SYNTONIC PHOTOTHERAPY 101: Basics and Use in the Vision Therapy Practice

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1

College of Syntonic Optometry

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

Robert Fox – Past President, Faculty
John Pulaski - Treasurer, Faculty

2

Disclosure

- The instructors for this course have no financial interest in any of the products or procedures mentioned in this course.

3

Course Learning Objectives

1. To learn the history of light therapy and syntonic phototherapy.
2. To learn about light action on the visual system.
3. To learn alpha-omega pupil and functional visual field measurement.

4

Course Learning Objectives

4. To become familiar with syntonic syndromes and their treatment.
5. To become familiar with light therapy as a tool in the treatment of the vision therapy patient
6. To be able to put this material into immediate use.

5

History of Light Therapy

1876 – General Augustus Pleasanton
Blue and Sun-Lights
blue light increased plant growth and stimulated glands of the body

At this time it was also found that UV light could kill bacteria

6

History of Light Therapy

1877 – Dr. Seth Pancoast

Blue and Red Lights

he used sunlight through red or blue glass to accelerate or relax the nervous system

7

History of Light Therapy

1878 – Dr. Edwin Babbitt

The Principles of Light and Color

he made the ChromoDisk that combined colored filters and placed the light on different parts of the body (he used all colors)

8

History of Light Therapy

1878 – Dr. Edwin Babbitt

The Principles of Light and Color

he used solar charged water and filtered it through colored glass to create an elixir to cure disease

(blue water for a sore throat)

9

History of Light Therapy

1890 – sunlight was necessary for the body to produce vitamin D which was necessary for calcium absorption

1903 – Niels Finsen won the Nobel Prize in Medicine for treating lupus vulgaris (a skin form of tuberculosis) with light

10

History of Light Therapy

1920- Dinshah Ghadiali

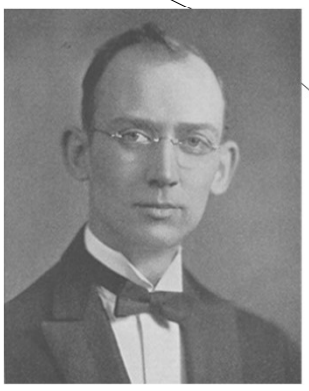
SpectroChrome program

12 color filter combinations applied to the body

1941- Harry Riley Spitler, DOS, MD

The Syntonic Principle

11



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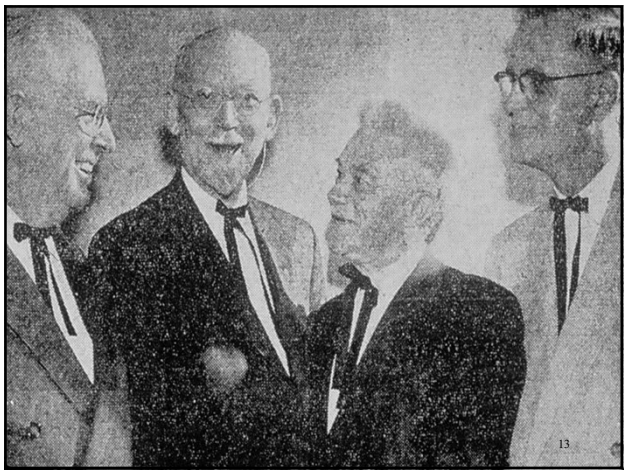

13

History of Syntonic Phototherapy

Harry Riley Spitler, DOS, MD

The Syntonic Principle

Colored light through the eyes

3 body types - Pyknic, Syntonic, and Asthenic

14

Syntonic Theory

Dr. Spitler developed 21 principles about the effect of light on the body and mind

- The select application of visible light to the eye
- Frequencies to balance the sensory motor systems
- Reaching the endocrine system via the pituitary, pineal and hypothalamus

15

History of Syntonics

- Charlie Butts, OD
  - Realized need for syntonics to fit within optometric theories of diagnosis and treatment
  - Worked with Larry Wallace OD to develop the basic syntonic syndrome approach

16

Photobiomodulation (PBM)

- "A form of light therapy that utilizes non-ionizing forms of light sources, including LASERS, LEDs, and broad-band light, in the visible and infrared spectrum. It is a non-thermal process involving endogenous chromophores eliciting photophysical (i.e. linear and non-linear) and photochemical events at various biological scales. This process results in beneficial therapeutic outcomes including but not limited to the alleviation of pain or inflammation, immunomodulation, and promotion of wound healing and tissue regeneration."
- -North American Assoc of PBM Therapy Website

17

- Karu of Russia identified cytochrome c oxidase as the main chromophore in the mitochondrial production of ATP. During stress/disease, nitric oxide (NO) binds to the cytochrome c oxidase, blocking ATP production. In PBM low level light (usually red or near IR)facilitates the release of NO thereby allowing normal ATP production to resume.

18

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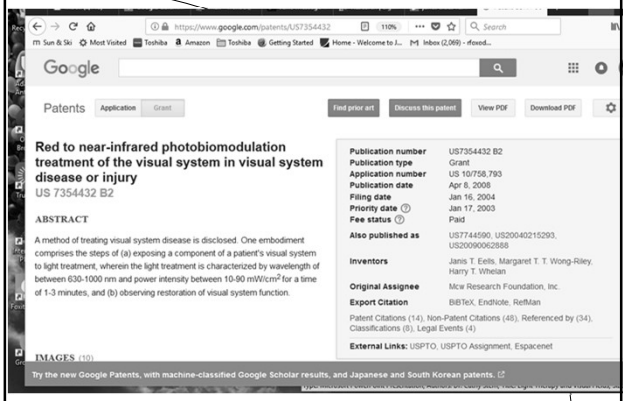
Current Research



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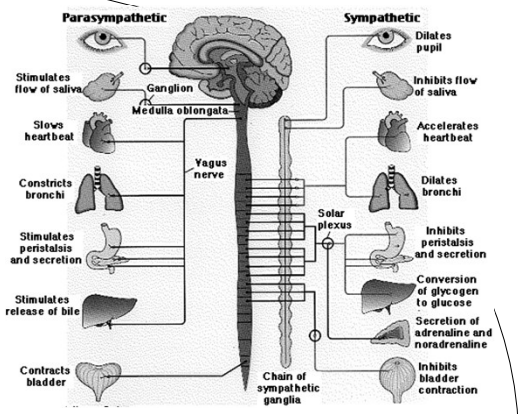
23

The Autonomic Nervous System

Sympathetic and Parasympathetic

24



25

Sympathetic Actions

- Dilates the pupil
- Increases tearing
- Increases intraocular pressure
- Decreases accommodation
- Turns eye outward

26

Sympathetic Actions

- Decreases mucus, saliva and digestion
- Decreases arterial dilation
- Increases pulse rate
- Increases blood pressure
- Increases blood sugar

27

Sympathetic Activation

- Thyroid
- Adrenal Medulla
- Pituitary
- Gonads
- Muscles

28

Post-Traumatic Vision Syndrome

- Exophoria/exotropia
- Reduced accommodation
- Reduced convergence
- Poor blink rate / poor tearing
- Photophobia

29

Parasympathetic Actions

- Pupil constriction
- Decreases tearing
- Decreases intraocular pressure
- Increases accommodation
- Turns eye inward

30

Parasympathetic Actions

- Increases mucus, saliva and digestion
- Decreases pulse rate
- Increases arterial dilation
- Decreases blood pressure
- Decreases blood sugar

31

Parasympathetic Activation

- Parathyroids
- Adrenal cortex
- Digestive tract
- Liver
- Pancreas
- Spleen

32

Light Action on the Visual System

- Light Pathways
- Effect on Autonomic Nervous System
- Frequencies of light and how they affect the visual system

33

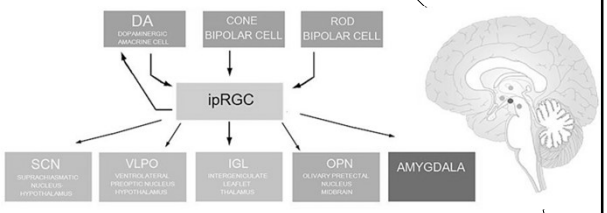
Light Pathways

- Nonvisual photoreceptors of the deep brain, pineal gland and retina
- Hypothalamus: suprachiasmatic nucleus>pituitary
- Pituitary: ACTH to adrenal gland
- >cortisol/stress hormone
- Pineal: melatonin production
- Retina: influences suprachiasmatic nucleus
- **Intrinsically photosensitive retinal ganglion cells**

34

- **Intrinsically photosensitive Retinal Ganglion Cells**(ipRGCs), also called **photosensitive Retinal Ganglion Cells** (pRGC), or **melanopsin-containing retinal ganglion cells**, are a type of neuron (nerve cell) in the retina of the mammalian eye. While responses to light in mice lacking rods and cone cells were first noted in 1923,[1] they were forgotten, then rediscovered in the early 1990s.[2] The source of these responses was shown to be a special type of retinal ganglion cell, which, unlike other retinal ganglion cells, is intrinsically photosensitive. This means that they are a third class of retinal photoreceptors, excited by light even when all influences from classical photoreceptors (rods and cones) are blocked (either by applying pharmacological agents or by dissociating the ganglion cell from the retina). Photosensitive ganglion cells contain the photopigment melanopsin. The giant retinal ganglion cells of the primate retina are examples of photosensitive ganglion cells.

35



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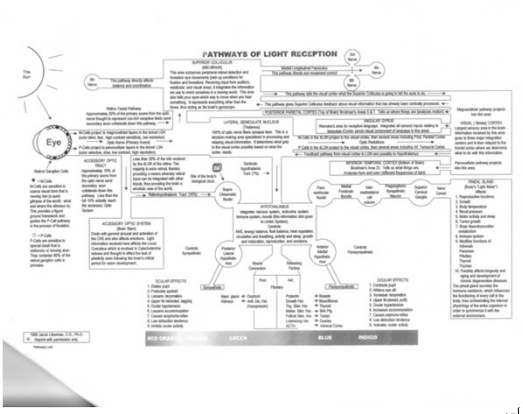
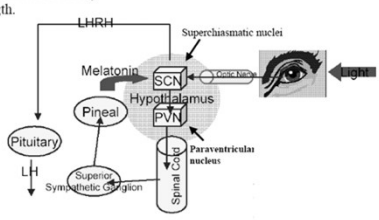


37

The pineal gland secretes melatonin and is a representation of day length.



High [melatonin] = short day length
Low [melatonin] = long day length

38

History, History, History!!

- Cause of stress – chronic, toxic, injury
- Time of onset
- Medications
- Previous treatments
- Surgeries – what were they before?
- Symptoms

39

Autonomic Imbalance

- Alpha Omega Pupil
  -the inability to sustain constriction under direct light (greater sympathetic activation)
  -the faster the dilation, the smaller the field
- Oculomotor imbalance
  -poorly controlled pursuits and saccades
  -head movement vs. eye movement
  -sign of constricted fields

40

Searfoss, 1991

- It is the rebounding response of the pupil to a penlight beamed approximately 4" away into the individual eye and left on about 5 seconds. The reaction is a closing down with a rebound as large or larger than before the light was shown into the eye. The suddenness and the size of the rebound has been correlated to the size of the visual field. The "worse" an alpha-omega pupil the smaller and more constricted the field. A sloppy, unusual, or little change is a signal of a possible problem. It is not fully understood but the symptom is believed to be fatigue of the adrenal system which is under continual stress. Whatever the cause of the symptom, it is an imbalance relating to and affecting the biochemistry. Expect the pupil of a balanced system to go down and stay with little or no change in size.

41

42

43

Pupil Testing Lab

- Pulaski lecture
- Normal pupil testing
  - Constriction holds several seconds
- Alpha-omega pupil – can't sustain constriction long at all
- Grading
  - 1+ to 4+
  - 4+ pupil releases immediately

44

Grading Pupils

Grade	Time to Release
1+	8 – 10 seconds
2+	5 – 7 seconds
3+	2 – 4 seconds
4+	0 – 1 seconds
	• Almost immediate

45

Effect on Autonomic Nervous System

- Color Vision
  -reduced color discrimination on Ishihara plates
  -reduced figure/ground perception
- Accommodation and Binocular Dysfunction
- ANS imbalance in head trauma

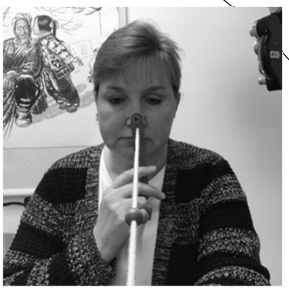
46

The Brock/Butts String Test

- Evaluates the convergence facility along Z axis as well as eight other quadrants
- The inverse proportion applies, the farther out the convergence along the string, the more constricted the functional visual field will be

47

Brock/Butts String



48

Difference Between Brock and Butts Strings

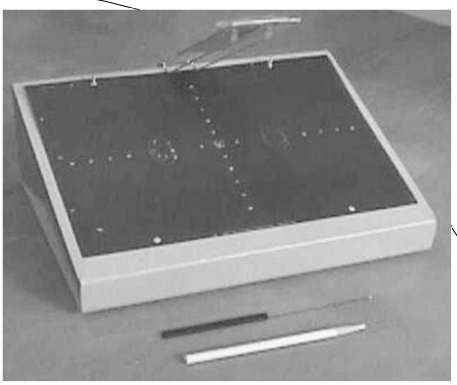
- The Brock String uses a bead on the string
- The Butts String utilizes examiner's thumb and forefinger along the string as the target
- The Butts String Test examines eight other quadrants rather than just along the Z axis

49

Functional Visual Field Measurement

- Reduced Visual Performance in the absence of organic cause
- What you see:
  - Generalized constriction of form and color
  - Enlarged blind spot

50



51

C & J Field Charter

52

Another View of C&J Charter

53

Functional Visual Field Measurement

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54

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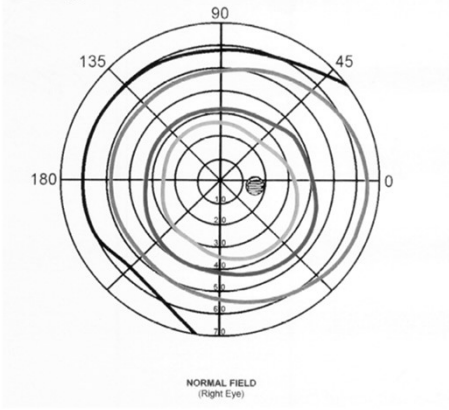


56

The Interpretation of Visual Fields

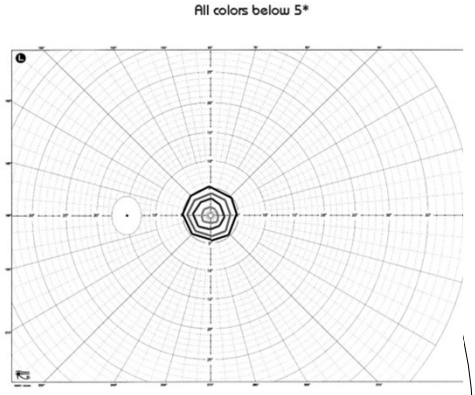
- Motion Field
  the extreme periphery of the retina capable of receiving sensations of motion without recognition of contour
  [motion is first form of vision – R. Melillo]
- Form Field
  recognition of contours of an object
  extent is when the patient can retain the perception of white in a stationary position

57

The Interpretation of Visual Fields

- Color Fields
  test green, blue, red (smallest to largest)
  there should be no interlacing or overlapping
- Blind Spot
  enlarged blind spot – questionable swelling
  or new theory of anomalous projection

58



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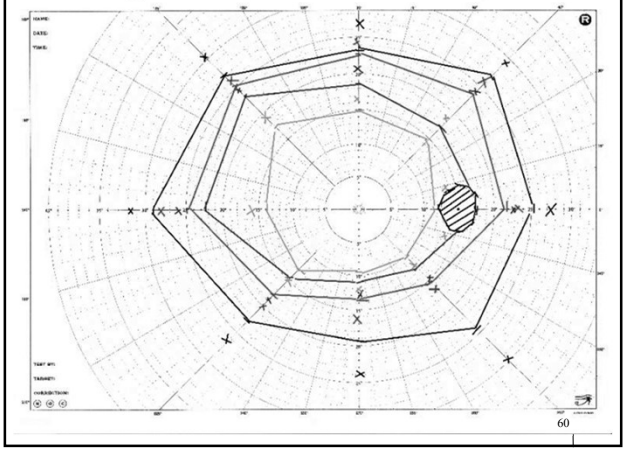

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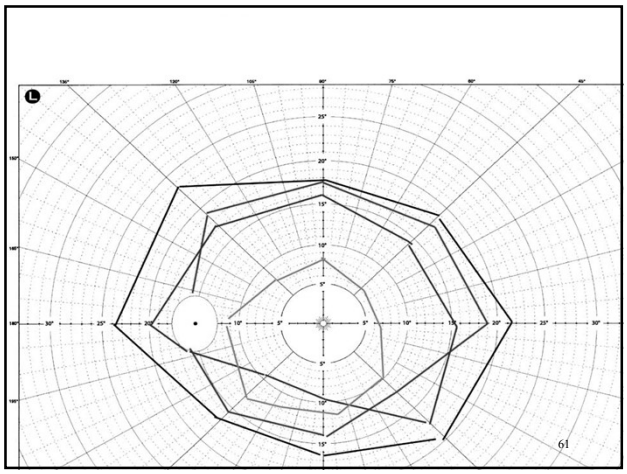


61

Syntonic Blind Spot

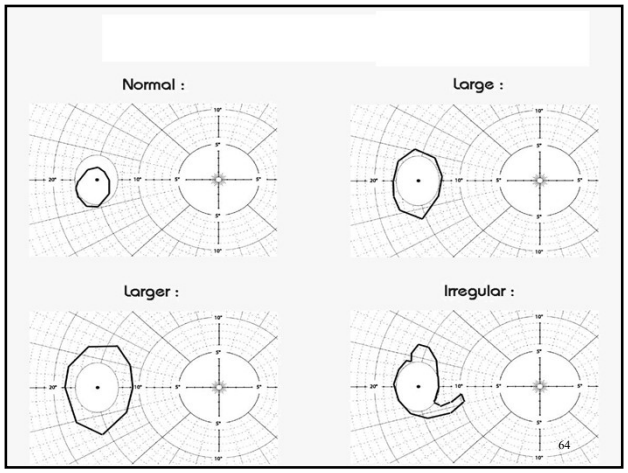
- Different from glaucomatous field
- Can be double or even triple normal size
- Often associated with reading problems
- Often associated with brain trauma

62

Syntonic Blind Spot

- Dural torque
- Difficult to measure if color fields are less than 15 deg
- Swelling vs projection
- Helps determine end of syntonic therapy

63



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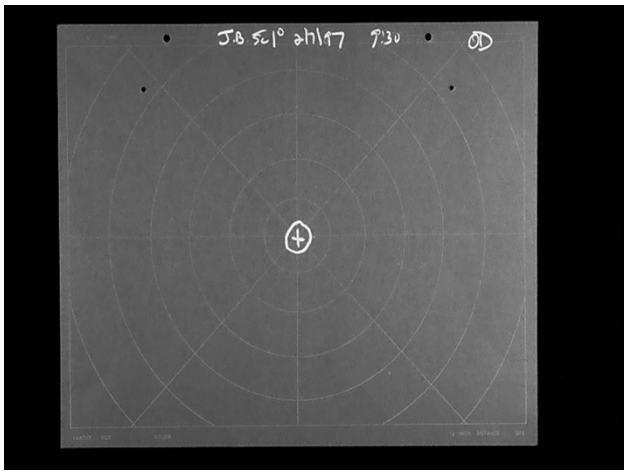
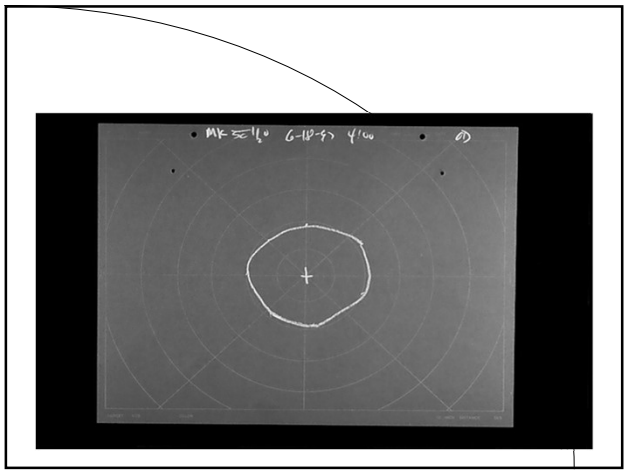
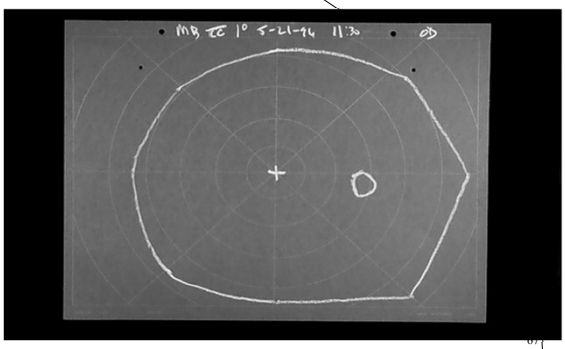
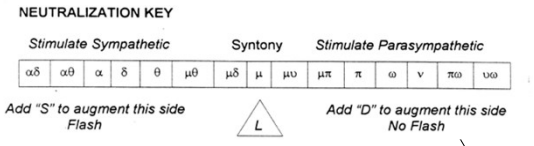






67

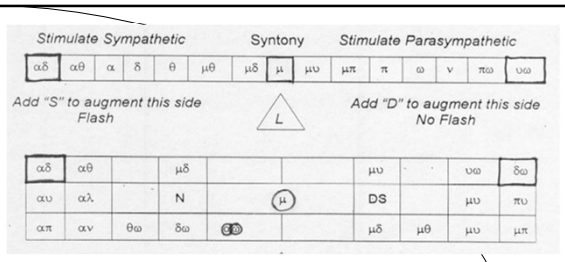
Balance Board – general considerations



Red end of spectrum= sympathetic stimulation

Blue end of spectrum= parasympathetic stimulation

68



alpha omega = emotional stabilizer

it balances sympathetic and parasympathetic

69

Red = sensory stimulant
Orange = motor stimulant
Yellow = intense motor stimulant

Green equalizes for physiological balance

Blue = sensory depressant
Indigo = motor depressant
Violet = intense sensory depressant

70

α alpha = red

δ delta = amber

μ mu = green

υ upsilon = blue

ω omega = indigo

71

Larry Wallace's Syntonic Syndromes

- Chronic/long standing syndrome
- Acute / trauma syndrome
- Amblyopia / esotropia syndrome
- Emotional / adrenal exhaustion syndrome

72

Mu Delta – "Chronic Syndrome"

Lemon physiologic stabilizer

Dx: convergence excess, esophoria/esotropia
alpha omega pupil and poor oculomotor
constricted visual field for form or color
low recovery on ductions (especially BI)

Sx: toxic or neuroendocrine imbalance
chronic health problems or past trauma

Tx: stimulate sympathetic, create exo response

73

Alpha Delta – "Amblyopia Syndrome"

Red-Orange sensory + motor stimulant

Dx: amblyopia, esotropia, poor accommodation,
constricted visual field, reduced vergence ranges

Sx: reduced acuity on one eye, head tilt or turn,
mmpoor depth judgment, diplopia
also slow reading speed and poor handwriting

Tx: stimulate sympathetic
especially in long standing strabismus

74

Alpha Omega – "Emotional Fatigue"

Ruby pupil, adrenal fatigue, emotional
trauma, exhaustion, mood swings

75

Mu Upsilon – "Acute Syndrome"

Blue-Green recent head trauma, anoxia, stroke

Dx: exophoria, exotropia, convergence
insufficiency (PTVS), alpha omega pupil,
enlarged blind spot, poor ocm / accommodation

Sx: headache, motion sickness, vertigo,
transient blurred vision, diplopia (monocular)

Tx: stimulate parasympathetic

76

Upsilon Omega – "Pain Reliever"

not a syndrome

Indigo headaches, asthenopia

(Violet)

77

Treatment Protocol (end at middle of spectrum)

Indigo Upsilon Omega

+

Blue-Green Mu Upsilon

78

Treatment Protocol

- Frequency of light into the eye
- 20 minutes per session
- Minimum of 4x per week
- Progress Evaluation every 8 sessions
  repeat history, vision analysis, VF
- Low Risk and Few Side Effects

79

Visual Fields Lab

- Signs of small fields
  - "Bull in china shop"
  - Copying problems
  - Poor spacing
  - Poor spelling
  - Poor oculo-motor skills
  - Can't line numbers columns up

80

Functional Vision Changes

What To Think (brain injury case)

- Visual Acuity Loss
  Sx: blurred vision
  enlarged blind spot
- Strabismus (exotropia)
  Sx: double vision, loss of depth perception
  hyperarousal of sympathetic

81

- Oculomotor Dysfunction
  Sx: skips/rereads lines of print
  poorly controlled pursuits and saccades
- Convergence Insufficiency
  Sx: reading difficulty, dizziness/nausea
  receded NPC and pulls back from target

82

- Accommodative Deficit
  Sx: blur, headaches
  reduced amplitude and flexibility
- Decreased Blink Rate
  Sx: dry eye, photophobia
  reduced TBUT, filamentary keratitis

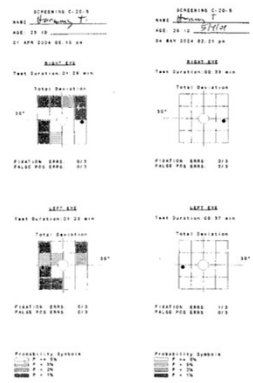
83

Visual Field Constriction

Sx: bumps into things, poor night vision,
spatial disorientation, attention deficit

alpha omega pupil, oculomotor dysfunction,
midline shift, information processing disability

84



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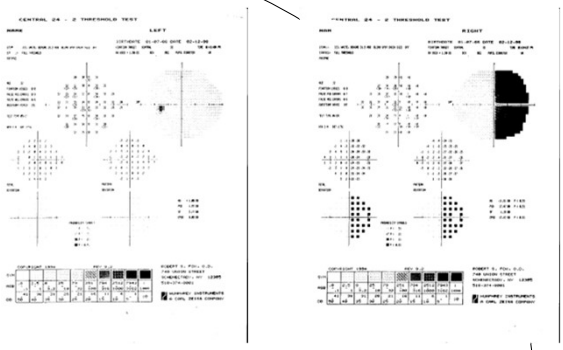
Scott – CO Poisoning



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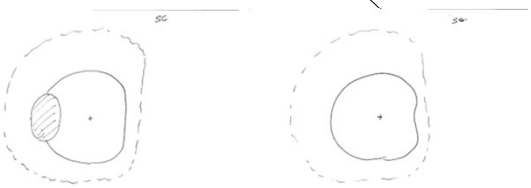

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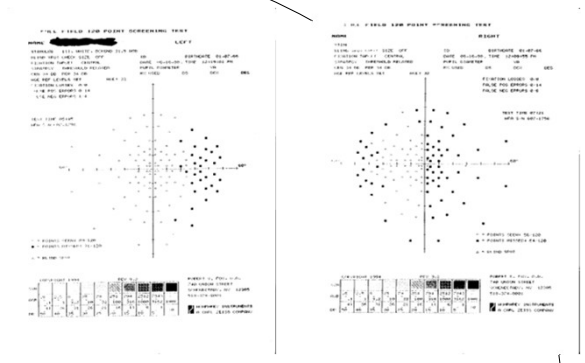

88

Pearls to Remember

- Enlarged blind spot and general constriction of visual field
- Light is a primary tool to rebalance the autonomic nervous and endocrine systems
- Wallace's 4 basic syndromes work 95% of the time
- Low risk with with high rate of success
- Successful syntonic cases handle VT much better than those without syntonics boosting overall success rates

89

●Thank you!!

90