Tom McNalley, MD

Medical perspectives on disability

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- No financial interests

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Objectives

- Describe the relationship between participation, activity and body functions/structure
- Describe major functions of the primary body systems
- List common disruptions of the body system.
- Discuss the most common disabling conditions in the U.S.

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What do you want to do in your life?

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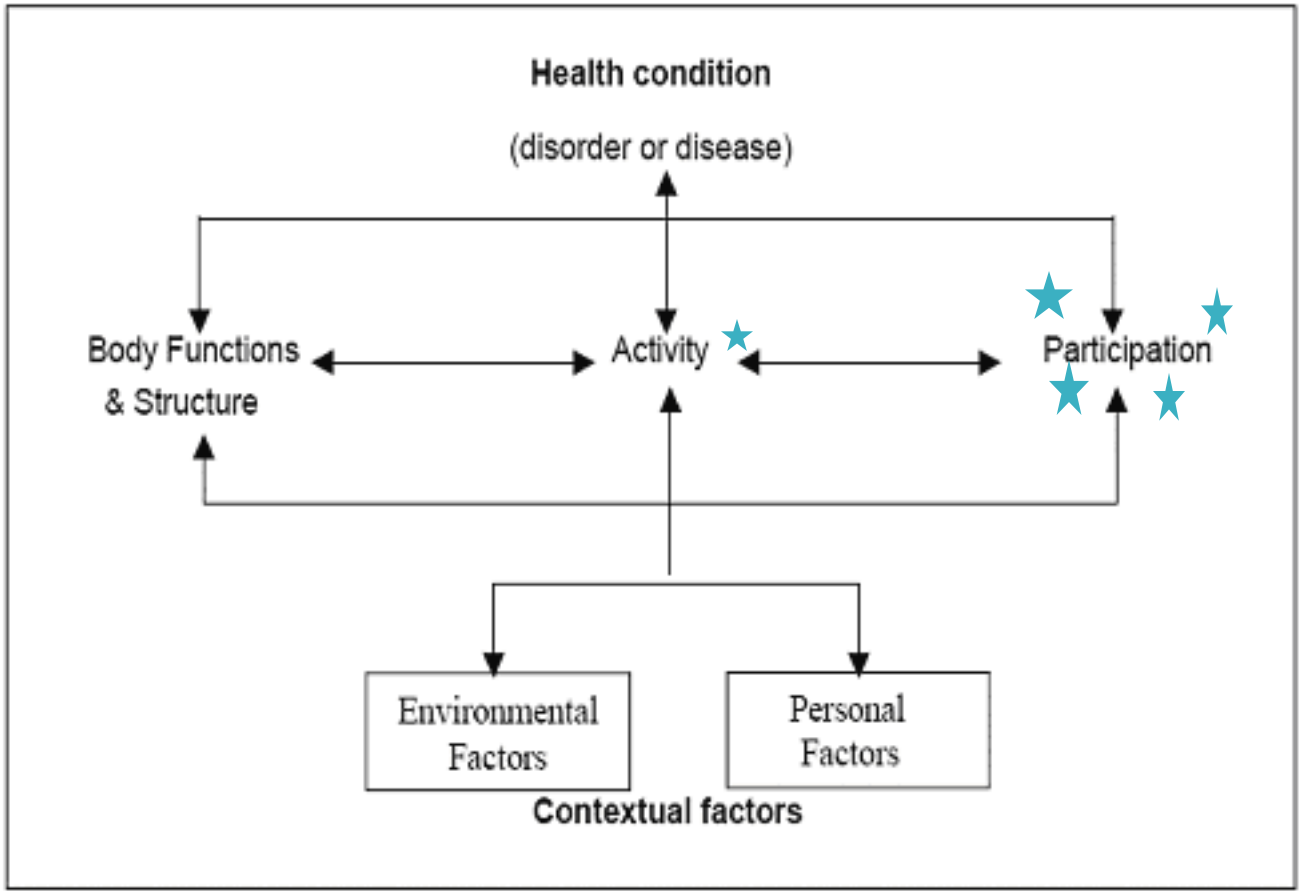
Impairment, disability and society: International Classification of Function (ICF)



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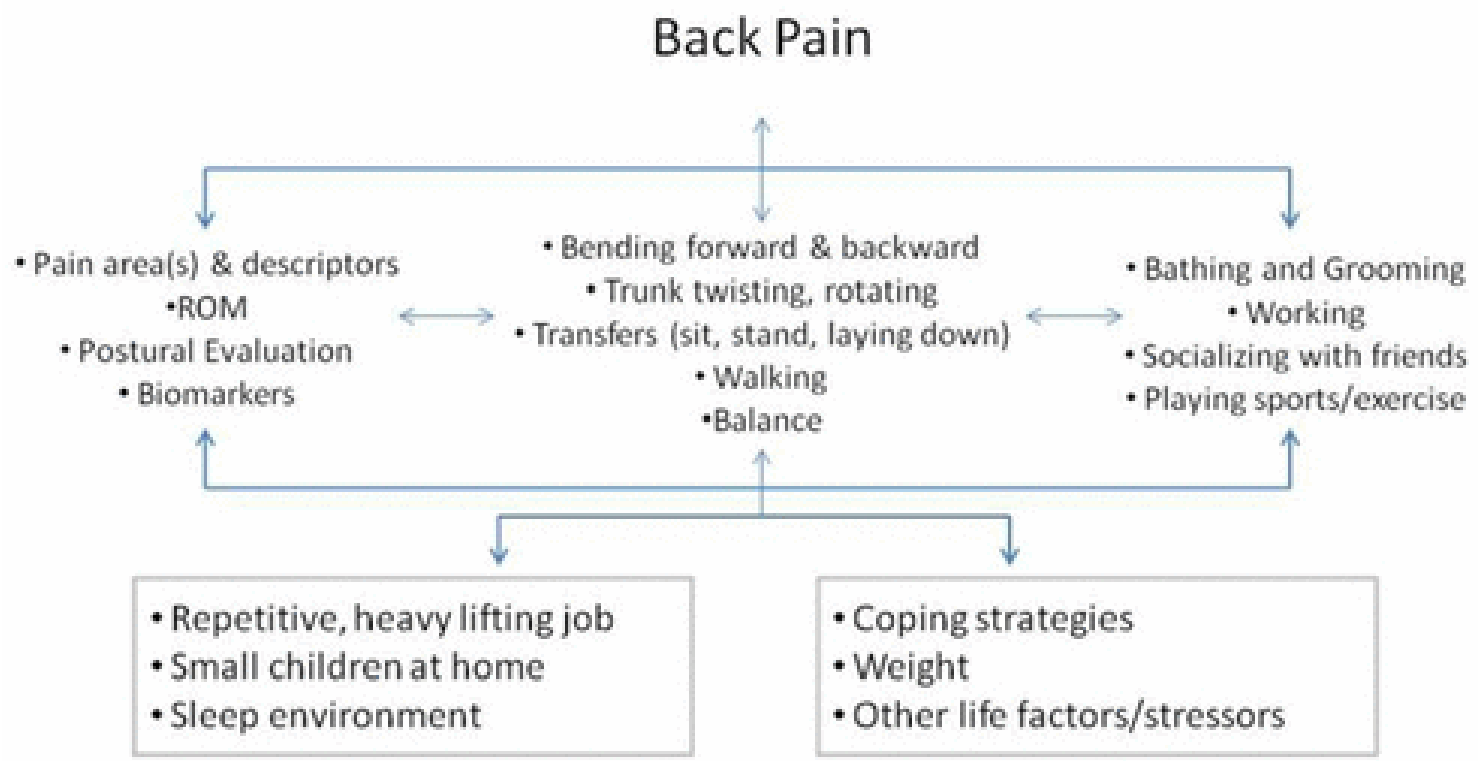
ICF: Back pain as example



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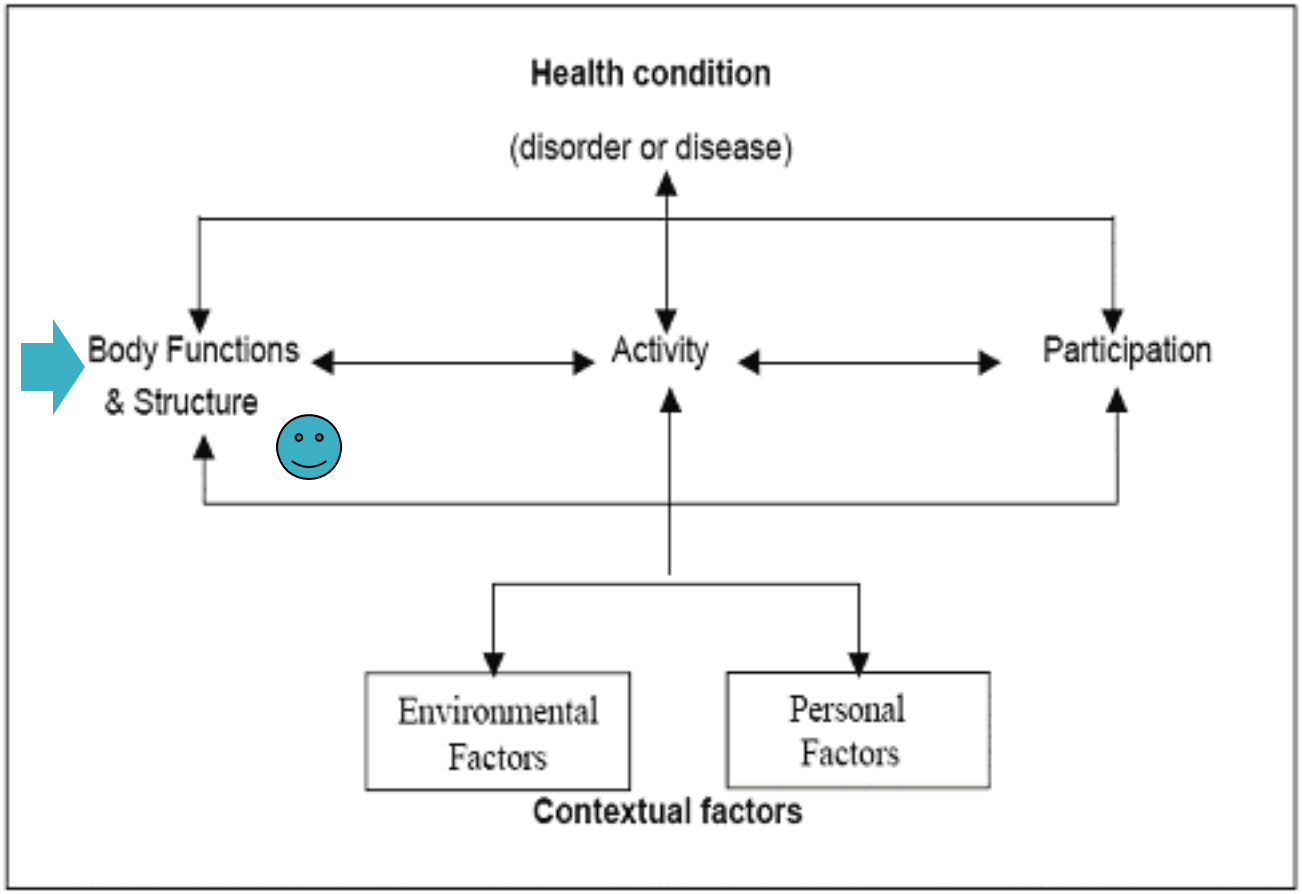
Impairment, disability and society: International Classification of Function (ICF)



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How many body systems can you name?

- Skin
- Respiratory
- Cardiovascular
- Gastrointestinal
- Endocrine
- Genitourinary
- Musculoskeletal
- Neurologic
- Lymphatic
- Psychiatric

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Focus for today

- Skin
- Respiratory
- Cardiovascular
- Gastrointestinal
- ***Endocrine***
- Genitourinary
- ***Musculoskeletal***
- ***Neurologic***
- Lymphatic
- Psychiatric

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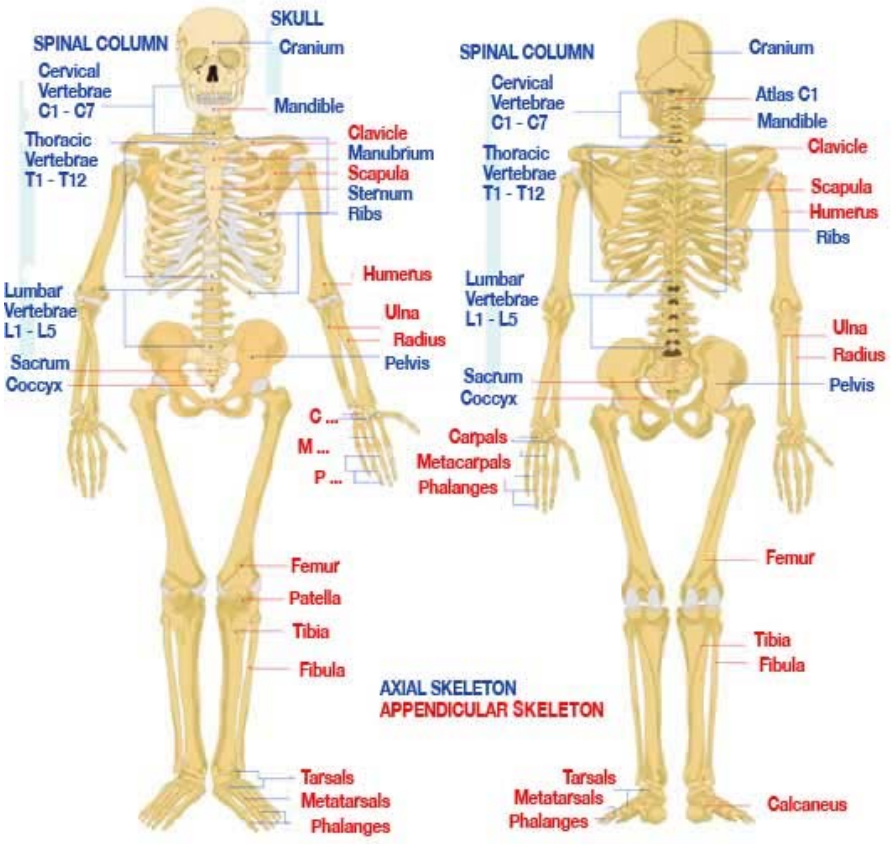
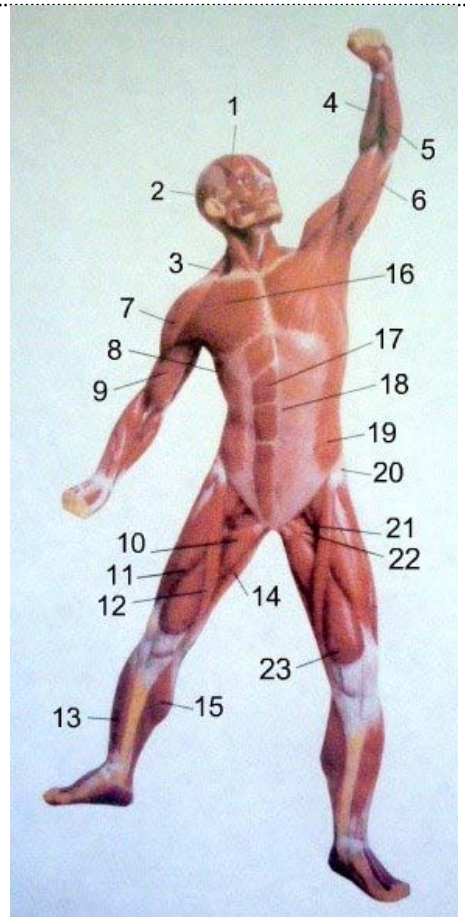
Musculoskeletal





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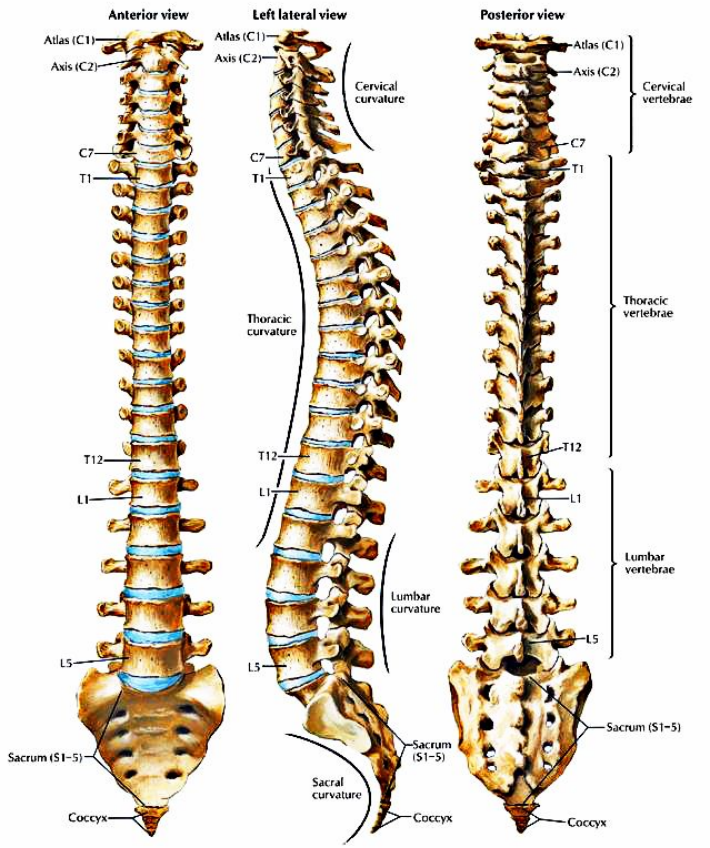
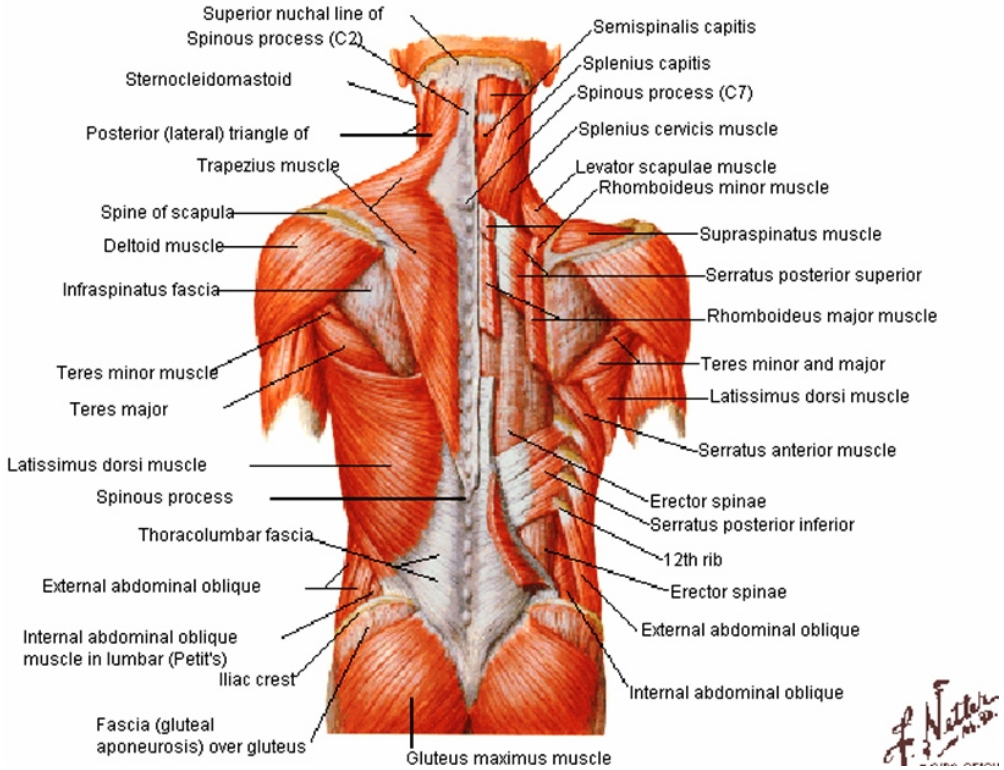
Trunk and spine





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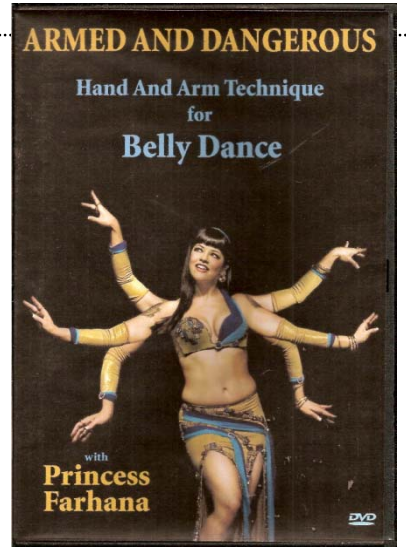
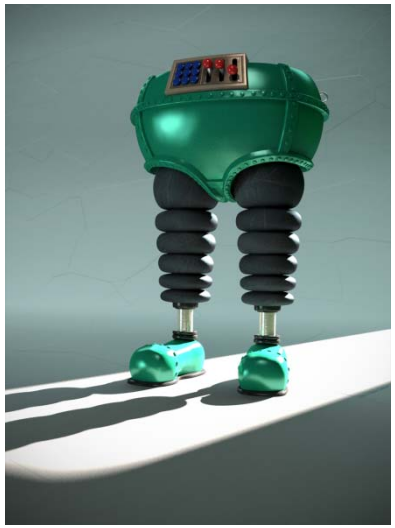
Limbs





- Dialogue between mobility and stability
- Lower extremities (stability>mobility)
  - Bear weight
  - Propel us forward
  - Balance
  - Shock absorption
- Upper extremities (mobility>stability)
  - Position the hand to function
  - Flexibility
  - Coordination

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Hands and feet

- Hands
  - Strong grasp
  - Fine dexterity
  - Combo of strong forearm muscles (extrinsic), small, finely controlled muscles in the hand (intrinsic)
- Feet
  - Shock absorption
  - Stability
  - Common source of pain, injury: interface with the world

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Neurologic System

- Central
  - Brain
  - Spinal cord
- Peripheral nerves
  - Motor
  - Sensory
- Autonomic System
  - Sympathetic
  - Parasympathetic

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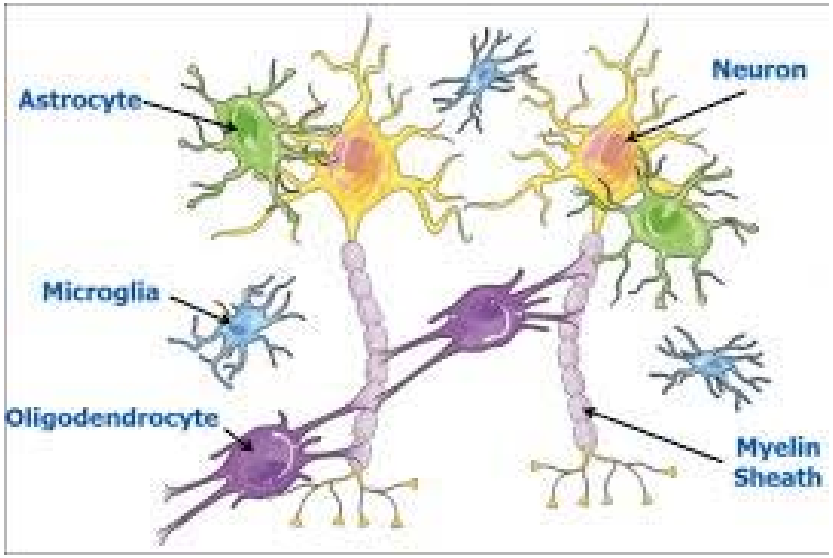
Central Nervous system

- Brain
  - Neurons
    - Grey matter
    - White matter (myelin)
  - Support (glial) cells: astrocytes, oligodendrocytes and Schwann cells



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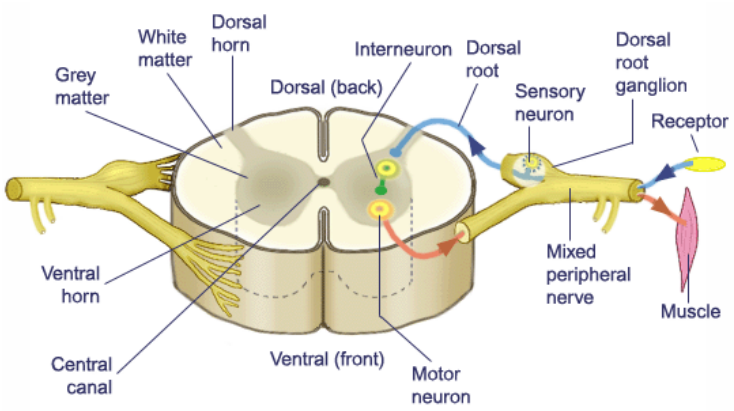
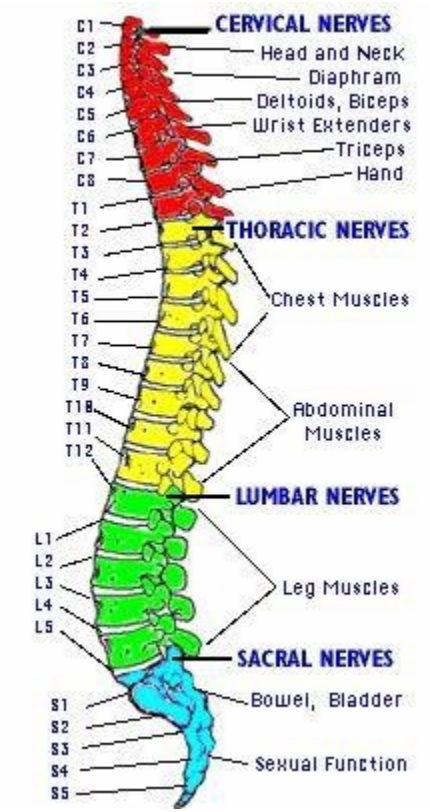
Spinal cord





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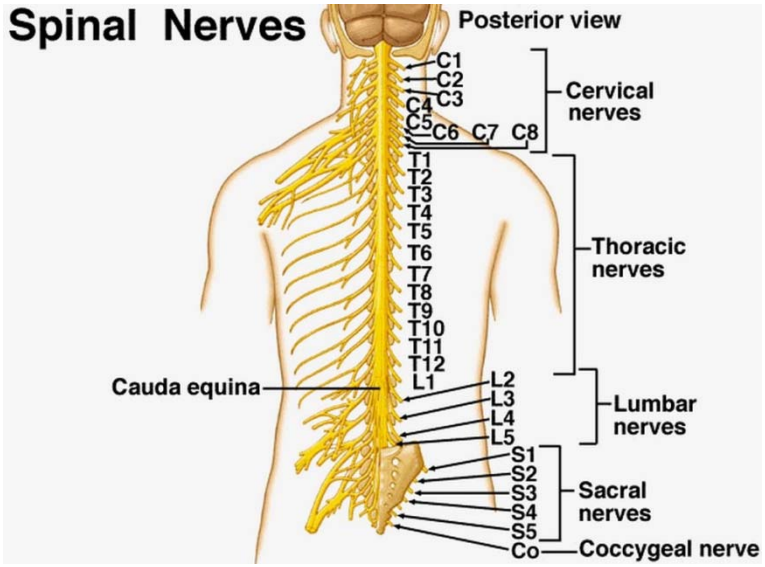
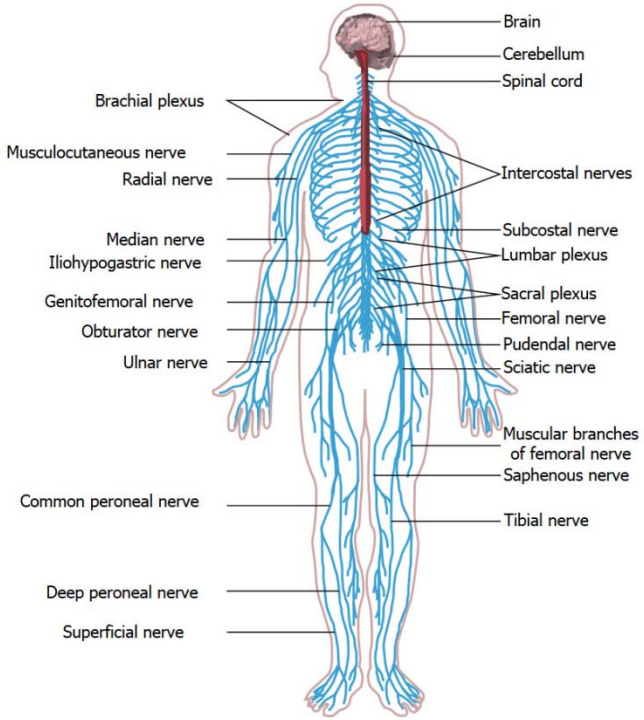
Peripheral Nervous system

- Sensory
- Motor





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Sensory and motor functions

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Integration of neurologic and musculoskeletal systems

https://www.youtube.com/watch?v=qkthxBsIeGQ

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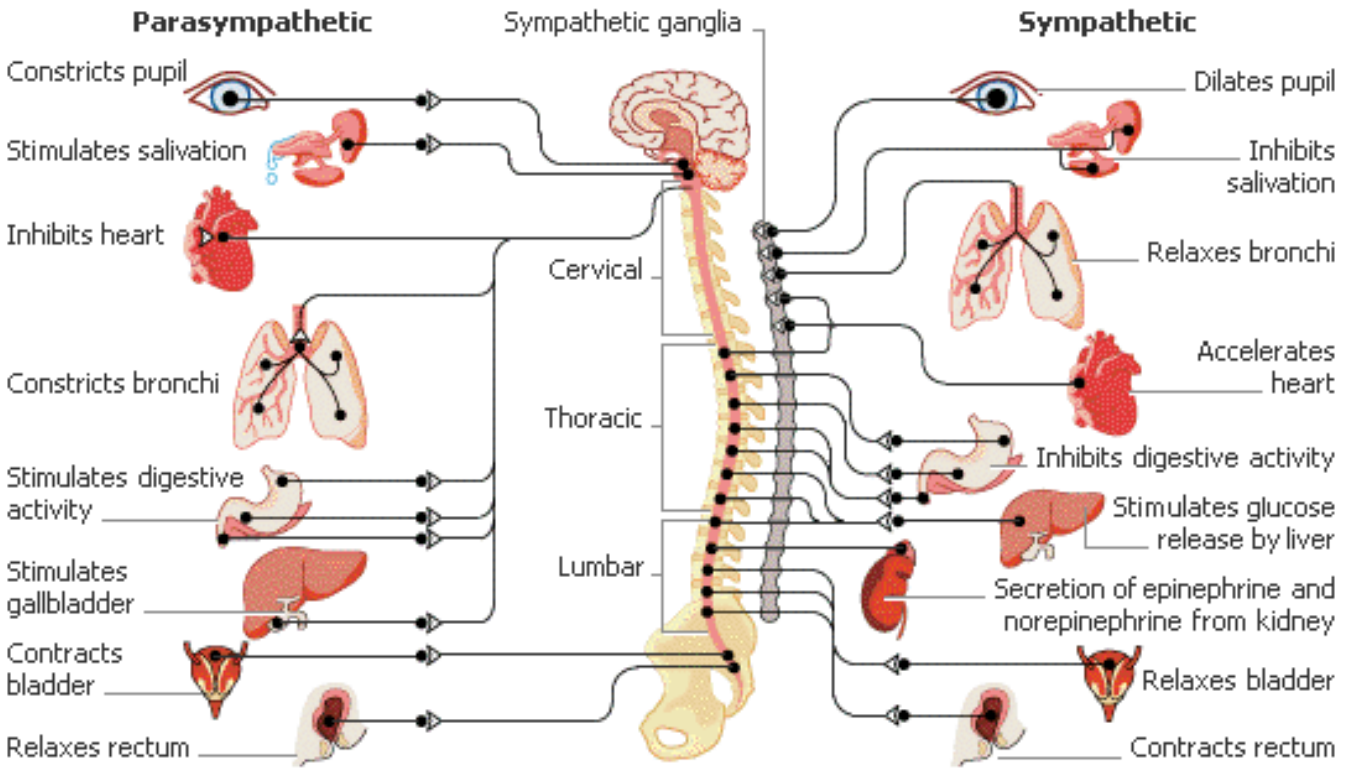
Autonomic Nervous system



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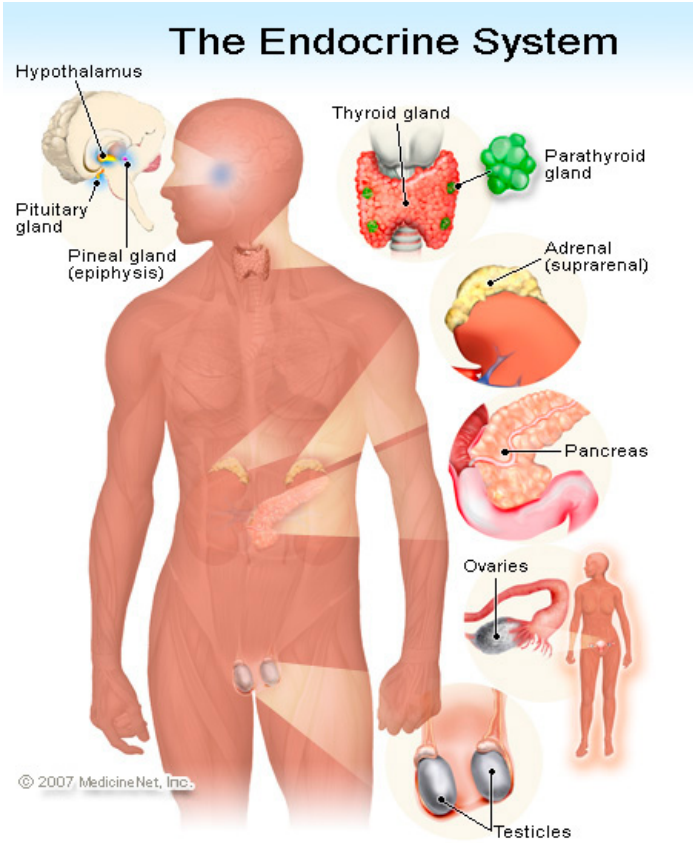
Endocrine

- Manages the physiologic response to change
  - Growth
  - Stress
  - Threat
  - Reproduction
  - Metabolism



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Endocrine targets

- Calcium
- Sex hormones (testosterone, estrogen, etc.)
- Blood glucose (insulin)
- Sleep (melatonin)

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Brainstorm problems

- Musculoskeletal
- Neurologic
- Endocrine and related

Quiz: What's the number one cause of disability in the U.S.?

A. Diabetes
B. Obesity
C. Arthritis
D. Depression

The answer is C

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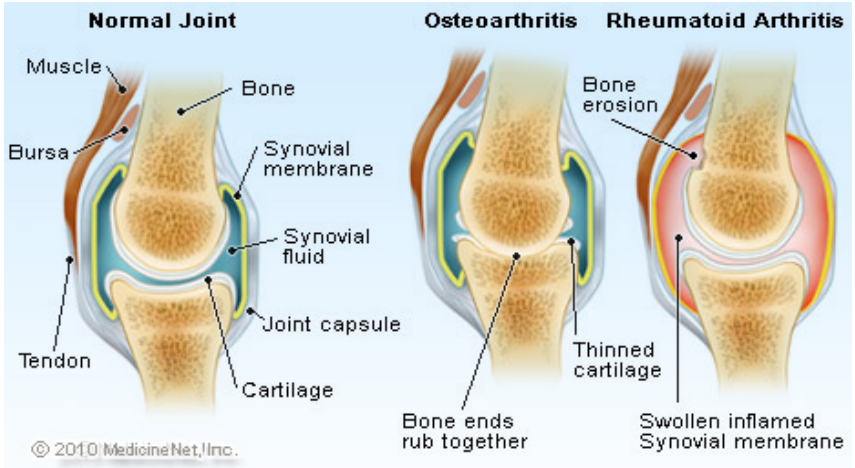
Arthritis

- 2 major types
- Osteoarthritis most common
- Involves any joints, generally back, knees, hips, fingers



Normal and Arthritic Joints

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MSK: arthritis, esp neck and back

Neck and back pain

- >50 billion dollars/ year in direct medical costs
- >70 billion dollars/year in direct and indirect costs

- Most common source of disability in Americans <45 years of age
- Leading cause of people missing work
- Chronic back pain > 3 months

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Acute vs. chronic pain

Acute pain

–Cause is usually known

–Duration: usually short

–Etiology: elicited by injury or disease

–Pain usually dissipates as healing proceeds

–Treat the underlying cause

–Treat pain

Chronic pain

–Cause is often not known

–Duration: typically long

–Etiology: often poorly understood

–Pain extends beyond the period of healing

–What if the underlying cause is not known?

–What do you treat?

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Trauma

- ~162 million people were affected by major trauma last year (motor vehicle accident, war-related injuries, suicide, homicide, natural disasters)
- 5.8 million people die each year from trauma and violence
  - 1.3 million killed in MVA; >50 million injuries
- 20th century: >191 million people were killed as a result of violence.
- 2013: 33,169 deaths related to firearms

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MSK: trauma

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MSK: Amputation

- Traumatic
- Atraumatic (diabetic complications)

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Amputation: prostheses

Diabetes and amputation: skin problems

- Dysvascular changes result in poor blood supply
- Neuropathy reduces or changes sensation
- Even small wounds can turn into big problems
- Prevention is key!

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Atraumatic amputation (DM)

- Every 30 seconds a leg is lost to DM in the world
- DM: 16 million in U.S.; 135 million worldwide
  - Increasing due to worldwide epidemic of obesity
- Worldwide: 70% of amputations are due to DM

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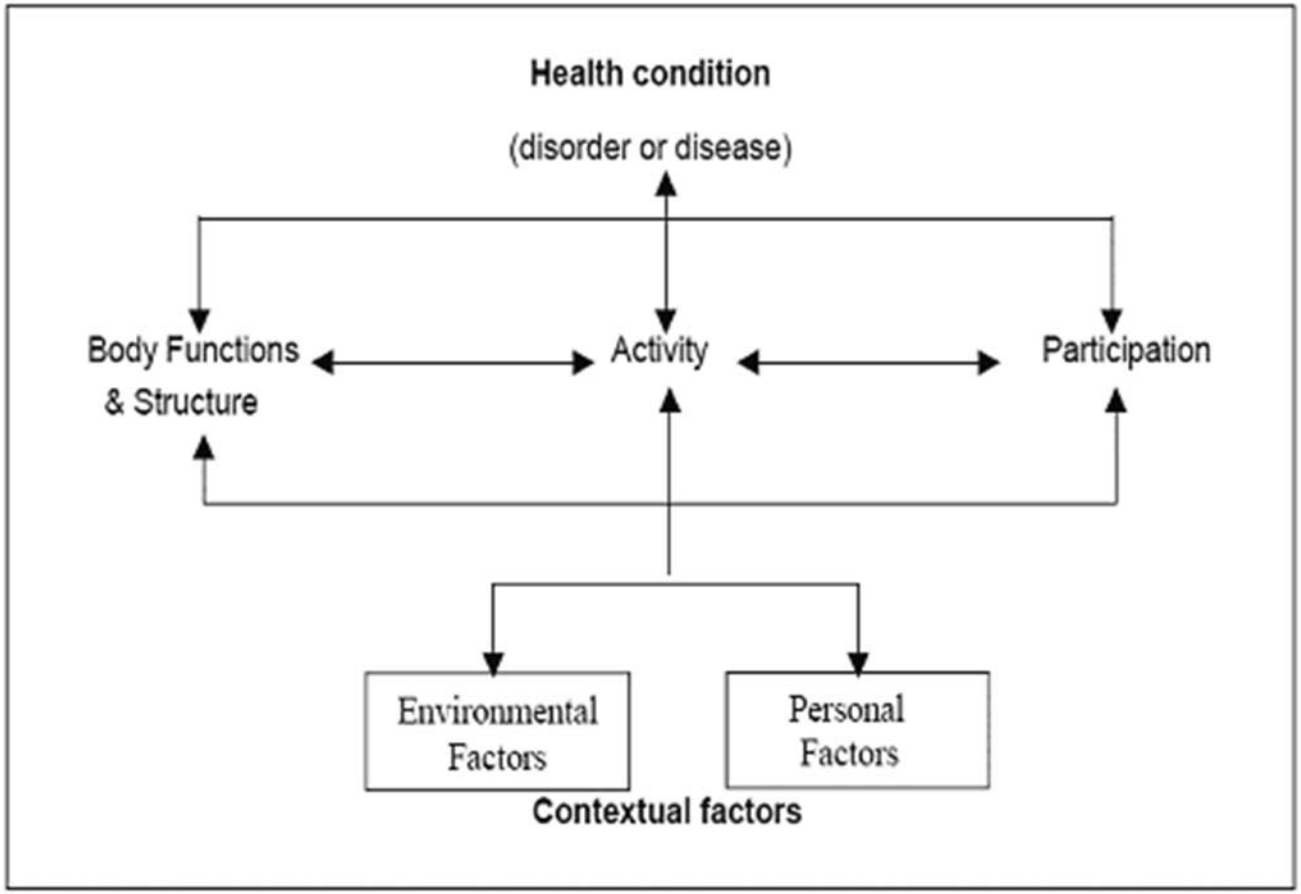
Returning to function, activity, participation



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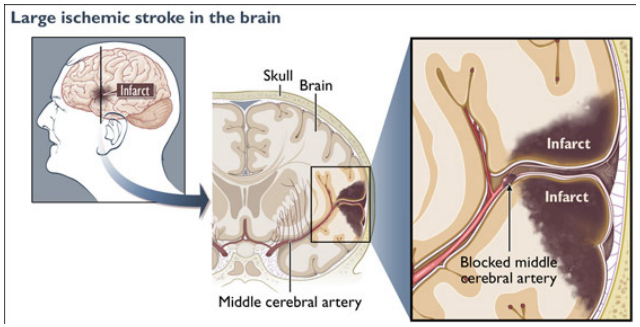
Brain injury



- Stroke: 3rd leading cause of death in the U.S.
  - –~780,000 strokes per year
  - –5.7 million deaths worldwide
  - –90% are in poor or middle income countries

- TBI: ~1.4 million per year in the U.S.
  - –Worldwide prevalence/incidence in world are unknown
  - –90% of deaths from TBI are in poor countries

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Traumatic brain injury: 1.4 million (U.S.)

- 50,000 die
- 235,000 are hospitalized
- 1.1 million are treated and released from an emergency department.
- The number of people with TBI who are not seen in an emergency department or who receive no care is unknown.

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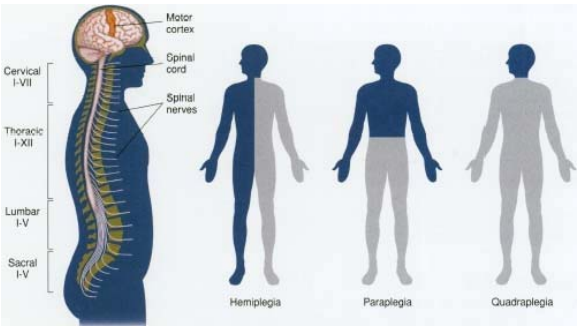
TBI

- Severe with motor impairment
  - Hemiplegia (= “half weak”)
  - Sensory impairment
- Less severe: “invisible” injury
  - May appear normal
  - Impairments across multiple domains
  - What are they?



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What happens after a TBI?

- Thinking (i.e., memory and reasoning);
- Sensation (i.e., touch, taste, and smell);
- Language (i.e., communication, expression, and understanding); and
- Emotion (i.e., depression, anxiety, personality changes, aggression, acting out, and social inappropriateness).

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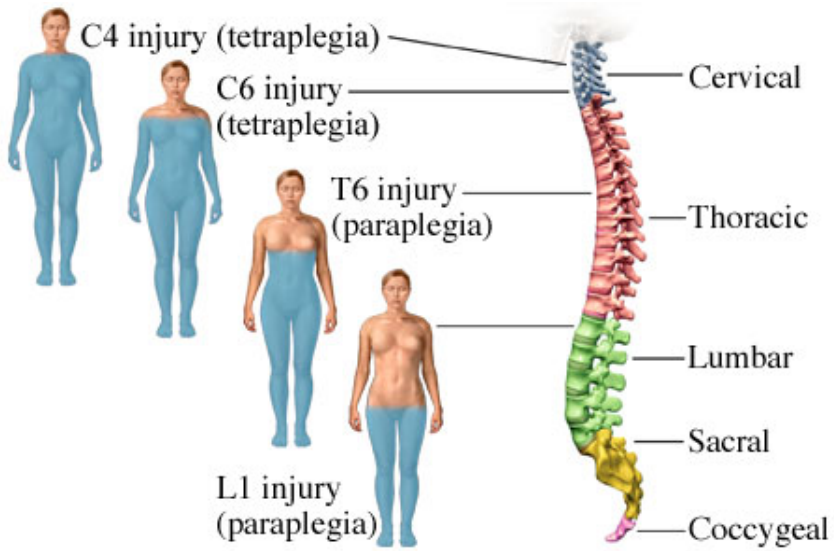
Trauma: Spinal cord injury (SCI)

~11,000/yr sustain an SCI in U.S.

• Nearly 200,000 people in the U.S. live with a disability related to a spinal cord injury (SCI).

• The leading cause of SCI varies by age. Motor vehicle crashes leading among persons under age 65. Among persons age 65 and older, falls

• Sports and recreation activities →estimated 18% of SCI cases.



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What happens after a spinal cord injury?

Paralysis

- Sensory impairments
- Complete absence
- Some preservation
- Respiratory impairments
- Bladder/bowel impairments
- Sexual dysfunction
- Obesity
- Diabetes

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What else can happen after spinal cord injury?

- https://www.youtube.com/watch?v=bYQx1W9axlY

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Most common disabling conditions in the US

- Arthritis
- Back pain
- Heart disease
- Cancer
- Depression
- Diabetes

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Summary

- Describe the relationship between participation, activity and body functions/structure
- Describe major functions of the primary body systems
- List common disruptions of the body system.
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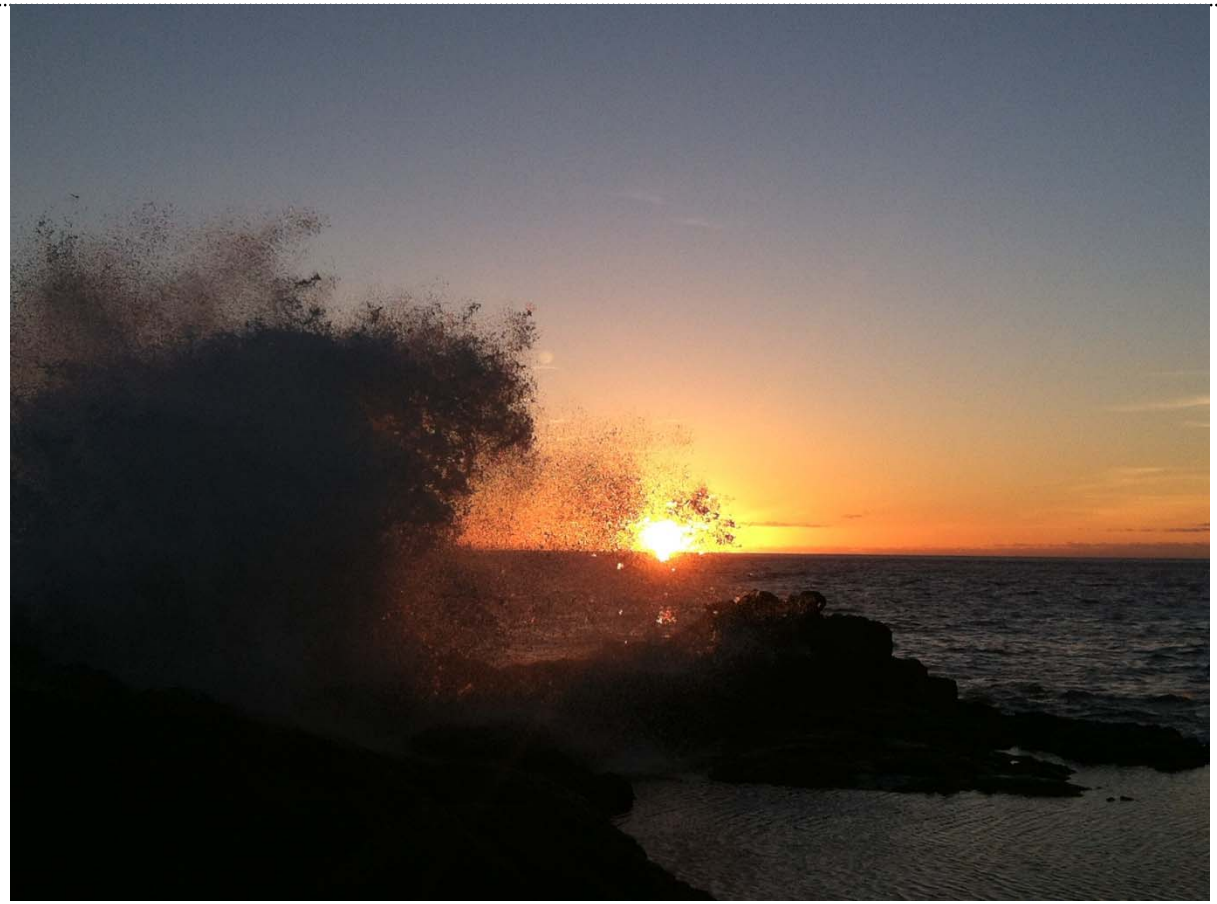

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