

# **Neuromodulazione E Riabilitazione Visiva: La Strada Per Il Neuroenhancement Visivo Nel Paziente Ipovedente**

“Neuromodulation and Visual Rehabilitation: The Path to Visual Neuroenhancement in the Visually Impaired Patient”

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Chapter 10. Pages 151-163

## **Evolution and results of Trans-Palpebral neuroelectric stimulation Edward C. Kondrot, MD**

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. (Fig. 1, 2 and 3)



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



A probe to delivery microcurrent to specific acupuncture points

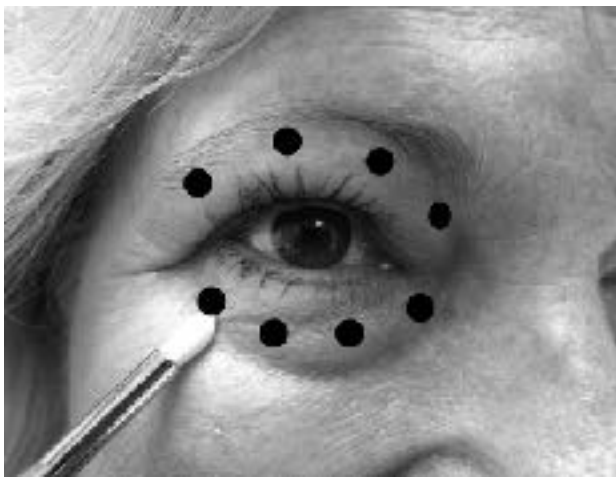


Fig. 2: Delivery to 8 peri-orbital points



Fig. 3: Phase two microcurrent machine customized able to program frequency

**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. (Fig. 4 and 5)



Fig. 4: Treatment delivered transpalpebrally 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. Debrececi (1) 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(2)(3) 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 (4) 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. (5) (6)

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, and 16 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 (7) 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 (8) 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 (9) (10) has published data concerning the use of Phase one protocols in 2001, in my book Microcurrent Stimulation: Miracle Eye Cure, and in October 2002 in the Townsend Letter (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. 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. (Fig. 5)



Fig. 5: 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 (11), 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 an 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* (12)

My current treatment protocol utilizing microcurrent is based on the understanding that the optimum benefit of microcurrent therapy will result when essential nutritional elements, hydration and oxygenation are present during the microcurrent application. The results of the treatment of 152 consecutive patients using microcurrent, along with essential supportive therapies were published in *Alternative Therapies* in (13). Although this study could be criticized that the supportive therapies are responsible for the change in vision, it is the author's opinion that the microcurrent treatments had the critical effects in changing the visual outcomes over , not the supportive therapies. It is the strong belief that these supportive therapies are necessary for the long term results of microcurrent treatment and should be included in any treatment plan,

The study's participants were selected to meet the following criteria: (1) they had an eye disease that had not been responsive to traditional treatments or (2) they wished to avoid surgery or the side effects of medication.

(1) age-related macular degeneration (ARMD), the dry type; (2) glaucoma; (3) ARMD, the wet type;  
(4) macular hole, wrinkling, pucker; (5) Stargardt's disease;  
(6) cataracts; (7) ischemic optic nerve disease;  
(8) retinitis pigmentosa (RP);  
(9) diabetic retinopathy;  
(10) histoplasmosis scarring; and  
(11) cone dystrophy.

Participants ranged in age from 15 to 95 years; 52% were female, and 48% were male.

Changes from baseline were documented through comparison with post-program results. Pre- and post-program testing included:

Early Treatment Diabetic Retinopathy Study Eye Chart. The Early Treatment Diabetic Retinopathy Study (ETDRS) eye chart is a test that measures acuity and has been accepted and approved in studies sponsored by the National Eye Institute and the US Food and Drug Administration (FDA). Each line on the chart has 5 letters, and the chart has a total of 14 lines or 70 letters.

Lighthouse Letter Contrast Sensitivity Test. This test measures the ability to see letters of increasingly lighter contrast. Failure to perceive lighter contrast is related to toxicity and heavy-metal poisoning.

Campimetry. Campimetry is one way to test the visual field systematically. It is used for testing central fields for white, blue, green, and red and also is used in Syntonics to assess subtle changes in awareness and visual fields. This test measures the ability to perceive motion.

## **Interventions**

The intervention in the 3-day program began with microcurrent treatments that balanced the autonomic nervous system and neuroendocrine functions and activities to reduce stress. Emphasis was placed on devel-



oping a customized program for each participant's eye problem. This program was recalibrated for each participant during the 3 days, depending on outcomes and response to treatment from measurements taken intermittently.

The 4 alternative modalities were provided at least once to each participant: (1) intravenous (IV) nutrition, oxidative therapy, (3) microcurrent stimulation, and (4) syntonics light therapy.

**IV Nutrition—Myer's Cocktail.** This specialized intravenous vitamin mixture was designed to provide key vitamins and minerals to support the eye and visual function.

It was suggested that all patients receive this mixture, particularly if they were deficient in zinc. It also was suggested that all patients in the program receive a Myer's cocktail once per month at their home locations until nutritional levels were at an optimum level. The cocktail that the Wellness Center offers is tailored to provide nutrients known to be supportive of good vision: (1) ascorbic acid, 500 mg/mL, 12 cc; (2) pyridoxine, 100 mg/mL, 2 cc; (3) hydroxocobalamin 1000, µg/mL, 1 cc; (4) B complex 100, 1 cc; (5) calcium gluconate 10%, 1 cc; (6) dexpanthenol, 250 mg/mL, 1 cc; (7) magnesium chloride, 200 mg/mL, 1 cc; (8) multitrace-5 concentrate, 1 cc; (9) selenium, 40 µg/mL, 5 cc; (10) taurine, 50 mg/mL, 2 cc; (11) zinc, 1 mg/mL, 5 cc; (12) lidocaine 2%, 5 cc; (13) sterile water, 200 cc; and (14) folic acid, 1 mg.

**Oxidative Therapy.** Oxidative therapies such as ozone therapy, ultraviolet blood irradiation therapy, and intravenous hydrogen peroxide therapy can be beneficial for treating a wide range of conditions ranging from viral and fungal infections to joint pain and arthritis. (14) Oxidative therapies work by stimulating the immune system, enhancing mitochondrial processes, and facilitating healing with virtually no side effects. Some researchers believe that this therapy can be beneficial in the treatment of macular degeneration and glaucoma and other eye disorders. Typically 20 to 40 treatments are necessary, although benefits can be experienced

after 1 or 2 treatments. Each patient receives a minimum of 2 oxidative IV therapies during the program. Ozone therapy is a type of oxidative therapy breakthrough treatment that can detoxify as it heals. It uses highly reactive oxygen gas, which stimulates regeneration and healing. It is used to treat a wide range of chronic conditions, including macular degeneration. The program offered ozone therapy in several ways: (1) intravenously, called autohemotherapy, where a small amount of blood is mixed with the ozone and then injected into the body; and (2) as eye drops, to help stimulate the healing of the eye. Hydrogen peroxide therapy was also given to some participants in the program. This type of oxidative therapy is given directly into the bloodstream through a slow IV drip and has the same beneficial results as other types of oxidative therapies

Patients with glaucoma have a compromised optic nerve. Elevations in pressure can cause the blood flow to the optic nerve to be reduced, resulting in damage to the nerve and loss of vision. Research evidence suggests that microcurrent has a protective effect on the optic nerve. MCS can be beneficial to patients with glaucoma because it helps increase blood flow and stimulates cellular activity, and now, evidence suggests a neuroprotective effect. MCS can lower the intraocular pressure, which is observed in patients after MCS treatment.

MCS is very effective in treating most eye diseases, including macular degeneration, glaucoma, cataracts, inflammation, and dry eyes. The flow of current from cell to cell and within cells promotes repair and regeneration of tissues. All patients who participated in the 3-day program were provided microcurrent devices, calibrated to their specific eye diseases, and were instructed to use them at home to continue vision improvement.

Syntonics, or optometric phototherapy, is the branch of ocular science dealing with the application of selected light frequencies through the eyes. (15) It has been used clinically for more than 70 years in the field of optometry with continued success in the treatment of visual dysfunctions, including strabismus (eye turns), amblyopia (lazy eye), focusing and convergence problems, learning disorders, and the after-effects of stress and trauma. In recent years, Syntonics is effective in the treatment

of brain injuries and emotional disorders. A specific wavelength of light is selected for each person to help rebalance their particular imbalance. Research is ongoing, but data indicate specific frequencies of blue-green light can improve the vision in patients with macular degeneration, and certain frequencies of green light can lower the pressures in patients with glaucoma.(16) Each color can have a myriad of frequencies, and the task is to identify the frequency that best resonates with the eye, stimulates retinal function, and balances the autonomic nervous system. Each participant received 2 light-therapy treatments per day.

Table 1 shows the number of patients affected by each of the 11 eye diseases as well as the total number of eyes affected. Some patients had a disease in only 1 eye, and some patients had more than 1 disease.

**Table 1. Ocular Conditions, Number of Patients, and Number of Eyes**

<b>Eye Disease</b>	<b>Number of Patients</b>	<b>Number of Eyes<sup>a</sup></b>
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
<b>Total</b>	<b>152</b>	<b>290</b>

Abbreviation: ARMD, age-related macular degeneration.

<sup>a</sup>Some patients had disease in only 1 eye; some patients had >1 disease.

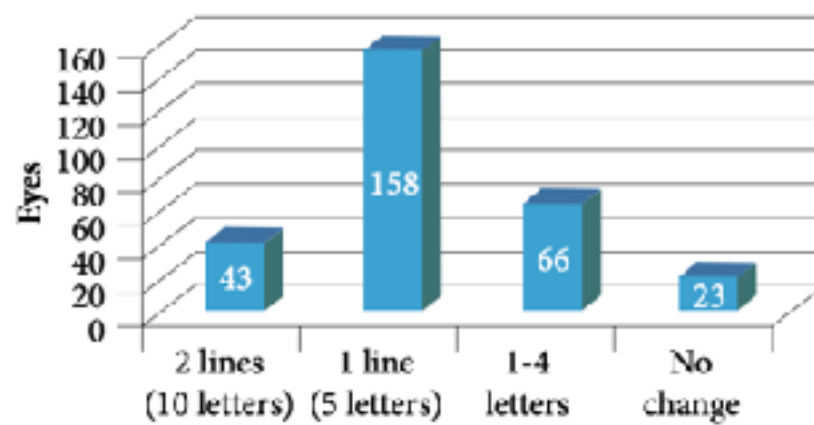
Sixty-nine percent of the study's participants had improvement of at least 1 line (i.e., 5 letters) in acuity, and 36% had improvement of at least 1 line in contrast (Table 2; Figures 1, 2, and 3). One line of improvement is a significant change that is noticeable to patients and improves their levels of daily functioning. Typically when a spectacle measurement improves the acuity by 1 line, a patient will be advised to get a new pair of glasses. Most ophthalmic studies agree that a 5-letter or 1-line improvement is very significant and that a mechanism that produces this visual change deserves more research.

**Table 2. Summary Results of All 152 Patients or 290 Eyes Treated**

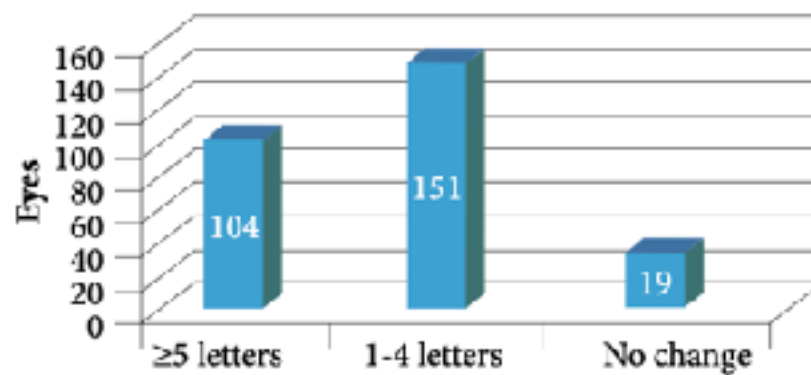
<b>Acuity Improvement</b>	<b>Number of Eyes<sup>a</sup></b>	<b>%</b>
≥2 lines (10 letters)	43	15%
>1 line (5 letters)	158	54%
>1-4 letters	66	23%
No change	23	8%
<b>Contrast Improvement</b>	<b>Number of Eyes<sup>a</sup></b>	<b>%</b>
>5 letters	104	36%
>1-4 letters	151	52%
No change	35	12%
<b>Visual Field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

<sup>a</sup>Some patients had disease in only 1 eye; some patients had more than 1 disease.

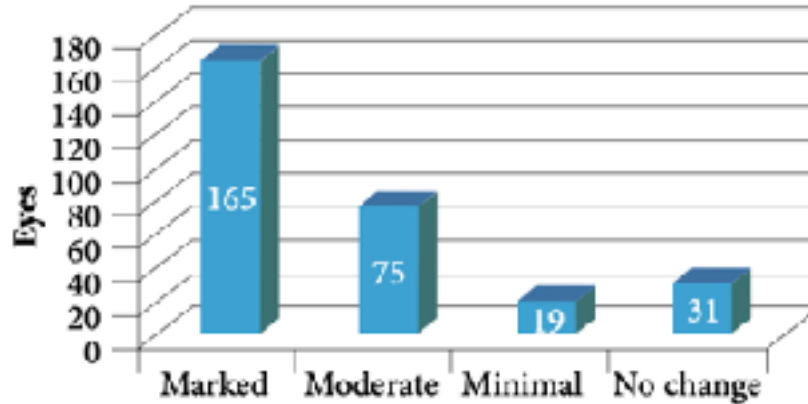
**Figure 1. Summary results for acuity improvement.**



**Figure 2. Summary results for contrast improvement.**



**Figure 3. Summary results for visual field expansion.**



## Results

Of the current study's participants, 69% had improvement of at least 1 line (ie, 5 letters) in acuity, and 36% had improvement of at least 1 line in contrast (Table 2; Figures 1, 2, and 3). The treatment modalities used were statistically beneficial to all groups treated—improving acuity, contrast, and visual fields. All treatment modalities are beneficial individually and have no associated pain or discomfort, toxicity, or side effects. This is in significant contrast to conventional medicine's treatments that are either invasive (surgery) or toxic (pharmaceuticals) and produces only short-term remediation without addressing any of the underlying causative factors that produce eye disease. The treatments used produced the results due to the possible mechanisms of (1) improvement of blood flow, (2) reduction in inflammation, (3) stimulation of cellular activity, and (4) Stimulation of stem cell activity and regeneration. All of these processes are known to be conducive to tissue, organ, and system health.

Further, to fully grasp the significance of these results, it is vital to highlight the limitations and toxicity involved in conventional treatments for macular degeneration, glaucoma, and cataracts.

ARMD is a progressive eye disease that is becoming more and more prevalent in the world. There are more than 2 million new cases per year in the United States and Canada. Currently, more than 30 million

people have the condition. There are 600 new cases of wet macular degeneration every day, making it a significant problem. Ten thousand people turn 65 years old every day in North America. The over 65 age group is the highest risk group for eye conditions that lead to blindness due to age as well as due to early life exposure to heavy metals, before the banning of leaded gas and certain toxic pesticides.

Conventional pharmaceutical and surgical treatment of both glaucoma and macular degeneration are fraught with limitations and toxic side effects that make the acceptance of natural, overall health-improving strategies, such as those discussed in this article, even more compelling.

Very little research has been done to date that has attempted to reverse chronic eye disease. Of the current study's participants, 69% had improvement of at least 1 line (ie, 5 letters) in acuity, and 36% had improvement of at least 1 line in contrast (Table 2; Figures 1, 2, and 3). The treatment modalities used were statistically beneficial to all groups treated—improving acuity, contrast, and visual fields. All treatment modalities are beneficial individually and have absolutely no associated pain or discomfort, toxicity, or side effects. This is in significant contrast to conventional medicine's treatments that are either invasive (surgery) or toxic (pharmaceuticals) and produces only short-term remediation without addressing any of the underlying causative factors that produce eye disease. The treatments used produced the results due to the possible mechanisms of (1) improvement of blood flow, (2) reduction in inflammation, (3) stimulation of cellular activity, and (4) stimulation of stem cell activity and regeneration. All of these processes are known to be conducive to tissue, organ, and system health. Further, to fully grasp the significance of these results, it is vital to highlight the limitations and toxicity involved in conventional treatments for macular degeneration, glaucoma, and cataracts. ARMD is a progressive eye disease that is becoming more and more prevalent in the world. There are more than 2 million new cases per year in the United States and Canada. Currently, more than 30 million people have the condition. There are 600 new cases of wet macular degeneration every day, making it a significant problem. . Conventional pharmaceutical and surgical treatment of both glaucoma and macular degeneration are fraught with limitations and toxic side effects that

make the acceptance of natural, overall health-improving strategies, such as those discussed in this article, even more compelling. None of the methods used in the 3-day program has any toxic side effects. Eye specialists have long been aware of the pathological changes that can result from the treatment of wet macular degeneration with anti-VEGF (vascular endothelial growth factor) injections. Endophthalmitis, which is a severe infection that usually leads to blindness, can occur, as can a retinal detachment. Glaucoma, as well as cataracts, can develop. However, there are even more disturbing findings. A recent national study designed to compare the relative effectiveness of 2 frequently prescribed anti-VEGF medications to treat wet macular degeneration had some alarming results. It determined that, for more than 18% of those receiving the anti-VEGF treatment, the treatment itself was found to produce geographic retinal atrophy (GA), which is a more severe form of macular degeneration involving retinal cell death. The team of researchers led by Juan E. Grunwald, MD, of the University of Pennsylvania, has published a study of 1024 patients whose color fundus photos or fluorescein angiograms showed no visible signs of GA at enrollment. (17)

#### **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 electrotherapy application is also bound by the Arndt-Schultz Law of Biomodulation. 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](http://www.eye-cell.com)) published in circulation their first paper on precise bioelectric signaling based organ regeneration controlling (Vascular Endothelial Growth Factor) (18) 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 ex-



pression of (Stem cell Derivative Factor) SDF1 or CXCL12. (19) During development, SDF1 plays a role in the migration of neurons.

[24] 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 bio-electric 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.

Klotho decrease with age and a deficiency is associated with increased risk of age-related diseases.

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

## **CONCLUSIONS**

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.

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