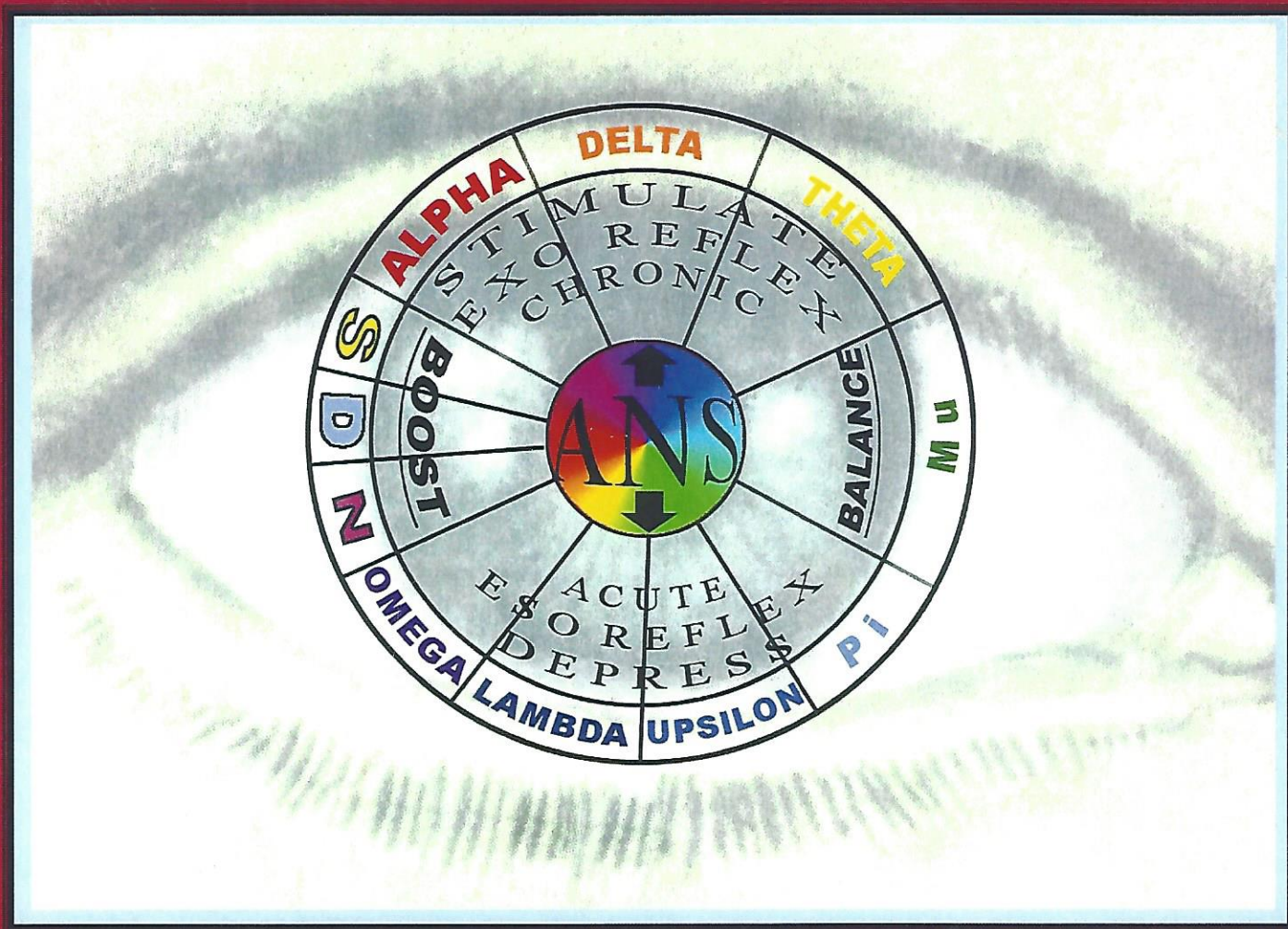


Journal of Optometric Phototherapy



Photobiomodulation and its Mechanisms

Blue Light and the Eye Miracle Meridians

Color Visual Fields Spectro-Chrome

March 2009

College of Optometric Phototherapy

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ABOUT THE COVER

The Syntonic Eye

The syntonic eye represents one of the oldest methods of phototherapy where colored light projected into the eyes balance the autonomic nervous system "ANS." When the body's physiological system is balanced, many of the underlying causes of both chronic and acute vision problems are corrected.

SPECIAL THANKS:

Dr. Jacob Liberman for creating the centerfold,
Dr. Rian Shah for line editing.

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A NONPROFIT CORPORATION DEDICATED TO RESEARCH IN PHOTORETINOLOGY.
THE THERAPEUTIC APPLICATION OF LIGHT TO THE VISUAL SYSTEM

March 9, 2009

Dear Colleagues,

Another year has passed and the excitement in our field continues unabated. Your board has continued to have phone conferences throughout the year and has been working on such developments as a new website and expanded CSO Library. Under the leadership of Tom Cunningham a new site is under construction and will be previewed at the annual meeting. Tom has also updated our library and created exciting introductions to our work for the public.

The faculty has been presenting syntonics lectures at conferences around the world. Sam Berne did a course in Mexico and I was a keynote speaker there as well. My presentation on syntonics and head trauma was very well received at their Annual Conference on Functional Optometry. A CSO branch in Mexico is being organized this year. Cathy Stern has been lecturing around the country on brain trauma and Stefan Collier is busy teaching behavioral optometry and syntonics throughout Europe. The International Light Association had me present a workshop on syntonics and clearing trauma as well a lecture on the use of syntonics and microcurrent therapy. Also in attendance was Sarah Cobb who lectured on the work of Carl Loeb. Don Barneski was also elected to the ILA board of directors. Attendees heard a wide range of presentations on color ranging from the use of color in education and the classroom to the relationship of sound to color.

New research on the effects of color continues at a rapid pace. More health professions are embracing light therapy in their practices. From physical therapy, dermatology, dentistry, sports medicine, and osteopathy, the use of color therapies is being employed to treat pain, edema, inflammation, and wound healing. Cool lasers are now the standard of care in many health practitioners' offices.

This year at our 77th annual conference in Niagara Falls attendees will have the opportunity to take the basic course and hear a wide range of advanced lectures. These will encompass iris phototherapy, light and sound combined for diagnosis and treatment, visual fields, and the Infinity Walk as a therapy adjunct for attention and balance. The latest research will be presented on circadian rhythms, melanopsin as a third photoreceptor, the effects of color on enzymes and synaptic response in the brain, and the use of color to facilitate communication. There will be cutting edge information in the field of energy medicine from Dr. Carryn Fletcher. We welcome back Dr. James Oschman who will bring us up to date on his research in bio-photons and much more.

This is another great Syntonics Conference you do not want to miss. The venue is exquisite with every room having a view of the falls. It is also a special opportunity to be together with your family of light practitioners.

Sincerely yours

A handwritten signature in cursive script, appearing to read "Larry Wallace". The signature is written in dark ink and is positioned above the printed name.

Larry Wallace, O.D., F.C.S.O.
President of CSO

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Shedding Light on Stroke Treatment

Alice Nixon , LCSW, BCD, *Executive Director* and Co-Founder of Spectrum International Institute for Wellness, Education and Research has been the Spectrum spokesperson to the annual Midwest Regional Conference of the Chicago Medical Society. She initiated and developed the first International Light and Sound 2000 Conference.

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Hidden Vision Problems in Parkinsons and Stroke Patients

Geoff Shayler BSc, FCOptom, FSCO was the first behavioural optometrist to incorporate syntonics, kinesiology and primal reflex therapies with optometric vision therapy. He has been a regular contributor of articles for the Journal of Optometric Phototherapy as well as published in the UK and Europe on the links between the visual field and near processing with educational performance and behaviour.



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***COLOR THERAPY* An Old ... New Age Therapeutic Option**

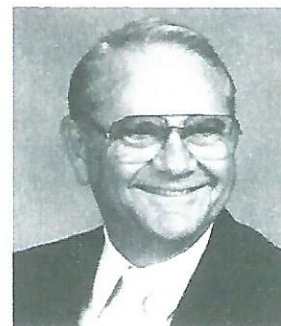
Darius Dinshah, is the president of the, Dinshah Health Society and editor of the DHS Newsletter. He is author of *Let There Be Light* which now in its 9th edition with about 45,000 copies in print. His video/DVD, *My Spectro-Chrome* is a 5 hour monolog on Spectro-Chrome. He is past president of the Visible Spectrum Research Institute.

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A Conversation With Charlie

Dr. Charlie Butts, Dean Emeritus of the College of Syntonic Optometry, has applied phototherapy to over 3,000 of his patients and has had an enormous influence in optometry. He created the basic course in syntonics and has mentored many of the accomplished syntonic practitioners. He still enjoys enlightening new optometrists.

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About the Centerfold - Pathways of Light Reception

Jacob Liberman, O.D., Ph.D., D.Sc. is the recipient of the H.R. Spittler Award. His first book, *Light: Medicine of the Future*, established him as an authority in the field of light and color therapy and is considered a classic in its field. In 2001, Dr. Liberman founded Exercise Your Eyes, Inc. and invented the EYEPART Vision Training System.

Inside back cover

Experimental and Clinical Approaches to Understanding Photobiomodulation and Its Mechanisms

by

Raymond J. Lanzafame, MD MBA; Philip Brondon, MS and Istvan Stadler, PhD
Laser Center, Rochester General Hospital, Rochester, New York

INTRODUCTION

The concept of using light to influence biological activity in mammalian tissues seems like the stuff of science fiction. Yet vision, vitamin D metabolism and melanocyte stimulation during sun tanning are examples of photostimulation in daily life. Therapeutic use of light is not new. Phototherapy is recorded in the Smith Papyrus and filtered sunlight was used to treat cutaneous lesions in sanitariums at the turn of the 20th Century. Understanding the mechanisms of photobiomodulation is critical for successful phototherapy.

So-called Low Level Laser Therapy (LLLT) is based on the principles of photobiomodulation and is being used to treat various conditions [1–14]. Studies have demonstrated that LLLT significantly influences a variety of cellular functions and clinical conditions [1, 4, 5, 8–23]. Other studies have concluded that LLLT had little or no effect [6].

A variety of biological processes, including the acceleration of wound healing [11,13,19,21,22], increased mitochondrial respiration and adenosine triphosphate (ATP) synthesis [8,10,12,17,18], cell proliferation [9–11,16,23], enhancement and promotion of skeletal muscle regeneration following injury [12] and a variety of other effects have been documented. Photobiomodulation enhances collagen synthesis in wounds and increases wound tensile strength [13]. Increased cell proliferation results from stimulation of mitochondrial respiration and ATP synthesis [8, 14–18]. Our laboratory has been interested in understanding the mechanisms and optimizing the parameters for photobiomodulation. The following investigations highlight some of the results of this work.

IN-VITRO STUDIES:

Oxidative Burst: Tissues and cells respond to photoradiation by altered metabolism and proliferation [28]. Human HEP-2 and Murine L929 cell lines were cultured in complete DMEM media. Photoradiation was administered using a THOR DDII LED Device (THOR Photomedicine, LTD., Amersham, UK) @ 5.0 J/cm²/treatment at 670 and 850nm simultaneously. The

Control group received no treatment. Cell samples were taken at 25 and 120 min post treatment. Cell responses were measured using CyQuant (Molecular Probes Inc., Eugene, OR), MTT (Chemicon International Inc, Temecula, CA) and 2,7-dichloro-fluorescein-diacetate (DCFH-DA), (Sigma, St. Louis, MO) for oxidative burst measurement. The relative response to photoradiation after two treatment cycles demonstrated that the oxidative burst is the first response after photoradiation followed by an increase in general metabolism and DNA synthesis. The magnitude of these responses increases with subsequent exposure. Oxidative burst and metabolic rate analyses demonstrated concurrent short time course elevations after photoradiation. The rate of increase when normalized to controls was significantly higher for the oxidative burst than for the metabolic rate. Both parameters demonstrated time dependency with maximal increases occurring between 20–40 min post exposure. The values decreased at 120 min but remained above pre-treatment levels. Successive light exposures at 120 min intervals caused an elevation in the oxidative burst and the metabolic rate. A similar time course and response were expressed. Both HEP-2 and L-929 cell lines responded in a similar fashion. A slight increase was observed in cellular proliferation based on DNA content in both cell lines. This effect appeared to be proportional with the number of treatments and time. Moving average analysis demonstrated a linear correlation for time and consecutive treatment series for the three parameters studied (i.e. oxidative burst, metabolic rate, and proliferation index).

Filtering Effects of Melanin: The influence of melanin on the outcome of photoradiation at 670nm was studied in cell culture [29, 30]. Gelatin filters with varying melanin concentrations were fabricated using pharmaceutical grade gelatin. HEP-2 and L929 cell lines received photoradiation at 670nm using an LED device (Quantum Devices, Barneveld, WI) at 5.0 J/cm² per treatment/ 24hr (50 J/cm² total fluence) and placing melanin filters between the light source and the wells. Five groups were photoirradiated based on the percentage of melanin in the filters: Group#1: no filter

Group#2: gelatin alone, Group#3: 0.0125%, Group#4: 0.025%, Group#5: 0.050%. Cell proliferation was measured using CyQuant and MTT assays for 240 hrs post photoradiation. Assay results demonstrated a significant dose response effect ($p \leq 0.05$) in both cell lines with the measured activity being inversely proportional to the melanin concentration in the filters. This study demonstrates that cutaneous melanin content should be taken into consideration when treating patients.

Effects of Nonsteroidal Anti-inflammatory Drugs: HEP-2 and L929 cells were cultured in complete DMEM media and daily photoradiation was administered at 670nm using LEDs (Quantum Devices, Barneveld, WI) at 5.0 J/cm²/treatment/day both in the presence and absence of NSAIDs [31]. Ibuprofen, indomethacin, and acetyl salicylic acid (ASA), were used at concentrations 12.5, 25, and 50 mcg/ml and celecoxib at 0.75 mcg/ml to mimic typical serum concentrations. Cellular response was measured using the MTT assay to assess cellular metabolic rate and the 2, 7-dichloro-fluorescein-diacetate (DCFH-DA) assay to measure oxidative burst following photoradiation. The presence of NSAIDs at doses matching their peak plasma concentrations significantly decreased the response to phototherapy at 670nm in both cell lines. No significant differences were detected between COX-1 or COX-2 inhibitors in this study. These observations may partially explain the variable responses to phototherapy for musculoskeletal disorders reported in the literature and suggest that photoradiation treatment parameters and NSAID use may require modification in these cases.

Effects of Phototherapy Dose Interval: Dosimetry and treatment frequency are controversial phototherapy issues. Efficacy of dose fractionation on photobiomodulation was evaluated *in vitro* [23]. Human HEP-2 and murine L929 cell lines were cultured in complete DMEM media. Photoradiation (670nm, 5J/cm²/treatment, 50J/cm² total energy delivery), was performed using varying numbers of treatments per 24hr period: Group I (Controls)- 0 treatments, Group II- 1 treatment per day, Group III-2 treatments per day, and Group IV-4 treatments per day. Cell proliferation was measured using CyQuant and MTT assays for 240 hrs post therapy. A Proliferation Index: $PI = (\# \text{ Cells Experimental}_t \div \# \text{ Cells Control}_t)$ was computed. The MTT assay results demonstrated a maximal response in Group III ($p < 0.05$, $n=3$). CyQuant maxima occurred in HEP-2 Groups II and III ($p < 0.045$) and L-929 Group III ($p < 0.091$). Cellular response to dose frequency varies. Delivering two treatments per 24 hour interval increased

metabolism and proliferation in both cell lines. Four treatments per day were inhibitory in both cell lines.

Effects of Pulsing on Phototherapy Outcomes: Delivering pulsed light has been suggested as a means of enhancing treatment efficacy particularly as pigmentation increases. This study was undertaken to determine whether pulsed light delivery mitigates the filtering effect of melanin pigment on photomodulation at 670nm in a cell culture model [32]. HEP-2 cells were cultured and photoradiation was administered through 0.025 % melanin filters at 670nm (Quantum Devices, Barneveld, WI) delivering 5.0 J/cm² /treatment/ 24hr for 72 hrs at different pulse rates. Group A received no light treatment. Group B received daily treatments without pulsing. Groups C, D, E, F, and G received treatments at 6, 18, 36, 100, and 600 Hz respectively. Cell proliferation and oxidative burst were measured using the MTT and 2,7 dichloro-fluorescein-diacetate (DCFH-DA) assays. The assay results were expressed relative to Group B controls. Delivering photoradiation at 670 nm at 100 Hz and 600Hz pulse rates significantly increased cell proliferation and oxidative burst in this model in the presence of melanin ($n=4$, $p < 0.05$). Frequencies of 6, 18 and 36 Hz inhibited cell proliferation at 72 hours, while 600 Hz was inhibitory at both 48 and 72 hours. Maximal stimulation was seen using 100 Hz pulsing in this model. This suggests that light pulsing may improve outcomes by mitigating the filtration effects of cutaneous melanin. Studies to further define these effects and to determine whether coherent light sources (i.e. laser) exhibit similar responses in this model are ongoing. Preliminary results [unpublished] appear to demonstrate that delivery of coherent light is superior to non-coherent photoradiation in this model.

STUDIES IN-VIVO:

Nitric Oxide Precursors: The effect of the topical application of an NO precursor (topically applied 2% nitroglycerin) in combination with photoradiation was investigated in an experimental wound model [33]. Sprague-Dawley rats (280-300gr) were anesthetized with 45mg/kg Pentobarbital IP and shaved. Five $\varnothing=5.0$ mm round, full-thickness wounds were created on the dorsum of each animal. The animals were divided into groups ($n=4$ per group) based on their treatment regime. Controls received neither treatment. Group A animals received photoradiation (670nm, 5.0 J/cm², NASA LED, Quantum Devices Barneveld, WI). Group B received the topical NO precursor only. Group C received photoradiation and the NO precursor. Treatments were administered daily from day 0 though day 10 post injury. The wound closure rate was measured by calculation of the wound area using digital imaging performed at 48 hour intervals for 18 days post injury. The use of a

topical NO precursor in combination with 670nm photoradiation accelerated wound healing in this model. The results were statistically significant ($p \leq 0.05$) on day 18 when comparing the control and combined therapy treatment group animals.

Reciprocity of Phototherapy: Energy Density and Exposure Time reciprocity is assumed and routinely used in Low Level Laser Therapy (LLLT) regimens. The effects of dose reciprocity on wound healing were investigated in a murine model [34]. Pressure ulcers were created on the dorsum of seven groups of C57/BL mice ($n = 18$ each). Photoradiation was administered for 18 days post wounding, delivering $5 \text{ J/cm}^2/\text{d}$ @ 670 nm using a custom LED apparatus and a treatment matrix that varied both intensity and exposure. Control animals were treated similarly, without LLLT. Ulcer staging was performed using a standardized scale. Changes in stage, wound area and wound closure rates were measured. Histology was performed and standard light microscopy evaluation was conducted. Photostimulatory effects at day 7 occurred using parameters of $125 \text{ s @ } 40 \text{ mW x } 1/\text{d}$; $625 \text{ s @ } 8 \text{ mW x } 1/\text{d}$; $62.5 \text{ s @ } 40 \text{ mW x } 2/\text{d}$; and $312.5 \text{ s @ } 8 \text{ mW x } 2/\text{d}$. Photostimulatory effects were observed at day 18 using treatment parameters of $625 \text{ s @ } 8 \text{ mW}$ and $312.5 \text{ s @ } 8 \text{ mW x } 2/\text{d}$. Statistically significant increases in wound closure rates occurred using $625 \text{ s @ } 8 \text{ mW}$; $62.5 \text{ s @ } 40 \text{ mW x } 2/\text{d}$; and $312.5 \text{ s @ } 8 \text{ mW x } 2/\text{d}$ treatments. These results are demonstrated in Figure 11. Mean ulcer grade scores were similar to controls in all animal treatment groups. Varying Irradiance and Exposure Time to achieve a specified Energy Density affects phototherapy outcomes in this model. Variation of Exposure Time and Irradiance may account for the conflicting results in the literature following phototherapy. It is likely that specific parameters for optimized outcomes exist for specific tissues and conditions.

Effects of Location of Phototherapy on LLLT Outcomes: This study was undertaken to determine whether wound healing outcomes could be affected if photoradiation is delivered to different areas of the wound [35]. Pressure ulcers were created on the dorsum of C57/Bl mice ($n=24$) using the ischemia-reperfusion method utilized in the experiment described above. Daily phototherapy was performed for 14 days post injury at 670nm and delivering $5.0 \text{ J/cm}^2/\text{treatment}/24\text{h}$ using an LED array (Quantum Devices, Barneveld, WI). Mice were divided into groups ($n=6$). Group A received no photoradiation (Control). Group B received photoradiation of the entire animal dorsum (Whole Body). Group C received photoradiation of the entire wound (Area) and Group D animals received

photoradiation of the wound edge (Perimeter). The wound closure rate and wound areas were determined by digital imaging performed at 48 hour intervals for 16 days post injury. This preliminary study demonstrated that delivering photoradiation to different zones influences wound healing outcomes in this model. The fastest wound closure rate occurred in Groups C and D. Treatment of the whole body (Group B) was less effective as compared with treatment of the entire wound or the wound perimeter (Groups C, and D respectively).

CLINICAL TRIALS:

Two ongoing clinical studies are being conducted to determine whether light treatments, when given with other standard wound care treatments and regimens, are more effective in promoting wound healing than standard care alone. Light therapy is provided 4 days per week, until the wound is healed. All patients continue their routine wound care.

The first study is a randomized control crossover trial. Patients are randomized to receive standard wound care alone, or in combination with LED light therapy ("NASA LED", Quantum Devices, Barneveld, WI) in the first study. Patients undergoing light therapy have their wounds exposed to light emitted from LEDs at wavelengths of 670 and 880nm for 1.7 minutes each to achieve a goal energy exposure of 4J/cm^2 per wavelength (i.e. a total of 8J/cm^2 combined) and at a power density of 50mW/cm^2 per wavelength. Light therapy is provided 4 days per week, until the wound is healed, either through wound epithelialization or skin grafting. All patients continue their routine wound care. Those participating in the light therapy arm receive light therapy in addition to their usual wound care regimen. Patients in the placebo control group are treated similarly. However, they receive "sham" light therapy at 5% of the dose used in the treatment group. Patients who have not healed after 60 treatments (14 weeks) continue treatment in an open label fashion using the same parameters as the treatment group.

Patients in a companion study are treated by exposing their wounds to light emitted from a THOR-DDII LED device (THOR Photomedicine, LTD, Amersham, UK) at 660 and 850 nm with a power density of 50mW/cm^2 and 150mW/cm^2 per wavelength respectively, and at a total fluence of 4 J/cm^2 per wavelength (e.g. a 1.7 minute treatment time). All patients in this study are treated in a similar fashion to those in the NASA LED trial.

Forty-one wounds have been treated to date in 36 patients, combining both studies. Light therapy treated wounds achieved a partial response in 16.2% (6/37) and

complete healing in 59.5% (22/37) of cases. Of the remaining wounds, 4/37 (10.8%) were unchanged and 5/37 (13.5%) were worse after LLLT. None of the control group wounds healed (n=4) and were essentially unchanged, achieving on average only a 7% reduction in wound area. These results are significant at the $p < 0.001$ level. There was no difference in outcomes based on the specific device used, nor was there a difference in the number of treatments required to achieve healing or improvement.

These results appear to demonstrate that phototherapy is efficacious in the management of recalcitrant wounds. Larger clinical studies will likely be necessary to convince the medical mainstream that phototherapy is useful.

COMMENT:

Biological systems are complex, with feedback loops and processes that can be inhibited, stimulated, or provide critical components for other processes. Some processes can be bypassed or produce end products, given proper substrates. Some of the byproducts of activity of neutrophils, lymphocytes and other cellular components of the inflammatory cascade produce

damage if left unchecked. Healing and other tissue responses are affected by the upregulation of specific substrates and the inhibition of others.

A growing body of evidence is demonstrating that mammalian cells, tissues, and whole organisms are responsive to photoradiation under various conditions. Collagen production is stimulated, various cytokines are upregulated (e.g. EGF, TGF- β , FGF, etc.) and inflammatory cytokines (e.g. IL-6, IL-8, and IL-1) are downregulated by photobiomodulation. Upregulation of cytochromes, as well as other transport and energy compounds (e.g. NADH, ATP, ADP, etc.) enhances the activities of various cellular components in the local milieu.

The successful use of phototherapy is critically dependent on understanding its mechanisms and strict attention to treatment parameters. It should be possible to construct dose-response curves (matrices) for various wavelengths that are correlated with knowledge of specific tissue components and activities. A broad range of clinical and research applications that center on the principles of photobiomodulation are possible and have the potential to improve health and well-being.

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Practical Guide for Charting and Interpreting Color Visual Fields

Don Barniske, O.D., F.S.C.O.

In 1928, an 81-page hand bound book was published by Dr. Wm. Arthur Mendelsohn that served as a guide for practical charting and interpretation of the visual form and color fields. His primary interest was not in eye disease as it affects the visual fields, but muscular imbalance of the extra-ocular eye muscles and progress in ocular training or vision therapy as it is known today. Form and color fields are presented before and after therapy to show changes from ocular training and lens therapy. The cases presented are compiled from practical experience and consultation with other practitioners who have given detailed study to the subject.

Dr. Mendelsohn was also very concerned with the effects of general health, nutrition, systematic diseases, focal infections, toxemia, hysteria, and stress on form and color visual fields. He mentions that intestinal stasis (constipation) is the most frequent interference to elimination of toxins, that it causes general toxemia and depletion of "duction capacities" or extraocular muscle imbalances. Further, he states that ocular training would be unsuccessful if the source of toxemia has been neglected.

Indications for Color Field Charting

- 1) vision below normal including amblyopia
- 2) suspicion of ocular pathology
- 3) complaint greater than refractive condition warrants
- 4) all cases for vision therapy
- 5) all cases showing poor fusion (poor recovery on ductions; less than half of the break for diplopia)
- 6) when heterophoria constantly varies day to day
- 7) all cases where correction of refractive and muscular defects do not remove complaints
- 8) grief cases

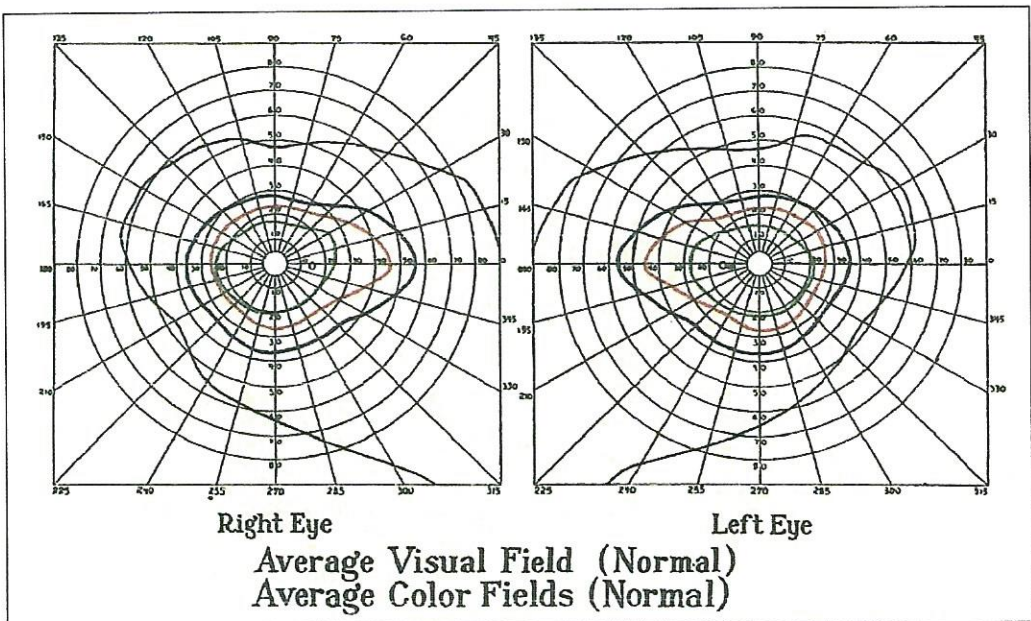
Technique

Of the several of the methods for charting VF, the perimeter method is the most popular. Mendelsohn liked to use a device called Myoculator to chart the form and color visual fields. It used a projected light for the target screen set at 13-inches test distance. Show the patient the colors before testing begins to ascertain their color interpretation. Always accept the patient's color interpretation, i.e. if blue is called purple, or red is orange, then accept it and start!

It was recommended to start with green first because it's supposed to be the smallest field. Green is followed by red (second smallest) and then blue ending with white. Then chart the blind spot. Blind spots may be charted with white only (with the option of using color).

As with all of us who have performed color VF, the patient may call the test target gray first, then another color before the actual color is perceived. They may call the green test object gray, then blue, then green when it receives their perceived color area. It's the same with color test wands, projected color light, or even the newer electronic computer screen test units we have found. Similarly, red may appear yellow first, then orange, then red when it enters the red perceived isopter. Blue may be called purple before it registers blue visually!

Horizontal and vertical meridians are charted first. If a constriction is noted, it is suggested to go to oblique areas for further evaluation.



Changes of Significance in the Color Field Limits

- 1) lateral depressions; especially nasal field (usually blue and red only)
- 2) vertical meridians depressed
- 3) all fields generally depressed

Lateral depressions appear as horizontal meridians; these are much smaller than average normal limits, while the rest of the meridians appear about normal. They are usually found in patients with a lowered fusional reserve of ocular muscles. After vision training to develop fusional reserve, the depressions usually enlarge and return to normal.

Lateral muscular imbalance (esophoria, exophoria) will usually show depression of the vertical meridians. Vertical imbalances, as well as low adduction at distance, are often present when the limits of all the color fields are constricted. In both of these instances, the limits will enlarge with successful vision therapy.

Involvements of the Green Field

Most involvement of the green field limits are traceable to focal or localized infections. Any point of infection with repair tissue (pus) exuding or toxins being absorbed into the general system will first register its presence by a marked constriction of the entire green field. Such a condition may bring about a constriction of the red field, but this follows an aftereffect of the systemic toxemia and will appear as with red overlapping into the green field.

Most choroidal diseases are a result of direct infection, while most retinal diseases are caused by general toxemia. Both affect the green and red field relationship and show overlapping of the color meridians.

Marked constriction of the green field in the early stages is often caused by:

- 1) abscessed teeth
- 2) acute tonsil infection (not chronic)
- 3) sinus infections (not draining)
- 4) acute poisoning (alcohol, paint, toxic drugs)
- 5) any foci(local) infection

Involvement of the Red Field

Contraction of the red field is the result of general systemic toxemia, and will usually overlap into normal green fields. Many cases of chronic focal infection is how a contracted or overlapping red field in addition to a contracted green field; this pattern indicates general toxemia.

General systemic toxemia is often caused by an unbalanced diet and nutritional changes are necessary to alleviate the toxemia. All cases of ocular muscular imbalance or lowered convergence with green or red field involvement are usually due to general toxemia. The toxemia needs to be removed before any vision therapy is considered. Mendelsohn devotes significant space to food assimilation and its importance to systemic toxemia. He also states that a normal, healthy person can consume all types of food, if eaten in the correct combinations.

Involvement of the Blue Field

In certain organ involvements and disease states, contraction or overlapping of the blue field can be found. Syphilis was discussed as demonstrating a prompt reaction in the blue field before modern medical treatment of the condition. Additionally, a specific heart involvement will contract the blue field before any others are involved.

However, this is not true if the heart disturbance is a reflex condition due to toxic elements from elsewhere in the system. A focal infection can affect the heart and the green field would be noticeable before the blue field changed. Or, all three fields may be interrelated and overlapping, the focal infection turning into a general toxic condition, and then the toxemia would affect the heart.

Mendelsohn states that the blue field is seldom the only one affected. For example, the focal infection would affect the green field, while the general toxemia affected the red field and the heart disturbance effected the blue field.

Toxic Amblyopia

Exogenic and endogenic poisoning and toxemia are presented. Exogenic poisons are usually self-administered, such as tobacco, coffee, tea, alcohol, lead, etc. They can cause amblyopia to distort and constrict form, while color fields are interlaced.

Endogenic poisons are usually generated internally, such as diabetic changes, glandular imbalances, kidney poisons, and toxic effects of certain drugs and medicines that affect color fields like endogenic poisons. They can affect the form of peripheral fields. Endogenic poisons can cause marked contractions of the color fields and occasional interlacing.

Specific effects of exogenic poisons:

Tobacco first effects the color fields by contracting the red field and interlacing. When vision is effected, the form field becomes distorted in the periphery. As a result, the area between the fovea and the blind spot will be dim or scotoma to color before a white scotoma is present. Upper outer quadrants show depressions to red often in both eyes. Blind spot enlargement is often present.

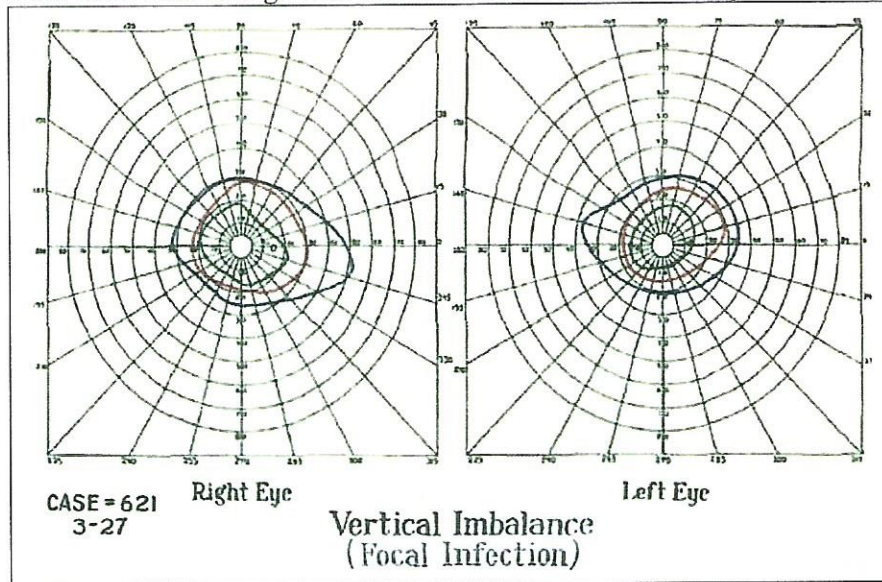
Alcohol may cause dimmed peripheral form recognition with interlacing red and green fields. More advanced stages result in a red scotoma followed by green. Central vision is markedly reduced. Noted was Traquair's comment on how amblyopia is rare in Britain from alcohol. However, because large amounts of very poor alcohol is being consumed in the U.S., such alcohols will have effects on vision and visual fields!

Coffee and tea consumption, beyond the person's ability to offset the poisonous effect, will effect mainly the red field as it contracts and interlaces with green (reviewer: "Starbucks fields"). In very severe and advanced stages, a scotoma for red will appear first. Quinine and aspirin have similar effects.

In the very early stages of toxicity, marked enlargements (stimulative) of the color fields occur concomitantly with contractions in superior or inferior areas, possibly toward the nasal site. As the toxic response advances, the color fields become very much contracted. This is also true for form fields and white fields.

Detoxification with peripheral stimulation during treatment results in larger fields than detoxification without peripheral stimulation.

Mendelsohn notes Traquair's claim that if white is as constricted as color fields, then recovery of the fields is limited. However, if the white field is large with constricted color fields, then improvement is expected.



The Four Divisions and What to Look For:

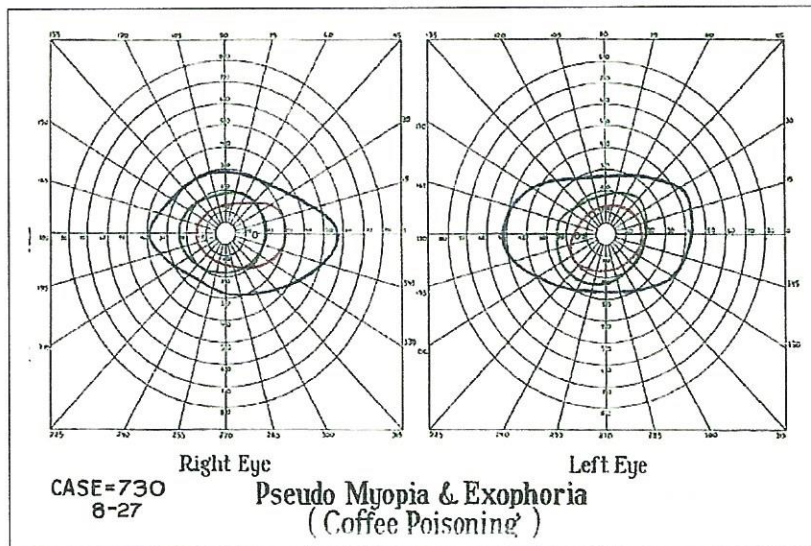
Primary Division cases are usually due to consumption of exogenic poisons, such as coffee, tea, alcohol, tobacco, stimulation drugs or wrong food combinations. In such cases, the red field is effected; if the toxic element is removed for a few days, the red field tends to normalize rapidly. In these cases of "stimulative toxemia", the ocular muscle ductions will be low in the morning and high later in the day. The color fields will be more normal in the morning and more markedly involved later in the day.

Secondary Division cases are usually due to endogenic poisons or chronic or long standing conditions. The toxic elements are depressive in nature. The field limits will first be enlarged and interlacing and then tend toward contraction. These cases are slow to respond to corrective measures, sometimes requiring months for fields to normalize. Hysteria is included in this division.

Semi-Final Division cases tend to be stable and have compromised color fields even though toxic elements have been removed. There may be dim areas for form fields and poor color fields (usually more for one color than another). There may be scotoma for color and scotoma for color form fields. These cases often pass to the Final Division..

Final Division cases have dim areas of the fields that develop into scotoma. The patient loses all recognition for form, light, and color in that area, creating a true blind spot. The patient may be aware of the scotoma or not. Some will project them into their visual fields on a book or sheet of paper.

Photostimulative light therapy (Mendelsohn's myoculator) helps in various cases following the removal of the toxin or hemorrhage. Light therapy helps blood flow through the ocular structures assisting with re-normalization. With a hemorrhage, the cause needs to be addressed, i.e. injury from trauma to the eye or systemic causes.



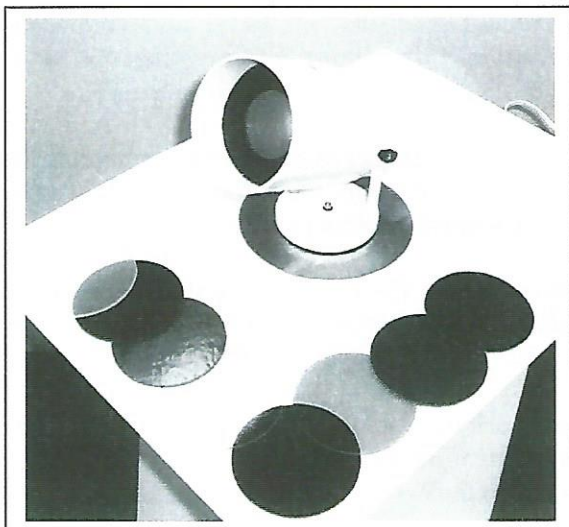
Conclusion

In conclusion, the important points for the refractionist to keep in mind for color visual field are

- 1) marked contractions or constrictions
- 2) marked enlargements
- 3) contractions of one meridian
- 4) overlapping or interlacing
- 5) areas of dim vision
- 6) areas blind to light (scotoma)
- 7) distortion or contraction of form fields
- 8) enlarged nerve head
- 9) small, sharp blind areas extending from the nerve head (often an indicator of glaucoma)

“If this guide is the means of exciting interest in this absorbing subject, much good will be done with those who follow this particular branch of refraction, and I will be more than repaid for my efforts.” -

Dr. Wm Arthur Mendelsohn



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Blue Light and The Eye

Larry B. Wallace, O. D., F.C.S.O.

A growing concern for today's optometrists is the effect of high energy visible light on the visual system in general and the retina in particular. This paper will explore the theories surrounding the role of blue light in the development of macular degeneration. It will also discuss how this role relates to the routine use of blue light in Syntonic Phototherapy.

Studies have shown that blue light has photochemical and photoelectric effects on retinal tissue. These effects include free radical generation, oxidation, inflammation, and toxic bioelectric currents, especially in the macular area. To better understand these effects, it is necessary to consider some of the current theories surrounding macular degeneration

pathophysiology. Most damage incurred from macular degeneration occurs as atrophy in the retinal pigment epithelium and choroid layers. It is within these layers that a cholesterol compound called lipofuscin is created. It coalesces into metabolic waste called drusen, a major marker of risk in macular degeneration.

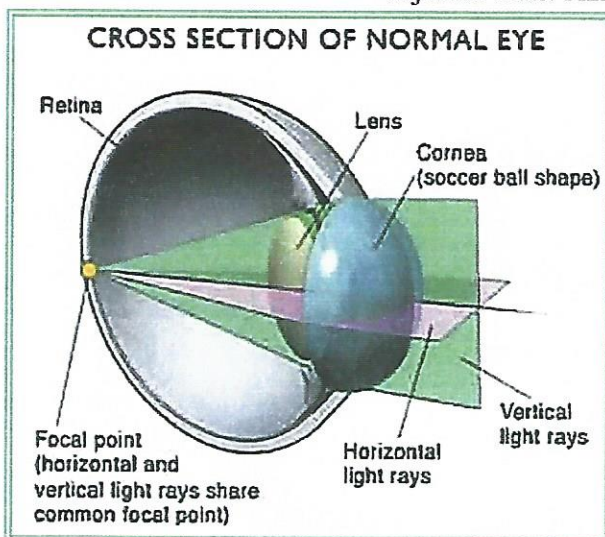
Drusen have a direct optical resonance with light from 410 to 440nm. This light frequency can trigger photochemical reactions resulting in free radical oxygen species. These byproducts damage sensitive tissues in the retina and choroid.

The outer photoreceptor segments shed cells daily from light bleaching; these cells must be phagocytized by adjacent REP cells. This phagocytation involves a complex process of recycling photo pigment and polyunsaturated fatty acids. These compounds are very susceptible to free radicals and oxidation resulting in lipofuscin production and damage to mitochondria in the outer rod cell segments.¹

The drusen, an accumulation of these reactions, begins to fill the sub-retinal spaces, blocking fluid and enzymes to Bruch's membrane and the macular area. This disrupts normal metabolism triggering apoptosis or cell death.

A molecule in the drusen called A2E is the key inflammatory and oxidation compound that destroys adjacent cells. A2E has a maximum photonic resonance to light at 440nm; this creates oxidative stress on the RPE and outer rod cells that surround the macula.

There is also an abundance of oxygen in the macular area where venous blood contains 90% oxygen. The reservoir of oxygen adds to the quantity of free radicals that will attach to local tissues in the area. The presence of drusen serves to provide additional free radicals. Drusen are considered a hallmark of aging and are a risk for both wet and dry macular



degeneration.²

Blue light seems to be 50 to 80% more damaging to the macular area than green light. The macular area is more exposed to light because it is an outer retinal layer. It is protected in several ways.

The cornea filters ultraviolet at 295nm, the lens absorbs UVB from 280 to 303nm, and UVA from 315 to 400nm. This effectively reduces light below 540nm by 70 to 80%. As the lens ages, it becomes progressively more yellow, filtering out more and more blue light.

The macula itself has three carotenoids, lutein, zeaxanthin, and meso-zeaxanthin, which absorb blue light and make up the protective macular pigment. These pigments serve as powerful antioxidants and their deficiency leaves the macula more vulnerable. New technologies such as the MacuScope can measure their presence and serve as a guide to supplement one's diet as necessary.³

Supplementing patients who have age-related macular degeneration (AMD) with melatonin has shown to prevent, reduce, and reverse both wet and dry macular degeneration.

Melatonin has been shown to play a role in regulating both retinal pigment and photoreceptor pathway signaling. Melatonin has also been shown to dissolve drusen. Melatonin's protective factors are reduced when enzymes, essential to its production, are depleted by stress hormones.⁴ (Melatonin is primarily produced by the pineal gland, where production is most powerfully suppressed by blue light. However, it is also produced in the retina because of the retina's lack of storage capability.)

The retinal protein melanopsin is another photosensitive substance found in the ganglion cell layer. It has a peak spectral sensitivity to short wavelength blue light. Melanopsin stimulation contributes to regulation of the following: circadian rhythm synchronization, visual and auditory attention enhancement, EEG activity, cortical enhancement of cognition and alertness, and pineal gland function.⁵ Blue light stimulation of melanopsin coordinates with melatonin production in our circadian rhythm regulation and possibly in retinal hormone production and physiology.

Light sensitive hormones certainly seem to be an important part of visual and non-visual function and health. A new theory proposes that hormone deficiencies play an integral role in macular degeneration.

It is theorized that the retina and macula accumulate cholesterol in an attempt to synthesize hormones such as pregnenolone from DHEA (a natural steroid produced by the adrenal glands). Pregnenolone, along with certain enzymes, can protect the macula from both vascular and neurological damage. Deficiencies of pregnenolone may also lead to the production of pathological drusen and subsequent AMD.

Patients with AMD tend to have low blood hormone levels of DHEA as well as a higher risk of cardiovascular mortality. Dr.'s George Rozakis and Sergey Dzukan have proposed a hormonal theory of macular degeneration. A major study is underway to determine if restoring optimal hormone balance by supplementation can prevent or reverse the progression of AMD.⁶

In Syntonic phototherapy, the stimulation of the adrenocortical, ovarian, and testicular hormones is facilitated by giving both alpha-omega (ruby) and mu-delta (yellow green) frequencies. Blue light may depress

these hormonal actions.⁷ The use of colored light stimulation to balance the endocrine system can play an important therapeutic role in treating AMD.

Evidence, therefore, supports that blue light may cause local retinal tissue damage from ionization, oxidation, free radical production, and systemic harm from endocrine imbalances. The sources of blue light we need to be concerned about surround us in modern society.

Fluorescent lighting uses high temperature mercury which puts out a spectral peak of narrow band blue light in the 440nm range. This narrow band emission is also found in screw-type high efficiency bulbs, and CRT and LCD computer monitors. Dr. Alexander Wunsch, a German physician, has done extensive research in the physics and biological effects of this narrow band lighting on human health. He has found that blue light is chrono-biologically active. This activity can cause sleep disorders, oxidative stress, mitochondrial damage, increased stress hormones such as ACTH, and reduced melatonin associated with macular protection.

Dr. Wunsch also points out that due to chromatic aberration, blue light focuses optically in front of the retina creating a blur. This area of retinal defocus contributes to visual and nervous stress.⁸ LED light sources are also narrow band light sources that may be hazardous with direct illumination in the eyes. Research indicates that the risk increases with higher levels of radiance and exposure. Safety standards are lacking at this time for this risk.⁹

What can we do as practitioners to counsel our patients and reassure them that our treatment with blue light is safe? First of all, we generally use blue light in tandem with green, which is outside the spectral area of concern. In treatment, we use blue combined with indigo which has a wide spectral range from 500 to 680nm. We can recommend blue-blocking yellow tints for those who work long hours on a computer.

We can also recommend using incandescent lighting in the computer workplace and advise against the use of high energy screw-in bulbs. These bulbs pose health concerns and disposal problems due to the mercury inside them. Environmental lighting protocols advocate the use of incandescent lighting as much as possible because they emit in the infrared region of the spectrum.

It is recommended that our AMD patients supplement their diet with antioxidants, including: vitamins A, C, E,

alpha-carotene, beta-carotene and the yellow carotenoids, lutein, zeaxanthin and meso-zeaxanthin. (whose yellow pigment absorb blue light).

Recent research has found that infrared light possesses a regenerative potential for tissue repair. Infrared serves to repair mitochondria and regenerate cell metabolism damaged from blue light. In addition, infrared reduces reactive oxygen species created by blue light.

Many biological indicators point to a reduction of cell death by exposure to infrared light.¹⁰ This may mean that color therapy instruments that have infrared radiation will compensate for any blue or high energy wavelength risks. These healing effects indicate a tremendous potential for the use of longer wavelength filters in the treatment of retinal disease. We have begun

to use red and yellow-green more in the treatment protocols with our AMD patients.

Blue light has many healing properties and has been used therapeutically since recorded time. From all the available literature, blue light can and does cause damage. In Syntonics, we use blue light in a limited mixture and augment the filters with infrared from our instrument light sources.

Syntonics helps balance the endocrine system and, therefore, plays a role in retinal protection. Therapeutic application of blue light possesses no risk to our patients. We know sunlight is very healing but overexposure can cause melanomas. We must educate ourselves and our patients that excessive exposure to narrow bands in the blue range of the spectrum should be avoided

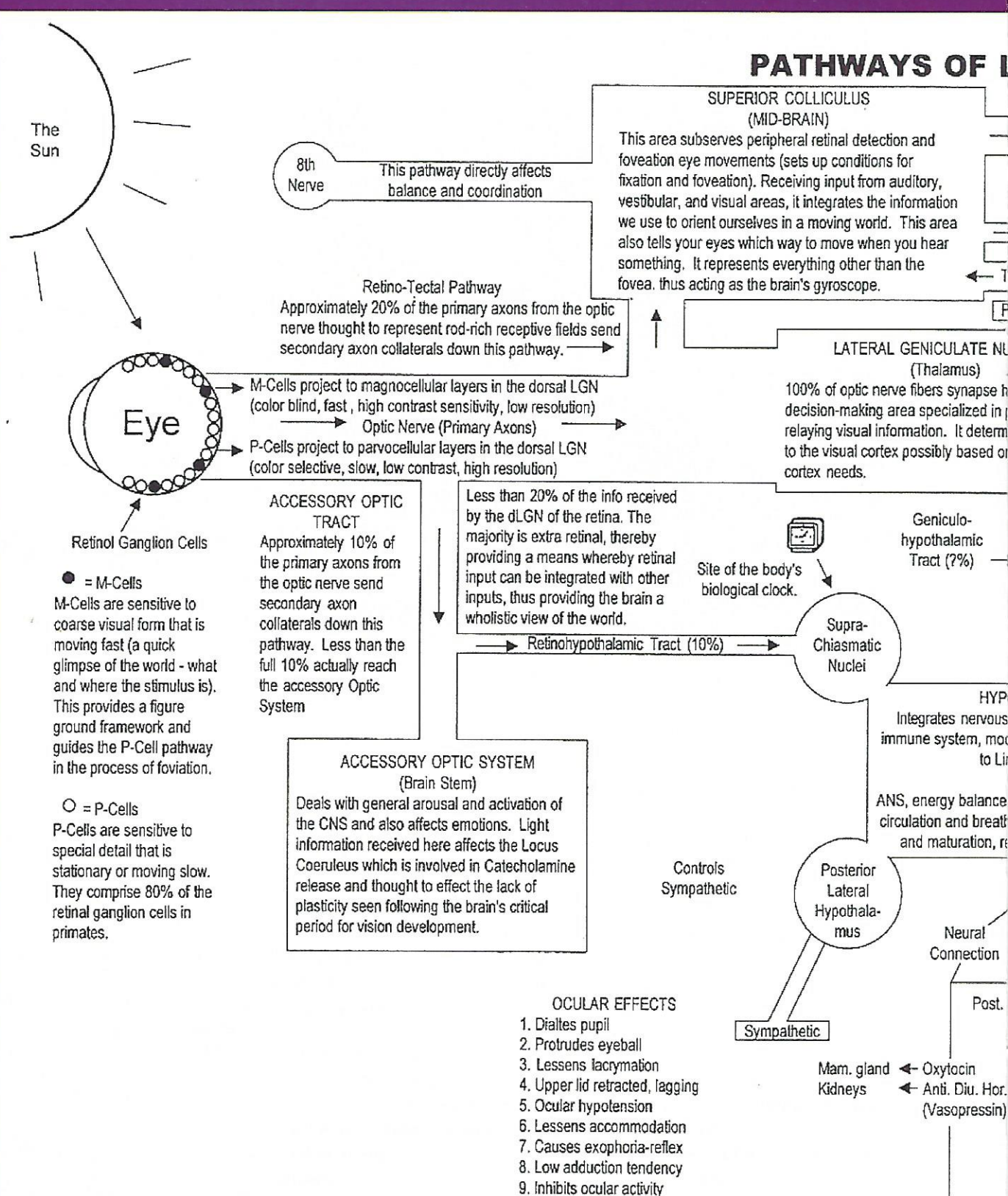
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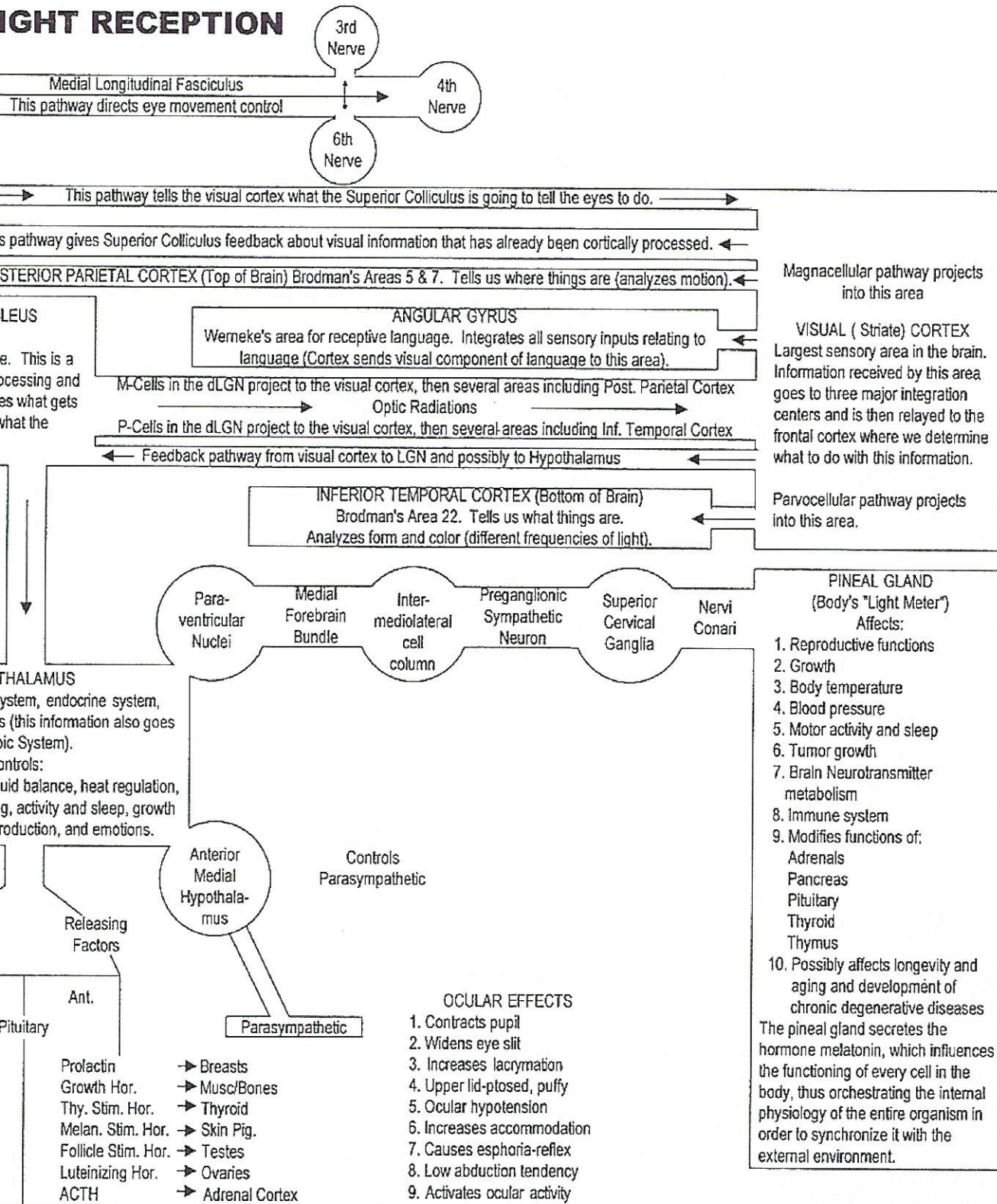
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LIGHT RECEPTION



BLUE

INDIGO

HEART BEATS LIGHT AND FOS EK FOTON TWO CURRENT WORKS BY VISUAL ARTIST, PETER TEREZAKIS

In 1996, I first created a site-specific installation of ten slowly flashing, eight-foot, florescent lamps, fifty feet apart, to describe a five hundred foot section of an ellipse across a rolling Pennsylvania meadow. Since then I have repeated permutations of this installation in numerous landscapes across the United States, Greece, Latvia, and Romania. The light sculpture (ten lamps now programmed to flash at the same rate as my resting heart beat), has also been used in performances, benefits, and outdoor events, which have drawn up to a thousand of the curious and supportive. There is a deep spiritual need within many of us to experience open spaces away and apart from the constructs of contemporary civilization. Far from the sounds of traffic and the glare of city lights, beneath a twilight sky, the kinetic play between light and shadow creates a fleeting sanctuary of peace.

Witnessing and participating in one of these light installations has its own therapeutic value which touches our spirit on a primal level. Inspired by having read that the ancient Greeks built temples of healing which utilized individual colored rays of light for specific medical conditions, I decided to present a similar experience. In collaboration with Dr. Joseph Shapiro, a fellow of the College of Syntonic Optometry, who has greatly influenced my work, I created Fos Ek Foton (Light from Everlasting Light), in August of 2008. This interactive installation employed the basic syntonic frequencies in a row of nine rooms built in Latvia's prestigious Riga Art Space. Over a thousand people experienced the effects of these different filter combinations.

The audience reactions were fascinating to witness. Some people positively swooped across the gallery space directly to a room of color, and never tried another. A couple of rooms consistently overflowed with groups of strangers. More than a few people methodically spent time in each room. Many individuals avoided particular colors altogether. Some dancers gathered in the yellow room as it made them feel "warm," even though there was no difference in temperature between any of the rooms in the cold gallery space. We had a few extreme cases where people cried openly, five individuals became extremely anxious, and a dozen others sat bathed in light with BIG smiles on their faces. This is a work which I will continue to explore and present in the years to come.

Dr. Shapiro had previously been involved with another art project involving light. It is interesting that our individual paths and work have converged to collaborate and create this project. He co-produced a traveling art show, presenting high visibility classical Chinese art work, viewed under three different types of illumination, white light, black light and pure luminescence in total darkness. Dr. Shapiro wrote about his production in Artzone, a multimedia art publication. Now I am writing about light used as an art form in a medical publication. In this respect, the circle of our work seems complete. Dr. Shapiro has also been a frequent guest lecturer in the Art History department on the medical aspects of light and color at the New School and the School of Visual Arts in New York City.

Terezakis has originated interactive works of art varying in scale from simple jewelry sized objects, to an interactive building designed in association with Donald Trump's architect, Der Scutt. His works have been exhibited throughout the United States, Europe, and Japan. Detailed photos, videos, and animations of his work may be seen at www.terezakis.com

Miracle Meridians

Jan van der Est, Samassati, Colorlight Therapist

“There are no such things as miracles, only unknown laws.” - St. Augustine

Working on people with light for several years, I have encountered many miracles. My drive to understand what happens has not only brought me into the science of quantum physics, but also into the more poetic world of Traditional Chinese Medicine. Here I first bumped into a specific type of meridian, which I like to call Miracle Meridians. This article is about these Miracle Meridians, two of which are closely related to the eyes.

The unfolding of life itself is still a mystery to science. For most of us, it is not something we think about a lot; new life is created every second somewhere in the world. We are so used to it that we are not aware of the real miracles in each new life that is started.

During conception a sperm cell and an egg cell unite, the chromosomes of the mother and father mix and the process of cell differentiation begins. It takes roughly thirty hours for the first cell to split and within this time frame anything needed for the new life to unfold is created. During embryogenesis this first cell turns into fifty trillion cells in just a few months.

How does the cell building the eye know it has to become an eye cell and not a nail cell? Science may tell us it is the DNA that knows, but how does the DNA know?

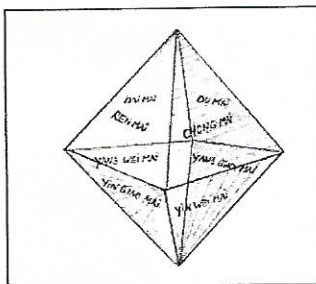
And during life itself: how does the body know it is time to change teeth, time for puberty, time for menopause? If we are injured and the body repairs itself, how does a cell know it has to become skin or blood vessel or bone? And how does the body know that the repair is complete?

These mysteries to science or miracles of life are facilitated by eight extraordinary vessels circulating a substance called JING (or essence energy) described for the first time in old Chinese texts. These Miracle Meridians act as fields of energy more than as discrete tracks. They are deeper and more foundational than the regular twelve meridians and, as such, have a much more profound influence at all levels. They guide the unfolding of life in cycles of seven years in

women and in cycles of eight years in men. Where the regular meridians guard the unfolding of normal life, the Miracle Meridians become meaningful when normal life deviates: war, serious illness, becoming unemployed, retiring, death in the family.

In these days of rapid changes the Miracle Meridians are called on more than ever.

Before zooming in on the 2 sets of Miracle Meridians related to the eye, here is a brief overview of them all:



- **Du Mai** (Governing Vessel) and **Ren Mai** (Conception Vessel) are the first distinction in Yang and Yin type of energies. Ren Mai is connected to Mother Earth and is like a nurturing (Yin) mother taking care of our physical wellbeing. In doing so she honors Du Mai, who represents the heavenly laws like a (Yang) father.
- **Chong Mai** (Penetrating Vessel) and **Dai Mai** (Girdle Vessel) represent form and structure. Chong Mai brings in the blueprint for the life to unfold and Dai Mai opens up the space to enable this. In all transformations we go through in life, Chong Mai and Dai Mai are involved.
- **Yang Qiao Mai** and **Yin Qiao Mai** (Yang and Yin Heel Vessel) represent the time aspect in us. The active daytime energy of Yang Qiao Mai spirals around the calmer night time energy of his partner Yin Qiao Mai. Their dance to the cosmic music creates day and night time rhythms in us. Yang and Yin Qiao Mai are closely related to the eyes.
- **Yang Wei Mai** and **Yin Wei Mai** (Yang and Yin linking Vessel) represent the sense of space in and around us. They connect the Yin and Yang areas in us to all Yin and Yang surrounding us.

In conception the energies of Chong Mai, Du Mai, Ren Mai and Dai Mai ignite, uniting Heaven and Earth in a cosmic meeting. This creates the time-space axis of Earthly existence through Yang and Yin, Qiao Mai and Yang and Yin Wei Mai.

The Miracle Meridians Related to the Eyes

Yang Qiao Mai and Yin Qiao Mai come in two pairs, one pair on the left and the other on the right side of the body. Both pairs find their origin in the foot (heel) area and flow upward to the inner canthus of the eye. Yang Qiao Mai takes the outside route (outside leg, side of the trunk); Yin Qiao Mai follows the inside track (inside leg, through the trunk).

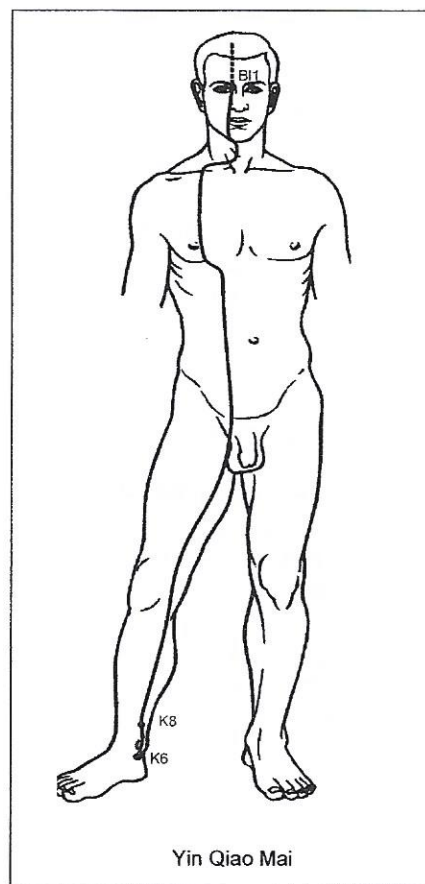
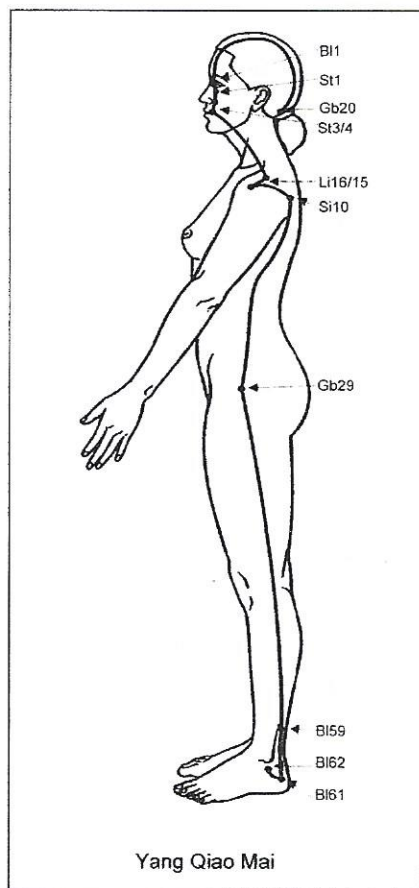
Yang Qiao Mai and Yin Qiao Mai are complementary: modest, quiet, turned inward (Yin Qiao Mai) and light-footed externally focused (Yang Qiao Mai). Two balancing forces continuously seeking each other's company. The outward movement finds its certainty in inner peace. We can only really relate to others if we relate to ourselves, if we stand firm on our internal foundation, if we feel our roots solidly planted in Mother Earth.

Yin Qiao Mai takes care of our internal feelings of safety and inner peace. She irrigates organs, muscles and connective tissues and broadcasts our inner feelings into these. She connects the Kidney and the

bladder meridians. A healthy Yin Qiao Mai brings stability; we are confident and independent, and supported by Mother Earth we accept what life brings us.

Yang Qiao Mai dominates our external activities and takes care of all outward movement, enabling us to dynamically and vitally move through life. He connects the Bladder, Gall Bladder, Small Intestine, Large Intestine and Stomach meridians. A healthy Yang Qiao Mai brings courage. We reach out spontaneously, take initiative and make things work. We are preserved from too much exuberance by Yin Qiao Mai.

Yin Qiao Mai and Yang Qiao Mai meet in the inner canthus of the eye. From there they enter the cerebrum (bringing clarity into the mind, which is also reflected in the eyes,) and the cerebellum (coordinating the motor system, especially the subtle movements of arms and legs). Their paths from feet to brain and their energy pave the way for physical and mental vitality and connect us from Earth to Heaven.



Symptoms of Imbalance

When Yang Qiao Mai dominates Yin Qiao Mai, we tend to feel better in the daytime than during the night. It may be hard to fall asleep; Yin Qiao Mai is simply not strong enough to calm Yang Qiao Mai down. We may feel low self esteem, lack of confidence, feel down, in need of sympathy and encouragement, craving acceptance, begging for attention and brooding at night (Yang Qiao Mai keeps us awake).

Some typical physical complaints related to a dominant Yang Qiao Mai include: problems with genitals, fear of sexual intercourse, complaints in the lower belly area, incontinence (urine), edema.

When, on the other hand, Yin Qiao Mai is the stronger we sleep well, but find it hard to wake up and keep our eyes open during the daytime. Sleeping disorders are very characteristic of imbalances in Yang and Yin Qiao Mai. A dominant Yin Qiao Mai may cause us to never feel at home, never settle down, have low adaptability, change jobs and partners frequently, drop out all the time.

Some typical physical complaints related to a dominant Yin Qiao Mai include: lower back pain, inflammations in cavities and openings of the head, (e.g. sinusitis, conjunctivitis), dizziness.

Understanding the true nature of the Miracle Meridians links together seemingly unrelated symptoms. Re-balancing the Miracle Meridians with color light has opened a new and exciting set of

therapeutic options, the exploration of which has only just begun.

Working with light in the eye area gives access to Yang and Yin Qiao Mai. Using Yin colors (green, blue, violet) will invite the sedative qualities of Yin Qiao Mai and spread through the whole body using the Yin Qiao Mai field. It can be used for excess conditions (physical, mental) anywhere in the body.

Yang colors in the eye area (red, orange, yellow) will stimulate vitality and spontaneity, enabling an easier passage through life.

I am currently exploring karma and the way it influences the essence energy of the Miracle Meridians. What makes it show up? How does it express itself? How can color light on the Miracle Meridians make karma more apparent so its lessons can be learned?

One thing has become very clear to me: color light on the Miracle Meridians invites the purity of the essence energy. Anything not resonating with this purity is invited to surface, be it physical, emotional, mental, spiritual or karmic. And it takes good therapeutic skills to guide clients through them!

The therapeutic actions through Yang and Yin Qiao Mai are many and can only be understood if we not only see their roles as described above, but also take their connections to the meridians and to the other Miracle Meridians into account. Is it through them that the eyes have such a major influence on our total being?

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Shedding Light on Stroke Treatment

By

Alice Nixon, LCSW, BCD

Geary D. had a major stroke in April, 2005, that left him unconscious for two weeks. He was not expected to survive. He was discharged from the hospital after a 3 week hospital stay that included one week of rehabilitation therapy.

Following the stroke, when reading the computer screen, the letters would jump up and down. He could play games that didn't require detailed information processing, but he would experience dizziness, lightheadedness and headaches when he tried to do detail work. He would have to lie down for fear of passing out.

In February, 2007, Geary felt some symptoms similar to what he experienced just prior to his stroke, which led him to a neurologist, ophthalmologist, and neuro-ophthalmologist for evaluation. None of them had any remedies for his symptoms.

In April, 2007, Geary visited a highly reputable Eye Clinic in the Chicago area. The following is taken directly from their evaluation:

"He complained of difficulty reading and working on the computer. He had a stroke two years ago. A brain MRI done March 30, 2007, demonstrated a left posterior occipital and left temporal lobe infarct. His description of his visual symptoms suggests a problem with central processing of visual information. He has been experiencing headaches with a recently prescribed pair of glasses."

"Medical history is significant for hypertension and diabetes. His current medications are lisinopril and metformin."

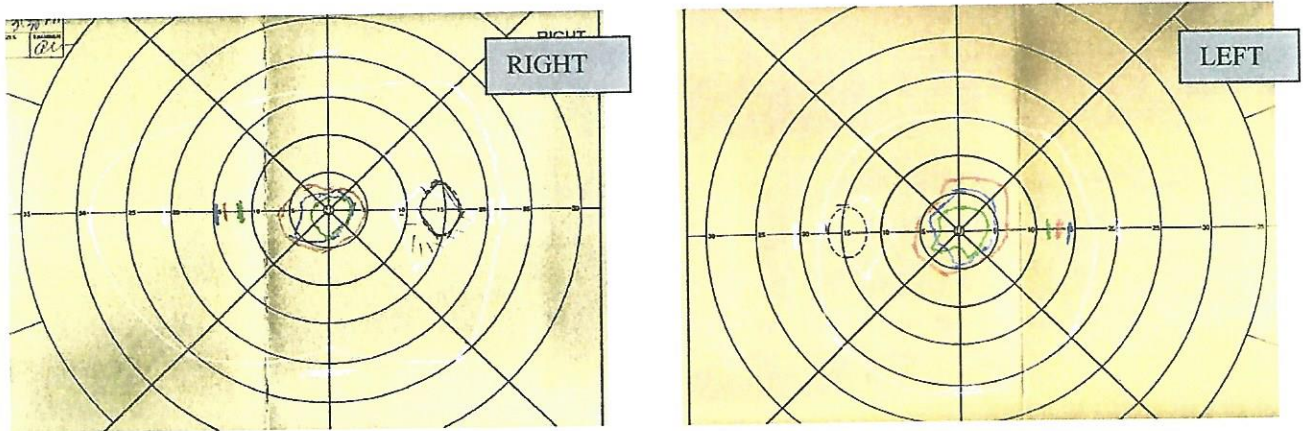
"Examination revealed best-corrected distance visual acuities of 20/20 in each eye. His pupils were equal in size and reactive to light bilaterally with no relative afferent pupillary defect. I checked his extraocular muscle balance carefully using the Maddox rod. At distance, he had no vertical misalignment with 1 diopter of exophoria. At near, he had no vertical misalignment with 7 diopters of exophoria. His ocular ductions and versions were full. Saccades and pursuit eye movements were normal. There was no nystagmus. His optokinetic nystagmus responses were intact. Goldman visual fields revealed no visual field loss in either eye. Humphrey visual fields revealed abnormalities in the inferior visual field bilaterally. Intraocular pressures were 16mmHg in both eyes. Slit-lamp examination was negative. Dilated fundusoscopic examination revealed no optic nerve or retinal pathology in either eye."

"This patient is experiencing difficulties processing visual information following his stroke. Unfortunately, I know of no effective treatment to offer him."

Geary D. was referred to me for light therapy in May, 2007, by a Chicago physician who has had many patients benefit from my light intervention.

The treatment evaluation and modalities I use begin with a medical history and the administration of a visual field of awareness test. Based on the results, I consider the use of a colored light device for home use over a twenty day period: colored film overlays for reading difficulties, colored glasses for light sensitivity and/or any presenting anxiety or depression, and certain eye exercises for eye strain.

On his initial visit, I took his history and measured his visual field.



I sent him home with a protocol consisting of two 10 minute/day sessions with blue/green as the recommended color choice with a 60 cycles per second flash rate. The device used was a Photron machine with a lens diminished in size by way of a small cap superimposed over the standard lens.; the standard lens size created too much light stimulation for Geary. He was to contact me everyday.

Geary was provided with blue green/glasses to ease his light sensitivity. They were to be worn outside as he would sunglasses. To assist his focus and comprehension while reading, he was supplied with blue/green plastic overlays to place over the written page. This was his chosen color preference after we experimented with several other overlays ranging from the red to the blue spectrum.

He was taught the palming technique to ease his eye strain and tension. This method entails the following: First, rub your hands together until they feel warm (about 15 to 20 seconds). Then place your cupped hands over your closed eyes, being careful not to touch your eyes or eye lashes with the palms of your hands. Make sure your eyes are in total darkness. The fingers of each hand should overlap and rest gently on the center of your forehead. Don't create any unnecessary pressure on your face. If your arms get tired, rest your elbows on a table. Sit quietly for one to two minutes with your hands over your eyes. The more relaxed you become, the blacker the darkness you will see with your eyes closed.

In addition, he was directed to tap on the K-27 meridians 15-20 times just prior to starting his session. The K-27 points are just under the clavicle, or collarbone. To find them, place your index fingertips on the U-shaped notch at the top of the breastbone, right about where a man knots his tie. Then move your fingers down over the collarbone, out to each side about an inch, into the soft tissue under the clavicle to the left and right of the sternum. Most people have small depressions there. While thumping the K-27 points with your fingertips of your index and middle fingers 15-20 times, take three deep breaths, in through the nose and out through the mouth.

According to Donna Eden as discussed in her book, *Energy Medicine*, crossing your hands while thumping on the K-27 points emulates the body's energies crossing at the neck. Eden claims that thumping the K-27 points has the advantage of making reading easier; it improves oxygen flow and increases the blood supply to the brain. She also states that doing this exercise before reading reduces eye strain and may help with dyslexia and other learning difficulties. Eden's work is built upon the combined concepts of acupuncture and therapeutic touch utilizing kinesiology to detect and correct imbalances in the body.

While doing the light therapy, Geary was instructed to practice certain eye movement exercises during his two 10 minute/ day light sessions. He was asked to liken the lens to a clock face with the hours written in numbers on the face. First, he was to move his eyes from 12 o'clock to 6 o'clock and back to 12 in a straight line through the center of the clock face for a minimum of 3 complete rounds [12 to 6; 6 to 12 is one round]. Next, he was directed to move his eyes to and from the following locations for a minimum of 3 rounds each: 9 to 3 and 3 to 9; 7 to 1 and back; 11 to 5 and back; 8 to 2 and back.

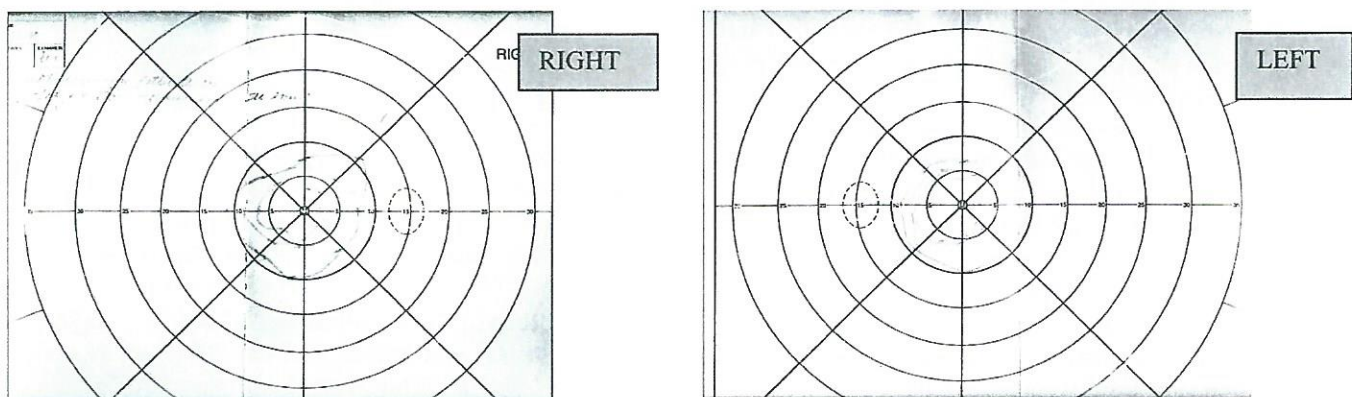
Geary took meticulous notes as he went through the two 10 minute/day session program. During these sessions he would get slight headaches and occipital heaviness with occasional neck stiffness. Also, the clicking sound of the flash element on the Photron bothered him terribly. This feedback provided me with information to make accommodations that would allow the treatment to continue. First, he was instructed to close his eyes, which would lessen the intensity of the frequency. Secondly, he was to listen to relaxing music with a headset to drown out the mechanical clicking sound.

It should be noted here that on the seventh day of treatment the headaches persisted. I changed his protocol to a single 10 minute session a day. I further suggested that when/if he began to get a headache, that he move farther away from the light, by at least 2 feet, which is a total of 3 feet from the light source. If the headache persisted, he was to close his eyes. Twelve days after his initial treatment, Geary's visual field was taken again.

I changed his protocol from blue/green alone to indigo and blue/green. His session was to last a total of 5 minutes each color, two 10 minutes sessions/day at a 60 cps rate. Again, I suggested he sit 3 feet away from the light source. He was to continue tapping his K-27 points 15-20 times just prior to beginning his light session and to continue practicing his eye movement exercises during his session.

Geary tried to do a twenty minute session with 10 minutes of indigo and 10 minutes of blue/green, but it was really too much stimulation. We kept it at two 10 minute sessions per day.

Geary continued his at home treatment protocol even though he was under the stress of relocating. Once he finished his 20 day sessions, his field was measured once again.



Geary returned for a follow-up visit 9/20/07, 2 months after his last assessment. He was clearly maintaining the gains he had made. He was functioning beautifully – almost as good as new. As a result of his remarkable success, Geary was bitten by the light bug. He began to research color therapies that included Syntonics, Dinshah's work, and color puncture. With an engineering background and an acupuncture credential, he was motivated to invent his own light devices. His quest for more knowledge took him to the 2007 Syntonics Conference where he shared his great success story. He ultimately purchased a variety of color therapy and microcurrent equipment to use in his recently founded acupuncture practice. For Geary, there has been no turning back.

Only a few decades ago, scientists considered the brain to be fixed or "hardwired," and considered most forms of brain damage, therefore, to be incurable. Since that time, the brain, far from being seen as a collection of specialized parts each fixed in its location and function, is now seen as a dynamic organ that can re-wire and rearrange itself as the need arises. According to the Vanderbilt Kennedy Center for Research on Human Development, brain plasticity or neuroplasticity "refers to how circuits in the brain change--organize and reorganize--in response to experience, or sensory stimulation." Randolph Nudo from the Landon Center on Aging at the University of Kansas Medical Center has found that the brain is capable of spontaneously sprouting new pathways after injury, such as that caused by a stroke. The specific details of how this process occurs at the molecular and ultrastructural levels are topics of the active neuroscience research.

The growing understanding of and interest in brain plasticity is driving a revolution in brain health and science around the globe. Neuroscience is beginning to look to plasticity-based therapies for treating a wide spectrum of cognitive problems. In light of the war in Iraq, traumatic brain injuries have become a more urgent focus of interest to medical profession in general.

This case study clearly illustrates the power of Syntonics in the treatment of brain trauma when conventional therapies failed. The use of color frequencies to rehabilitate mild to moderate post traumatic head injuries and stroke victims deserves a place in this research.

IN MEMORIAM

Dr. June Robertson

June is one of my Optometric heroes. Especially my sytonic optometric hero. I think I really figured out who she was at my Fellowship exam. She wanted the patient's name up in the right hand corner with the date underneath, and then whether the field was done with any kind of correction or not. She was tall, angular and could be very imposing to a sytonic newbie. I felt like I was back in school again preparing for an examination.



Over time we became colleagues and friends. She taught me one of my favorite techniques when doing a visual field. June had me put a large white plus sign through the middle of the field with a red dot in the center. Then we played "Mr. Red Dot who was hungry and hadn't eaten". The wand came in and as soon as the color appeared the child would say "stop" or often yell out the color. I have been able to get a field with a two year old with this technique. Thank you June.

June and Dave visited my husband and I at a summer camp one year. We were settling for a cup of tea on a summer porch. June insisted that she not receive "that weak herbal stuff." She wanted tea "a spoon would stand up in." I grimaced, complied and laughed. This was definitely part of her English/Scottish heritage.

June also taught me about running the College of Sytonic Optometry. We had many phone conversations; I remember questioning why she put two people together who seemed very dissimilar and probably wouldn't work well together. June told me yes, she knew this and had wanted the one person to move into another position. It was much like putting fire and ice together she said. She really tried to get the board to function as a board in many other organizations.



My husband and I went to visit her and her husband several years after her stroke. It was difficult to see her unable to express herself, and to do the simple things. Dave, her husband was so patient and kind with her. June took me down stairs and gave me books and Vision Training equipment. She wanted someone else to have it and use it. I was very impressed with her depth and breadth in her reading material. I hadn't known she was interested in so many topics.

Dear June, we will truly miss you and your contributions to Syntonics and Optometry. It will continue to help patients in the years to come. ... Betsy Hancock O.D., FCSO

Hidden Vision Problems in Parkinson's and Stroke Patients

Geoff Shayler Bsc, FCOptom, FCSO

Abstract

Most of us regard our eyesight ability as what we see in the optician's consulting room, and we are happy with our confirmation of 6/6 or 20/20. However, is that all there is to seeing?

Our visual system is referred to as the operating system of the brain. It is known that the most complex activity of our brain is to process visual input. Over 70% of all brain activity is devoted to processing visual information.

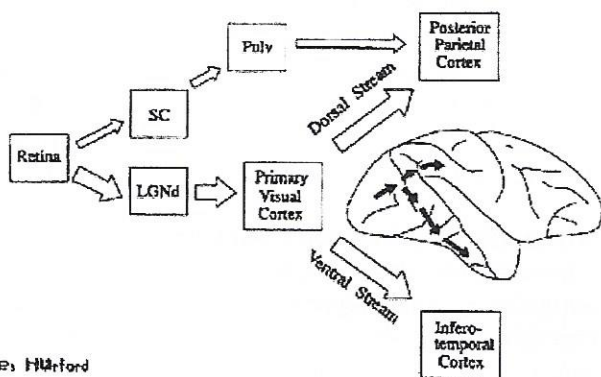
The visual system is represented in every major area of the brain, as well as in the midbrain and brainstem, for example:

Frontal lobe: eye movement planning

Parietal lobe: provides our visio-spatial map

Temporal lobe: recognition of people, places, faces and motion

One of the factors identified in some patients with Parkinson's disease (PD), is a contraction of the functional visual field, as a result of an imbalance of the magno/parvocellular pathways. This results in balance, posture, and stability problems and contributes to difficulties in reading, concentration and attention.



James H. McFord

A simple reading test, initially developed to identify school children with visually related learning difficulties, can identify which patients have these visual processing difficulties, as well as identify those who could be helped with appropriate optometric vision therapy!

Background Neurology

A number of studies have shown deficits in magno, parvo and koniocellular pathways in patients with PD:

“...the koniocellular subpopulation of RGCs may be particularly vulnerable in early stages of Parkinson's disease” *Sartucci, Ferdinando, et al, 2003 1*

“Sensory deficits have been documented in Parkinson's disease, in particular within the visual domain” *Silva, et al, 2005 2*

“We conclude that in Parkinson's disease, independent damage occurs in the early magno-and parvocellular pathways” *Silva, et al, 2005 2*

“Indeed, previous studies have appropriately shown that Parkinson's disease patients demonstrate thinning of retinal ganglion cell axons reminiscent of ocular neurodegenerative diseases, such as glaucoma, where ganglion cell loss comprises an important part of disease pathophysiology and concomitant magno-, konio- and parvocellular deficits coexist” *Bruce I 3 2005/6*

“Ganglion cell loss in glaucoma has now clearly been shown to affect all ganglion cell populations.” *M. Castelo-Branco 2006 4 (see Castelo-Branco et al., 2004).*

The same argument applies for PD if the underlying disease mechanism relates to contrast processing control. When procedures with unbiased color sampling strategies are applied, which is one of the main innovations of our study, “it becomes obvious that multiple pathways are concomitantly affected.”

Armstrong 2007

Parkinson's disease is associated with a range of visual signs and symptoms, including defects in: visual acuity, color vision, the blink reflex, pupil reactivity, saccadic and smooth pursuit movements and visual evoked potentials. Visual signs and symptoms can be an important though obscure aspect of the disease and should not be overlooked. *Armstrong 2007*

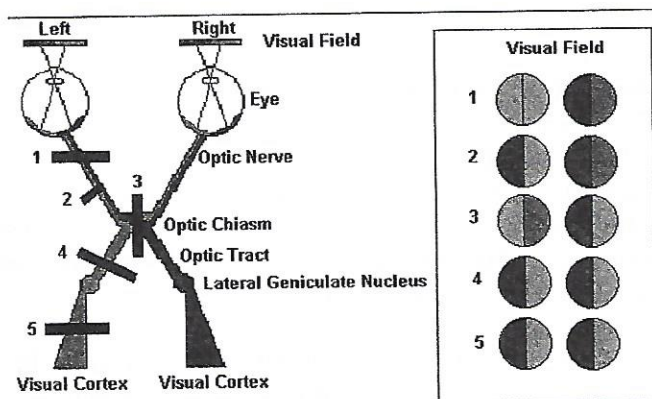
I am not sure if the above paragraph is supposed to be a quote. There were quotes around it but no endnote...unless Armstrong is supposed to be quoting it.

Introduction

A number of studies indicate that children with learning difficulties have visual processing difficulties due to an imbalance of the magno and parvo visual processing systems.

The effect of these problems include: eye movement problems, low convergence, poor accommodation, reduced reading range and reduced functional fields of vision. These measurements have a direct link to scholastic ability as identified by school examination results.

Similar problems may be found in some patients with Parkinson's disease, patients suffering from stress, depression, brain trauma and occasionally in individuals following a stroke.



Pathological and Functional Visual Field Loss

Threshold visual fields are those visual fields measured by the use of automated perimeters using light threshold measures, such as Henson, Friedmann, Dicon, etc. This type of screener is particularly good for identifying pathological disorders such as those found in glaucoma, or "typical" neural damage from brain trauma or stroke as shown in this diagram. I feel this type of field test is related to "detailed" parvocellular processing.

Functional visual fields are a measure of the ability to process specific visual information in the periphery. For example, the use of the Bjerrum (tangent) screen is a measure of when a moving target appears within the perceptual field of the individual which is more related to "motion" magnocellular processing.

Pathological defects such as those caused by neural damage are permanent, but functional loss can often be

recovered with appropriate intervention by a behavioral optometrist. This is one area that is particularly suitable to the application and integration of optometric phototherapy (syntonics) with vision therapy.

In PD, visual field constrictions are generally functional and therefore potentially recoverable.

Osteoporosis.

PD may increase the risk for low bone density and osteoporosis. Both men and women are at risk. Experts recommend that patients with PD get tested for osteoporosis, especially if they have problems walking.

Generally, PD patients are in the older age range and have a greater risk of falls that result in broken bones. This may cause greater concern, or stress, with ambulation.

Stress

Stress and chronic illness are interconnected. Stress comes from a variety of different sources that can be physical, as well as emotional. Stress can come from the life adjustments that PD often creates, such as alterations in daily life tasks, fatigue, anxiety and frustration. The important thing to be aware of, however, is that stress can worsen PD symptoms, especially tremor.

The Neurology of Stress

Stress leads to the fight or flight response causing an overaction of the sympathetic nervous system. Some research into the heart rate variability of patients with PD has shown general depression of the autonomic nervous system, particularly depression of the parasympathetic. This is in addition to the structural damage to the magno-, parvo- and koniocellular pathways. As a result, more "energy" is required for the autonomic nervous system to function. This leads to reduced functional visual fields with ensuing visual processing difficulties.

Stress and Skeffingtons Four Circles

Stress reduces the functional visual field which impacts all areas of Skeffingtons circles. When we look at the recognized symptoms of PD, we can see how his concept is mirrored in this health condition.

- **Antigravity** - Disturbed gait and unstable posture are common and serious problems in elderly patients, since they increase the risk for falling and injury. Some studies have suggested that the appearance of these symptoms early in the course of the disease predict a faster decline

than having tremor as the predominant symptom.

- **Centering** – Many studies have found evidence of abnormal eye movement control in PD. Deficits in the inhibition of unintended saccades and slowed initiation of intentional saccades have been reported in some, but not all, investigations.
- **Identification** – Over recent years the presence of cognitive impairment in a proportion of patients with PD has been highlighted. Efficient use of working memory resources is thought to be involved in the performance of tasks in both domains. Vision is also affected, including impaired color perception and contrast sensitivity (parvo- and koniocellular deficits). These problems progress and can impair motor functioning.
- **Speech/Auditory** - Speech problems occur in more than 70% of patients, by some estimates. Speech difficulty can be caused by rigidity of the facial muscles, loss of motor control, and impaired breath control. Tone can become monotonous, words can be repeated over and over, or the rate of speech can become very fast.

Simple assessment of the Functional Visual Field

- Patient stands 3m from clinician.
- The patient is asked to concentrate on the clinician's nose. The patient is asked how far down the clinician's body they can see without moving their eyes.
- The clinician can simply compare their field to his.

Frequently in PD, the field is less than the length to the clinician's waist and is frequently much smaller than this!



Instead of the above view patients with PD may see as little (or less!) as is shown below.



Note: the smaller the field, the poorer the measured visual acuity, and the greater the symptoms.

Consider how much of this patient's visual information is lost and the effect of this loss on that person's function and performance.

Reading Range

As we get older, reading becomes more difficult and glasses may become necessary.. However, the range (depth of focus) available for reading is linked to the functional visual field; when the field is small, the range of clear near reading is more limited.

The Reading Test

With their reading glasses on, measure the near (np) and far (fp) points that the print can be held before it just starts to blur., The difference between the two (fp-np = af) is their accommodative flexibility.

In a mature adult with an accommodative flexibility less than 17 cm, consider a visual processing deficit. Referral to a behavioral optometrist is therefore advisable for further investigation and possible optometric vision therapy.

Those patients with a small range of clear near vision are more likely to suffer from the outlined symptoms that are listed below.

A simple reading chart has been developed by optometrists Geoff Shayler and Dr. Roger Fitch which can be provided to local medical doctors so that they can identify patients who should be referred for behavioral vision assessment.

Typical Symptoms of a Functional Visual Problem in PD and Stroke

- vision less clear when stressed
- blurred vision at distance / computer and / or reading which is not fully relieved with spectacles
- eye strain with no apparent cause
- eyes feel tired with computer work which is not fully relieved with spectacles
- slow reading
- loss of concentration when reading
- poor or reduced comprehension of the written word
- can't be bothered with reading small print
- driving a car causes strain or tired eyes
- uncomfortable driving - multi-lane roads, motorways
- light sensitivity
- restricted depth of focus when reading – may need to hold close
- eyes just don't seem quite right!
- balance and/or postural problems
- photophobia
- clumsy, falls, walking into objects, knocking over ornaments, etc

Treatment Regime

This is a condition where Optometric Phototherapy (Syntonics) reigns supreme. Normal optometric vision therapy (OVT) is unlikely to prove beneficial as the cause is due to suppressed neurological function. Syntonics is a gentle, passive way of accessing and recovering peripheral visual function. Supplementary OVT can provide a stimulus for the patient to reorganize their visual abilities – fields, fixations, focus, fusion, flexibility. Developing peripheral function will also help stabilize their posture and reduce the risk of falls.

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- Reply to "Letter to the Editor: Independent patterns of damage within magno-, parvo- and koniocellular pathways in Parkinson's disease (Silva MF et al. Brain 2005; 128: 2260–2271)."

Results of Optometric Vision Therapy

Following vision therapy with Syntonics, the functional ability of the visual system can potentially be expanded to an age adjusted normalcy, allowing:

- more comfortable reading
- better comprehension of the written word
- better awareness when driving
- less strain when driving
- more comfortable vision and less eyestrain with VDU use
- reduced light sensitivity
- improved posture, balance, etc.

Attached is a summary of this article produced as a poster that was presented at a conference organized by the Neurorehabilitation Department at Southampton University in the UK in September 2008.

The Future

Our present research suggests that there may be an increase in these problems when there is a head down rather than head forward position.

There has been a lot of research into PD but little work in the visual consequences of the condition.

Through this research, I feel that we may soon be able to identify some of the biochemical aspects of visual processing and related visual (mal) functions that are related to contraction of the visual field.

Once we gain an insight into these other health conditions which are not related to 20/20 eyesight but impact visual processing, then we will be able to provide evidence that Optometric Phototherapy (Syntonics) and optometric vision therapy, have a huge combined potential to help millions of people.

Reading chart

Copies of the reading chart can be obtained by contacting me by email on kinoptom@lineone.net.

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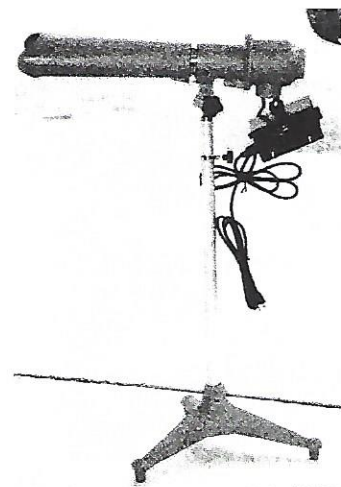
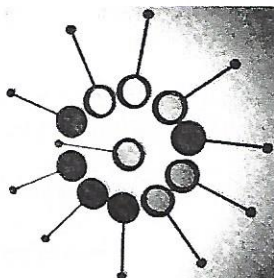
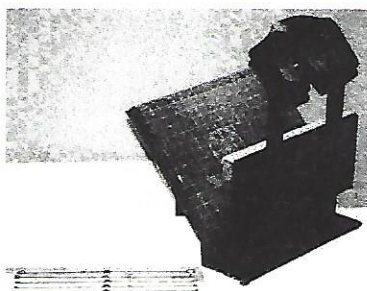
Skeffington Circles and Functional Visual Fields, Shayler, G.R. Journal of Optometric Phototherapy, April 2006

C&j instruments

C&j instruments has more than 25 years experience manufacturing syntonics equipment. Throughout our years serving the optometric community, C&j Instruments has enjoyed a close working relationship with the College of Syntonic Optometry. For more information call or email us for a free brochure and price list.

Rex J. Cross, Owner

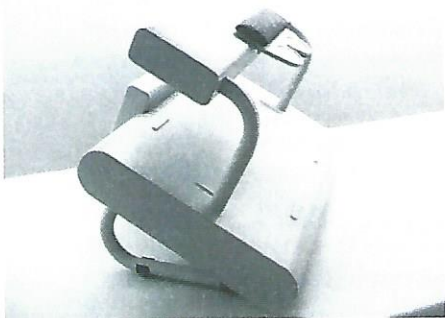
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OPTOMATTERS – SYNTONICS – EQUIPMENT – 2009



COFMA (Colorfield Machine)

A new colorfield tester with 2 build-in camera's and 1 LCD screen for a better Test observation and a correct charting of fields.

Incl: 1 COFMA, 1 case teststicks, 50 charts for the left eye, and 50 charts for the right eye, one 12 volt adapter, CE & URL Norm.

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COC (Color Coach)

A new Syntonizer for office Training. This instrument has the following integrated filters: alpha, delta, theta, mu, pi, omega, upsilon, lambda, D, S, N.

The COC has also the possibility to go in a stroboscopic performance and speed adjustable with a potencymesurer.

The COC has also a removable binocular to improve binocular disorders.

Incl: 1 COFMA, one 12 volt adapter, CE & URL Norm.

Price: 2.995,00 Euro excl. shipping

For more details just contact us!



COB (Color Boy)

This instrument is a more simplified version of the Color Coach, adequate for hometraining. For some patients daily training with syntonics is advisable. The Color Boy, a handy portable kit is perfectly suitable for hometraining.

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Thanks to the carton goggles which you can order in different filter combinations, a perfect hometraining is possible with the Color Boy.

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Color Therapy: An Old *New Age* Therapeutic Option

by

Darius Dinshah

It is said that everything that goes around comes around, or there is nothing new under the sun; this is certainly true of color therapy. While details may not exist, gem therapy, a form of color therapy which is still practiced, dates into antiquity. Using a particular colored gem would give an effect similar to using an inexpensive, comparably-colored, presently available filter.

Color therapy came into a more modern form in the mid-1800's through the efforts of several researchers. Notable among them were General Augustus Pleasanton, and two physicians, Seth Pancoast and Edwin D. Babbitt. Though the electric light was not yet invented, their utilization of sunlight and glass filters served as efficiently as any present-day therapeutic device.

The first edition of the classic reference volume, Principles of Light and Color by Dr. Babbitt, was published in 1878. It detailed many case histories that were successfully treated with color therapy using a rudimentary device: a colored glass bottle. It has been reprinted through the years in its original 56 - page format, as well as in edited versions. The book also covered his thoughts regarding the value of different colors in plant life, in clothing, etc.

A difficult point for many to understand: How can colored light possibly cause a physiologic effect inside a human (or animal) body? Several answers can be given, each may be correct for a particular case or health condition.

The first, and probably best known, is "blue-light" therapy for some types of neonatal jaundice. Light applied to the skin causes a chemical reaction (photo-oxidation) in blood circulating under the skin. This effectively lessens bilirubin levels with the aid of the liver.

The second physiologic effect of light is the production of vitamin D as a result of light absorption by the skin. In this example, light is generated by a higher frequency (ultra-violet) than visible light.

Third, is the effect that results from light energy entering the eyes. It is a common misconception that the eyes function solely in the capacity of visual imaging. Light exposure is well known to cause a beneficial change in "seasonal affective disorder" (SAD), a condition believed to be caused by insufficient light energization through the eyes to the hypothalamus/pituitary gland.

The fourth physiological effect of light is the author's hypothesis, derived from several sources. Each individual cell in a living organism has a specific function to perform. In so doing, it generates and radiates a specific energy; the cellular energy totality is often termed the "aura". The liver radiates the equivalent frequency (harmonic) of red light, the pituitary radiates green, the spleen violet, heart is magenta, lymphatic system is yellow, and so on. The philosophy behind color therapy is this: when a particular organ or system is underactive, its auric level decreases, so the appropriate activating color is projected on the affected area (sometimes the entire body). If over activity is present, such as in a fever, the obvious remedy is an opposite (depressant) color. Further, by energizing the natural reparative powers present within us rather than relying on drugs with their attendant and often dangerous side-effects, resistant bacteria are discouraged.

Another important development in color therapy (Spectro-Chrome, 1920) was the codifying of colors with their chemical/physiologic effects, as in the above paragraph, by Dinshah P. Ghadiali. He based his Spectro-Chrome System on Dr. Babbitt's writings, his own experiences as an eclectic medical practitioner in India, and spectroscopic discoveries by Joseph von Fraunhofer, Gustav Kirchhoff, and other scientists of that era.

Dinshah, as he preferred to be known, devised a method of combining filters to create colors that do not exist in the visible spectrum. These "artificial" multi-frequency colors considerably expanded the scope of health conditions amenable to color therapy. That important innovation separated Spectro-Chrome from color therapy in its usual sense.

At this time, commercial color instruments range in the thousands of dollars and offer little advantage compared to the simplest box/lamp/filter arrangement costing less than \$50. The light source can be almost any incandescent bulb (or sunlight), but the selection of filters is of utmost importance.

This article was written to enlighten many to the possibility of using one of the world's oldest, safest, most effective therapies, now in a form more easily applied than ever in a home setting. Alas, we enter an emancipated therapeutic *New Age*.

Conversation with Charlie

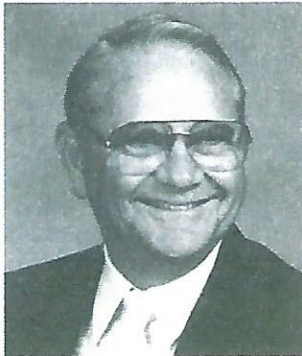
by Sarah Cobb

1. **Does syntonics change the ACA ratio?**

Yes. For example, if a person is exophoric then an eso reflex can be achieved by using filters that depress the system. Over the long term, the phoria would change. To train accommodation, use alpha omega as it tones the iris and ciliary muscle. For more information turn to page 198 in the Syntonics Principle.

2. **What about fusional reserves?**

Sometimes alpha/omega is all that is needed. But generally, omega lowers them and delta/omega raises them. This combination is used for OEP's #3, #4, #5, #6, #8, #14A, #14B, #15A, #15B, #16A and #16B. Numbers #9 thru #11 require a different combination of filters. For more details check the advanced course.



3. **Nystagmus is a difficult condition to treat. What do you know about it?**

The late Dr. Michell from Eugene, Oregon treated 87 cases successfully by using omega only for as long as needed. The speed of the nystagmus is determined by the size of the field. The smaller the field, the more rapid the movement. I treated only 2 cases but we had very little nystagmus in my area.

4. **How effective is syntonics in treating eye disease?**

Wow! Loaded question. We do not treat eye diseases. **WE BALANCE THE PHYSIOLOGICAL SYSTEM AND IT CORRECTS ITSELF.**

5. **What is the role of micro current with syntonics in correcting visual problems?**

We can correct 80% of visual problems with light frequency and micro current (also a frequency.)

6. **If an optometrist was considering adding syntonics to his practice, what would the first thing you would suggest s/he do?**

He has to care for the well being of his patients in a way he never has before. He has to want to study and find out what we are doing. You have to have the proper equipment to diagnose these cases and find the proper filters to use. Not all doctors



have the ability to do this work nor do they want to, but learn enough to where you can refer these patients for proper care.

7. **How has the College of Syntonics Optometry changed you?**

First it changed my life, my being, my practice, and then my approach as an optometrist. I'm proud to say Larry and Ray have led us well and the new ones are carrying the torch. We need not worry any more whether we are going to carry this forward. God bless all the torch carriers.

Love,
Charlie

About the Centerfold

Pathways of Light Reception

Jacob Liberman, OD, PhD, DSc.

The Pathways of Light Reception chart was designed as a visual representation of the vast psycho-neuro-immuno-endocronological network responding to and being guided by light stimulation to the eye. Most of the information came directly from a group of well-known scientists who I had a personal relationship with, and who were deeply involved in phototherapy research. Among them were Drs. John Ott, Fritz Hollwich and Russel Reiter, to name a few.

The purpose of the chart was twofold. First, in order to create a solid scientific foundation for ocular phototherapy, all the scientifically confirmed neural pathways, involved in the visual and non-visual transmission of ocular light perception were displayed.

Second, was to demonstrate that the eye's primary function is to guide movement and physiological activity by seamlessly connecting the outside and inside world. This is accomplished in at least two ways. First, via the visual pathway, light triggers the eye to move in order to determine where it is, what it is and what is required to catalyze and guide appropriate movement. Second, via the non-visual (energetic) pathway, light cues the physiology about the time of day, time of year and continuously changing spectral characteristics; this catalyzes and guides appropriate physiological response. In essence, light is continually guiding our every move and function.



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