

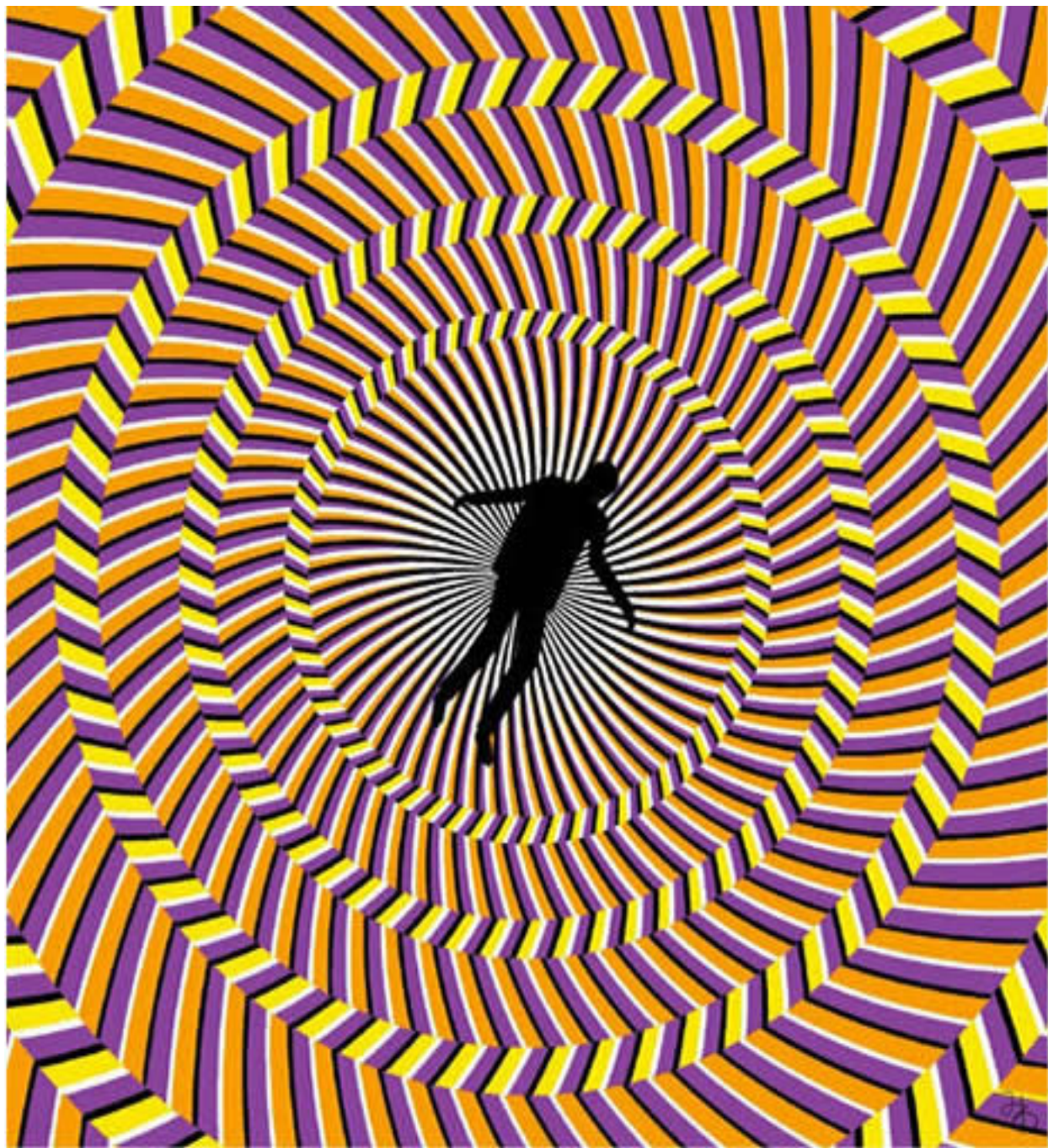
# Understanding Neurologic Physical Therapy and Neurotology

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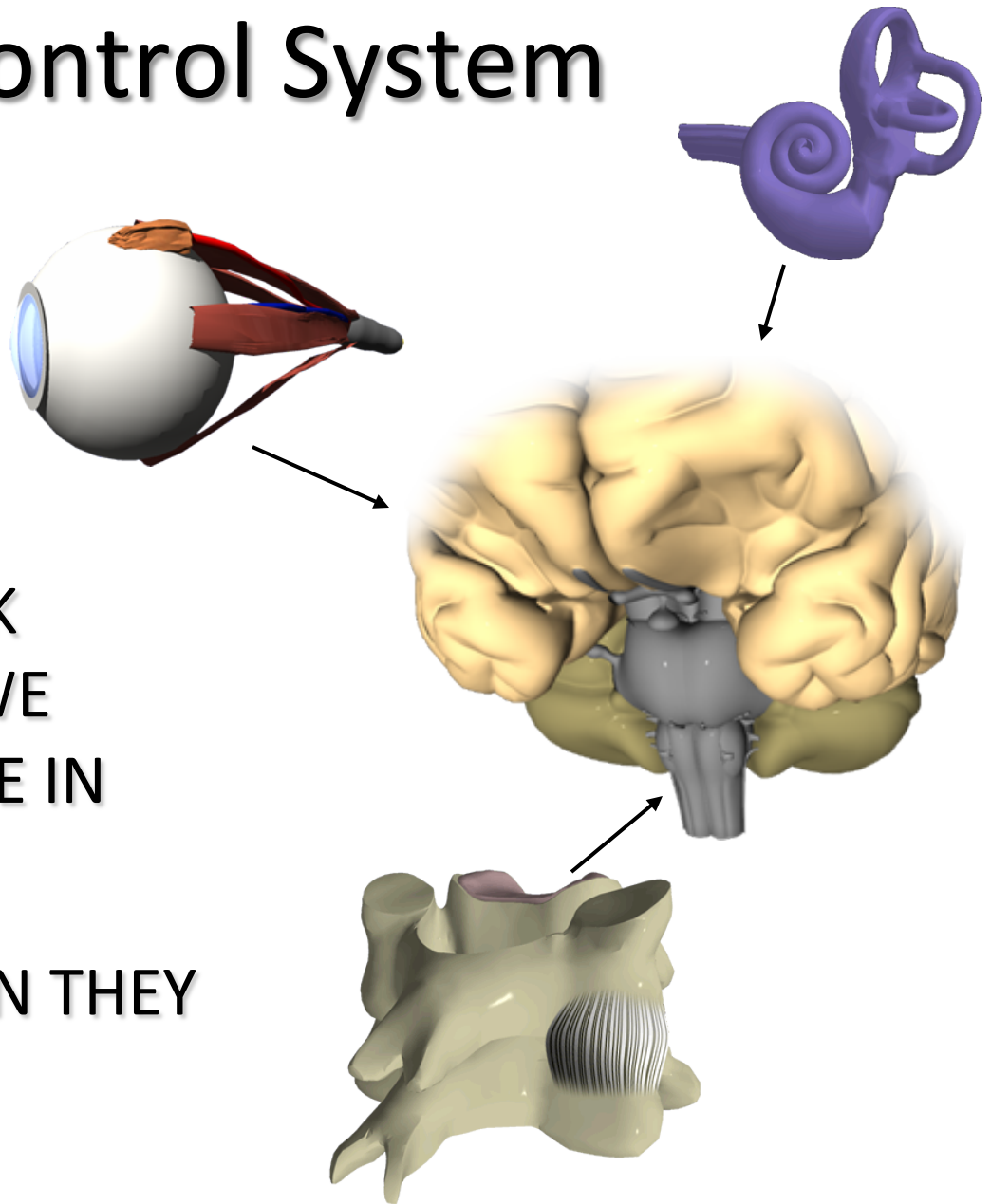
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# Often overlooked symptoms of brain injury

- 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

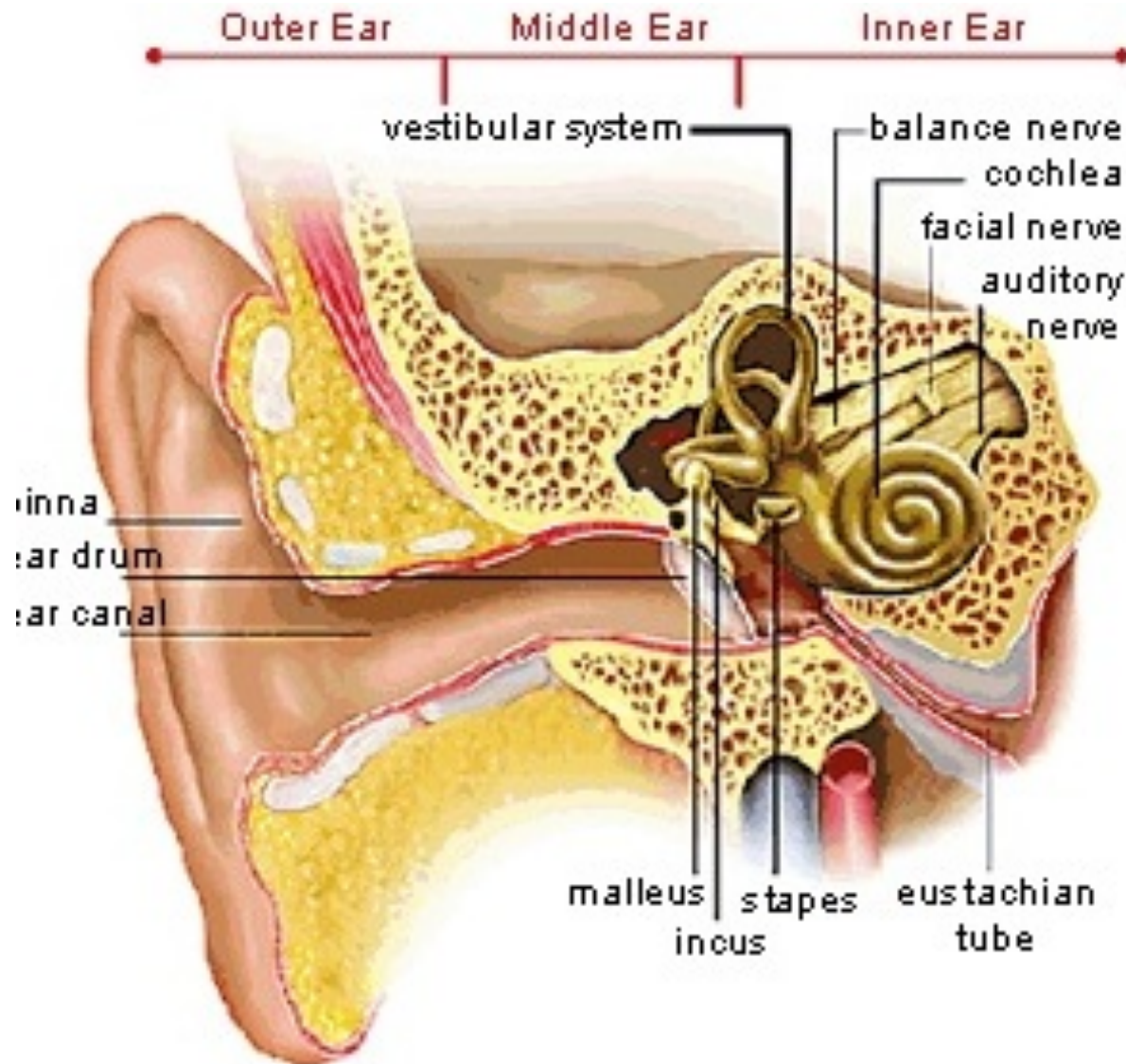




# The inner ear is in the head!



# The Inner Ear



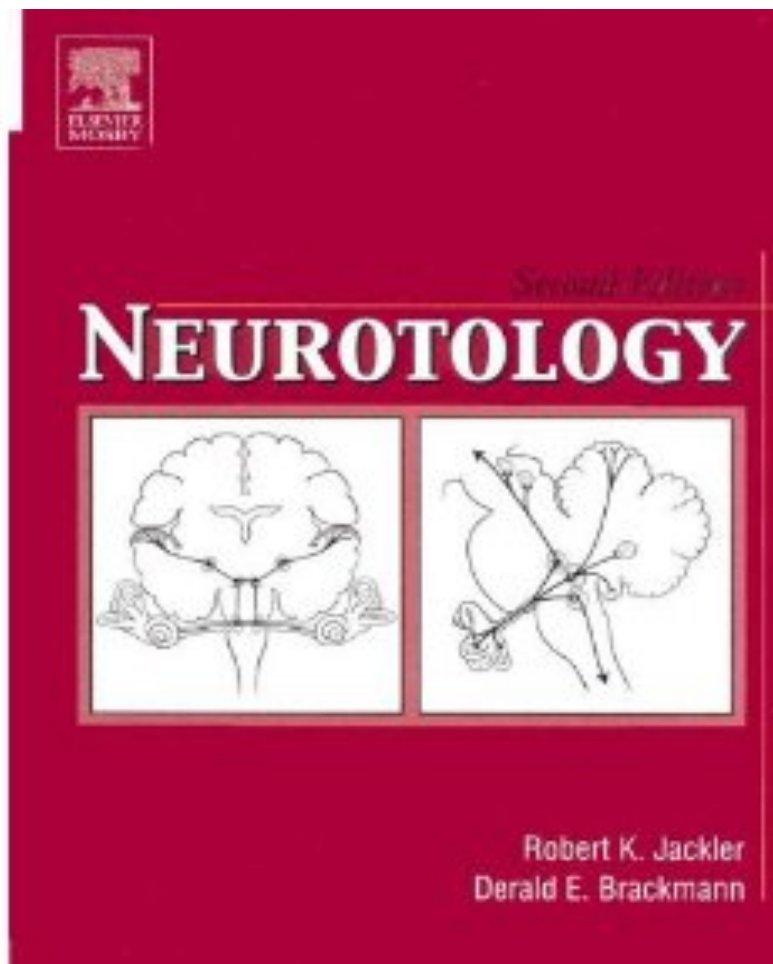
# Because every brain is unique each recovery is different

- 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

