Understanding Neurologic Physical Therapy and Neurotology

Heather Campbell, PT, MA
South Valley Physical Therapy
303-861-0057
heather@southvalleypt.net

Melissa Winthers, Esq.
Fleishman & Shapiro P.C.
303-861-1000
mwinthers@colorado-law.net
Often overlooked symptoms of brain injury

- Feeling like your body is not attached to you
- Brain isn’t processing where you are in three dimensional space
- Dizziness
- Imbalance
- Motion hypersensitivity
- Visual motion hypersensitivity
- Vertigo
- Nausea
- Headaches
- Fatigue
- Visually dependent
Postural Control System

HOW DO THESE WORK TOGETHER SO THAT WE KNOW WHERE WE ARE IN SPACE?

WHAT HAPPENS WHEN THEY AREN’T WORKING TOGETHER?
Balance Components

• Vestibular system
  inner ear tells us about rotational movement, linear acceleration, and gravity

• Vision system
  we rely on visual reference as to where we are relative to horizon and objects around us

• Somatosensory system
  joint, muscle and ligament sensors for movement, pressure and tension
The inner ear is in the head!
The Inner Ear
Because every brain is unique, each recovery is different

- Adaptation to changes in the balance system: how and at what cost
- Is the adaptation efficient and successful?
- “Pre-existing” and “Co-existing” Conditions
  - History of migraine
  - Anxiety or temperament
  - Concussion or neck injury
  - Visual or hearing impairment
  - Metabolic or vascular issues
What is Neurotology?
Sample of Tests

- Positional testing
- **VNG** video nystagmography
- **ENG** electronystagmography
- **VEMP** vestibular evoked myogenic potential
- **ECOG** electrocochleography
- **ABR** auditory brainstem potential
- **MRI** or **CT Scan**
What is Neurologic Physical Therapy?
Sample of Tests

• **Gaze stability** (VOR)
  Coordination of eye motion with head motion

• **Head orientation** (JPE and kinesthetic sense)
  Accurate use of neck with inner ears

• **Perception gravity vector**
  Stacking body weight over feet

• **Visual dependence**
  Reliance on vision during balance challenges

• **Vestibular function**
  Without vision or reliable surface
The Recovery Process

• Identify missing piece(s)

• Identify system errors or lack of integration

• Identify contributing factors
The Recovery Process

• Direct repair
  BPPV, ROM, strength, sensation, Hydrops, vision, pain management, sleep

• Recalibration
  sensory re-weighting of balance systems
  postural responses

• Management of sensory input
  schedule activity and rest, repetition of normal
TBI Rehabilitation Team
potential members

- Patient and family
- Primary care physician
- Physical therapist (neurologic/vestibular specialty)
- Neurotologist
- Neuro-optometrist
- Neuropsychologist
- Occupational therapist
- Teachers and school administrators
- Counselor