

## **Position of Patient**

## **Support of Patient**

### **Foundational Surface**

- Tile
- Carpet
- Carpet with Pad
- Foam
- Other

### **Adjunct Tools**

- Chair
- Swings
- Balance Boards
- Rotation Boards
- Billy Board
- Walking Rails

### **Head vs. Body Rotation (VOR vs. VOR/COR)**

### **Visual Considerations**

- Eyes open – “integrative”
- Eyes closed – “drive post rotary”
- Lenses – changes in VOR gain
- Prisms – changes in VOR gain
- Occlusion – full vs. sector
- Color – syntonics, tints

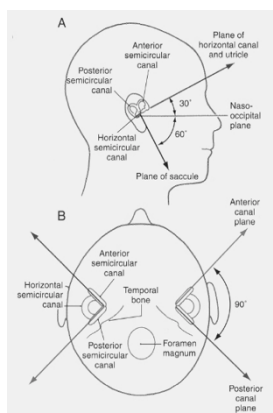
## Linear Vestibular Input

- Walking
- Heel to Toe
- Forward to Backward
- Lateral shifts
- Head position
- Eye position

## Rotational Vestibular Input

- Self vs. Non-self directed
- Supported vs. Non-supported head
- Head Position
- Number and Speed of Rotations
- Duration of rotations
- Range of rotations
- Fixations during rotations
- Repetitive effects
- Caution – Seizure Disorder

## Head Position



## Post-Rotational Demands

- Fixation maintenance
- Blinking
- Localization with hand vs. virtual point
- Finger thumb for proprioception-SMA
- Movement in space
- Lenses
- Prisms

**Effects of**  
**1-Time of Day**  
**2-Previous Activities**

**Monitoring Patient**

## **Therapeutic Applications Case Presentations**

- Traditional Medicine / Vestibular Rehab
- Occupational Therapy
- Multi-Sensory Learning Programs
- Vestibular Applications in VT

**Is there truly a  
difference between  
vestibular and visual  
rehabilitation ?**

## **Vestibular Rehabilitation Medical Model**

- Compensatory
- Substitution
- Habituation
- Medication, Surgical

## **Compensatory -Medical**

- Stop what you're doing
  - Reduce range
  - Reduce speed
- Blinking
  - Head movements
  - Ocular movements

## **Substitution**

- Proprioceptive / Kinesthetic input
  - Touch
  - Stomp foot while walking
  - Finger thumb
  - Base of support
- Visual input
  - Lens applications
  - Increase spatial input
  - Breathe

## **Finger Thumb**

- Rick Collier – article on joint / proprioception
- Frontal cortex, Supplemental Motor Area
- \*Increased Proprioception
- \*Increased Peripheral Vision
- Increased Short Term Memory
- Increased Spontaneous Speech

## Habituation

- Gaze Stabilization (VOR)
  - 20X horizontal, vertical, diagonal, rotational
  - “Keep image clear”
  - Modify range of movement, speed and reps
- Optometric Considerations
  - Look soft and see space (Where is it?)
  - Proprioceptive localization
  - Lenses

### 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 \_\_\_\_\_.

<p><b>EYE EXERCISES - 13</b> Gaze Stabilization: Standing Feet Heel-Toe “Tandem”</p>  <p>With feet in full heel-toe position keep eyes fixed on single stationary target held in hand or placed on wall _____ feet away and move head side to side for _____ seconds. Repeat while moving head up and down for _____ seconds. Repeat sequence _____ times. Do _____ sessions per day. ___ Repeat using full field stimulus _____.</p>	<p><b>EYE EXERCISES - 14</b> Gaze Stabilization: Standing Feet Apart (Compliant Surface)</p>  <p>On pillow with feet apart, keep eyes still on single stationary target held in hand or placed on wall _____ feet away and move head side to side for _____ seconds. Repeat while moving head up and down for _____ seconds. Repeat sequence _____ times. Do _____ sessions per day. ___ Repeat using full field stimulus _____.</p>
<p><b>EYE EXERCISES - 15</b> Gaze Stabilization: Standing Feet Together (Compliant Surface)</p>  <p>On pillow with feet together, keep eyes still on single stationary target held in hand or placed on wall _____ feet away and move head side to side for _____ seconds. Repeat while moving head up and down for _____ seconds. Repeat sequence _____ times. Do _____ sessions per day. ___ Repeat using full field stimulus _____.</p>	<p><b>EYE EXERCISES - 17</b> Gaze Stabilization: Marching in Place</p> <p>While marching in place on _____ surface _____ keep eyes fixed on a single stationary target placed on wall _____ feet away and move head up and down for _____ seconds. Repeat while moving head side to side for _____ seconds. Repeat sequence _____ times per session. Do _____ sessions per day. ___ Repeat using full field stimulus _____.</p> 

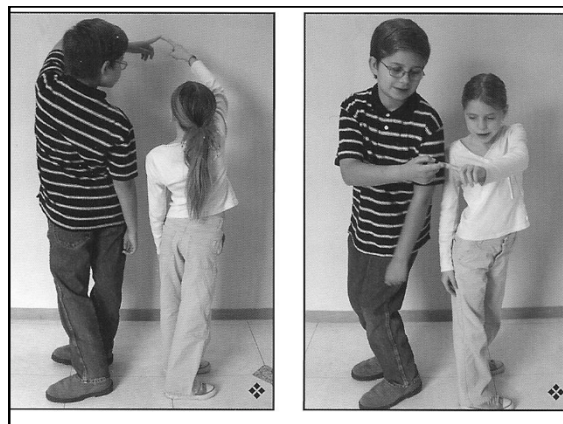
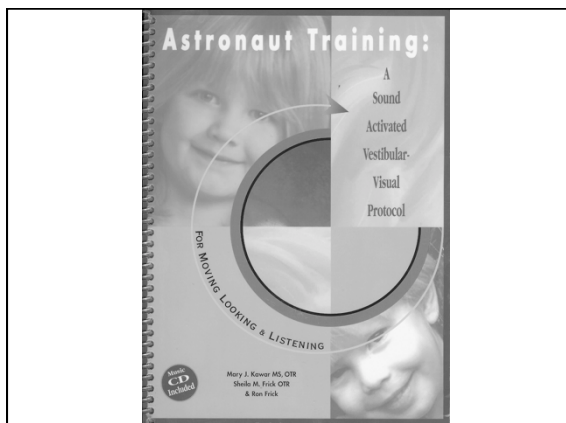
## Medication and Surgical Approaches

## OT and Sensory Integration

- Hyper kiddos need slow and steady linear
  - Large Range
- Hypo kiddos need strong and intense linear, then rotational (like eso/BIorBO?)
  - Small Range
- Rhythmic movement – music/IM ?
- Seizure considerations – Watch Rotational
- Astronaut Program – Mary Kawar,OTR

## Astronaut Program

- Prepare for linear, then rotary activities
- Linear Activation
- Eye Movement Wrap-Up
- Rotary Activation



## OD Considerations in SI

- Fixation maintenance
- Ocular motor apraxia (prop., tools, etc)
- Binocular stability – R/B activity
- Range of movement in paresis
- Effects of low plus and BI prism on ambient process and VOR gain

## Multi-Sensory Learning Programs

- Sensory Learning Institute
- Sensory Integration Research and Rehabilitation Institute (SIRRI)
- The Sensory Center

## Multi-Sensory Learning Programs

- Slow Vestibular Input
- Auditory Integration Therapy (AIT)
- Colored Light Therapy (syntonics)

## Vestibular Applications in Vision Therapy

**What does not include some form of vestibular input ?**

## **Overall Applications**

- Arousal / Attention / Organization / Processing Speed
- Ocular Motor Function
- Binocularity
- Nystagmus
- Unilateral Spatial Inattention

## **Arousal, Attention and Modulation**

- Basic Activities
  - Turn and Touch
  - Turn and Clap
  - Turn and Catch
  - Four Corners (Belgau later)
- Modulatory effects

## **Therapy Applications**

- Increase attention and arousal, for fatigue
- Lenses – Sphere vs. Prism
- Developmentally delayed child
- Autism
- CVI or Functionally visually impaired
- Traumatic brain injury
- Infinity Walk [www.infinitywalk.com](http://www.infinitywalk.com)

**Why is Movement often the Key to Learning ?**

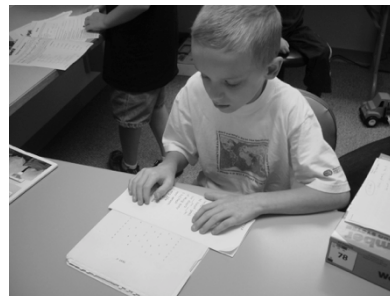
## **Vestibular Input Applied to Eye Movement Activities**

- Performance on the DEM, others
- Reading performance
- Processing speed – Minute Math
- Saccadic intrusions crossing midline
- Range of movement for paresis

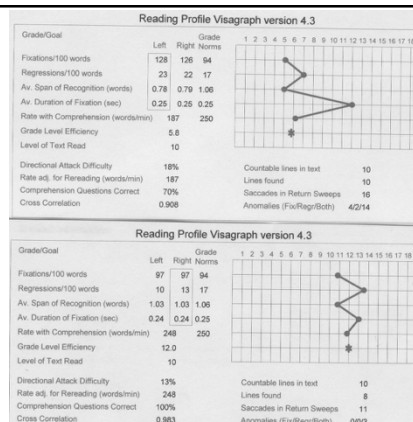
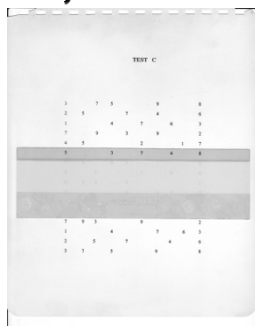
## Belgau Activities

- Choose assessment tool (DEM, Michigan Tracking, Oral Reading, Visagraph, etc.)
- Bean Bag 20X, Head only
- Bean Bag 20X, Eyes only
- Recheck findings, scores plus behavioral observations
- \*Modify bean bag activities as you wish
- [www.balmetrics.com](http://www.balmetrics.com)

## Test C Pre 52, 54 seconds Post 42 seconds



## Test C Pre Belgau Activities 107, 103 seconds



## How Might the Patient Benefit?

- Increased arousal / attention
- Increased modulation / filtering
- Increased processing speed
- Increased bilateral processing
  - Timing of motor
  - Language / Comprehension
- Cerebellar subsystem transfer

## Does it Always Work ?

- Increase Dizziness, Vertigo ?
- Processing Speed Too Fast
  - Lack reading experience
- Overwhelmed and can't recall word
  - Watch for Limbic Response
- Others

### **What Should You Do ?**

- Calm Condition Down, Continue ?
- Lower Demands of Task
- Decrease Speed, Range, Repetitions
- Easier Reading Material
- Add Support from motor, visual
- Others

### **Studies on Belgau Activities**

- University Heights Elementary
- Schools for the 21<sup>st</sup> Century Project
- Lakota Junior High – COVID

### **Saccadic Intrusions**

### **EOM Range of Movement**

- Causes-R/O Restriction, Muscle Weakness
- Paresis / Palsy
  - Differentiate with doll's eye
  - Is several enough vs. post rotary effects ?
- Ron, et.al. study on subsystem transfer
  - Pursuit, Saccade, VOR, OKN
- Infantile esotropia – abduction deficit

### **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

**Can the ocularmotor subsystem transfer study be used in the case of EOM paresis /palsy ?**



**What can one do to improve a  
paresis / palsy of EOM ?**

**To treat or not to treat.....  
that is the question!**

### **Treatment Considerations**

- Pursuits
- Saccades, Margolis Eye Throwing
- Optokinetic Nystagmus Drum or Cloth
- Vestibular Input
  - Doll's Eye
  - Post Rotational
- Document via Vision Disk
  - Monocular
  - Binocular

### **AI Transfer, RG Vectos**

- After Image Transfer
- R/G Anaglyph, Tranaglyph
  - Jump Recoveries
- Work to limits of capability
- Continued Eye Throwing and Post Rotary Vestibular Input
- Now is 5 months out, 35-40 degrees monoc, 20 degrees binocular to R, Working again

### **Infantile Esotropia**

- Abduction deficit
- Cross Fixation
- IOOA
- DVD
- Latent Nystagmus
- Brodsky – multiple papers

**6.5 mo old-bilateral  
abduction palsy  
saw a Cranial Osteopath  
The next day...**

### **Infantile Esotropia**

- Binasal to break cross fixation
  - Allows alternate fixation laterally, work all types of EOM movements (pursuits, saccades, VOR, OKN)
  - Watch target (TV,mirror,etc.) and rotate on chair
  - Post rotary fixations laterally
- Cranial Osteopathy
- Down Syndrome – Accommodative Esotropia ?

## Gaze Palsy

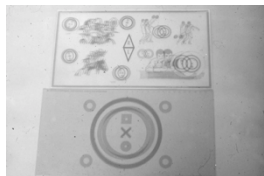
- Generally gaze and body is to one side
- Where is lesion ?
- Doll's eye testing
  - Simple vs. Repeated input
- Rotations should be to where you want the patient to go
- Possible effects of opposite direction

## Binocularity

- Suppression
- Phoria findings
- Duction findings
- How do you explain the effects ?

## Probes to Use

- Brock String
- R/G Anaglyph, Tranalglyph
- Polaroid Vectograms



**How long after TBI or CVA should one instigate therapy ?**

**How do you know benefits aren't just simply decreased swelling or inflammation ?**

## Changes in Binocularity

- Decrease H, V and torsional components
  - \*Increase ranges on BO/BI findings
  - \*Decrease suppression using R/G, beads and string
  - Key is ADDING Vestibular Input to your already efficacious therapy routines
- “Visual-Vestibular Therapy”

### Why Might These Improve ?

- Increase Arousal
- Improve Overall Bilaterality
- Equalize Tone to All EOM
- Others

### Strabismus

- Changes in binocularity
- Vergence Adaptation
- Developmental vs. Acquired
- Examples
  - Intermittent Esotropia
  - Arnold Chiari malformation
  - Multiple aneurysm, BS CVA, INO likely
  - Infantile esotropia

### Arnold Chiari Malformation

### Visual Findings of 5 Month FU

- Eccentric Circles maintenance therapy has been done somewhat inconsistently
- Refractive Status R  $-0.25$ , L  $-0.75$
- Good reserves in accommodation and convergence
- Saccades within normal as measured by DEM
- Visual hygiene and near plus was discussed

### Convergence Spasm

### Nystagmus Treatment

- Null point
- Contact lenses ?
- Convergence may override (far/near)
- Afterimage transfer
- Vestibular input

### **Visual Neglect (aka Unilateral Spatial Inattention)**

- Commonly found left side following stroke
- Draw a Clock, Dual Extinction, Line Bisection
- Treatment generally directed at looking into affected field
- Prism applications
- Vestibular input
  - Rotational
  - Temperature

### **Summary**

- Vestibular system is the **FIRST** to emerge !
- Early ocular alignment is vestibularly driven !
- The visual and vestibular systems are reciprocally interwoven !
- The vestibular system can be used to supplement vision therapy.
- But most importantly, it can help to benefit the outcomes of our patients!

**What does the future hold ?**

**The journey, not the destination,  
is a source of wonder.**

**-Loreena McKennitt**

### **RESOURCES**

- Astronaut Training  
Kawar
- Eye Movement Disorders  
Wong
- The Neurology of Eye Movements  
Leigh/Zee
- Vestibular Rehabilitation  
Susan Herdman

**Thank You !**