2025 Early Career Scholar Program

An Intensive Multi-day Opioid REMS Initiative in Pain Management

CME OUTFITTERS

This activity is supported by an independent educational grant from the Opioid Analgesic REMS Program Companies.

Please see https://www.opioidanalgesicrems.com/Resources/Docs/List_of_RPC_Companies.pdf for a listing of REMS Program Companies. This activity is intended to be fully compliant with the Opioid Analgesic REMS education requirements issued by the U.S. Food and Drug Administration (FDA).

The Biopsychosocial Model of Pain

Clinical assessments, physiologic mechanisms, and biopsychosocial factors in pain development and persistence

Jeffrey Gudin, MD

Professor of Anesthesiology, Perioperative Medicine, and Pain Management
University of Miami Miller School of Medicine
Board Certified in Pain Management, Anesthesiology, Palliative Care, and Addiction Medicine
Miami, FL

Learning Objective

- Incorporate knowledge of physiologic mechanisms and biopsychosocial factors influencing pain development, persistence, and management into clinical assessment and appropriate management of pain

Audience Poll

How frequently do you integrate biopsychosocial factors (e.g., psychological, social, and emotional factors) into your clinical assessment and management of pain?

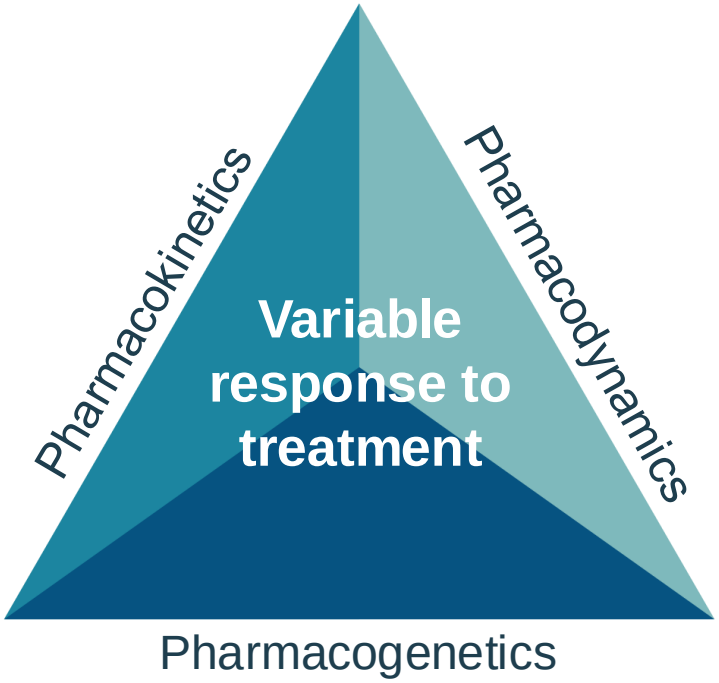
A. Never
B. Rarely
C. Sometimes
D. Often
E. Always

Audience Poll

Do you have a specific tool that you use to assess biopsychosocial factors (e.g., psychological, social, and emotional factors) into your clinical assessment and management of pain?

A. Yes
B. No
C. I just wing it using my clinical expertise

Why is Pain so Difficult to Manage?



- Lack of education about pain
- Poor assessment
- Complex pathophysiology
- Limited analgesic options
- Psychological manifestations (primary and secondary)
- Comorbid pathologies
- Compliance/AEs/misuse
- Cost/managed care limitations ($)

AEs = adverse events

Akbar N, et al. *Ann Geriatr Med Res*. 2019;23(4):190-196.

Patient Case: Harold

46-year-old male, 5’9”, 220 lbs, in your practice for 2–3 years; receiving 60–90 hydrocodone per month for pain related to a dominant right shoulder injury while lifting at work

- APAP ineffective, NSAIDs cause intolerable gastritis; occasional lorazepam for “stress”
- No prior right shoulder history, doing “home” physical therapy
- Divorced, smokes 1 PPD, 5–6 drinks per week – recreational

MRI: thickening of the rotator cuff tendons, particularly the supraspinatus tendon, with increased signal intensity on MRI indicating inflammation, potential fluid in the subacromial-subdeltoid bursa, and small calcific deposits within the tendon

Patient presents with right shoulder and neck pain, “can’t do anything at home,” angry, not sleeping, stressed, affects ability to work

APAP = N-acetyl-para-aminophenol (acetaminophen); MRI = magnetic resonance imaging; NSAIDs = nonsteroidal anti-inflammatory drugs; PPD = packs per day

Chronic Pain

An estimated 20.9% of U.S. adults (51.6 million) live with chronic pain

Arthritis is the most common chronic pain condition

Women and those over the age of 65 are the most likely to suffer

Chronic pain costs the U.S. up to $635 billion annually

More than 8 in 10 patients with chronic pain are affected by depression

50%–88% of patients report sleep difficulties

Estimated to affect 20% of the world's population

Rikard SM, et al. *MMWR Morb Mortal Wkly Rep*. 2023;72:379–385. Gaskin DJ, Richard P. *J Pain*. 2012;13(8):715-24. Sheng J, et al. *Neural Plast*. 2017;2017:9724371. Treede RD, et al. *Pain*. 2015;156(6):1003-1007. Seiger AN, et al. *Cell Rep Med*. 2024;5(10):101761.

Most Common Musculoskeletal Chronic Pain Locations

Yong RJ, et al. *Pain*. 2022;163(2):e328-e332.

Pain is Present in Many Disease States

- Cancer
- End stage renal disease, especially those needing hemodialysis
- End stage liver disease
- CHF, COPD
- Limb amputation (prolonged and varied)
- Neurological diseases (e.g., ALS, HD, MS, stroke, TBI)

ALS = amyotrophic lateral sclerosis; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; HD = Huntington's disease; MS = multiple sclerosis; TBI = traumatic brain injury. Viderman D, et al. *J Clin Med.* 2023;12(23):7302.

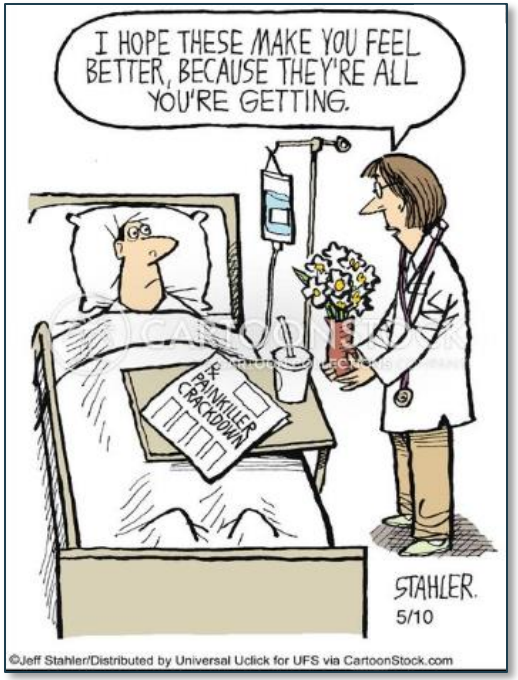
Consequences of Untreated or Undertreated Pain

- Reduced quality of life, impaired physical function, and high economic costs
- Physical disability, fear, anger, depression, anxiety, and reduced ability to carry out the roles of family member, friend, and employee
- **It is critical for clinicians to recognize these consequences EARLY and understand available options for analgesic therapies**

Katz N. *J Pain Symptom Manage*. 2002;24(1 Suppl):S38-47. Dowell D, et al. *MMWR Recomm Rep*. 2022;71(3):1-95.

Limited Treatment Options

- **Nonpharmacologic Tx**
- **APAP/NSAIDS**
- **Opioids**
  - Traditional and ADF and opioid-like molecules
- **Adjuvants**
  - Topicals
  - Antidepressants
  - Anticonvulsants
- **Interventions**
  - Nerve blocks
  - Implantable therapies

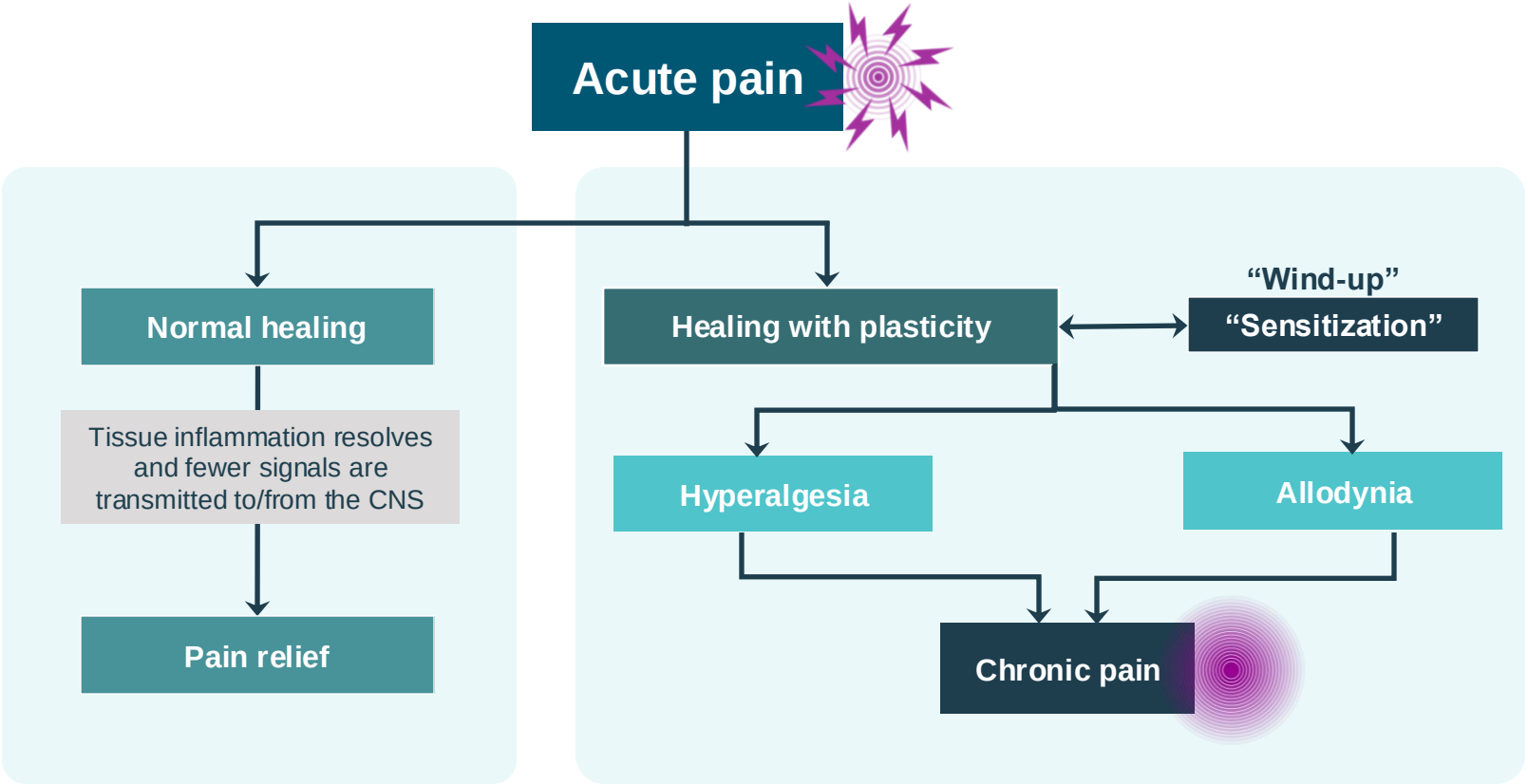


GOOD MEDICINE … BAD DRUGS

ADF = abuse-deterrent formulation; Tx = treatment

Dowell D, et al. *MMWR Recomm Rep.* 2022;71(3):1-95. Manchikanti L, et al. *Pain Physician*. 2023;26:S7-S126.

Pathophysiology of pain



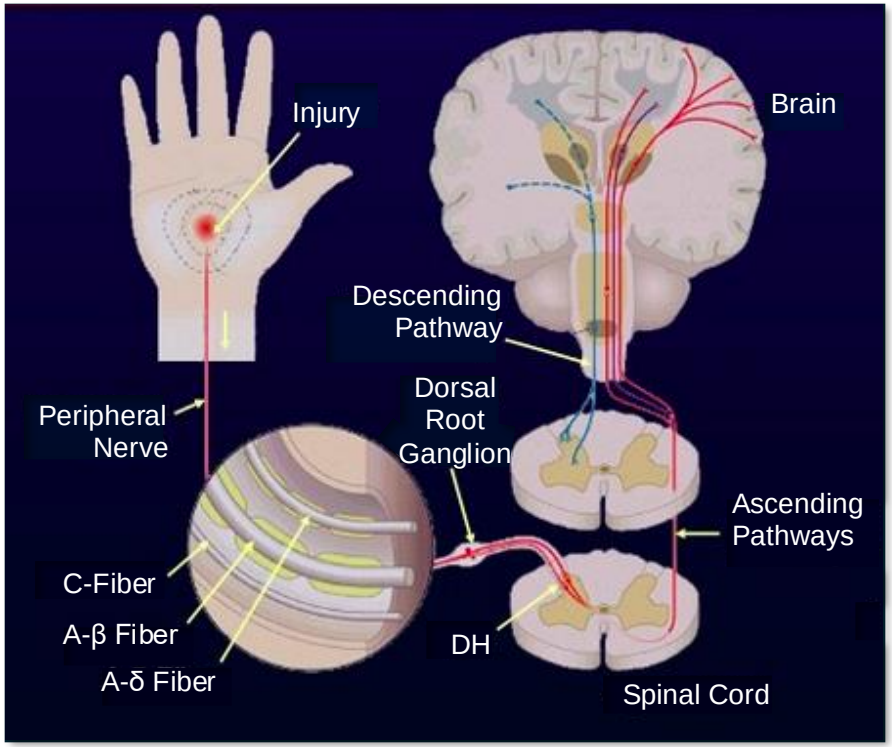
CNS = central nervous system

Adapted from Marcus DA. *Am Fam Physician*. 2000;61(5):1331-1338.

Treating Pain

If only it was this simple…

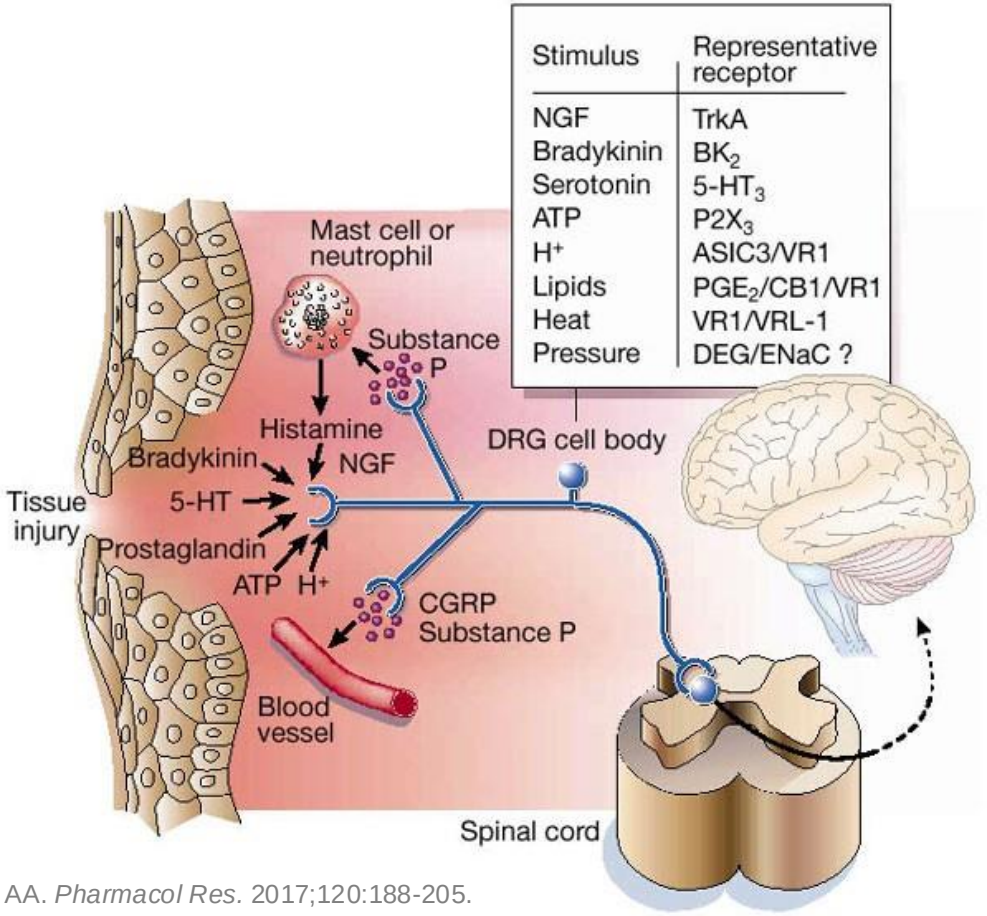
Physiology of Pain Perception



- Transduction
- Transmission
- Modulation
- Perception
- Interpretation
- **Behavior**

DH = dorsal horn. Yang JY. *Asian Spine Journal.* 2010;4(1)57-63. Osterweis M, et al., eds. The anatomy and physiology of pain. In: *Pain and Disability: Clinical, Behavioral, and Public Policy Perspectives.* 1987. https://www.ncbi.nlm.nih.gov/books/NBK219252/.

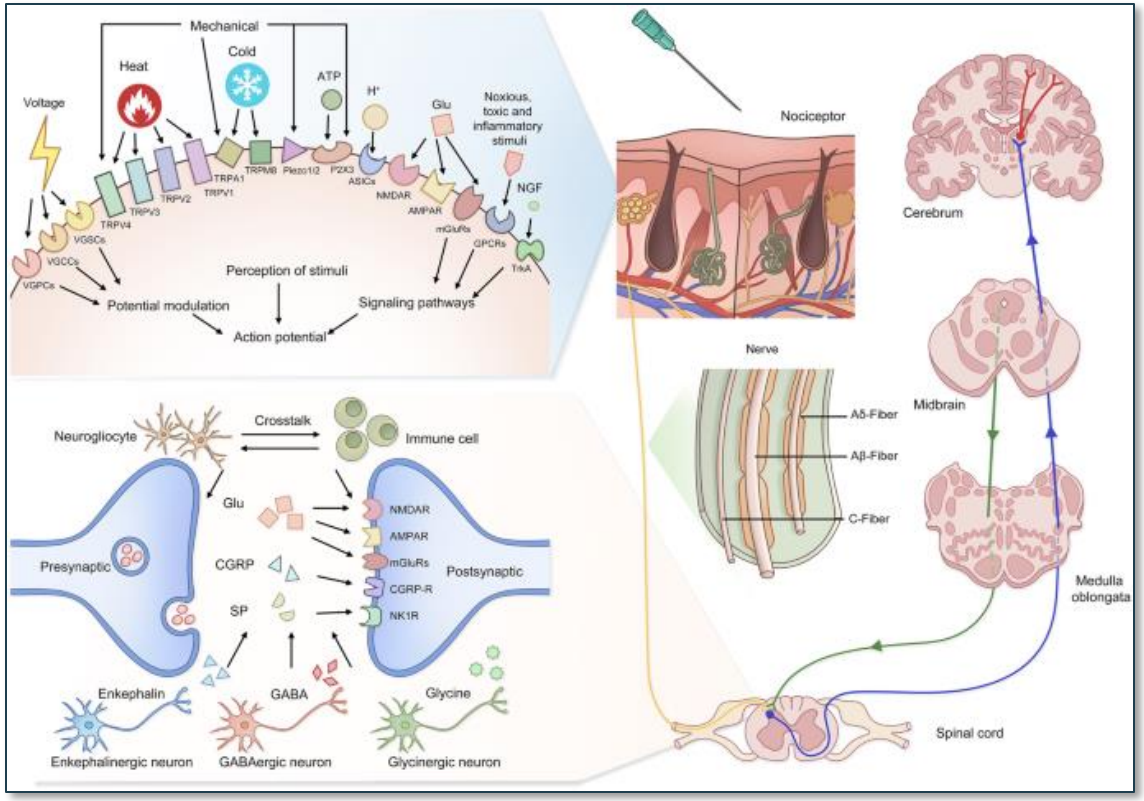
The Nociceptive Message Starts in the Periphery



$5\text{-}HT_3$ = 5-hydroxytryptamine; ATP = adenosine triphosphate; ASIC3= acid-sensing ion channel; BK2 = bradykinin receptor type 2; CB1 = cannabinoid receptor 1; CGRP = calcitonin gene related peptide; DEG/ENaC = degenerin/epithelial sodium channel; DRG = dorsal root ganglia; NGF = neurotrophins; $P2X_3$ = P2X purinoceptor 3; PGE_2 = prostaglandin E2; TrkA = tropomyosin receptor kinase A; VR1/VRL-1 = vanilloid receptor 1/vanilloid-like receptor 1

Weinbroum AA. *Pharmacol Res.* 2017;120:188-205.

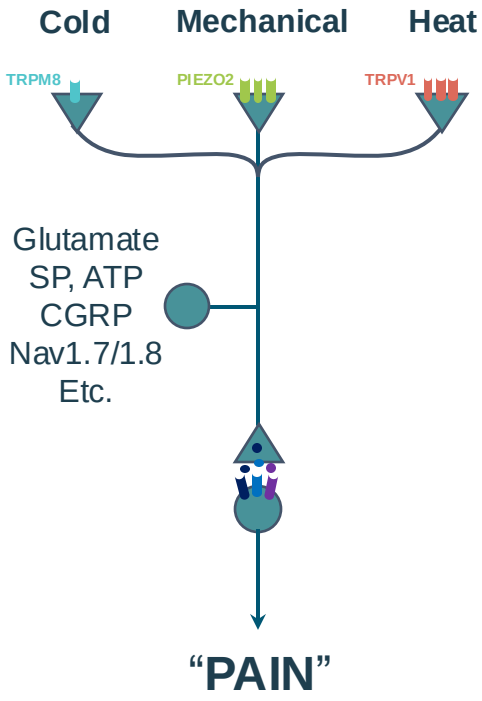
Mediators of Nociceptive Pain

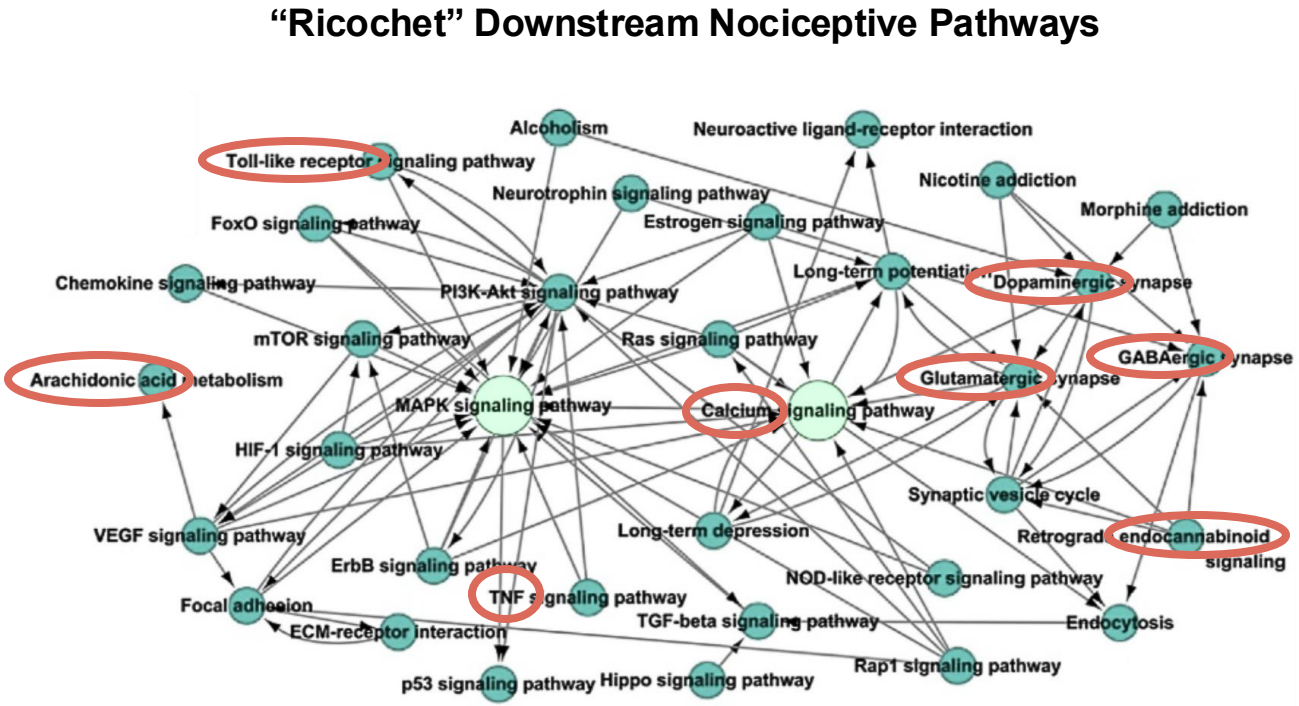


Ion channels and transporters are key mediators of nociceptive pain and are at the center of analgesic drug development

Cao B, et al. *Signal Transduct Target Ther*. 2024;9(1):155.

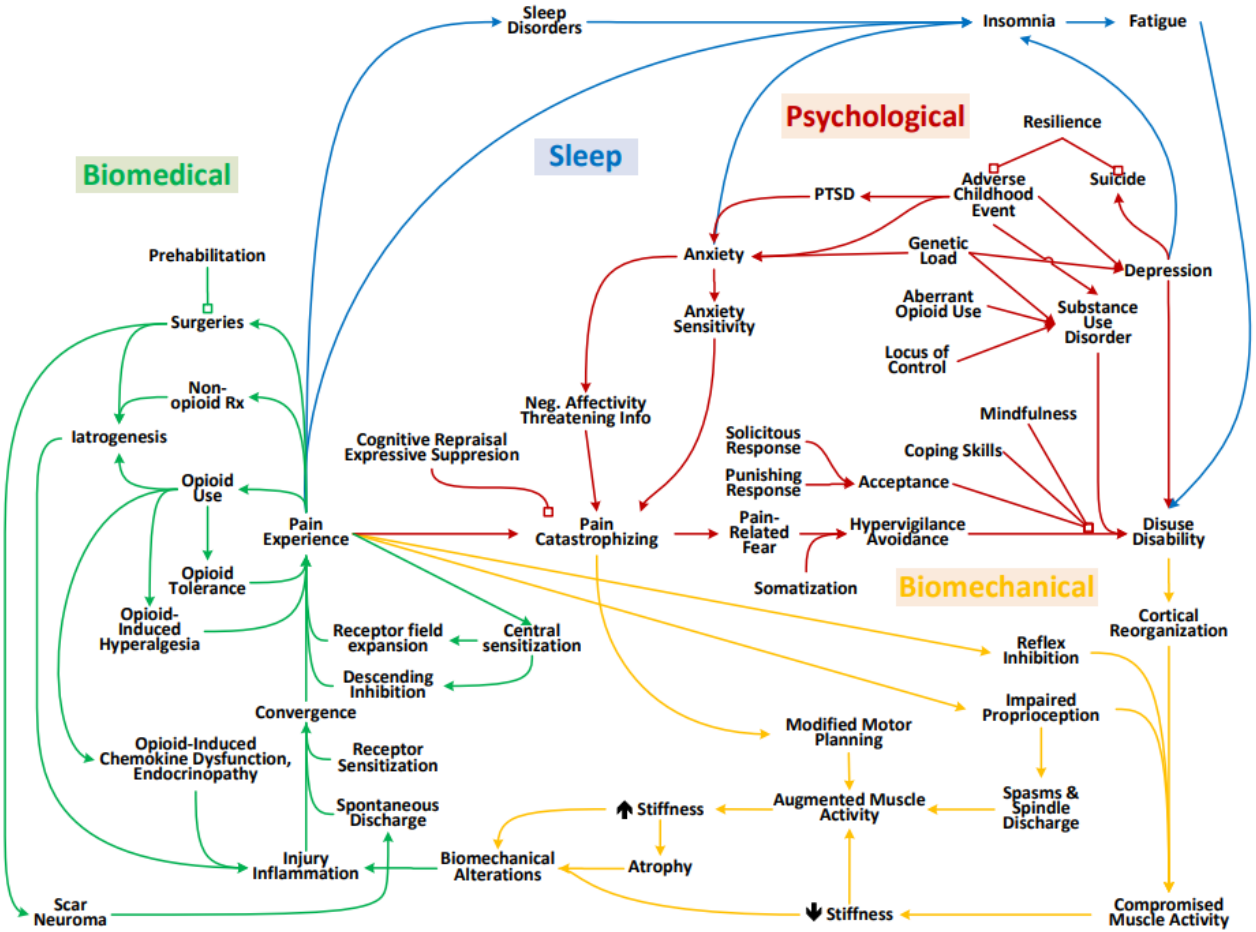
Why Pain is so Difficult to Treat…





Nav = sodium voltage-gated channel; PIEZO2 = piezo-type mechanosensitive ion channel component 2; SP = substance P; TRPM8 = transient receptor potential melastatin-8; TRPV1 = transient receptor potential vanilloid type 1. Lin JJ, et al. *Theranostics.* 2017;7(7): 2015-2031.

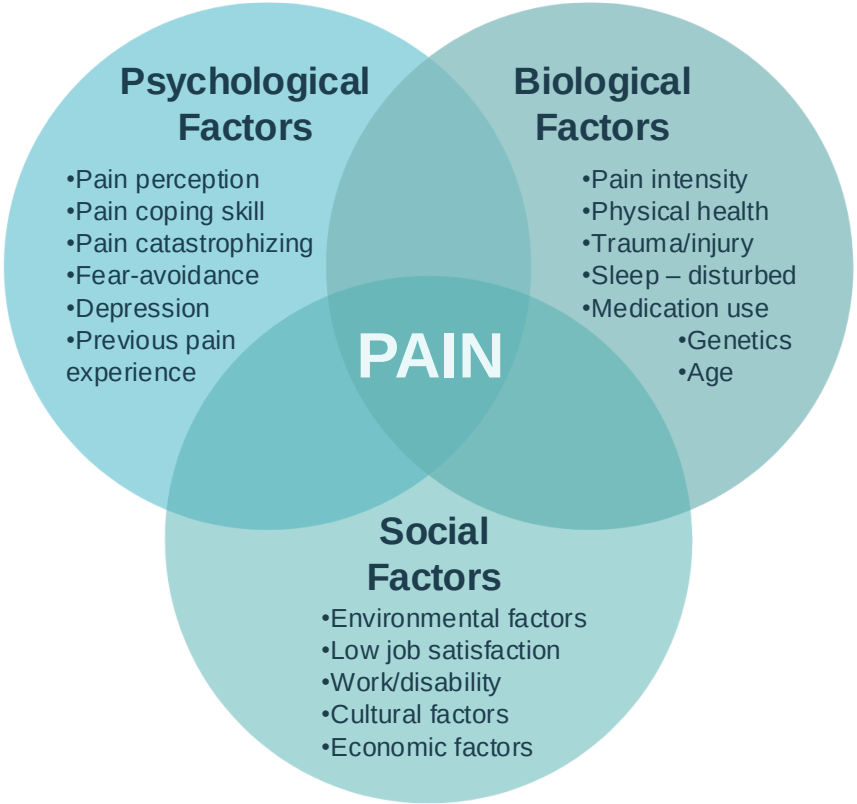
The Body's Response to Pain is Complex!



American Chronic Pain Association [ACPA] and Stanford University Division of Pain.
Stanford Resource Guide to Chronic Pain Management: An Integrated Guide to Comprehensive Pain Therapies. 2021.
https://med.stanford.edu/content/dam/sm/pain/documents/ACPA-Stanford-Resource-Guide-to-Chronic-Pain-Management-2021-Edition-4-18-21-.pdf.

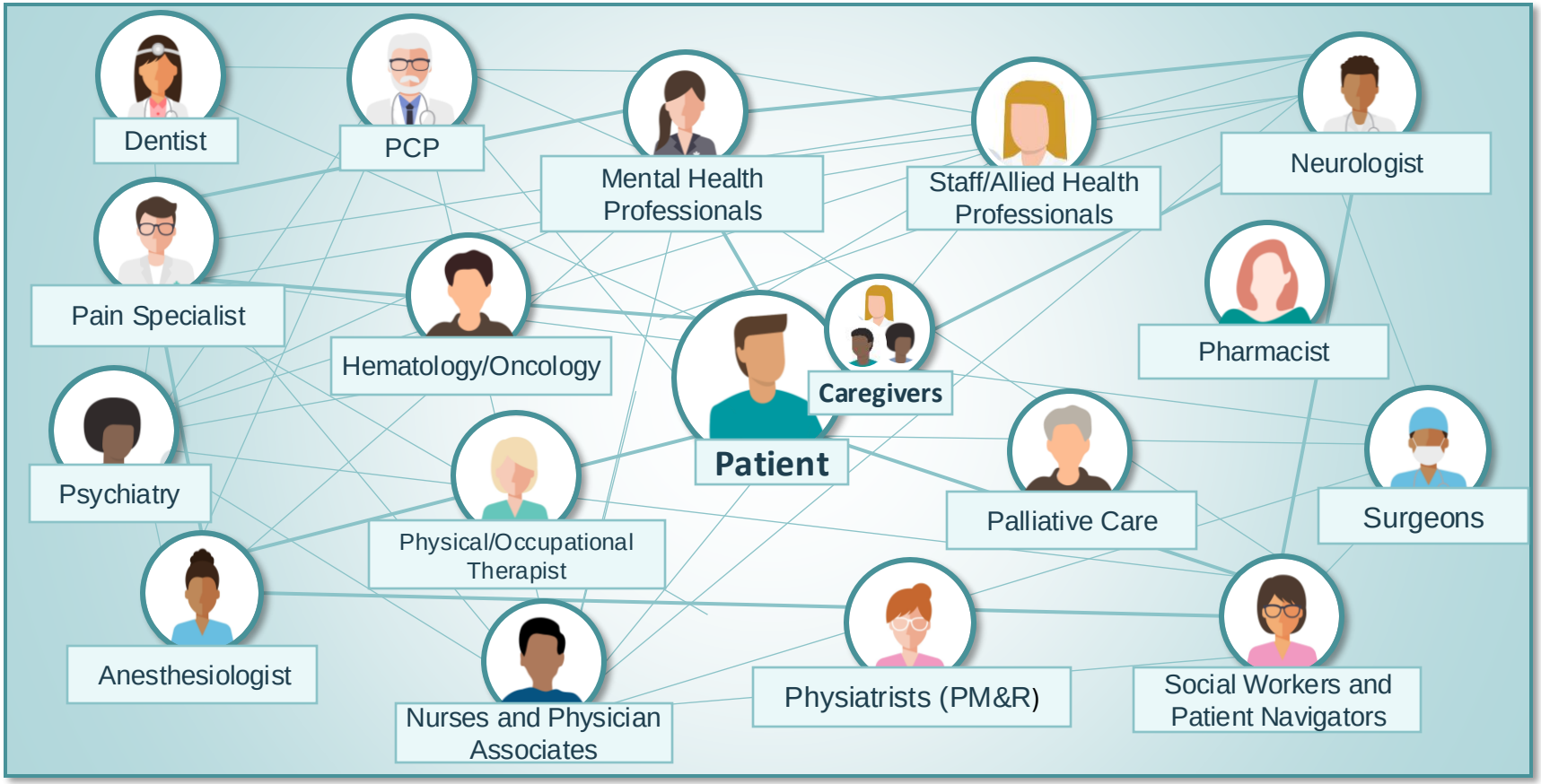
Pain Influences are Multifactorial

- Pain comprised of biological, psychological, and social factors
- As pain itself is multifactorial, best practices and optimal pain treatments are also multifactorial



Cohen SP et al. *Lancet.* 2021; 397(10289):2082-2097.

Team-based Approach for the Management of Pain



Multimodal Interdisciplinary Management

Lifestyle change

Exercise/walking program, weight loss

Psychological/behavioral

Psychotherapy, group support, coping skills, CBT

Surgery

Total knee arthroplasty, total hip replacement, spine surgery

Physical therapy & rehabilitation

Physical therapy, occupational therapy, aquatic therapy, assistive devices

Interventional approaches

Injections

Complementary, alternative, & mind-body approaches

Acupuncture, yoga, Tai-Chi, Qigong, mindfulness

Pharmacotherapy

Topical/oral analgesics, adjuvants

New therapies ARE coming!

CBT = cognitive behavioral therapy

Welsh TP, et al. *Med Clin North Am*. 2020;104(5):855-872. Cohen SP et al. *Lancet*. 2021; 397(10289):2082-2097.

From Self-Healing to Augmented Biology Therapies

Augmented Biology

Self-Healing

Devices

- Transcutaneous electrical nerve stimulation (TENS)

Natural

- Traditional Chinese medicine
- Acupuncture
- Menthol
- Cannabidiol
- Supplements

Physical

- Physiotherapy
- Massage
- Posture
- Acupuncture
- Hot/cold therapies

Psychology

- CBT
- Mindfulness
- Visualization
- Meditation

Exercise

- Aerobic exercise
- Tai chi
- Yoga

Nutrition

- Balanced diet
- Weight loss

Welsh TP, et al. *Med Clin North Am*. 2020;104(5):855-872. Cohen SP et al. *Lancet*. 2021; 397(10289):2082-2097.

The Biopsychosocial Model of Pain

- Pain pathology
- Inflammation
- Nociception
- Chronic disease

- Stress and coping
- Catastrophizing
- Depression/anxiety
- Cognition

- Sleep
- Nutrition/diet
- Exercise/mobility
- Substance use

- Social exclusion
- Discrimination
- Stigmatization
- Employment/income

Adams LM, et al. *J Appl Behav Res.* 2018; 23:e12125. Darnall BD, et al. *Pain Med.* 2017;18(8):1413-1415. Robinson-Lane SG, et al. *J Gerontol Nurs.* 2017;1-8. McClendon J, et al. *Arthritis Care Res (Hoboken).* 2021;73(1):11-17.

Pain Psychology and the Biopsychosocial Model of Pain Treatment

- Pain is defined as an aversive “sensory and emotional experience,” yet few understand how to address the emotional aspects of the pain experience
  - 72% of therapist and psychologist respondents reported having little or no formal pain training, and 55% endorsed low comfort levels in addressing and treating pain
- The Institute of Medicine’s report on Relieving Pain in America and the National Pain Strategy both specify a need to treat pain **comprehensively**
- Clinicians across disciplines need education on the importance of multidisciplinary pain care and the integral role of psychological factors in the experience of pain

Darnall BD, et al. *Pain Med*. 2017;18(8):1413-1415.

The Biopsychosocial Approach to Chronic Pain

- Biopsychosocial model focuses on the complex interaction of biological, psychological, and social factors
  - Suggest a difference in disease versus “illness” – which refers to a subjective experience of how a sick person and members of their family lived with, and respond to, symptoms of disability
- Analogous to the difference between nociception and pain – where one involves the stimulation of nerves that convey information to the brain versus subjective perception that results from the transmission and modulation of this information

Gatchel RJ, et al. *Psychol Bull.* 2007;133(4):581-624.

The Biopsychosocial Approach to Chronic Pain

- Pain information is filtered through an individual's genetic composition, prior learning history, psychological status, and socio-cultural influences
- The interrelationships among biological changes, psychological status, and the socio-cultural context all need to be considered to fully understand a person's perception and response to pain and illness
- **Any model that focuses on only one of these dimensions will be incomplete and inadequate**

Gatchel RJ, et al. *Psychol Bull.* 2007;133(4):581-624.

Biopsychosocial Model – Intertwined Factors

BIO ····· PSYCHO ····· SOCIAL

Central Processes

Biological ↔ Cognitive

Somatic ↔ Affective

Efferent Feedback ↓

Afferent Feedback ↑

Peripheral Processes

Autonomic ↔ Endocrine

Immune Systems

Genetic Predispositions

↔

- Activities of daily living
- Environmental stressors
- Interpersonal relationships
- Family environment
- Social support/isolation
- Social expectations
- Cultural factors
- Medicolegal/insurance issues
- Previous treatment experiences
- Work history

Meints SM, et al. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018;87(Pt B):168-182. Gatchel RJ. *Am Psychol.* 2004;59(8):795-805.

So HOW Do We Incorporate Biopsychosocial Assessment?

Assessment of Psychosocial and Functional Impact of Chronic Pain

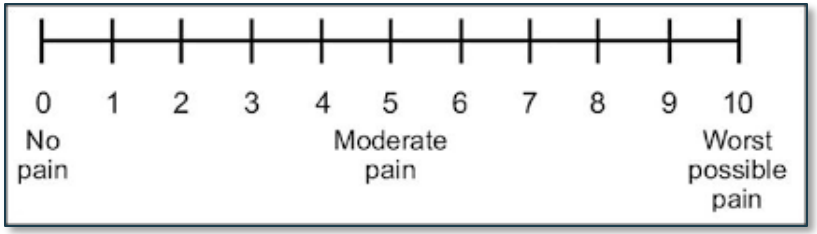
Assess key psychosocial and behavioral factors that are consequences of persistent pain:

- Mood/Affect
- Coping Resources
- Expectations
- Sleep Quality
- Physical Function
- Pain-related interference with daily activities

Turk DC, et al. *J Pain*. 2016;17(9 Suppl):T21-T49

Measures for the Assessment of Pain in Adults

- Typical assessments of pain (location, severity, and quality) and its impact on functioning cannot possibly tell the full story
- Pain is a biopsychosocial phenomenon in which thoughts, emotions, and behavior contribute significantly to pain perception and pain outcomes



Hassett AL, et al. *Arthritis Care Res (Hoboken).* 2020;72 Suppl 10:342-357.

Measures for the Assessment of Pain in Adults

Optimal comprehensive assessment of pain may also include:

- Underlying pain mechanisms
- Perceived meaning of the pain
- Level of pain acceptance
- Pain coping strategies
- Pain-related behavioral/fear avoidance (e.g., kinesiophobia)
- Resilience factors (e.g., high levels of positive affect, strong social support, internal locus of control, and a sense of purpose in life)

Hassett AL, et al. *Arthritis Care Res (Hoboken).* 2020;72 Suppl 10:342-357.

Questionnaires Reviewed

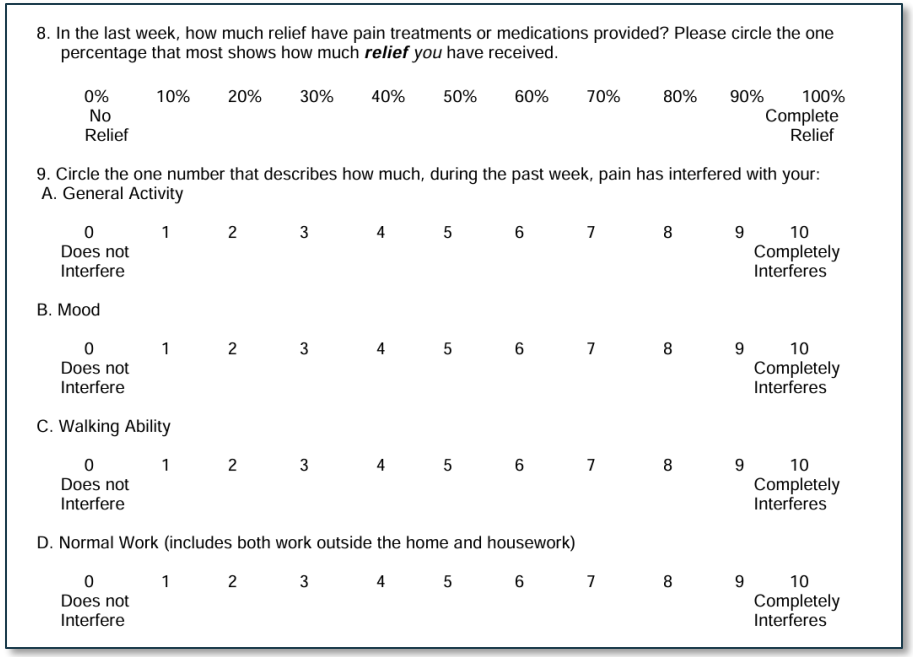
- Pain severity and pain interference subscales from the Brief Pain Inventory (BPI)
- Defense and Veterans Pain Rating Scale (DVPRS)
- Michigan Body Map (MBM)
- PainDETECT questionnaire (PD-Q)
- Patient-Reported Outcomes Measurement Information System Pain Interference (PROMIS-PI) scales
- Ambulatory assessment of pain intensity, including the use of Ecological Momentary Assessment and daily pain diaries

Hassett AL, et al. *Arthritis Care Res (Hoboken). 2020;72 Suppl 10:342-357.*

Brief Pain Inventory (BPI)

15 item (short version) validated assessment of pain intensity and pain interference

- Assesses the presence of pain
- Pain intensity (worst, least, average, and current)
- Pain location (body map)
- Impact of pain interference on general activity
- Mood
- Walking ability
- Normal work
- Relationships with others
- Sleep
- Life enjoyment
- Helps clinicians document pain medications used and the relief provided by those medications as well as other pain treatments



8. In the last week, how much relief have pain treatments or medications provided? Please circle the one percentage that most shows how much ***relief*** *you* have received.

0% No Relief | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% Complete Relief

9. Circle the one number that describes how much, during the past week, pain has interfered with your:

A. General Activity

0 Does not Interfere | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Completely Interferes

B. Mood

0 Does not Interfere | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Completely Interferes

C. Walking Ability

0 Does not Interfere | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Completely Interferes

D. Normal Work (includes both work outside the home and housework)

0 Does not Interfere | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 Completely Interferes

Hassett AL, et al. *Arthritis Care Res (Hoboken). 2020;72 Suppl 10:342-357.*

Importance of Psychology in Chronic Pain

- All pain has a psychological component
- Seeing a psychologist does NOT mean that the pain is not real, nor that the patient has a primary mental health disorder
  - If they do, MUST stabilize that disorder to attain pain control
  - Unaddressed psychological symptoms worsen response to medical treatment
- You are probably not (and don't have to be) the patient's behavioral psychologist

Meints SM, Edwards RR. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018;87(Pt B):168-182.

Importance of Psychology in Chronic Pain

- Hard to get patients to embrace the concept
- Rehabilitation is not just physical
- Helps setting realistic, meaningful, and functional goals
- Builds repertoire of non-pharmacological strategies
- Coping skill development (un-reliance on Rx)
- Early intervention is key!

Rx = prescription

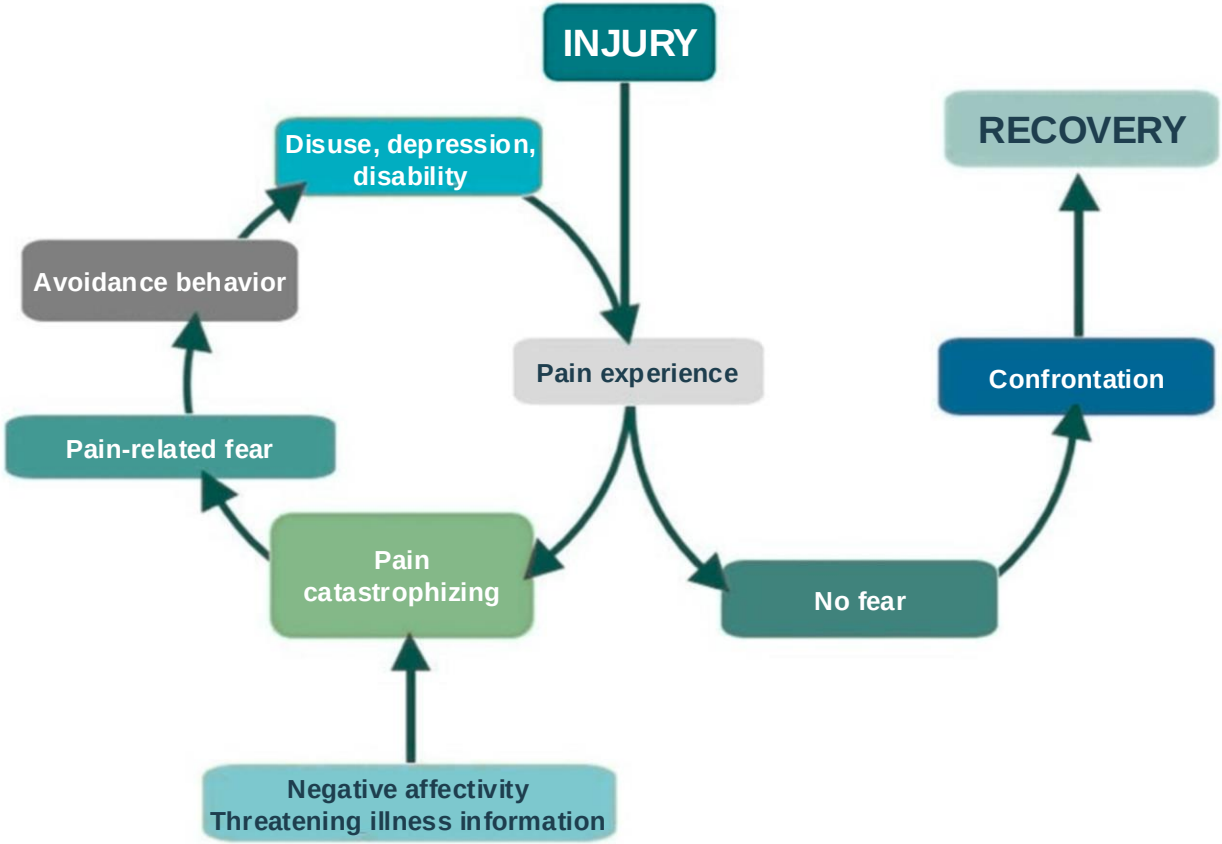
Meints SM, Edwards RR. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018;87(Pt B):168-182.

Patient Discussion Points

- Explain pain
  - Include central sensitization (in lay terms)
- Hurt vs. harm
- Ask about their expectations
  - What are their functional goals?
- Talk about other modalities, activation
- Set very achievable and realistic short-term goals

Dowell D, et al. *MMWR Recomm Rep*. 2022;71(3):1-95. U.S. Food and Drug Administration [FDA]. *FDA's Opioid Analgesic REMS Education Blueprint for Health Care Providers Involved in the Treatment and Monitoring of Patients with Pain*. 2023. https://www.fda.gov/media/173774/download?attachment.

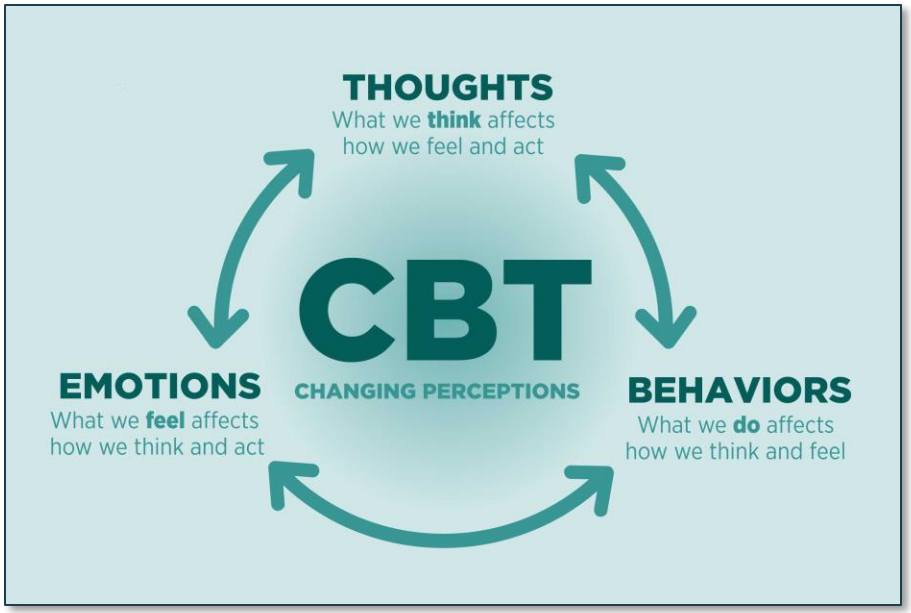
Fear-Avoidance Model of Chronic Pain



Vlaeyen JWS, Linton SJ. *Pain.* 2000;85(3):317-332.

Cognitive Behavioral Therapy (CBT)

- Assists with pain catastrophizing, fear avoidance, coping and increasing activity
- Includes: pain education, relaxation strategies, pacing, sleep hygiene, communication strategies, and cognitive “restructuring”



Gold standard behavioral treatment for chronic pain

Ehde DM, et al. *Am Psychol*. 2014;69(2):153-166.
Meints SM, Edwards RR. *Prog Neuropsychopharmacol Biol Psychiatry*. 2018;87(Pt B):168-182.

Other Relaxation Strategies

- Progressive muscle relaxation
- Guided imagery
- Autonomic training
- Meditation
  - Easy to find YouTube videos, online scripts, and other resources

Garland EL, et al. *JAMA Intern Med*. 2020;180(1):91-105.

Sleep Hygiene

Consistent sleep/wake time and pre-sleep ritual

Eliminate naps

Reduce caffeine, alcohol, large meals, and blue light

Spend less pre-sleep time in bed

Various (unsuccessful) methods to shut your brain off

Gupta CC, et al. *BMJ Open.* 2023;13(2):e060401. van der Meijden WP, et al. *Sleep.* 2016;39(6):1305-1310.

Personalized Medicine Applies to Chronic Pain

One size does *not* fit all

Patient Case: Harold

What do we do with the patient from our case?

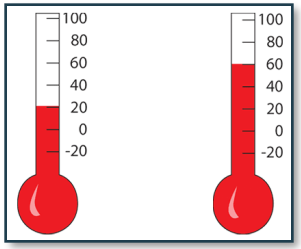
Key Considerations:

- Musculoskeletal pain
- Tobacco use
- Alcohol use
- Lorazepam, hydrocodone
- STRESS…

Don’t Forget About Complementary Nonpharmacological Strategies

Acupuncture

CBT



Heat and Cold

TENS

Stretching

Relaxation

Weight Reduction

Patient Education

Fine PG. *The Diagnosis and Treatment of Breakthrough Pain*. 1st ed. New York, NY: Oxford University Press; 2008.; Bennett D, et al. *P&T*. 2005;30:354-361. Davies AN, et al. *Eur J Pain*. 2009;13:331-338. McCarberg BH. *Pain Med*. 2007;8:s8-s13.

Summary

- Chronic pain is not just a symptom – it can be a syndrome that becomes the disease
- Clinicians need to understand the multifactorial biopsychosocial nature of pain and its associated treatments
- Optimal assessment and treatment is multidisciplinary
- Need to find resources in your town (or online) that can help patients access services that we cannot provide
- Patients are suffering… keep up the fight

SMART Goals

Specific, Measurable, Attainable, Relevant, Timely

Put information into action! Consider the following goals; then *set a time frame* that fits with your work environment and *a reasonable improvement target* that aligns with your patient population.

- Integrate scales into your clinical practice when assessing biopsychosocial factors
- Recognize that patients are at the center of multidisciplinary care
- Educate your patients on importance of psychology in chronic pain