Six Subtypes of Concussion and the Optometric Considerations

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COPE # 63404-NO

Concussions – A Hot Topic

- Concussions in the Military(IED)
- Concussions and TBI in the NFL
  - Legal cases, suicide
  - Borland retires from 49ers, others follow
- Return to Play Law – all 50 states
- Rest vs. Exercise
- Primary vs. Secondary concussions
- *Importance of vision in pretesting, evaluating and treating concussions

What Should Optometrists be Concerned With?

- Ocular Health
- Visual Acquisition Skills-VAS
- Visual Information Processing Skills-VIPS
- Neural Networks of Brain Functions
  - Stable visual world = VOR + OKR = 1.0 gain
  - Visual and proprioceptive localization
- Relate these to Daily Function – Activities of Daily Living (ADL's)

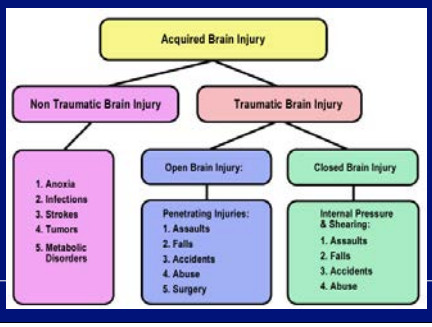
What is a Concussion?

- Definition
- Acquired Brain Injury
  - Non-traumatic
  - Traumatic
    - Open
    - Closed – if considered mild, then concussion
- *What are the functional losses?

What is a Concussion/mTBI?

- Defined as an immediate acceleration and deceleration or stopping event, resulting in temporary or permanent damage to the ***"structures"*** of and within the head.
- 2.5 million TBI reported in 2010(hospital)
  - 75% were mTBI
  - How many are not reported?
  - 1 of 10 mTBI have persistent symptoms
  - *2 weeks out with symptoms, need evaluation

Acquired Brain Injury



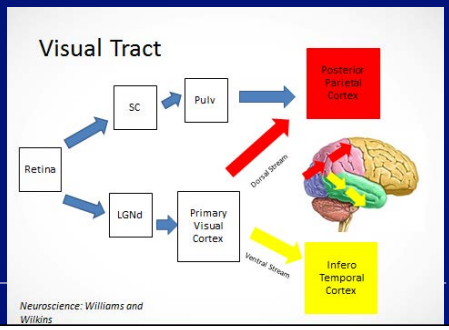
The Concussion – Types of Damage…

- Focal vs. General Dysfunction
  - R vs. L Hemispheric Processing
  - Subcortical vs. Cortical Processes
  - Ability to Multi-Task, Speed…Why?
- Macroscopic vs. Microscopic
  - tissue and neural network damage,
  - cascading neurometabolic concerns
- Dorsal vs. Ventral Streams – neural networks
- KEY – Long pathways affected

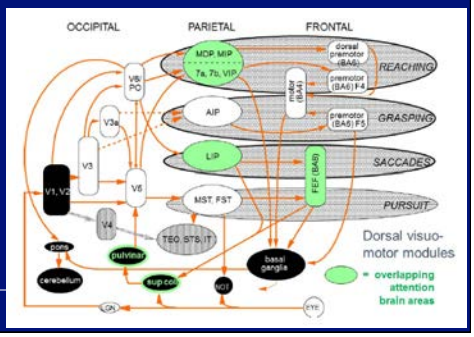
Cellular Pathophysiology

- Acceleration/deceleration
- Tethering loads in vascular, neural and dural elements
- Stretching, compressing tissues and axons
- Metabolic changes, neurotrophic factors
- Short vs. long term changes
- Chronic traumatic encephalopathy (CTE)

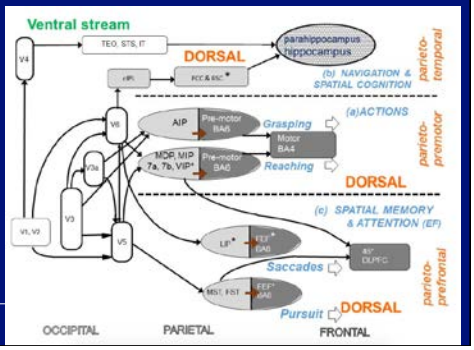
Performance Affected by Dorsal and Ventral Paths



Four Visuo-Motor Modules Of the Dorsal Stream



Dorsal – Three Functional Roles



Automaticity

- What is it?
- Do we have limitations?
- Can you lose it?
- How is it related to development and brain injury?
- What can we do to recover?

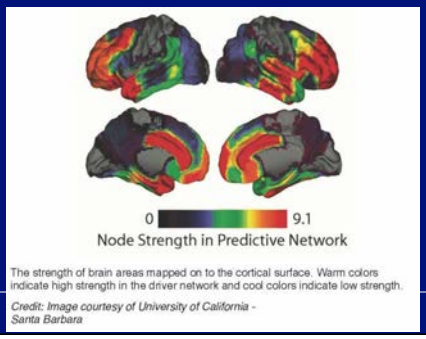
Considerations of Automaticity

- Selective Attention
  - Filtering of sensory input
- Motor control
  - Inhibition
  - Modulation of timing
  - Concussion disrupts longer, integrated pathways
- Examples
  - Driving a car
  - PET study on noun to verb

Structural and Functional Imaging

- CT and MRI
- *Diffusion Tensor Imaging (DTI)
- *Positron Emission Tomography (PET)
- *Functional MRI (fMRI)
- Magnetic Resonance Spectroscopy (MRS)
- Exercise and Cerebrovascular Dynamics
- Electroencephalogram (EEG) and Evoked Potentials (VEP!)

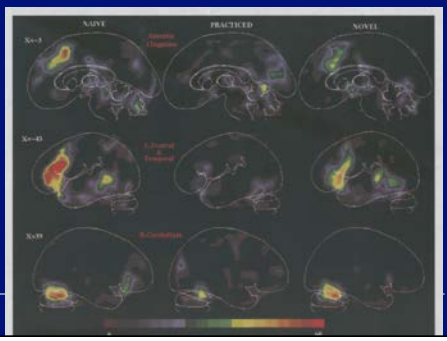
fMRI = Function, Neural Networks



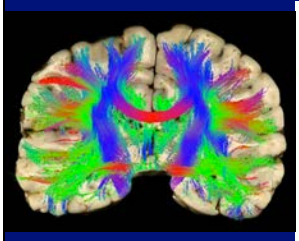
The strength of brain areas mapped on to the cortical surface. Warm colors indicate high strength in the driver network and cool colors indicate low strength.

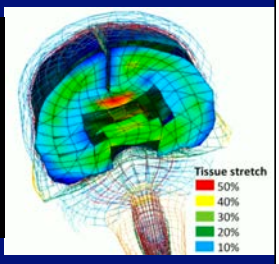
Credit: Image courtesy of University of California - Santa Barbara

Say the Verb for the Noun

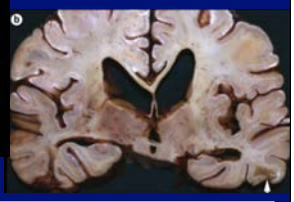


Bruised Brain vs. Shearing





Normal vs. Chronic Traumatic Encephalopathy - Corpus Callosum



Energy Demand on the Brain

- 2% body weight, 20% of body energy
- Visual system ranks among highest energy consumers
- Only 3% of neurons can be highly active at any one time
- *Fundamental limit on the capacity to process information, need to filter attention, it also constricts multi-tasking

Visual Demand on the Brain

- Visual processing accounts for 44% of the brain energy consumption
- Opening one's eyes consumes up to 50% of glucose when viewing a complex, dynamic scene
- "Many ABI are unable to filter all of the information and may want to turn the switch off "

*Thus a loss of automaticity and too much noise online!

Testing Considerations

- Static vs. Dynamic Demands
  - Accommodation and other Visual Acquisition Skills (VAS)
    - Amplitude
    - Flexibility
    - Sustainability
- Imaging of fMRI of CI – Tara Alvarez
- Temporal effects – initially get worse
- Once recovered, effects of exercise and cerebrovascular dynamics

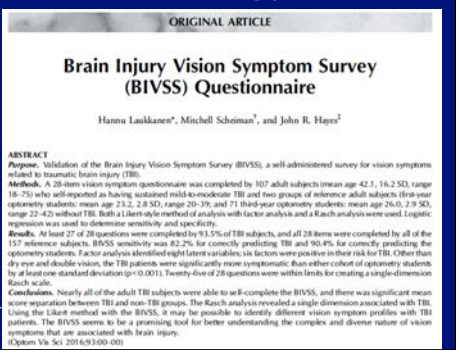
What do you Observe in a Concussion/mTBI?

- Physical aspects are ***overt***
  - Slow to get up, disoriented, gait
- Speech/Cognitive aspects are ***overt***
  - Speech is irregular, not oriented to self, place or time
- Visual aspects are commonly ***covert***

Post Concussion Syndrome

- Headaches
- Dizziness
- Fatigue
- Irritability, Anxiety
- Insomnia
- Loss of Concentration
- Noise and light sensitivity
- *Visual Sequelae

BIVSS - laukkanh@pacificu.edu



ORIGINAL ARTICLE

Brain Injury Vision Symptom Survey (BIVSS) Questionnaire

Hannu Laukkanen*, Mitchell Scheiman†, and John R. Hayes‡

ABSTRACT

Purpose. Validation of the Brain Injury Vision Symptom Survey (BIVSS), a self-administered survey for vision symptoms related to traumatic brain injury (TBI).

Methods. A 28-item vision symptom questionnaire was completed by 107 adult subjects (mean age 42.1, 16.2 SD, range 18–75) who self-reported as having sustained mild-to-moderate TBI and two groups of reference adult subjects (first-year optometry students: mean age 23.2, 2.8 SD, range 20–39; and 71 third-year optometry students: mean age 26.0, 2.9 SD, range 22–42) without TBI. Both a Likert-style method of analysis with factor analysis and a Rasch analysis were used. Logistic regression was used to determine sensitivity and specificity.

Results. At least 27 of 28 questions were completed by 93.5% of TBI subjects, and all 28 items were completed by all of the 157 reference subjects. BIVSS sensitivity was 82.2% for correctly predicting TBI and 90.4% for correctly predicting the optometry students. Factor analysis identified eight latent variables; six factors were positive in their risk for TBI. Other than dry eye and double vision, the TBI patients were significantly more symptomatic than either cohort of optometry students by at least one standard deviation ($p < 0.001$). Twenty-five of 28 questions were within limits for creating a single-dimension Rasch scale.

Conclusions. Nearly all of the adult TBI subjects were able to self-complete the BIVSS, and there was significant mean score separation between TBI and non-TBI groups. The Rasch analysis revealed a single dimension associated with TBI. Using the Likert method with the BIVSS, it may be possible to identify different vision symptom profiles with TBI patients. The BIVSS seems to be a promising tool for better understanding the complex and diverse nature of vision symptoms that are associated with brain injury.

(Optom Vis Sci 2014;91:100–00)

Pieces of the Puzzle…

- If you have one patient with a concussion, you've had one experience in concussion!
- How do we evaluate? Look at the individual as a whole or do we look purely at the visual acquistiion skills?
- Recent paper on vertical / TBI suggests that prism is the key, or is it simply one more piece of the puzzle?
- KEY – Interdisciplinary Care

UPMC – Six Subtypes

Knee Surg Sports Traumatol Arthrosc
DOI 10.1007/s00167-013-2791-6

SPORTS MEDICINE

A comprehensive, targeted approach to the clinical care of athletes following sport-related concussion

Michael W. Collins · Anthony P. Kontos · Erin Reynolds · Christopher D. Murawski · Freddie H. Fu

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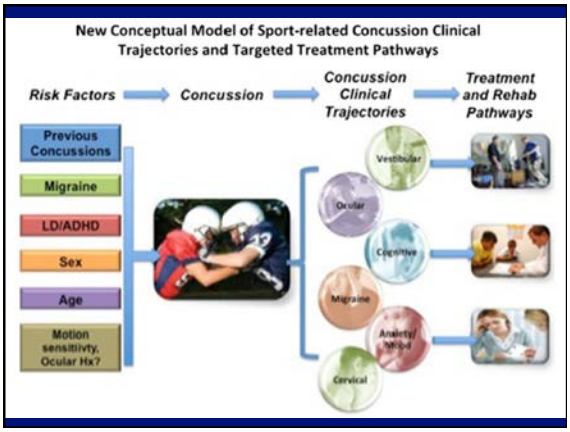
6 Trajectories of Concussion

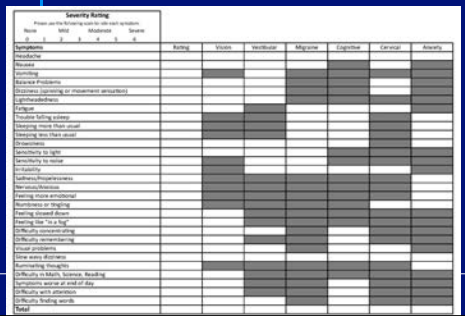
- 1 - Vestibular
- 2 - Ocular (Visual)
- 3 - Cervical
- 4 - Cognition/Fatigue
- 5 - Anxiety
- 6 - Migraine
- Isolated vs. Mixed
- Medical, Non-medical Therapy



Trajectory Evaluation/Mgmt

- Clinical Interview – from ImPact battery
  - Risk Factors
  - Symptoms
- Assessment – visual and other subtypes
- Non-Pharmaceutical Treatment Options
- Pharmacological Treatment Options
- Lifestyle Changes
  - Academic, Occupational, Play
- Reassessment and Guidance

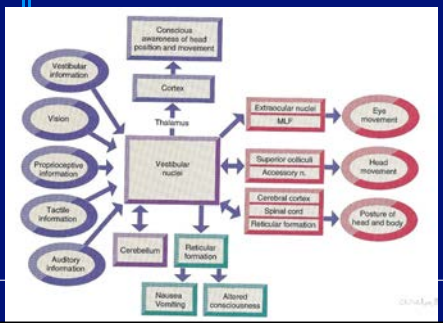
Trajectory Symptom Chart



Vestibular Trajectory

- *Arousal and Calming
- *Extensor Tone
- Cocontraction-flexion/extension
- Equilibrium Responses
- Gravitational Security
- Bilateral Coordination
- *Eye Movements
- *Stability for Visual Information Processing

What is the Vestibular System?

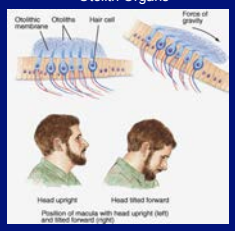


Vestibular Trajectory

- Peripheral vs. Central damage
  - Peripheral – otoliths and semi-circular canals
  - Central – NPH and INC, cerebellum
- Rotational vs. Linear stimulation vs. Combo
- Relationship to visual motion (VOR gain)
- Expose/Recover Model - 5 minute rule

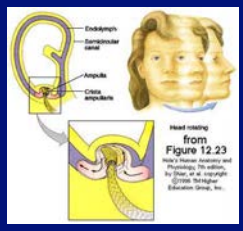
Sensors of the Inner Ear

Otolith Organs

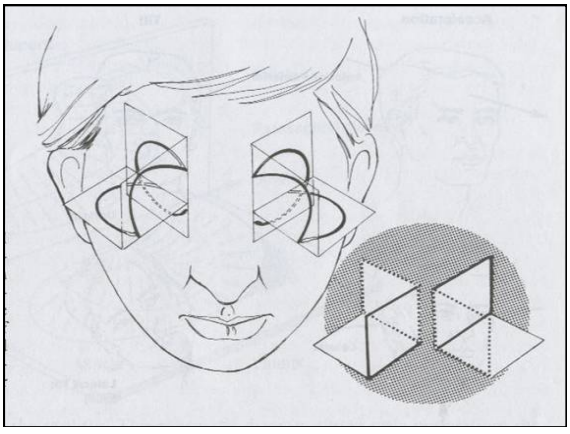


Linear Accelerometers

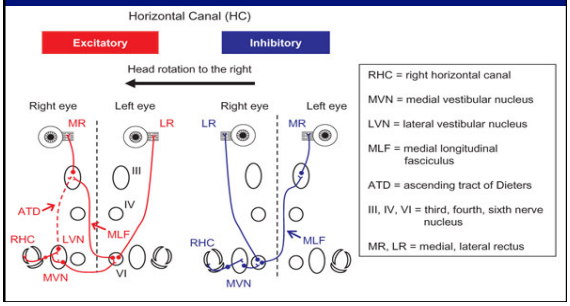
Semicircular Canals



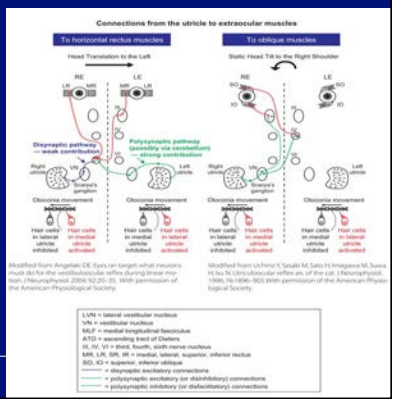
Angular Accelerometers



SCC Input to EOM's (pairs)



Otoliths - affects all EOM



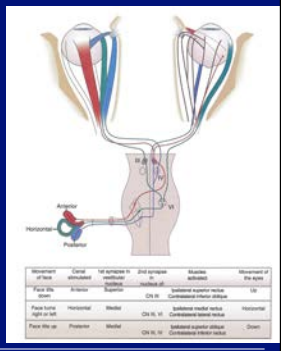
Primary Functions of the Vestibular System

- *VOR-Vestibulo-Ocular Reflex- Maintains gaze stability
  *KEY-visual and head motion
  VOR gain = 1.0, reduced in mTBI
- VCR-Vestibulo-Cervical Reflex- Maintains position of head on neck
- VSR-Vestibulo-Spinal Reflex- Maintains balance during transitions, standing, and gait

Vestibular – Key Concepts

- First system to be fully myelinated
- Important in arousal, thus critical to rehabilitation
- Related to Visual Motion Processing through VOR gain
- SCC are directly related to pairs of EOM
  - Rotational input
- Otoliths affect all EOM
  - Linear input and tilt

You cannot separate visual motion processing and vestibular input



Ocular (Visual) Trajectory

- Visual Acuity – F,N,dynamic visual acuity
- Refraction
- Ocular motor
  - VOR, pursuits, saccades, OKR
  - Gaze palsy, nystagmus
- Binocularity
  - Convergence and release
  - Diplopia – what allows fusion
- Accommodation - asymmetric

Ocular (Visual) Trajectory, contd.

- Visual Motion Sensitivity
- Photosensitivity
- Dry or wet eye – "staring"
- Visual neglect (USI), Visual field loss
- Ocular Health
- Post Trauma Vision Syndrome has no ICD 10 Code – consider Post Concussion Syndrome(F07.81)

Cervical Trajectory

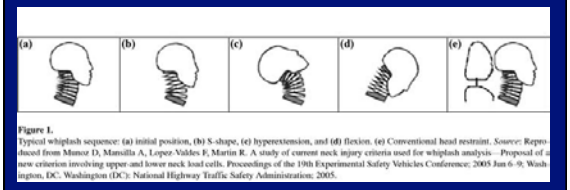


Figure 1.
Typical whiplash sequence: (a) initial position, (b) S -shape, (c) hyperextension, and (d) flexion. (e) Conventional head restraint. *Source:* Repro-duced from Munoz D, Mansilla A, Lopez-Valdes F, Martin R. A study of current neck injury criteria used for whiplash analysis – Proposal of a new criterion involving upper and lower neck load cells. Proceedings of the 19th Experimental Safety Vehicles Conference; 2005 Jun 6–9; Wash-ington, DC. Washington (DC): National Highway Traffic Safety Administration; 2005.

Cervical Trajectory

- Headaches
- Dizziness
- Loss of balance
- Nausea
- Visual disturbances
- Auditory disturbances
- Reduced cogntion
- Postural considerations

Injury Can Result In :

- Impaired nervous system communication
- Inhibited blood flow to the brain
- Reduced cerebral spinal fluid(CSF) drainage resulting in intracranial pressure
- Decreased movement can result in less vestibular input

Cervical Reflexes

- Cervico-Ocular Reflex (COR)
  - Interacts with VOR, relevant when recovering from vestibular lesions, therapy
- Cervicospinal Reflex (CSR)
  - Changes in limb postion driven by neck afferent activity, supplement VSR via tone
- Cervicocollic Reflex (CCR)
  - Stabilizes head on body with VCR

Cervical Overview

- *Part of the Visual/Vestibular/Cervical Triad
- With dizziness, cervical input can provide information stabilizing information about head movement
- Decreasing head movement to alleviate vestibular mismatches may contribute to cervical issues

Cognition/Fatigue Trajectory

- Selective Attention (Concentration)
  - Filtering and distractability
  - Central/Peripheral (x,y) and Z-axis
- Memory
  - Forgetfulness, short-term memory
- Processing Speed
  - Difficulties with multi-tasking, slower
- Fatigue
  - Visual hygiene, Lenses, Vision Rehab

Selective Attention

- Filtering and distractability
- Static vs. dynamic environment
- Sustainability and fatigue
- One step behing-mental fogginess
- Dissociated thoughts
- Treatment – compensatory vs. therapeutic
  - Visual Information Processing Skills

Memory

- Short (working) vs. Long term memory
- Related to ability to sustain attention
- Treatment – compensatory vs. therapeutic
  - Checklists/notebooks vs. active therapy
  - Time can be a cohesive factor to bring part/ whole relationships back online

Processing Speed

- Due to overall speed or ability to switch patterns of thinking?
- Difficulties with multi-tasking
- Effects of vestibular input, can document changes with any visual task (DEM/KD/ Visagraph)
- Treatment – compensatory vs. therapeutic
  - Relate to ADL's vs. simply improvement in scores

Fatigue

- General vs. Visual fatigue
- Often related to lack of vestibular input
- Visual hygiene – blinking, breaks, working distance, etc. (compensatory-hat, sunglasses)
- Lenses – appropriate plus, possible prism or binasal occlusion
- Visual Rehab – Improve visual acquisition and/or information processing skills-develop automaticity

Cognition/Fatigue Overview

- Selective Attention
- Memory
- Processing Speed
- Fatigue
- This can be a critical missing component of a rehabilitation plan

Anxiety Trajectory

- Insecure performance
- Difficulty turning off thoughts
- Visual field awareness/tunneling
  - Seeing space and relationships
- Victim vs. active participant
- Difficulty with sleep

Anxiety Treatment

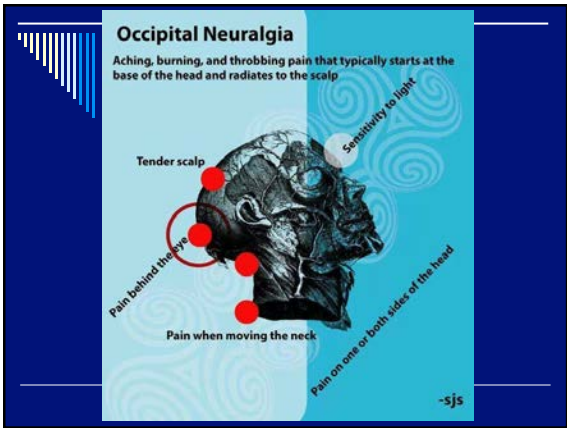
- Consultation with mental health
- Visual rehabilitation can provide many experiences for the patient to realize that they can improve and thus hope can emerge
  - Plus lens decreasing motion
  - Blinking and fixation to decrease dizziness
  - Improve VAS and VIPS
  - Linear stimulation to calm
- See Ratey – SPARK book (exercise and brain)

Migraine Trajectory

- Differentiation of headaches
- Loss of automaticity affects blood flow for neuronal firing
- Migraine subtypes
- Treatment considerations
  - Optometric Contributions

Migraine Subtypes

- Migraine with or without Aura
- Hemiplegic Migraine
- Post-traumatic Migraine
- Vestibular Migraine
- Chronic Migraine
- Perhaps Occipital Neuralgia



Medical Treatment

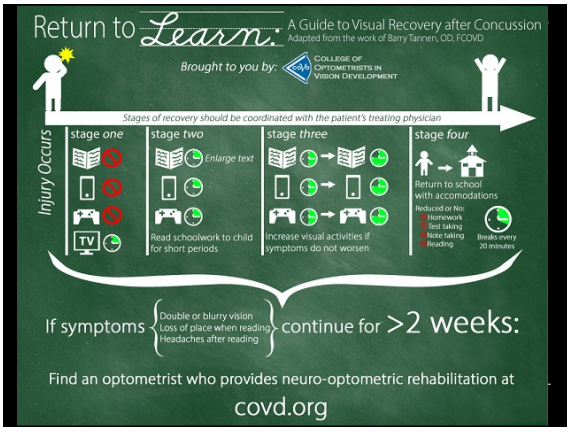
- Headache Clinics
- Pharmaceutical approaches
  - Pharmaceuticals
  - Vitamin B-2, Magnesium
  - Melatonin and inability to sleep
  - Acetaminophen and Ibuoprofen may lead to rebound effects-varied data, but often they are now being eliminated
  - Frankincense (Boswella) oil – aroma, oral

Concussion Program Overview

- Rest – Continuum
- Targeted Therapies
  - Address trajectories based on need
- Dynamic Physical Exertion Protocol
- Integration to ADL's, Return to…

Return to …

- Play – Zachary Lystedt, 40+ states
- Social
- Academic/Learning/Reading
- Work
- Driving
- Combinations – ADL's or LIFE!



Non-Pharmaceutical Treatment

- Visual Rehabilitation
- Vestibular Rehabilitation
- Motor Therapy
- Cognitive Therapy
- Psychological Counseling
- Pain/Headache Management

UPMC Dynamic Physical Exertion Protocol


UPMC SPORTS MEDICINE CONCUSSION PROGRAM GUIDELINES FOR POST-CONCUSSION REHAB

Optometric Considerations RTP

- Do you start VT/NOR week one?
- What visual skills and when?
- When do you add vestibular input?
- When do you add cognition to task?
- If HA or VMS occurs, what do you do?
- What if second impact?

Visual Testing and Treatment for Concussions When and How?

Before the Hit…

- Prior to the Sport Season
  - Baseline test at combines
    - NCAA 2010 requires it.
  - Identify at-risk to prevent future injury
  - Recent study on vision therapy preventing concussions
  - *Comprehensive Vision Exam including EOM and Vestibular should be included

Optometric Overview

- Testing with consideration of the complexity of visual pathways
- Substitution Activities, how to blink and follow with refixation
- Visual Motion Sensitivity
- Ocular-motor function
- Gaze Stabilization
- Further Treatment Tools

Dynamic Visual Acuity Test

- Best refraction in place for distance
- Rotate head 2 cycles per second horizontally
- Decrease in visual acuity of 2 lines is pathognomic for a vestibular issue, often accompanied with dizziness
- *Could be visual motion sensitivity
- *What if 1 line blurred?
- Trial low plus, cervical stimulation

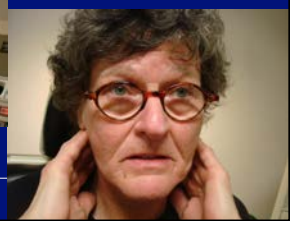
Vestibular/Motion Testing

- Disequilibrium Testing - quantify
  - "Look R and L" in exam room
  - Observe head vs. eyes
  - Watch for blinking
  - KEY – Blink and Fixate
- Optokinetic testing (motion)
- Central/Peripheral Processing – outside
- Probe effects of plus, BD, BI, binasal, tint

Visual Fixations During a Turn vs. No fixations

Driving Considerations

Low Plus and Cervical Input Can Improve Blur and Dizziness



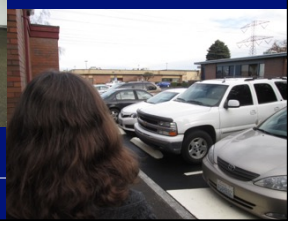
Recommend Scarves and Hoodies !

Visual Motion Hypersensitivity

- Lack of VOR/Visual Motion integration
- Shut down periphery as it bothers you
- You continue to emphasize tunneling
- If you begin to be aware of periphery, then motion is accepted, less startle response
- KEY – Look soft and easy, accept volume
- Be careful and add peripheral input during all vision therapy procedures

Small vs. Large Field OKN

Outside Testing – C/P Aspects



Discuss Central Viewing
Increase Peripheral

Visual Crowding – Optic Flow

Gaze Stabilization Exercises

- Fixed to Moving targets
- Variable distances from targets
- Simple to complex visual backgrounds
- Simple to complex surfaces during:
  - Sitting
  - Standing
  - Moving

Tracking – Gaze Stabilization

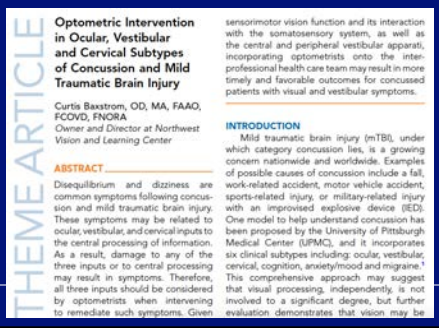
EYE EXERCISES - 4
Visuo-Vestibular: Head / Eyes Moving in Opposite Direction

Holding a single target, keep eyes fixed on target. Slowly move target up-down while moving head in opposite direction of target for _____ seconds each direction.

Perform in _____ position. Repeat _____ times per session. Do _____ sessions per day.

___ Repeat using full field stimulus _____.

Overall View of VVC Subtypes



THEME ARTICLE

Optometric Intervention in Ocular, Vestibular and Cervical Subtypes of Concussion and Mild Traumatic Brain Injury

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ABSTRACT

Disequilibrium and dizziness are common symptoms following concussion and mild traumatic brain injury. These symptoms may be related to ocular, vestibular, and cervical inputs to the central processing of information. As a result, damage to any of the three inputs or to central processing may result in symptoms. Therefore, all three inputs should be considered by optometrists when intervening to remediate such symptoms. Given sensorimotor vision function and its interaction with the somatosensory system, as well as the central and peripheral vestibular apparati, incorporating optometrists onto the inter-professional health care team may result in more timely and favorable outcomes for concussed patients with visual and vestibular symptoms.

INTRODUCTION

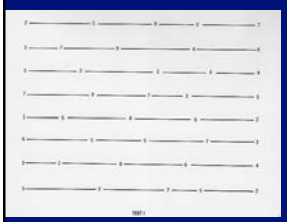
Mild traumatic brain injury (mTBI), under which category concussion lies, is a growing concern nationwide and worldwide. Examples of possible causes of concussion include a fall, work-related accident, motor vehicle accident, sports-related injury, or military-related injury with an improvised explosive device (IED). One model to help understand concussion has been proposed by the University of Pittsburgh Medical Center (UPMC), and it incorporates six clinical subtypes including: ocular, vestibular, cervical, cognition, anxiety/mood and migraine.[1] This comprehensive approach may suggest that visual processing, independently, is not involved to a significant degree, but further evaluation demonstrates that vision may be

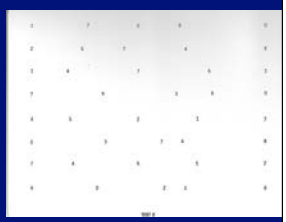
EOM Testing and Therapy

- Entrance Skills
  - Fixation
  - Pursuit, OKN
  - Saccades
  - VOR
- King-Devick (KD) – sideline test
- Developmental Eye Movement (DEM)
- VOMS – better clinical tool than KD

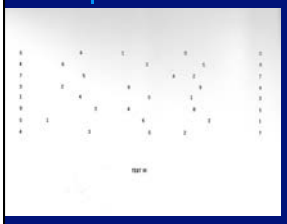
King-Devick Testing - sideline www.kingdevicktest.com

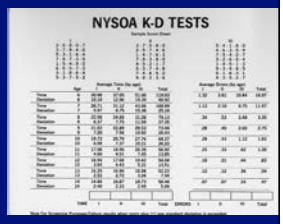
KD Test



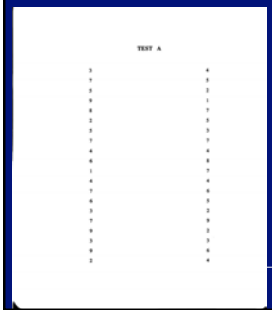


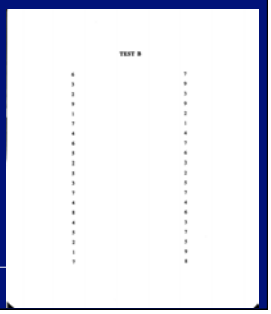
KD Test – what are you testing?





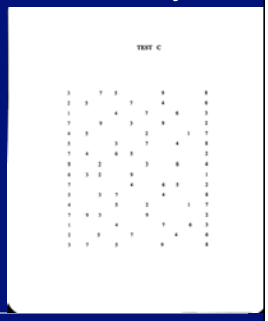
DEM Testing



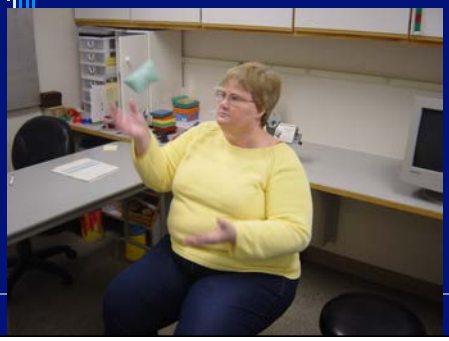


DEM Testing - What are you testing?

C divided by A + B = Ratio
Adults generally around 1.0
-Can improve by adding vestibular input
-Key-how does this improve
  processing speed
  R/L integration

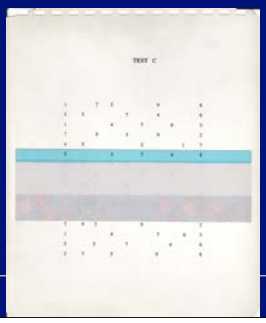


Post Concussion



Test C Pre Bean Bag Activities 107, 103 seconds

Test C Post Bean Bag Activities 42 seconds



VOMS – Clinical Test

A Brief Vestibular/Ocular Motor Screening (VOMS) Assessment to Evaluate Concussions

Preliminary Findings

Anne Mucha,* DPT, Michael W. Collins,† PhD, R.J. Elbin,‡ PhD, Joseph M. Furman,§ MD, PhD, Cara Troutman-Enseki,* DPT, Ryan M. DeWolf,† MS, ATC, Greg Marchetti,‖ PhD, and Anthony P. Kontos,†¶ PhD
Investigation performed at the University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Vestibular-Ocular-Motor Screening – VOMS vs. KD

- Smooth Pursuits
- Saccades
  - Horizontal and Vertical
- Convergence
- Vestibulo-Ocular Reflex (VOR)
  - Horizontal and Vertical
- Visual Motion Sensitivity

Oculomotor Therapy Effects in Traumatic Brain Injured Patients

Faster Rate of Improvement
Saccades 4.5X
Optokinetic 3.0X
Pursuit 2.5X

***Higher level of improvement**
***Some oculomotor subsystem transfer**
See JBO article by Ciuffreda- EOM Rehab

Further Treatment Tools

- Lenses
  - Frame, SV vs. Progressive vs. Monovision
  - Low plus (magn. increases VOR gain)
- Prism
  - Compensatory binocular, low base in
- Selective Occlusion
  - Binasal occlusion
- Tints and Filters
- Visual Rehabilitation/Vision Therapy

Lens Considerations

- Often plus is helpful due to: refraction, accommodation, motion, VOR gain, arousal/attention from motion/vestibular
- Can also increase plus or cut minus in Rx
- Bifocals may present issue, Progressives
- SV far and near may be most beneficial, also recall cervical issues

Selective Occlusion

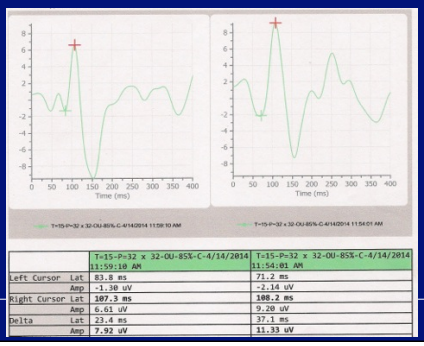
- Visual disorientation or motion hypersensitivity
- Full occlusion
- Spot patch
- Binasal/Nasal occlusion
- Pinhole glasses
- Brimmed hats

Binasal Occlusion-Motion Sensitivity

Ciuffreda KJ, Yadav NK and Ludlam DP Effect of binasal occlusion (BNO) on the visual-evoked potential (VEP) in mild traumatic brain injury (mTBI). Brain Injury 2013;27(1):41-47.

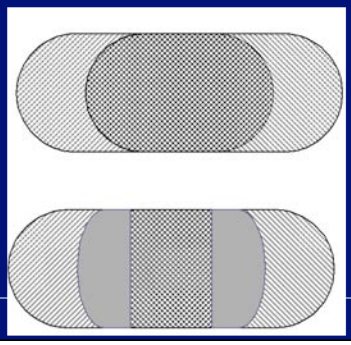
*It is speculated that mTBI attempt to suppress visual information to reduce their abnormal motion sensitivity. BNO negates the suppressive effect, thus an increase in VEP amplitude and decrease in symptoms

VEP Without and With Binasal



		T=15-P=32 x 32-OU-85%-C-4/14/2014 11:59:10 AM	T=15-P=32 x 32-OU-85%-C-4/14/2014 11:54:01 AM
Left Cursor	Lat	83.8 ms	71.2 ms
	Amp	-1.30 uV	-2.14 uV
Right Cursor	Lat	107.3 ms	108.2 ms
	Amp	6.61 uV	9.20 uV
Delta	Lat	23.4 ms	37.1 ms
	Amp	7.92 uV	11.33 uV

How Might Binasal Occlusion Work?



Motion Sensitivity – Binasal and Blinking

- Most motion sensitivity is across the horizon (width)
- Binasal if too wide is bothersome, thinner better
- Blinking also helps, but binasal with blink preferred!
- Difficulty of movement in the environment!
  - Improve peripheral awareness
- Television- Large TV worse, but farther away helps, but what about other things in visual field - z axis?

Low Base In Prism

- May decrease noise, decrease emphasis upon near space and shift outward
- Padula study – combined BI with binasal
- Ciuffreda study – separated them
  - Effect of binasal occlusion (BNO) and base in prism (BIP) on visual evoked potential in mTBI. Brain Injury 2014;28(12):1568-80
  - VEP in visual normals dropped with BNO, not in BIP

Tints and Filters

- Decrease contrast and brightness
- Wavelength Specific
- Neutral Grey
- Polaroid
- FL-41 – Corning
- Noir Filters – topaz uv shield 41 & 47 uv shield
- Blu-Tech
- NeuroLenses – eyebrainmedical.com

Visual Rehabilitation Overview

- Single vs. Multiple Trajectories
- Vestibular for arousal / calming
- Visual Guidance – Substitution
  - VOR mismatch of vision/vestibular
  - Blink, Refixate
- Vestibular Rehabilitation
- Visual Acquistion Skills
- Visual Information Skills
- Vision can affect ALL trajectories

Optometric Toolbox

- Visual Hygiene
- Lenses
- Prism
- Selective Occlusion
- Tints and Filters
- Visual Rehabilitation/Vision Therapy
  - Search – Ciuffreda, Scheiman

Optometry is a critical part of the concussion/mTBI team.

Every rehabilitation team should include an optometrist specializing in this area. This provides critical input for the patients to reach their potential in the most efficacious way.

Case Presentation 1

- 42yo, 1990 MVA, 2009 assaulted(6 yrs ago), kicked in head-unable to work
- DVAT 20/50 – 20/25 with cervical, vestibular and visual therapy
- Going back to work 2 wk prior has been having difficulty throughout the day
- Was Rx'd +75, but got +1.25 but not helping

Case Presentation 2

- 46yo, 9 mo. Prior MVA/Concussion, in PT (lower back)
- Complaints – difficulty tracking, blurred vision, dizziness, can't handle noise, minor neck pain

Concussion - MVA

- Visual Acuity 20/20 ODS, Dynamic VA-20/30
- Refraction +.25, 14B +1.50, 20 -.25/+.25, 21 +1.75/+1.50, NPC 16"/20"
- Adult DEM A-29, B-28, C 72 on 2nd attempt
- Post Bean Bag DEM C – 56 sec
- Treatment Plan
  - Central/Peripheral, Fixations, Vest. warmup
  - Bean Bag Activities
  - Gaze Stabilization

Three Week Follow-up

- Feels much better overall, processing speed up, not losing place reading, no dizziness, no blurry vision
- DVAT 20/20
- NPC 8”/12” (no tx)
- Adult DEM A-23, B-23, C-48
  - Post Bean Bag 44
- NPC still receded, to begin treatment

Summary

- Assess
- Lens
- Prism
- Selective Occlusion
- Tint, Filters
- Vision Therapy/Rehabilitation
- Communicate
- Referral considerations

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