Syntonics: Optometric Color Therapy for the Treatment of

Acquired Brain Injuries

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The application of syntonic color therapy for the rehabilitation of brain injury can be very dramatic but is often under utilized, although its use greatly enhances the speed, efficiency and success of vision therapy.[1,2,3] Acquired brain injury may be related to traumatic brain injury, certain kinds of mild closed - head injuries, postconcussive syndromes, surgical trauma syndrome, cerebral palsy, stroke, and other kinds of cerebral vascular accidents. Essentially, acquired brain injury is a trauma to the brain that could result from a blow to the head or other neurological dysfunction, which produces anything from loss of consciousness to impaired cognitive or physical abilities. The injury may be mild or severe, but is often amenable to rehabilitation, especially with the use of phototherapies.

Vision is the dominant source of our information processing and is a learned or developed skill. Vision may be compromised in any trauma to the brain, resulting in changes in behavior, loss of memory, and changes in identity, learning and performance. Vision is closely tied to imbalance of the autonomic nervous system and the endocrine system, which support the visual system neurologically and chemically. Both systems are very amenable to rebalancing using color.

Because many visual problems are simply imbalances in the nervous system or endocrine system, treating the whole body through light application takes away the symptoms of these visual dysfunctions and brings not only the body but the visual system back into balance. In the case of head injuries of any type, the first thing that is upset is balance in the autonomic nervous system. Specifically, light into the eye has a profound effect by directly affecting the pituitary, pineal and hypothalamic pathways within the brain. Light shined into the eye also directly affects the blood, a living matrix system that connects all the vascular systems of the body.[4] Fifty percent of the blood in our body passes through the eye every 40 minutes and is directly visible through the pupil of the eye. Light shined into the eye can have a profound effect on the perivascular system and the blood flow, not only in the eye but through the whole body. Colored light shined into blood causes changes in pH and immune function.[5]

There are also inherent electrical energy systems that control and drive the physiology of the body. There is not only a digital system of the central nervous system but also a direct current system that parallels this both anatomically and functionally. This too is directly under the influence of light input. Light into the eye can have effects on the treatment of ocular pathology, both locally through specific tissues and non-locally to address systemic imbalances.[6] Light entry into the eye also affects the ocular functions changing the conditioned reflexes of eye coordination, focusing and eye movement skills. Specific frequencies of light can stimulate or relax the sensory motor systems of the eye by affecting electrical discharge in the hypothalamus. Light can affect endocrine function through direct neurological connection to the pituitary and pineal glands, automatically regulating much of the involuntary functions of our physiology. Frequencies of light also can affect the balance between the

heart and the brain, changing the heart variability rate and also rebalancing the autonomic and limbic circuits which regulate our emotions. Colored light not only produces vision in the brain cortex but energetically transfers information to the hypothalamus, the pineal gland, the pituitary and also the vestibular system, affecting posture as well. Light and color have a profound affect by activating the endocrine and autonomic nervous systems and their supportive functions such as vision, emotions, immune functions, cognition, and balance.

Diagnostic criteria for optometric phototherapy include a history that is significant for head trauma, but also things like fevers, infections, toxicity and stress. Clinically, one of the first signs of ANS imbalance is poor pupil responses: the inability of the pupil to sustain constriction under direct light, called the alpha omega pupil. Imbalances are reflected by reduced motility of the eyes, that is, jerky and erratic eye movements and inability to smoothly move the eyes together as a team. The analytical exam measures eye coordination, focusing skills, and the sensitivity of visual input and motor output. The keynote finding is visual field measurements especially noting general constrictions in the form, in color, sensitivity of the peripheral fields and enlarged blind spots.

Specific treatment uses frequencies of light that have general fields of action. For instance, red is known as a sympathetic or sensory stimulant; orange is known as a motor stimulant; yellow, as an intense motor stimulant; green, as an equilibrator or used to balance the physiological system; blue, as a sensory depressant; indigo, as a motor depressant; and violet being the most intense sensory depressant of all. Some of these color combinations comprise a strategy to treat the majority of imbalances in the autonomic and endocrine system and hence the visual system.

There are four basic syndromes treated.[7] One such combination is blue green "acute syndrome," which is used for symptoms such as pain, swelling and the need for palliation. Symptoms relate to infections, trauma, anoxia, stroke and high fever. Blue-green is primarily a parasympathetic activator, which serves to slow down sensory motor function.

Yellow-green is used in the "Chronic Syndrome," which relates to glandular, metabolic, or organic imbalances, toxemia in the system, and the general need for physiological balance. Yellow - green is used as a physiological stabilizer and detoxifier.

The red-indigo combination is termed the "Emotional Fatigue Syndrome," and those colors are used for emotional exhaustion, nervous stress and emotional trauma. It is common to find extreme fatigue and hyperirritability due to adrenal exhaustion.

The red-orange color refers to "Lazy Eye Syndrome" and is used for strabismus or amblyopia. Often seen as a requirement for higher sympathetic arousal. Individuals often exhibit over flexion in their motor systems.

In general, the red end of the spectrum serves to stimulate or activate the sympathetic branch of the autonomic nervous system, while the blue end or the violet-indigo end of the system tends to activate the parasympathetic branch of the autonomic nervous system and its support to various visual functions.

Most commonly, the autonomic nervous system acts in what is called a coupled reciprocal mode; when one branch of the autonomic nervous system is activated, the other is more depressed in its function acting as somewhat of a balance board effect between the two rising the action of one while depressing the action of its antagonistic branch. However, the autonomic nervous system can also be coactivated or coinhibited; that is, there is mutual antagonism where the branches of the autonomic nervous system can be both activated or both depressed. This is a common response to trauma.

A third basic action of the autonomic nervous system is unilateral where only one specific branch of the nervous system is affected. The dominance of the autonomic nervous system differentiates specific emotions and is mediated biologically by certain hormones. For instance, ACTH mediates the sympathetic nervous system, or cortisol mediates the parasympathetic nervous system. Chronic stress can coactivate both systems by accelerating or inhibiting both equally. Or there is unilateral activation of one branch of the autonomic, which has specific localized effects on our physiology such as under-

or over activation of neurological pathways. Balances or imbalances in the autonomic nervous system also have significant effects on the regulation of our emotions.

In a landmark book, *The Affect Regulation or the origin of Self and the Neurobiology of Emotional Development,* author Alan Shore discusses at length how imbalances of the autonomic induced by head injuries and head trauma can affect the whole body physiology by rewiring the neurochemical events which mediate our behaviors.[8] Shore discusses the hypertonicity of both the sympathetic and parasympathetic following some kind of trauma to the head, affecting our psychobiology. This includes imbalance between the orbital frontal cortex and the limbic structure's dual pathways.

The limbic structure of our brain stores implicit and explicit memory while the brain stem stores motor stress. Trauma blocks the normal neurological feedback systems of biochemistry and behavior resulting in maladaptations such as posttraumatic syndrome, TMJ syndrome, myofacial pain and posttraumatic vision syndrome. Orbital frontal trauma can reset our limbic system and reset the procedural memory of our central nervous system so that we are conditioned into a state of dysfunction. Trauma can imprint or freeze itself into our motor and sensorimotor systems by conditioning imbalances in the autonomic nervous system, resulting in overreaction or constriction of emotions. Shore speaks about the right orbital frontal cortex being the master regulator of the brain and the body. The frontal orbital cortex is the specific anatomical center where the autonomic nervous system is coupled with the dual limbic pathways of our lower brain stem. This area is highly susceptible to hematomas and contusions, which can result in soft tissue damage not picked up in general MRIs or CAT scanning procedures.[10]

Imbalances in the frontal orbital cortex result in biochemical electrical damage that pass through our whole brain, resulting in a shattering of our self-concept, and hyperreaction to stress, which puts us out of control in relation to environmental input[11] This poor autonomic regulation also results in compromises to the immune function, peripheral vision, and the electric coherence of the brain. Seizure activity following trauma is one artifact of poor regulation. The use of color can restabilize the nervous system and should be one of the first steps taken following a head injury, before any other therapies are begun.

Because the autonomics are so easily upset, a whole sequella of events usually follows a trauma. The most common in the field of optometry is called posttraumatic vision syndrome.[12] The first sign of posttraumatic vision syndrome is decreased visual acuity, a lack of sharpness of vision, both far and near, resulting in symptoms such as blur and mental confusion.

Exophoria or exotropia is the second most common sign. This means that the eyes go into a divergent pattern, turning outward at both far and near, resulting in decreased depth perception, double vision, diminished concentration, diminished organization and visual memory.

Next is decreased convergence, or the inability to turn the eyes inward, to localize things in visual space relative to ourselves. Convergence is the ability of the eyes to turn inward, to localize objects in space relating to ourselves. When convergence is decreased we have blurred vision, may have closing of an eye, headaches, pain and reading problems.

Next is decreased blink rate, again an imbalance in the autonomic nervous system. This often results in a mild seizure-type activity of staring, which symptomatically produces dry eye and light sensitivity due to the pupil's inability to stay constricted under direct illumination. Posttraumatic vision syndrome also creates spatial disorientation with hallucinations, vertigo and memory loss.

Because the visual system is so intimately related to our self-image, often we will have distortions in body image with symptoms such as postural warps, right-left confusion, loss of spatial judgment and shifts of our midline in space relative to our body.

Another sign is decreased accommodation, which is the inability to sustain focus and keep detail clear at various distances. This results in the symptoms of reading problems, blur, and headaches. Decreased ocular motility, poor fixations and pursuits is another sign of posttraumatic vision syndrome. This means the inability to move the eyes smoothly through space and localize things not

only with the eyes as a team, but with each eye individually. Symptoms of this dysfunction are nystagmus, reduced depth perception, skipping words and losing our place when we are trying to read.

And finally, the most significant sign is visual field defects, which can be total loss of our visual field in certain sections; congruous losses, where each eye loses the same part of visual field, incongruous losses where there are different losses in different parts of space; altitudinal losses where we lose visual field perception either upper or lower, or enlarged blind spots. Symptoms of visual field defects consist of bumping into things, poor night vision, poor ocular motor skills, reduced visualization skills, postural warps and neuromotor distortions.

Symptoms of posttraumatic vision symptom are often overlooked, especially during initial treatment of the injury. Because these problems are sometimes hidden or neglected it prolongs and impairs the rehabilitation process. Vision consists of many subsystems requiring integration to create the flow of processing information to the brain. When information processing is disturbed, not only a whole host of vision signs and symptoms are produced, but also imbalances throughout the individual are produced, seen as compromises in function of emotional, physical and mental health. The treatment of these imbalances can be accomplished by using specific frequencies of light into the eye using specific instrumentation. Instruments use specific frequencies or filter combinations. Generally, treatment consists of light shined into the eye for 20-minute intervals three to five times per week. This treatment is comfortable. It has very low risk, as light is basically an energy modality and has almost no side effects. Every six to eight sessions, a progress evaluation is done which consists of remeasuring certain aspects of the visual field and the visual analysis, as well as monitoring the patient's signs and symptoms. These measurements allow the treatment to be modified to enhance results. The frequencies that are used to treat binocular and sensory motor imbalances also result in improvement in visually related attention and memory disorders, focusing and eye coordination problems, ocular pathology, eyestrain and headaches, and restoration of visual field constriction and defects.

A study was done at Neural Rehab, a clinic devoted to rehabilitation of head injury in Rochester, New York. A total of 46 patient records were reviewed. Of these, 28 had head traumas resulting from auto accident or falls, 18 had cerebral vascular accidents such as strokes or aneurysms. Of the 46, 40 people had decreased visual fields with general constrictions and enlarged blind spots; 39 had accommodation or focusing insufficiency; 24 had binocular deficiency including strabismus or convergence problems; 20 had exophoria, exotropia or hypertropia. Twenty of the individuals had general ocular motor dysfunction; 19 had reduced vision in one or both eyes; and six had hemiaopsia. The basic frequencies used in treating these conditions were primarily blue-green and blue-indigo, with other colors used in specific cases. However, out of 75 treatments, 52 used blue-green and blue-indigo. The results were that 32 out of the original 46 had increases in their visual fields from 20 percent to 500 percent. All 46 showed significant improvements in other areas of visual function. This color therapy was done in conjunction with a multidisciplinary approach to rehabilitation including physical therapy, occupational therapy, speech therapy, and 13 psychotherapy among other modalities[12] Syntonics and optometric vision therapy are very powerful tools which need .to be included in the treatment of acquired brain injury.

In conclusion, the use of color therapy and phototherapy through the eyes is a primary method to rebalance the autonomic and endocrine systems as well as the electrical and biochemical systems of the body. The pathways for this energetic application are well established. Light and color have specific effects on emotions, body physiology and nervous function. These systems are almost always out of balance as a result of acquired brain injury. Through the use of light and color, the individual can be made neurologically ready for other treatments as well, with a rebalancing neurologically which sets the individual in a more receptive mode for learning new behaviors and learning new skills as a part of the rehabilitation process. Use of energy medicine such as light is one of the futures of medicine. Energy application such as colored light have very few if any side effects and can serve and support many other kinds of therapies. At this time, energy medicine is not a final and unified model

but is basically a matrix of different kinds of energies including kinesthetic, bioelectrical, electromagnetic, gravitational, thermal, light and sound.[13] Energetic medicines can address traumatically blocked brain function by also allowing the living matrix in our body to extract the information needed to rebalance our biological systems. There are not one but many pathways where this could occur. In syntonic phototherapy it may be the retinal hypothalamic pathway, through the retinal vascular, and even acupuncture points. These applications are the future of medicine and healing. Syntonics is a time-honored and clinically proven modality of treatment and has a major role to play in the rehabilitation process.

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