SYNTONICS (OPTOMETRIC PHOTOTHERAPY)

The therapeutic application of light through the visual system

Syntonics (*optometry phototherapy*) has been used clinically for over 60 years in the field of optometry. It is the branch of ocular science dealing with the application of selected visible light frequencies through the eyes. It has been utilized with continued success in the treatment of visual dysfunctions such as strabismus, amblyopia, accommodation, convergence, vision related learning disorders and the visual sequellae of traumatic brain injury.

Throughout most of history, the role of light in human function has been chiefly limited to its initiation of seeing[1]. Early practitioners such as Babbitt, Pleasanton, Pancoast and Dinshah clinically found that color, applied to the skin could have a non intrusive curative effect on bodily ailment. Similarly, the use of green or blue light on the skin is the currently preferred medical treatment for neonatal jaundice[2–4].

At the turn of this century, it first became known that light entering the eyes not only served vision, but also traveled to other important brain regions. It was then that Dr. Harry Riley Spitler theorized about the role of the eyes in phototransduction and light and color in function and development.

Spitler concluded that bodily ailments were primarily caused by imbalances in the nervous systems. He also believed that applying certain frequencies of light by way of the eyes could restore balance within the body's regulatory centers, thereby directly affecting the source of visual dysfunctions.

Based on his discoveries, Spitler conceived the principle for a new optometric science which he called *syntonics*. Syntony means "balance". Clinical application of selected light frequencies in optometric practice began in the early 1920's. In 1933 he established the College of Syntonic Optometry, dedicated to research in the therapeutic application of light to the visual system. In 1941 the results of treatment in more than 3,000 cases were published in his book *The Syntonic Principle*[5] and suggested that this method could improve and normalize certain visual functions.

When Dr. Spitler had determined the most effective light frequencies, the need for uniformity in the light and its application in practice was addressed. Collaboration with glass and instrument manufactures resulted in the production of the *syntonizer*.

During the same period of time that Dr. Spitler was developing syntonics, others such as Skeffington, Harmon, Renshaw, Gesell and Getman demonstrated that vision is learned and thus amenable to remediation. Collectively, the efforts of these pioneers laid the foundation of behavioral vision care and the practice of vision therapy.

As vision therapy has evolved, so has the science and practical application of syntonics. In the 1960's, Charles Butts, O.D., PhD. distilled, reorganized and integrated Spitler's work. He clarified the use of light frequencies using the analogy of a "balance board". Red (low energy, long wavelength) was at one end affecting the sympathetic nervous system; the spectrum continued across the board – orange, yellow, green, blue, indigo – with violet (high energy, short wavelength) affecting the parasympathetic at the other. The balancing fulcrum was located at green.

Dr. Butts developed a diagnostic workup and treatment regimen which added a new dimension to vision therapy. Patients were diagnosed according to symptoms utilizing a specific case history, the O.E.P. 21 points, papillary responses, near point visual fields and other tests.

A manually performed near point visual field is used as an indicator of visual performance. Referred to as a functional field, it reflects the sensitivity of the visual system in gathering, processing and sending out

information which is reflected as performance. Optometrists using syntonics consider functional as well as physiological aspects to interpret the visual fields.

Illogical, restricted, spiraling or tunnel visual fields are signs of the Streff Non-malingering Syndrome[6–7]. They may also be a visual manifestation of the Selye General Stress Syndrome[8]. The non-pathological constricted visual field is a significant measurement used to indicate both the need for treatment and the success of the treatment applied. Small fields of 10° or less are not uncommon and are monitored as treatment progresses until an expanded visual field is obtained. Two studies specifically using prescribed light frequencies through the eyes demonstrate expansion of the visual fields as a result[9–10]. Clinical experience of over a thousand optometrists spanning seven decades supports that visual field changes indicate a significant step toward improved visual performance.

As the measurement of functional visual field responses became an integral part of syntonic practice, the supply of measuring instruments such as the campimeter began to decrease, hastened by the development of electronic field analysis. J.O. Jenkins, O.D., an alumnus of the Spitler era, and Rex Cross, B.A.,M.A., had formed C&J Instruments for producing syntonizers. Dr Jenkins designed a field charter and production of the second "college" instrument began. Mr. Cross continues to honor the standards and traditions of the College of Syntonic Optometry in the manufacture and distribution of "college" instruments maintaining the parameters of the originals.

It is common for an optometrist unfamiliar with phototherapy to ask what color, i.e. frequency, to use for a particular visual program. While several techniques have developed over the years, the syntonic approach is based on presenting frequencies to stimulate and balance the autonomic nervous system.

In 1994 Larry Wallace, O.D. further refined syntonic diagnosis and prescription by introducing the concept of four *syntonic syndromes*, corresponding to the light frequencies most often used.

A phototherapy treatment plan may span a period of one to two months requiring three to five session per week. The optometrist may prescribe a series of twenty phototherapy sessions of twenty minutes each to begin a vision therapy program, or implement phototherapy concurrently with other vision therapy techniques. Although syntonics is rarely used in isolation from other procedures, in some cases a lens prescription and light therapy are enough to solve the patient's visual complaints. Syntonics philosophy and methods are considered by its proponents integral to a vision therapy practice.

The College of Syntonic Optometry recognizes those who achieve a certain level of expertise and mastery with the status of Fellow. After two years of syntonic practice a fellowship candidate is asked to apply phototherapy only, before using additional techniques, to three patients. The evaluation of these phototherapy-only cases is the basis on which the doctor's understanding of syntonics is assessed.

Researchers and other professionals are still a step away from understanding the clinical methods and practice of light stimulation which syntonists have used with positive results for over a half a century. Noting that clinical experience often precedes validating research, it seems unreasonable to discount the success of syntonics because research has not yet fully ascertained how it works.

The discovery by Lewy, Rosenthal *et* al of S.A.D. (Seasonal Affective Disorder) and its treatment with light has stimulated voluminous research and awareness of the effects of light on the psycho-physiological system. In 1992-94 there were over five thousand articles published in the medical literature describing light's effect on physiology. Eleven hundred studies used color and nearly eight hundred dealt with experimental phototherapy. Not until September of 1993 had modern-day researchers[11] questioned light's effect on the autonomic nervous system. Recall that Dr. Spitler published *The Syntonic Principle* in 1941, hypothesizing that low frequency light stimulates the sympathetic and high frequency stimulates the parasympathetic branches of the autonomic nervous system.

Interest in optometric phototherapy has increased in recent years[12]. Research showing that color changes the interaction and timing in the sustained and transient visual processing system may be one of the reasons[13–19]. Approaches using color overlays ad color tints in glasses that appear to help improve reading may be another[20–22].

Optometric research published in the New England Journal of Medicine supports the theory that a temporal deficiency exists in the magnocellular pathway (transient vision system) of reading-disabled children[13]. Efficient timing and interaction of the magnocellular pathway with the parvocellular (sustained) system appears to be crucial for efficient visual processing[14]. Color has been shown to affect the timing of relationships of this dual pathway[13–16]. This might explain why syntonics practitioners report changes in their patients' neuromotor and perceptual skills when neither movement nor practice has been initiated during phototherapy.

All optometric institutions teach the basic science supporting phototherapy including physics, the nature of light, physical ad ocular anatomy, neurology, physiology, microbiology, optics, pediatrics/binocular vision, vision therapy, pharmacology and other subjects.

Syntonics has always been available to all doctors of optometry as a post-graduate curriculum. To ensure competence, syntonizers were originally made available only to licensed optometrists who had attended the education program at the college campus in Eaton, Ohio.

The College of Syntonic Optometry of today is an international organization which provides basic and advanced education as well as fellowship at its Annual Conference on Light and Vision, bringing together many disciplines in the exploration of light's influence on vision and health.

References

1. Zajonic A. Catching the light. The entwined history of light and mind. Bantum Books, New York 1993
2. Donzelli, GP. *Green light phototherapy: towards new trends*. J Photoch & Photobio 1989; 4(1):126-8
3. Avyash H. Hadjugcorgiou E. Sofatzis J et al *Green light phototherapy in new born infants with ABO hemolytic disease*. J Pediatric 1987; 111(6 pt 1): 882-7.
4. Amato M. Inabnit D. *Clinical usefulness of high intensity green light phototherapy in the treatment of neonatal jaundice*. Eur J Pediatrics 1991; 150(4): 274-6.
5. Spitler, HR. The Syntonic Principle. The College of Syntonics Optometry 1941; Library 21 E 5th St. Bloomburg, PA 17815.
6. Streff, JW. *Fixation and eye tracking losses associated with the Streff Syndrome*. J Optom Vision Develop 1994; 25(2): 70-8
7. Erickson GB, Griffin JR, Kurihara JI. Streff Syndrome a literature review. J Optom Vision Develop 1994; 25 (2): 64-9
8. Selye H. The Stress of Life. McGraw-Hill, New York 1956.
9. Kaplan R. Changes in form visual fields in reading disabled children produced by syntonic stimulation. Int J Biosoc R 1984.
10. Liberman J. *The Effect of Syntonic (colored light) Stimulation on certain Visual and Cognitive Functions*. J Optom Vision Develop 1986: vol 17.
11. Niijma A, Nagai K et al. *Effects of light stimulation on the activity of the autonomic nerves in anesthetized rats.* Physiol Behav 1993; 54: 555-61.
12. Birnbaum MH. *Behavioral optometry: a historical perspective*. JAOA 1994, 65:225-64.
13. Lehmkuhle S, Garzia R et al. *A defective visual pathway in children with reading disability*. New Eng J Med 1993; (328) 14:989-96.
14. Bassi CJ. Lehmkuhle S. *Clinical implications of parallel visual pathways*. JAOA 1990; 61-98-110.
15. Williams MC, LeCluyse K. *Perceptual consequences of a temporal processing deficit in reading disabled children*. J Am Optom Assoc 1990; 61: 111-121.
16. Williams MC, LeCluyse K. Rock-Faucheux A. *Effective interventions for reading disability* JAOA 1992; 63(6): 411-7.
17. Solman RT, Dain SJ et al. *Color-mediated contrast sensitivity in disabled readers*. Optom Vis Sci 1991; 68 (5): 331-337.
18. Scheiman M., Blasky P. Ciner E et al. *Vision characteristics of individuals identified as Irlen filter candidates*. JAOA 1990; 61:6000-5.
19. Lopez R Yolton RL. Kohl P et al. *Comparison of Irlen Scotopic Sensitivity syndrome test results to academic and visual Performance data*. JAOA 199;: 65:705-14.
20. O'Conner PD. *Reading disabilities and the effects of colored filters*. J Learning Disabil 1990; 23 (10): 596-603.
21. Robinson GL, Miles J. *The use of colored overlays to improve visual performance – a preliminary survey*. Exceptional Child 1987; 34(3): 65-70.
22. Whiting PR. Robinson GLW. *Using Irlen colored lenses for reading: a clinical study*, Australian Educ Develop Psychologist 1988; 11:7-10.

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