CONCUSSION MANAGEMENT & VESTIBULAR THERAPY

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A LITTLE BIT ABOUT ME

- Grew up in Bismarck, ND
- Graduated from the University of Mary in 2003
- Obtained my Certificate of Competency in Vestibular rehabilitation via APTA and Emory University in March of 2013
- Obtained Certified Exercise Expert for the Aging Adult through the Geriatric Section of the APTA, July 2017.
- Recent Geriatric Clinical Specialist in June 2018
- V2FIT certified in Concussion Health (Visual Vestibular Functional Integration)-August 2019

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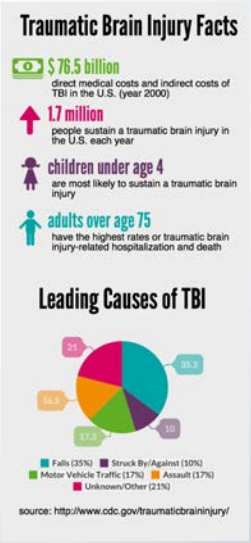
GET THE FACTS:

- Traumatic brain injury (TBI) is a major cause of death and disability in the United States.
- From 2006 to 2014, the number of TBI-related emergency department visits, hospitalizations, and deaths increased by 53%.
- In 2014, an average of 155 people in the United States died each day from injuries that include a TBI.[1]
- Those who survive a TBI can face effects that last a few days, or the rest of their lives. Effects of TBI can include impairments related to thinking or memory, movement, sensation (e.g., vision or hearing), or emotional functioning (e.g., personality changes, depression).
  - These issues not only affect individuals but also can have lasting effects on families and communities.



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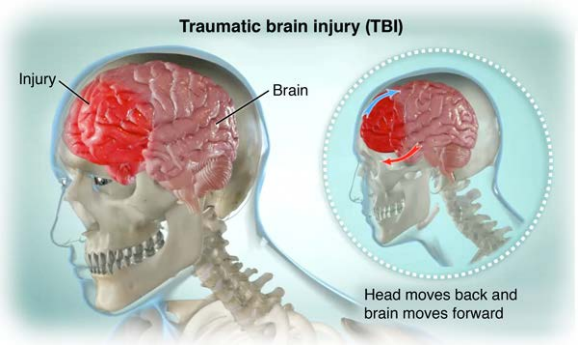
WHAT IS TBI?

- A TBI is caused by a bump, blow, or jolt to the head that disrupts the normal function of the brain.
  - Not all blows or jolts to the head result in a TBI.
  - The severity of a TBI may range from **"mild"** (i.e., a brief change in mental status or consciousness) to **"severe"** (i.e., an extended period of unconsciousness or memory loss after the injury).
  - Most TBIs that occur each year are mild, commonly called **concussions**.



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HOW BIG IS THE PROBLEM?

- In 2014,[1] about 2.87 million TBI-related emergency department (ED) visits, hospitalizations, and deaths occurred in the United States, including over 837,000 of these health events among children.
  - TBI contributed to the deaths of 56,800 people, including 2,529 deaths among children.
  - TBI was diagnosed in approximately 288,000 hospitalizations, including over 23,000 among children. These consisted of TBI alone or TBI in combination with other injuries.
- In 2014, an estimated 812,000 children (age 17 or younger) were treated in U.S. EDs for concussion or TBI, alone or in combination with other injuries.[1]
- Over the span of eight years (2006–2014), while age-adjusted rates of TBI-related ED visits increased by 54%, hospitalization rates decreased by 8% and death rates decreased by 6%.[1]

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WHAT ARE THE LEADING CAUSES OF TBI?

- In 2014,[1] falls were the leading cause of TBI. Falls accounted for almost half (48%) of all TBI-related emergency department visits. Falls disproportionately affect children and older adults:
  - Almost half (49%) of TBI-related ED visits among children 0 to 17 years were caused by falls.
  - Four in five (81%) TBI-related ED visits in older adults aged 65 years and older were caused by falls
- Being struck by or against an object was the second leading cause of TBI-related ED visits, accounting for about 17% of all TBI-related ED visits in the United States in 2014.
- Over 1 in 4 (28%) TBI-related ED visits in children less than 17 years of age or less were caused by being struck by or against an object.
- Falls and motor vehicle crashes were the first and second leading causes of all TBI-related hospitalizations (52% and 20%, respectively).
- Intentional self-harm was the first leading cause of TBI-related deaths (33%) in 2014.

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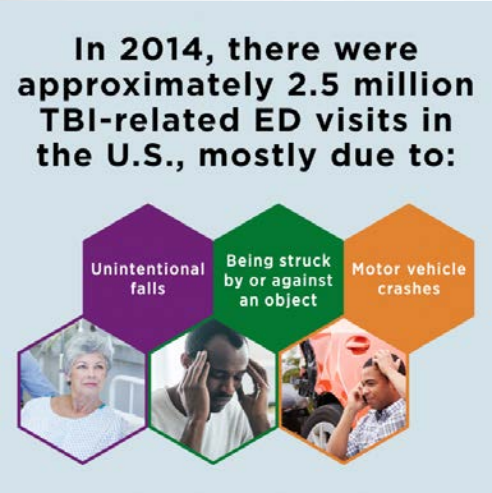
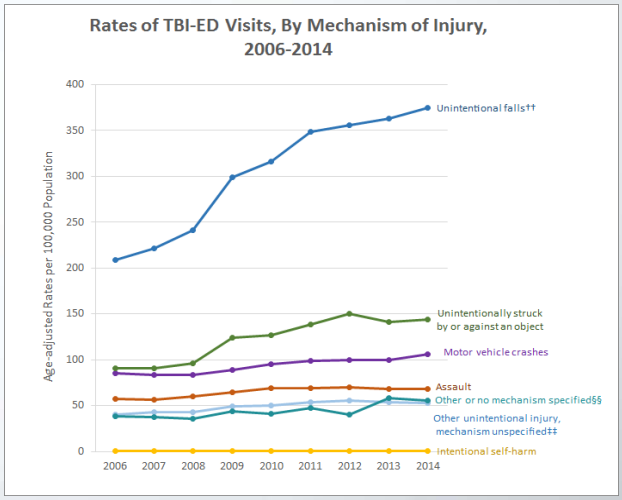
QUICK STATISTICS





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RISK FACTORS FOR TBI

- Among TBI-related deaths in 2014:
  - Rates were highest for persons 75 years of age and older.
  - The leading cause of TBI-related death varied by age:
    - Falls were the leading cause of death for persons 65 years of age or older.
    - Intentional self-harm was the leading cause of death for persons 45-64 years of age.
    - Motor vehicle crashes were the leading cause of death for persons 15-24, 25-34, and older adults aged ≥75 years.
    - Homicide was the leading cause of death for children ages 0-4 years.

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RISK FACTORS FOR TBI

- Among TBI-related ED visits and hospitalizations in 2014:[1]
  - Hospitalization rates were highest among persons 75 years of age and older.
  - Rates of ED visits were highest for persons 75 years of age and older and children 0-4 years of age.
  - The leading cause of TBI-related ED visits varied by age:
    - Falls were the leading cause of ED visits among young children aged 0 to 4 years and older adults 65 years and older.
    - Being struck by or against an object was highest among those 5 to 14 years of age.
- The leading cause of TBI-related hospitalizations varied by age:
  - Falls were the leading cause of hospitalizations among children 0 to 17 years and adults 55 years of age and older.
  - Motor vehicle crashes were the leading cause of hospitalizations for adolescents and adults aged 15 to 44 years of age.

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WHAT IS VESTIBULAR REHABILITATION?

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- **Vestibular rehabilitation** is a specialized form of **therapy** designed to reduce dizziness, headaches and imbalance. It involves an individualized problem-oriented approach to promote compensation and brain adaptation.
  - Typically completed by a specially trained physical therapist.

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WHAT IS THE VESTIBULAR SYSTEM & HOW IS IT IMPACTED IN CONCUSSION/M-TBI?

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- The **vestibular system** is a sensory system in the inner ear that contributes to our balance and spatial orientation.
- It consists of two main components, the semi-circular canals and the otolith organs.
  - The semi-circular canals detect rotation of the head such as nodding your head “yes” or shaking your head “no.”
  - The otolith organs are more sensitive to gravity and detect linear acceleration of the head such as moving forward in a car or up in an elevator.
  - We have some important visual-vestibular reflexes that help coordinate our eye movements with our head movements.
    - The vestibular-ocular reflex which helps stabilize an image on the retina during head movements.
    - The optokinetic reflex which allows us to follow a moving object.
      - After a concussion, m-TBI, changes in brain processing and vestibular system function impact these reflexes.

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STRUCTURES OF THE INNER EAR

- Semicircular Canals
- Otolith Organs
  - Utricle
  - Saccule
- Vestibular Ocular Reflex (VOR)
- Optokinetic Reflex

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CAN TRAUMA CAUSE DAMAGE TO THE VESTIBULAR SYSTEM/INNER EAR?

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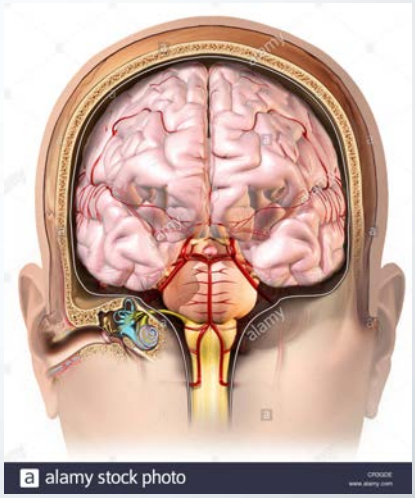
- The brain and vestibular (balance) system can both be damaged with head trauma.
  - Concussion
  - mTBI



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TRAUMA TO THE INNER EAR

- A direct or indirect blow to the head can: – Damage the inner ear in several ways.
  - Damage nerve, crystals, membrane, fluids.
  - Affect how the vestibular system and brain work together as a team.
    - • e.g. trying to figure out what is moving (you or the TV)

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DOES IT MATTER IF MY VESTIBULAR/BALANCE SYSTEM IS AFFECTED?

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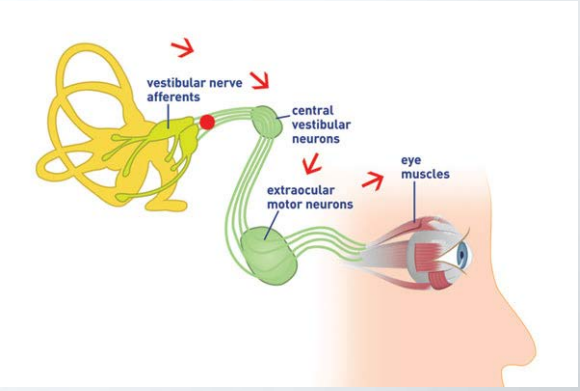
MERCEDES-BENZ COMMERCIAL: "MAGIC BODY" CONTROL

- YYYEEESSS!!!
- This video is a great and funny way to show us the important connection between our inner ear and our vision!!
- LET'S TAKE A PEEK!!
  - https://youtu.be/nLwML2PagbY



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THE VESTIBULAR SYSTEM IS ALWAYS "WORKING" EVEN WHEN WE AREN'T THINKING ABOUT IT!

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- The vestibular system is difficult to appreciate until you lose its function!!
  - Keeps things around you stable
  - Helps us with our overall sense of balance
  - Keeps the world clear (stable vision)
  - Helps in conflicting situations:
    - e.g. When you are sitting on a train and one train moves while another stays still, it helps you decide if it's your train that is in motion.
  - Tells us that we are moving in space
    - e.g. plane taking off

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WHAT WILL I FEEL IF I SUSTAIN TRAUMA TO MY INNER EAR?

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- Vestibular symptoms
  - Dizziness
  - Vertigo (feeling of spinning)
  - Nausea
  - Imbalance or falls
  - Blurred vision
  - Hearing loss/noises in ear
    - Typically sudden in nature
    - May return, May remain permanent or even somewhere in between.

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HOW CAN A PHYSICAL THERAPIST HELP?

- The best treatment for symptoms of a concussion starts with an assessment of vestibular function by a specially-trained physical therapist .
- Evaluation includes **vision** and **balance** testing to determine how the brain interprets movement of the body, head and environment.
- Following the evaluation, the therapist will work collaboratively with you to determine the best course of action to help you patient return to your normal level of function at work, school or competitive sport

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PHYSICAL THERAPY TREATMENT

- Depending on the cause of your dizziness, treatment may include:
  - Vestibular Rehabilitation Therapy (VRT)
  - Hands on treatment (to treat your neck or body movement)
  - Coping strategies
  - Education and fall prevention

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PHYSICAL THERAPY TREATMENT

- VRT will likely be based on your personal goals and be customized to your needs!
- Rehab may include:
  - Eye exercises
  - Balance/walking exercises
  - Exercises for motion sensitivity
  - Exercises specific to your sports or work
  - Assistance planning a “Graduated Return” to school, work, sports, other activities
  - Information on diet, exercise, sleep, trigger prevention

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IN SUMMARY

- Concussion is a brain injury
- Trauma can cause vestibular dysfunction
- If you have prolonged symptoms after concussion, speak to your healthcare providers for assessment and treatment
- Dizziness, vertigo (spinning), blurred vision, imbalance or falls are symptoms you may experience.

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- American Academy of Neurology, Sports Concussion Resources: https://www.aan.com/concussion
- https://youtu.be/pLwML2PaphY (Mercedes-Benz commercial)
- www.alamy.com (photos utilized throughout presentation)

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QUESTIONS

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