Would You Rather…

Pain and the Gate Control Theory

- Stick yourself with a needle, or have someone else stick you with a needle?

Would You Rather….

- Have a broken leg or chronic back pain?

Would You Rather….

- Get burned by an iron, or get a paper cut?

Would You Rather….

Hit your funny bone or stub your bare toe on the sidewalk?

Would You Rather….

- Suffer a concussion or have a migraine headache?

PAIN!

What IS Pain?

An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

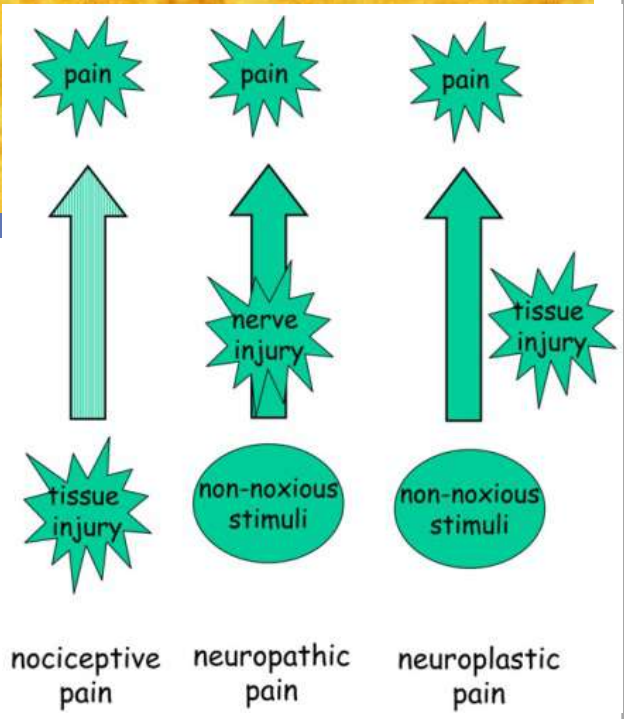
-(International association for the study of pain 1979)

PAIN!

Questions you should consider:

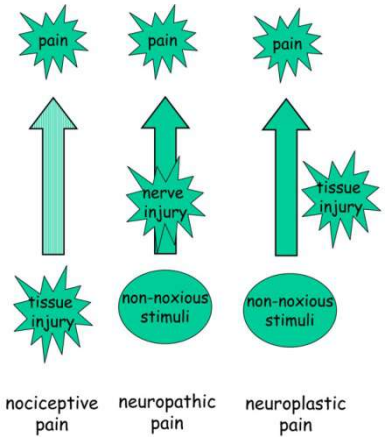
- What causes pain?
- Why do some people feel more pain than others?
- Will you always feel pain if you are injured?
- Does inflammation cause pain?
- Does pain trigger the healing process?
- Is pain measureable?
- Why is some pain response delayed?

Types of Pain



- **Nociceptive (Tissue) Pain**
  - Nociceptive pain results from tissue damage.
  - subdivided into somatic and visceral (gut) pain.
  - can be experienced as sharp, dull, or aching.
  - may be radiation of the pain, especially visceral pain, but it will not be in a direct nerve distribution.

Types of Pain



Neuropathic (Nerve) Pain

- occurs when there is either damage to or dysfunction of nerves in the peripheral or central nervous system.
- frequently coexists with nociceptive pain
- described as having a burning or electrical quality. It may feel like a shock or lightning bolt. Sometimes patients do not describe the sensation as being "painful" but rather as feeling unpleasantly strange or tingly, like an arm feels when it wakes up from "going to sleep." This is called a dysesthesia.

Nervous System Organization

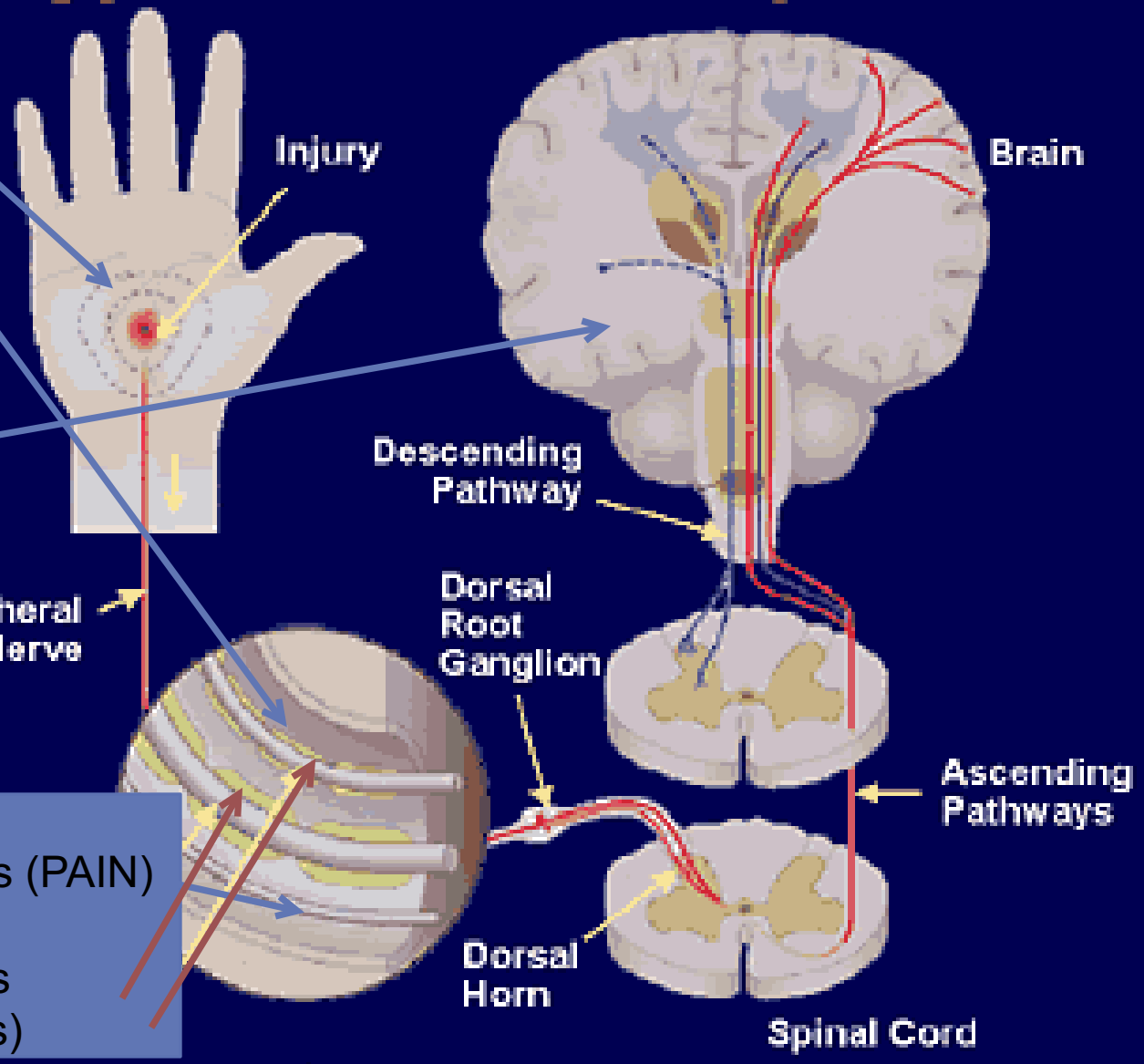
What part of the nervous system deals with pain?

"Gate Control" Theory

- A principle of pain control
  - There is a "gate" within the spinal cord that organizes and interpret sensations
  - Larger fast nerve fibers carry sensations such as temperature and pressure
  - Smaller, slower nerve fibers carry the pain sensation
  - Stimulating the larger, faster nerves can "close the gate" on the smaller slow pain nerves
  - Translation: Cold, heat, acupuncture, rubbing an injury and chemical irritants can provide relief against pain

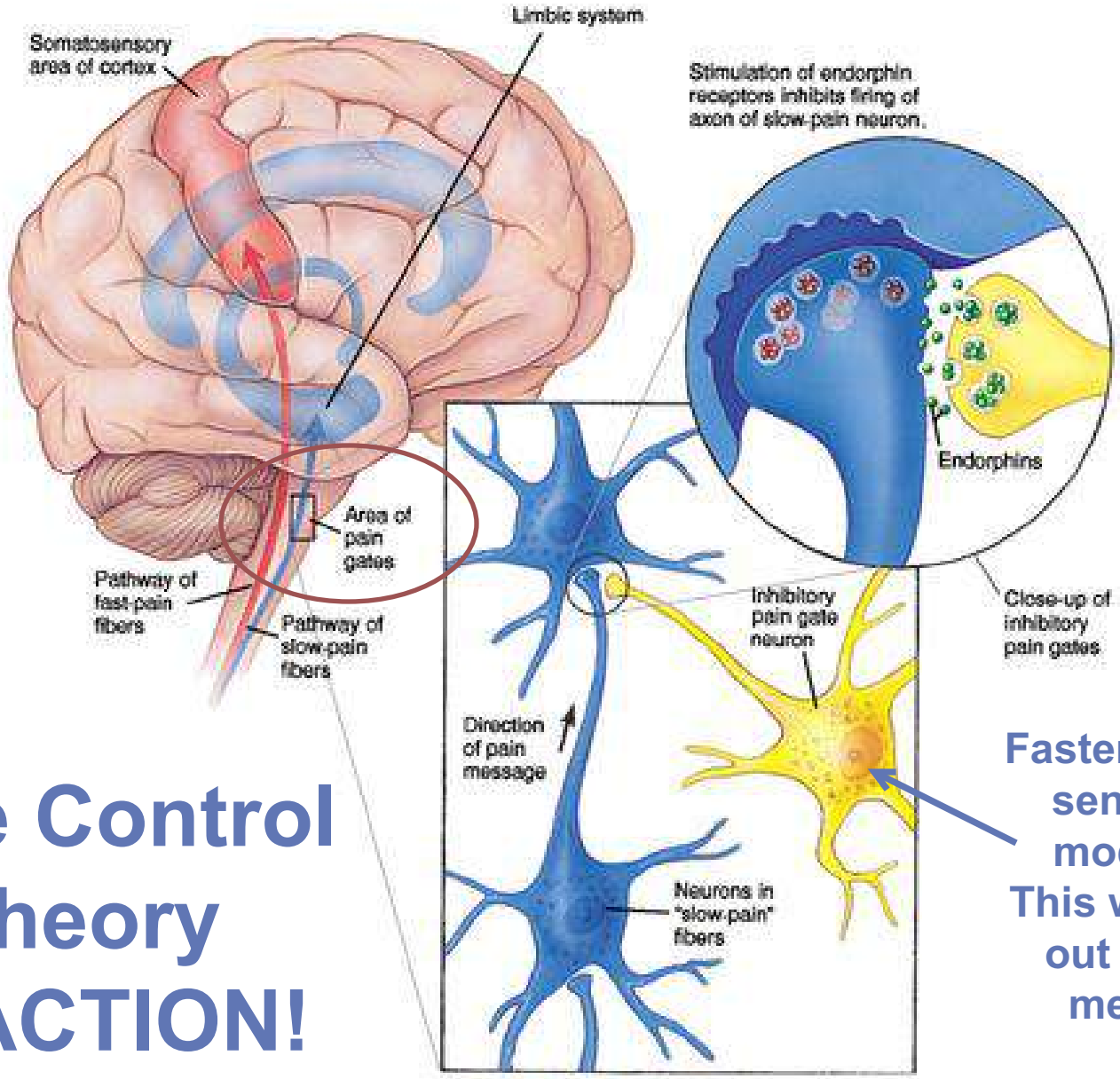
Physiology of Pain Perception

- Transduction
- Transmission
- Perception
- Interpretation
- Behavior



Small, slow fibers (PAIN)

Larger, fast fibers (other sensations)



Gate Control Theory IN ACTION!

Faster message sent due to modalities! This will cancel out the pain message.

Pain Management/Modalities

Pain management techniques:

- How do they work?
- Types/comparisons

Types of Modalities

- Cryotherapy
- Thermotherapy
- Contrast Bath

Cryotherapy

- Indications
  - Swelling and inflammation present
  - Acute soft tissue injuries
    - Sprains
    - Strains
    - Contusions
    - Spasms
    - Tendonitis
- Contraindications
  - Allergic
  - Circulatory disturbances
  - Raynaud's phenomenon
  - Prolonged application
    - Over superficial nerves
    - Longer than 30 minutes = adverse effects
      - Hunting Response

Cryotherapy

- Physiological Effects
  - Decrease in blood flow
    - Vasoconstriction
  - Decrease in muscle spasms
  - Decrease swelling
  - Decrease in pain perception
- To maximize effects should be used with RICE

R.I.C.E

- Rest
  - Immobilization
  - Crutches
- Ice
  - Apply appropriate cryotherapy modality
- Compress
  - Compression wrap or sleeve, ace bandage
- Elevate
  - Injured body part above heart
  - May be best method for reducing swelling

- RICE method should be used first 2-3 days of injury
- Ice for 20-30 minutes
- Reapply every 1-2 waking hours
- Keep compression on and elevate when possible

Stages of Cryotherapy

- 0-3 minutes after initiation feel cold sensation
- 2-7 minutes after initiation feel mild burning, aching
- 5-12 minutes after initiation feel numbness, anesthesia

Cryotherapeutic Methods

- Ice Packs
  - Flaked or crushed ice in a towel or plastic bag
  - Apply for 15–20 minutes combined with RICE
  - Can be used on any area of body– easiest and simplest.

Ice Massage

- Paper cup filled with frozen water to from an ice cylinder
- Rub or massage directly over area until skin becomes bright pink– usually for 7–10 min
- Tendonitis, muscle spasms, neck strains, bursitis

Cryotherapy Methods cont..

- Cold Water Immersion
  - Whirlpool, bucket or container filled with mixture of water and ice– temp– 55–65 degrees F
  - Immerse for 10–20 minutes
  - Great for hands, feet, ankles or knees
  - Can be combined with stretching or exercises

⑩Chemical coolant

- Vapocoolant Cold spray
- Sprayed on surface of skin
- Used for myofascial pain and trigger points
- Effects are temporary and superficial

Thermotherapy

- Indications
  - Sub-acute injury
  - No signs of inflammation
  - Best done before therapy/ exercise
  - Tendinitis
  - Strains
  - Spasms
- Contraindications
  - Acute injury
  - Loss of sensation
  - Eyes
  - Genitals
  - Pregnant abdomen
  - Malignancy
  - Monitor often, especially elderly and infants

Thermotherapy

- Physiological Effects
  - Decrease muscle spasm
  - Decrease pain perception
  - Increased blood flow–vasodialation
  - Increase metabolic rate
  - Decreased joint stiffness
  - Increase range of motion
  - Increased general relaxation

Moist Heat Packs

- Hydrocollator Packs
  - Silicate gel in a cotton pad immersed in 170 degrees of hot water
- Apply 15-20 minutes
- Layers of towels are placed between skin and pack
- Superficial heat

Whirlpool Bath

- Tank with a turbine motor which regulates the movement of water and air
  - Creating a hydromassage
- Reduces swelling, muscle spasm and pain and active movement is also assisted
- Treatment time is dependant upon area
  - 10–30 minutes
- Tank must be drained and cleaned daily to prevent disease transmission

Contrast Baths

- Alternating thermotherapy and cryotherapy
- Whirlpools, buckets, hot packs and ice bags can be used
- Alternating hot and cold increases local circulation to the treated limb
  - Vasodialtion–Vasocontriction
- Application
  - 4:1 or 3:1 ratio
  - Hot: Cold
  - Begin with thermotherapy modality
  - End with cryotherapy modality
  - Alternate for 20–30 minutes

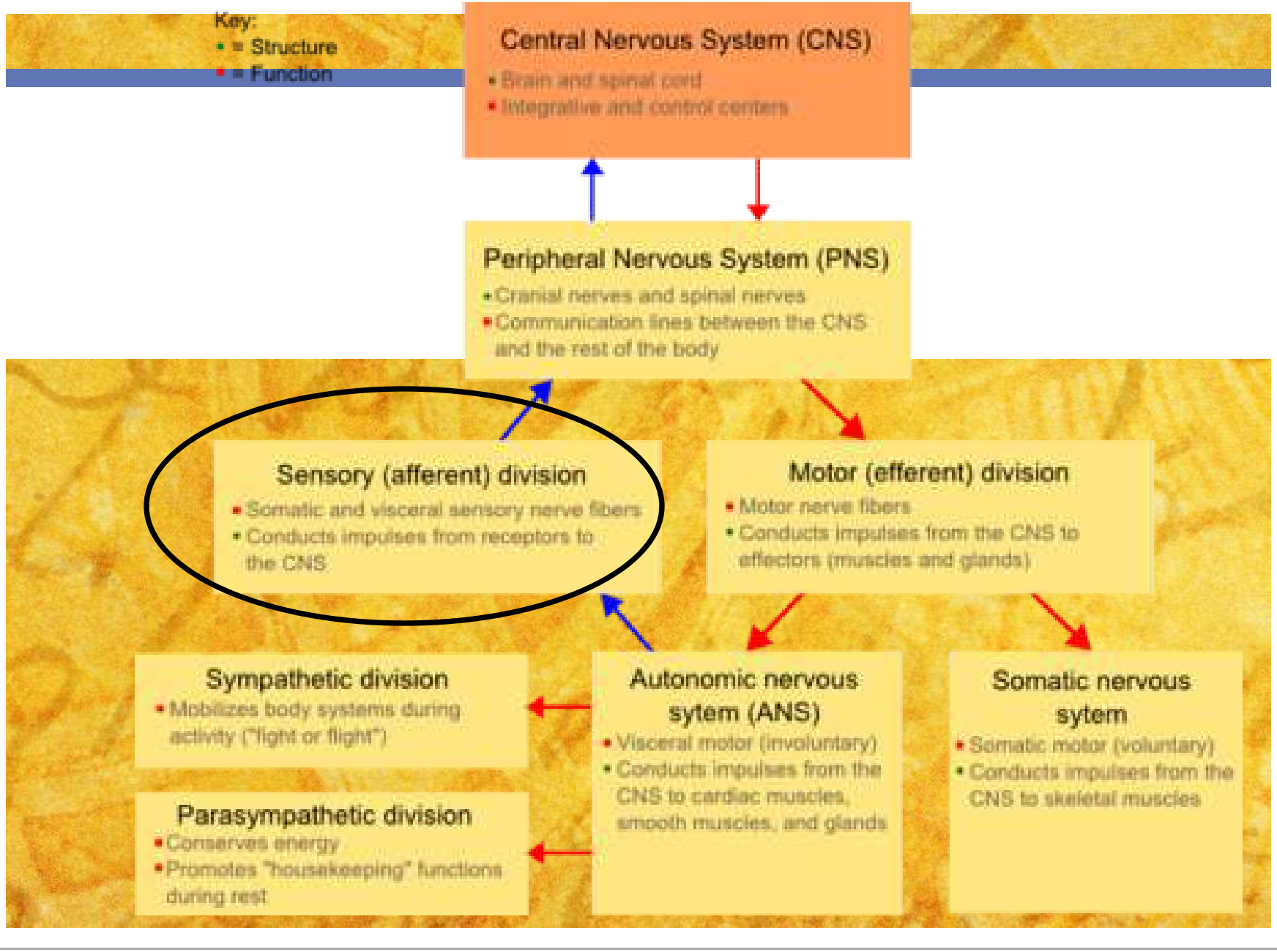
"Nervous System and Pain: What Do you Know?"

THINK-PAIR-SHARE

1. What is happening in your body when something hurts?

2. What are 3 things that YOU do to make pain go away?

3. Can a doctor or other professional do something to make pain go away that you CAN'T do by yourself?


Key:
• = Structure
• = Function
Central Nervous System (CNS)
• Brain and spinal cord
• Integrative and control centers
Peripheral Nervous System (PNS)
• Cranial nerves and spinal nerves
• Communication lines between the CNS and the rest of the body
Sensory (afferent) division
• Somatic and visceral sensory nerve fibers
• Conducts impulses from receptors to the CNS
Motor (efferent) division
• Motor nerve fibers
• Conducts impulses from the CNS to effectors (muscles and glands)
Sympathetic division
• Mobilizes body systems during activity ("fight or flight")
Parasympathetic division
• Conserves energy
• Promotes "housekeeping" functions during rest
Autonomic nervous sytem (ANS)
• Visceral motor (involuntary)
• Conducts impulses from the CNS to cardiac muscles, smooth muscles, and glands
Somatic nervous sytem
• Somatic motor (voluntary)
• Conducts impulses from the CNS to skeletal muscles