation Induced By Transcutaneous Nerve Stimulation In Peripheral Ischemia (Raynauds Phenomenon And Diabetic Polyneuropathy)". *European Heart Journal* 3.4 (1982): 303-314.

6. Kaada B. "Promoted Healing Of Chronic Ulceration By Transcutaneous Nerve Stimulation". *VASA* 12 (1983): 262-269.

7. Cheng Ngok., *et al*. "The Effects Of Electrical Current On ATP Generation, Protein Synthesis And Membrane Transport In Rat Skin". *Clinical Orthopedics and Related Research* 171 (1982): 264-271.

8. Chan HH., *et al*. "Electroacupuncture provides a new approach to neuroprotection in rats with induced glaucoma". *The Journal of Alternative and Complementary Medicine* 11.2 (2005): 315-322.

9. Chu TC and Potter DE. "Ocular hypotension induced by electroacupuncture". *Journal of Ocular Pharmacology and Therapeutics* 18.4 (2002): 293-305.

10. Michael., *et al*. "Nutritional Supplementation, Electrical Stimulation, and Age-Related Macular Degeneration". *Journal of Orthomolecular Medicine* 8.3 (1993).

11. Miller., *et al*. "The treatment of Macular degeneration, Stargardt's Disease, Retinitis Pigmentosa and Other Retinal Disease with Microcurrent Stimulation Therapy" (2000).

12. Kondrot EC. "Microcurrent Stimulation: Miracle Eye Cure?" (2001).

13. Kondrot EC. "Initial results of microcurrent stimulation in the treatment of age-related macular degeneration". *Townsend Letter* 231 (2002): 65-67.

14. Inspirstar Corporation.

15. The Resonance Effect: How Frequency Specific Microcurrent Is Changing Medicine-Carolyn McMakin (2017).

16. Kondrot EC. "Ten Essentials to Save Your Sight". Advantage Publishing (2016).

17. Kondrot EC. "Improvement in Vision Parameters for Participants Treated With Alternative Therapies in a 3-day Program". *Alternative Therapies In Health And Medicine* 21.6 (2015): 22-35.

18. Watson T Modality and Dose. "Dependency In Electrotherapy". *Physiotherapy* 93 (2007): S674.

19. Shinichi K., *et al*. "Establishment of a Simple and Practical Procedure Applicable to Therapeutic Angiogenesis:". *Circulation* 99.20 (1999): 2682–2687.

20. Levilester S., *et al*. "Low current electrical stimulation upregulates cytokine expression in the anal sphincter". *International Journal of Colorectal Disease* 27.2 (2012): 221–225.

21. Nicholas J., *et al*. "The Age-Regulating Protein Klotho is Vital to Sustain Retinal Function". *Arvo Journals: Investigative Ophthalmology and Visual Science* 54.10 (2013): 6675-6685.

22. "Brombach Perimeter Manual of Technique". The American Optical (1937).

23. Lloyd RI. "Evolution of perimetry". *Archives of Ophthalmology* 15 (1936): 713-732.

Volume 10 Issue 9 September 2019