Objectives
1. Outline a biopsychosocial approach to pain management
2. Describe how understanding pain neuroscience can help you manage pain
3. Suggest strategies for managing your pain

Biomedical Model of Pain
The belief that:
- Pain always reflects tissue damage
- Pain nerves transmit a reliable signal to the brain
- Goal is to find and fix the tissue damage
- If no tissue damage can be found, “it is all in your head”

The biomedical model is fairly good with acute pain
It is not good at explaining or fixing chronic pain
- Chronic pain is not always associated with tissue damage
- Even when there is tissue damage, pain is not always proportional

Biopsychosocial Model of Pain
- The belief that pain results from perceived danger:
  - Physiologic response to actual or potential tissue damage
  - Interplay between sensory input and brain processing
  - Previous pain experience
  - Beliefs about pain
  - Coping style
  - Emotions
  - Family, social, and cultural background

No Brain, No Pain!
- Pain ≠ Tissue damage
  - Not all pain involves tissue damage (e.g., grief ➞ pain)
  - Not all tissue damage causes pain
  - Pain is often not proportional to tissue damage
- Pain is the brain’s interpretation of a sensory experience
  - For example, spicy food is either delicious or painful

Pain Management Approach
1. Understand your pain
   - Identify pain mechanism
   - Identify source(s) of pain
2. Prevent pain from developing, when possible
3. Fix causes of pain, when possible
4. Decrease the pain experience
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Identify the Pain Mechanism

- Pain can develop via different physiological mechanisms
- Identifying the pain mechanisms can guide optimal treatment
- It is like bringing your car to the mechanic – they need to figure out if the problem comes from the engine, computer, tires, etc., to be able to fix the correct problem

Different Pain Mechanisms

- **Nociception**: activation of nerves that sense ‘danger’
  - Mechanical
  - Chemical (inflammation or tissue damage)
  - Heat/cold
- **Neuropathic pain**: damage to nervous system
  - Peripheral: e.g., carpal tunnel or herniated disc, etc.
  - Central: e.g., stroke, spinal cord injury, Parkinson’s, etc.
- **Sensitization**: malfunction of the nervous system
  - Peripheral: nerves become sensitive and fire too easily
  - Central: malfunction in how the spinal cord and brain process pain

Nociception

- Can be caused by any tissue
  - (except the brain)
- Is generally proportional to the stimulus
- Tends to decrease when the stimulus decreases
- The nociceptive signal can be modified by descending pathways before it gets to the brain

Descending Pathways

- They modify what signals get to the brain
- Descending inhibition:
  - Occurs when the brain thinks there is less danger than nociceptors suggest (this is good)
- Descending facilitation:
  - Occurs when the brain thinks there is more danger than nociceptors suggest (this increases pain)

Descending Modulation

- Changes what nociceptive signals get to the brain
- Increase descending inhibition (good)
  - Regular exercise
  - Mind-body practices (e.g., meditation)
  - Cognitive approaches (e.g., coping skills)
- Increase descending facilitation (bad)
  - Catastrophizing, stress, negative thinking
  - Focusing on anatomical problems or imaging test results that might not be causing the pain
Neuropathic Pain

• Due to injury or disease of peripheral or central nervous system
  o Peripheral neuropathic pain is felt in the area served by that nerve
  o Central neuropathic pain is caused by injury or disease to brain or spinal cord (e.g., stroke, Parkinson’s, etc.)

Neuroplasticity & Sensitization

• Neuroplasticity
  o Changes in brain structure or connections; can be caused by pain, stress or trauma
• Peripheral & central sensitization
  o Increased sensitivity of nerves in peripheral or central nervous system
  o Occurs due to inflammation, psychosocial factors (e.g. stress or anxiety), being sedentary
• Neurogenic inflammation
  o Sensory nerves can fire backwards and release inflammatory chemicals in the tissues
  o Can cause nociception and tissue damage in those tissues

Central Sensitization

• Seen in many types of chronic pain, fibromyalgia, migraine, myofascial pain syndrome, irritable bowel, chronic fatigue, PTSD, multiple chemical sensitivity...
• Aggravated by
  o Childhood or adult trauma (physical or emotional)
  o Stress, anxiety, negative thinking...
  o Genetic susceptibility
  o Nociceptive or neuropathic pain
• Sensitization can amplify nociceptive or neuropathic pain
• Central sensitization can result in pain in the absence of any tissue damage
  [Yunus 2007]

Why Care About Pain Mechanism?

• Different mechanisms of pain are best managed in different ways
• That is:
  You can’t fix a flat tire by changing the oil

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Managing Causes of Pain

• Prevent pain from developing, when possible
  • Learn good body mechanics, posture
  • Maintain proper muscle strength and flexibility
  • Remain active
  • Manage stress, anxiety and depression
• Fix causes of pain, when possible
  • Weakness, tightness, poor motor control, instability...
  • Inflammation
  • Muscle spasm, trigger points, tight fascia...
  • Psychosocial factors contribute to pain & stress
Prevent Pain if Possible

How Heavy is Your Head?

For example: avoid placing too much stress on muscles and joints

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Physical Therapy Pain Management

• Patient education: neuroscience, self-management
• Exercise: relaxation, stretching, aerobic, strengthening
• Manual therapy: massage, trigger point therapy, myofascial release, instrument assisted, nerve mob
• Taping: Kinesiotape or Rock Tape, McConnell tape
• Modalities: heat, ice, TENS, traction, laser
  - Modalities typically have temporary benefit

Self-Management Strategies

• Understanding pain, mind-body approaches
• Exercise: may include stretching, strengthening, aerobic
• TENS (trans-cutaneous electroneural stimulation)
• Heat, ice, topical rubs (hot, cold, anti-inflammatory)
• Home traction (for certain spine problems)
• Self-management of trigger points

Decreasing Sensitization

• Pain neuroscience education
  - www.youtube.com/watch?v=RWMKucueji [5 min]
  - Curable app: www.curablehealth.com
• Exercise (activates descending inhibition)
• Physiological quieting, diaphragmatic breathing, biofeedback
• Manual therapy: e.g., massage, myofascial release
• Modalities such as TENS
• Mind-body approaches such as Tai Chi, qigong, yoga, Pilates, etc.

Maximizing Function in Spite of Pain

• Pain can’t always be eliminated
• You sometimes have to choose:
  - Have pain and stop doing things you enjoy
  - Have pain but still do things that are important to you
• Remaining as physically and mentally active as possible, and keeping social relationships strong can improve your quality of life
Chronic Pain is a Car with Four Flat Tires

- You can’t move forward by fixing just one tire
- A single approach might not solve your chronic pain
- You need to fix all 4 flat tires by using multiple approaches: education, self-management, physical therapy, medications, procedures...

Metaphor from American Chronic Pain Association: video at https://youtu.be/5RIii6OUK2A

Pain Management Patient Resources

- 5-minute video about chronic pain neuroscience: https://www.youtube.com/watch?v=RWMKucuejIs
- American Chronic Pain Association: https://www.theacpa.org
- UC Davis pamphlet: search “UC Davis pain self-management plan” has multiple modules that let you pick what area might be most helpful for you now.
- On-line pain self-management: https://www.liveplanbe.ca has questionnaires to customize information and suggestions for issues that you face
- Curable app is a self-directed pain self-management program: www.curablehealth.com
- Potsdam Fibromyalgia/Ehlers-Danlos Syndrome (F/EDS) Support Group welcomes anybody struggling with chronic pain: 1st Tuesday of every month; info at: https://webspace.clarkson.edu/~lrussek/pfsg.html