

Chronic Pain: Rational Treatment

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What is Pain?

IASP (2020):

- An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.
- “Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors.”

Classification of Pain

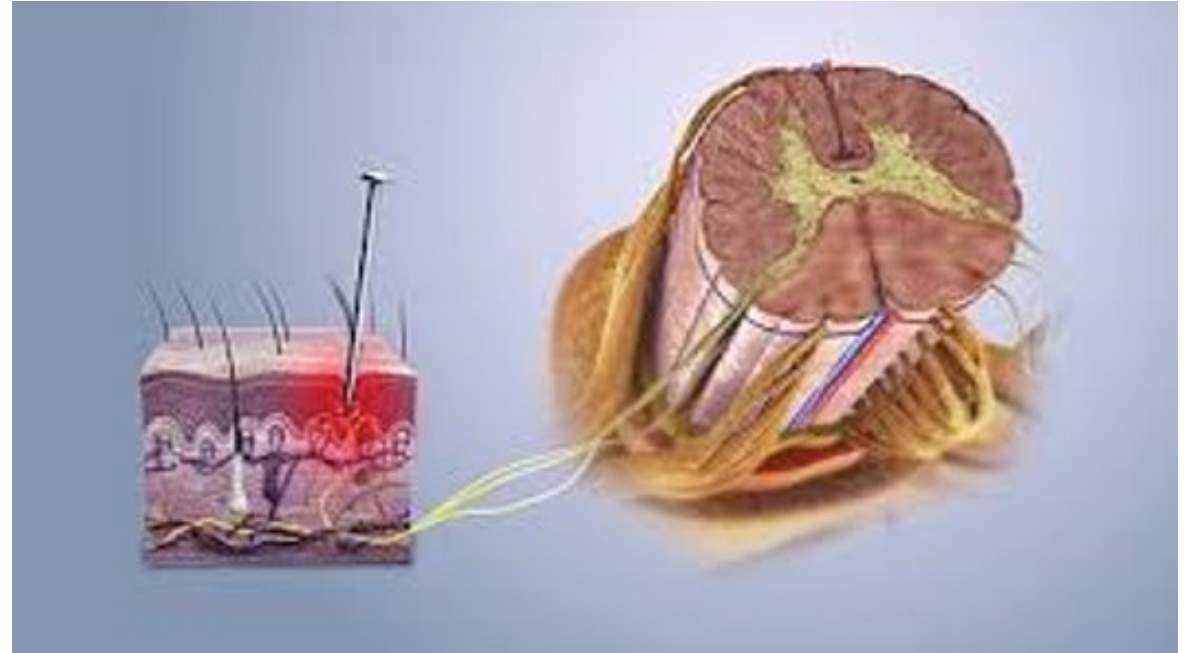
Simplified, there are 3 types of pain (IASP):

- Nociceptive pain
- Neuropathic pain
- Nociplastic pain



Nociceptive Pain

- Actual or threatened damage to (non-neural) tissue activates peripheral nerves called **nociceptors**
- Respond to NOXIOUS stimuli = intense
- Pain \neq nociception



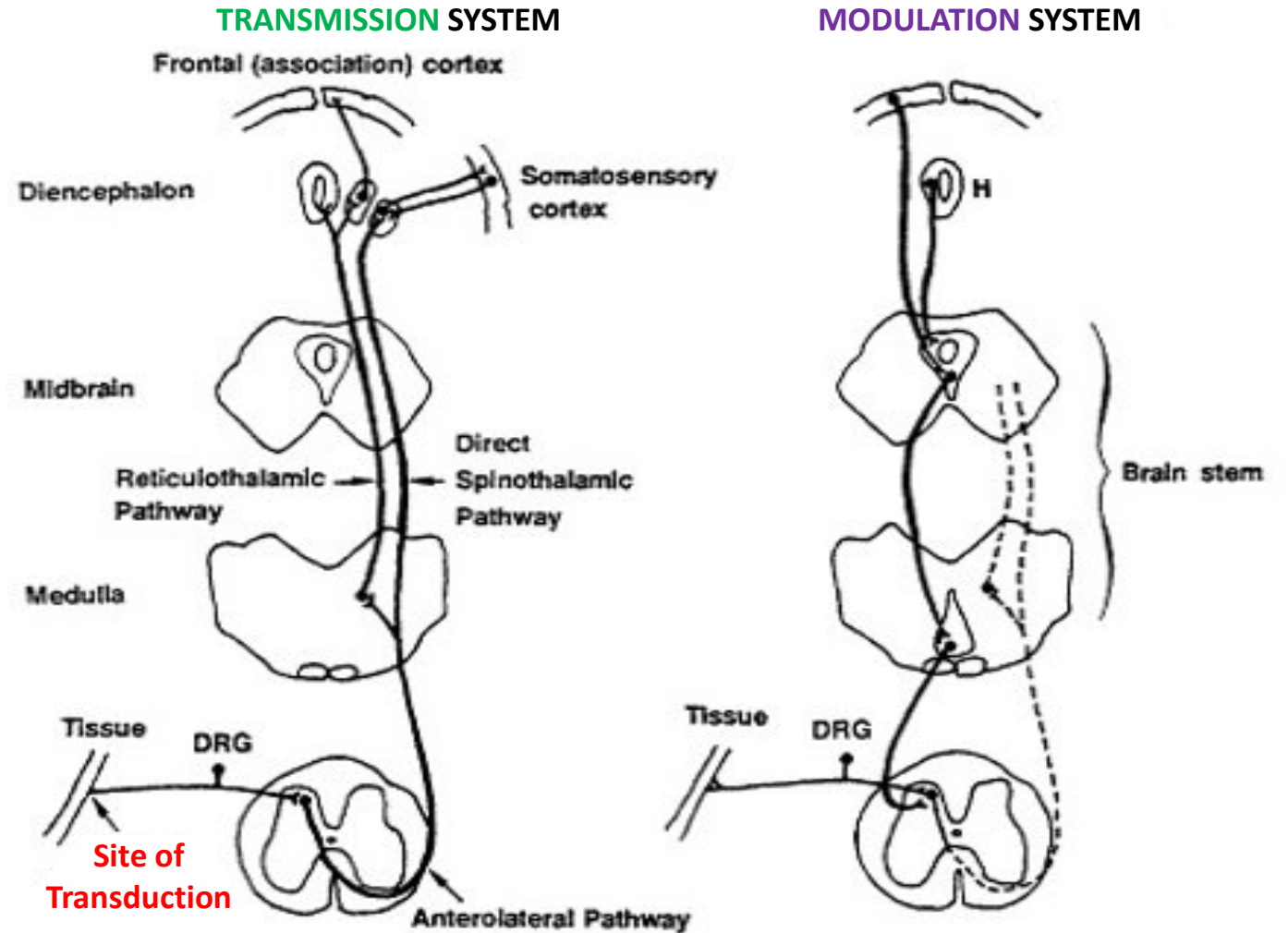
Nociceptive Pain

Noxious stimulus → (TRANSDUCTION)

electrochemical impulses in peripheral nerves → (TRANSMISSION)

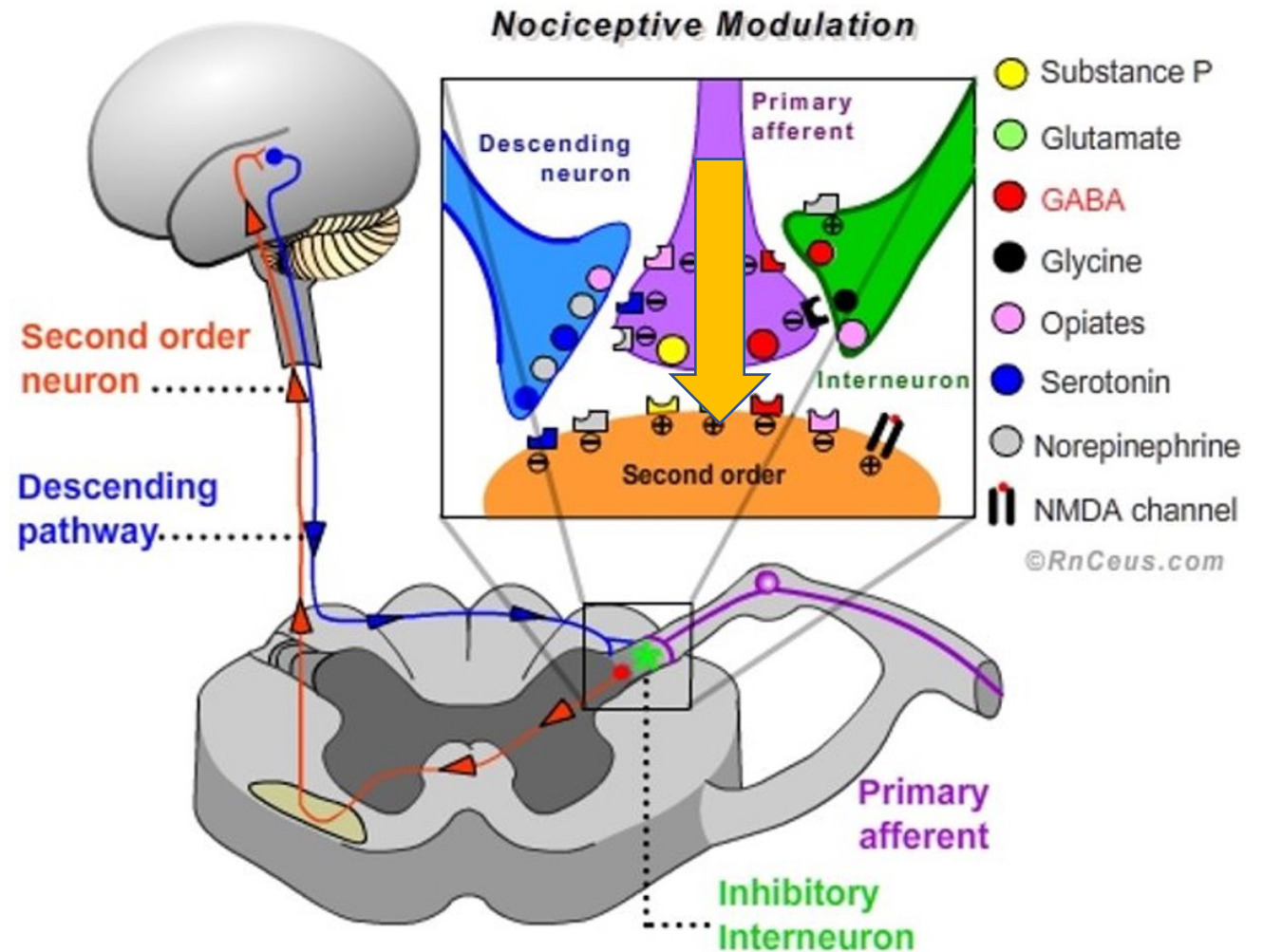
spinal cord → (MODULATION)

brain → (PERCEPTION)



Pain Modulation

- Explains why the activation of nociceptors \neq pain
- Chemical systems modulate pain (opioid, serotonergic, glutamatergic, noradrenergic, cannabinoid)
 - May facilitate pain
 - Hyperalgesia
 - May inhibit pain
 - Analgesia



Nociceptive Pain

- Nociceptive pain is protective
 - Helps prevent injury
 - Reflex withdrawal
 - Initiation of behaviors to avoid further contact
 - Promotes healing
 - Guarding/protection of injured tissue
- Examples: arthritis pain, acute post-traumatic pain



A Note on Acute Pain

The New York Times

Opinion

After Surgery in Germany, I Wanted Vicodin, Not Herbal Tea

By Firoozeh Dumas
Jan. 27, 2018



Rosalie Stroesser

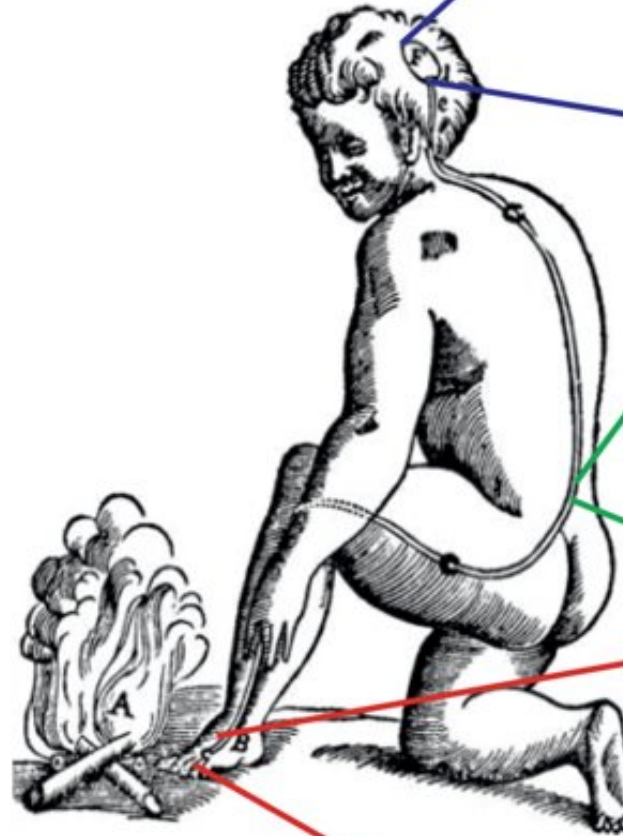
“Pain is a part of life. We cannot eliminate it nor do we want to. The pain will guide you. You will know when to rest more; you will know when you are healing.’

I bring a lot of medicine with me from the United States, all over the counter, all intended to take away discomfort. The German doctors were telling me that being uncomfortable is O.K.”

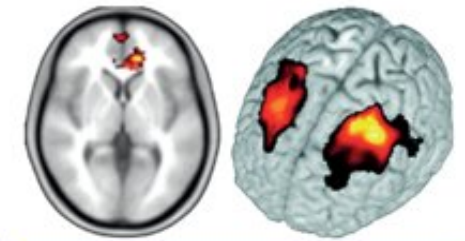
Nociceptive Pain

- **Adaptive:** Hypersensitive when risk of further damage is high, eg, immediately after injury
 - Sensitization can occur in peripheral and central nerves
 - Eg, sunburn
 - Subsides to baseline over time when tissue injury has resolved
- Long-lasting but not permanent

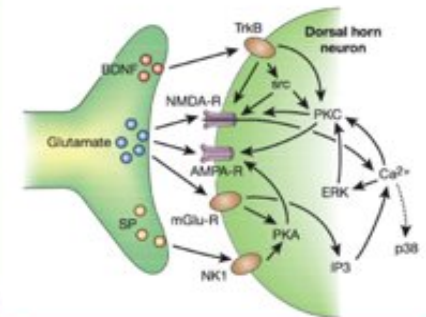
Descartes, 1644



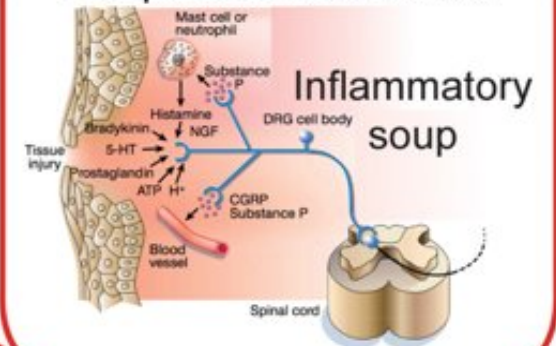
Cortical reorganization



Central sensitization

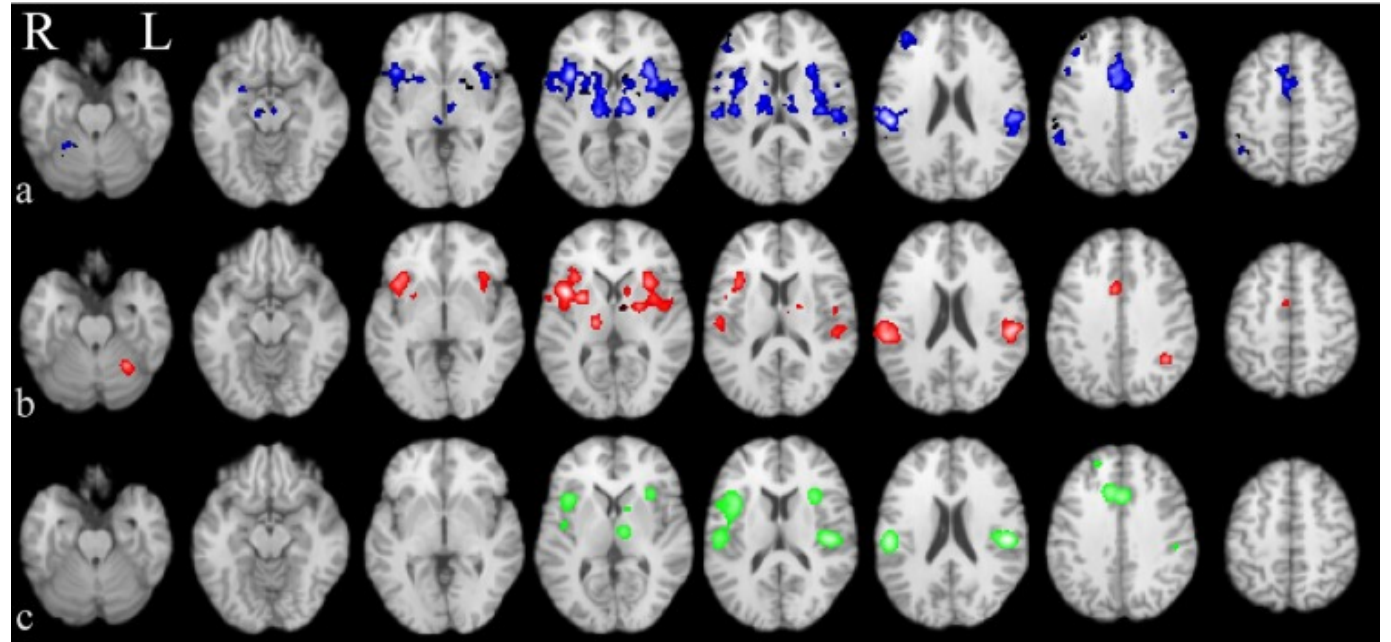


Peripheral sensitization



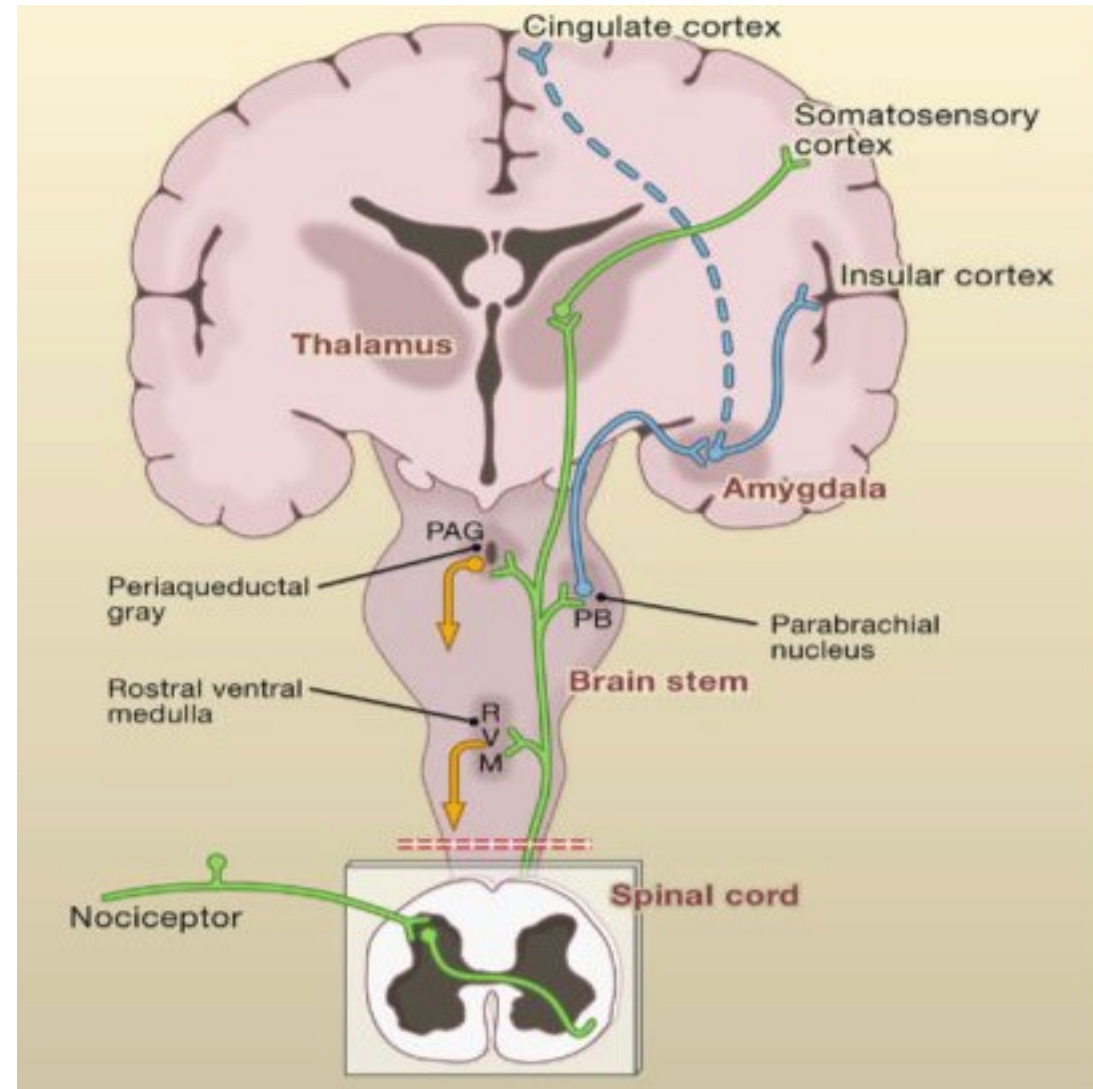
Nociplastic Pain

- IASP: “Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage... or evidence for disease or lesion of the somatosensory system causing the pain.”
- Patients can have a combination of nociceptive and nociplastic pain



Neuropathic Pain

- “Pain arising as a direct consequence of a lesion or disease affecting the somatosensory system.”
 - At any point(s) within somatosensory pathways
 - Sustained by aberrant processing
- No protective effect
- Subsets
 - Peripherally generated pain
 - Centrally generated pain
 - Sympathetically maintained pain



Pathology ≠ Pain!

Table 2: Age-specific prevalence estimates of degenerative spine imaging findings in asymptomatic patients^a

Imaging Finding	Age (yr)						
	20	30	40	50	60	70	80
Disk degeneration	37%	52%	68%	80%	88%	93%	96%
Disk signal loss	17%	33%	54%	73%	86%	94%	97%
Disk height loss	24%	34%	45%	56%	67%	76%	84%
Disk bulge	30%	40%	50%	60%	69%	77%	84%
Disk protrusion	29%	31%	33%	36%	38%	40%	43%
Annular fissure	19%	20%	22%	23%	25%	27%	29%
Facet degeneration	4%	9%	18%	32%	50%	69%	83%
Spondylolisthesis	3%	5%	8%	14%	23%	35%	50%

Just Semantics...

- **Pain Heterogeneity**

Within a single diagnostic category (PHN, osteoarthritis, etc) there may be multiple pain mechanisms and patient characteristics at play

Greater variability in “pain phenotype” between patients than between pain syndromes?

Pain mechanisms (and thus treatment responses) may be determined by individual patient factors as much or more so than disease process

→ Variability in treatment effects

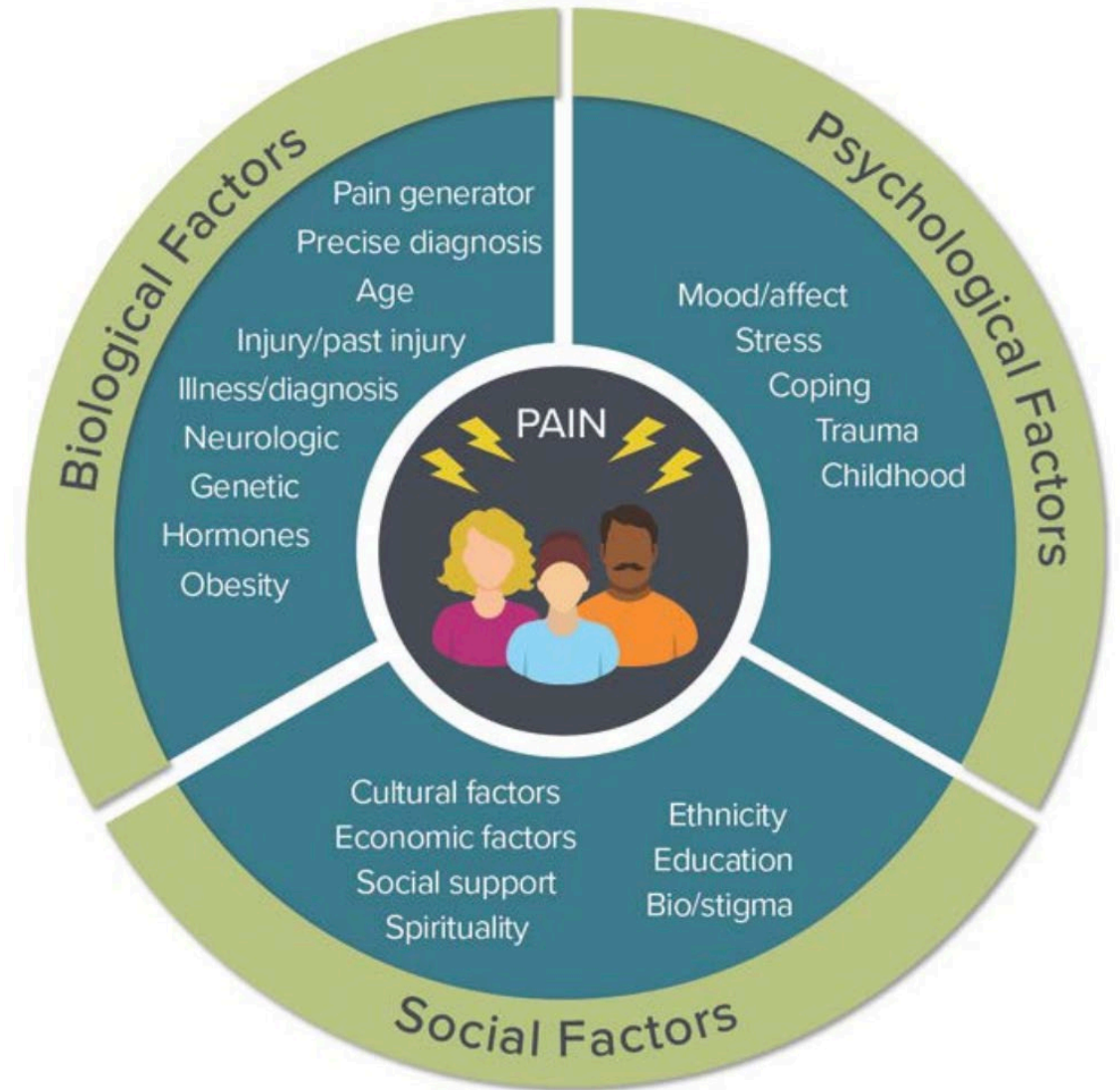


Figure 5: The Biopsychosocial Model of Pain Management



Pharmacological Treatments

- NSAIDs
- Acetaminophen
- Muscle Relaxants
- Steroids
- Anticonvulsants
- Antidepressants
- Opioids
- Anxiolytics

Opioids Relieve Pain...and More?

- 1500s used for “melancholia” or “mania”
- 1800s-mid 1900s Opium Cure for refractory depression
 - Daily tincture of opium in escalating doses
- 1980s-2000s buprenorphine for treatment-resistant depression



Acute Pain Management: Low Back Pain

- First Line Consensus
 - Advice
 - Reassurance
 - Light Physical Activity
- For short-term relief
 - Heat
 - Manual therapy
 - Exercise
 - NSAIDs* and opioids†
 - * no good evidence for acetaminophen
 - †high rates of adverse effects, lack of efficacy
 - use when NSAIDs not tolerated/contraindicated





Fibromyalgia

- Affects 2-4% of people, women > men
- Likely centrally driven pain amplification (nociplastic) pain process
- Diagnosed based upon
WPI ≥ 7 + SS ≥ 5 OR
WPI 3-6 and SS ≥ 9

Criteria Needed for a Fibromyalgia Diagnosis

1. Pain and symptoms over the past week: total number of painful areas (out of 19 parts of the body)

PLUS level of severity of these symptoms (0-3):

- a. Fatigue
- b. Waking unrefreshed
- c. Cognitive (memory or thought) problems

PLUS number of other general physical symptoms (0-3)

2. Symptoms lasting at least three months at a similar level

3. No other health problem that would explain the pain and other symptoms

Fibromyalgia

- Treatment:

Exercise

Aerobic

Tai Chi or Yoga

CBT

CAM

(Medications: duloxetine, milnacipran, pregabalin. NOT opioids, not OTCs)



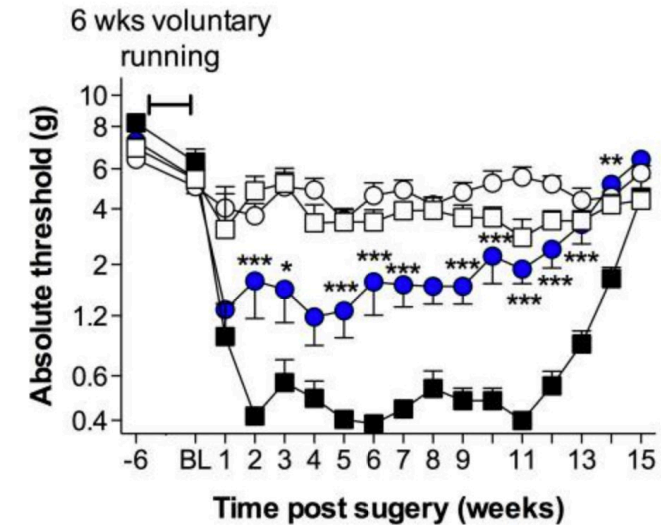
<https://www.nytimes.com/guides/well/beginner-yoga>

AHRQ 2019 Review Non-Pharmacologic Therapies for Chronic Pain

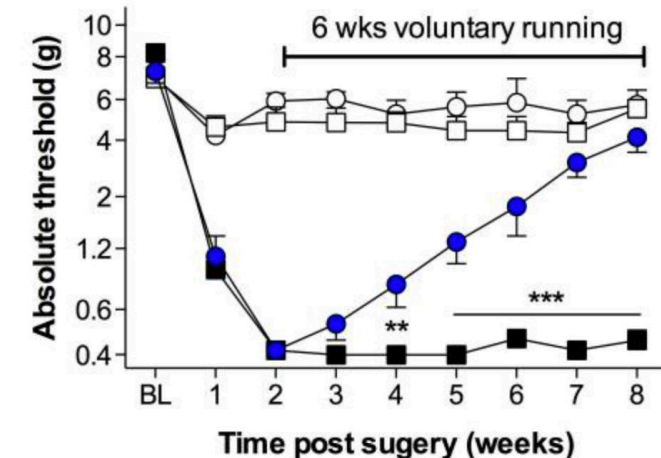
- **Key Messages**
- Interventions that improved function and/or pain for ≥ 1 month:
 - Low back pain:** Exercise, psychological therapy, spinal manipulation, low-level laser therapy, massage, mindfulness-based stress reduction, yoga, acupuncture, multidisciplinary rehabilitation (MDR)
 - Neck pain:** Exercise, low-level laser, mind-body practices, massage, acupuncture
 - Knee osteoarthritis:** Exercise, cognitive behavioral therapy (CBT)
 - Hip osteoarthritis:** Exercise, manual therapies
 - Fibromyalgia:** Exercise, CBT, myofascial release massage, mindfulness practices, taichi, qigong, acupuncture, MDR
 - Tension headache:** Spinal manipulation
- Some interventions did not improve function or pain.
- Serious harms were not observed with the interventions.

Inactivity and Chronic Pain

- In animal models, greater activity prior to induction of chronic pain prevented the development of hyperalgesia
- Regular activity reduces the excitability of pain nerves in the CNS and releases endogenous opioids and serotonin (descending inhibitory pathway)

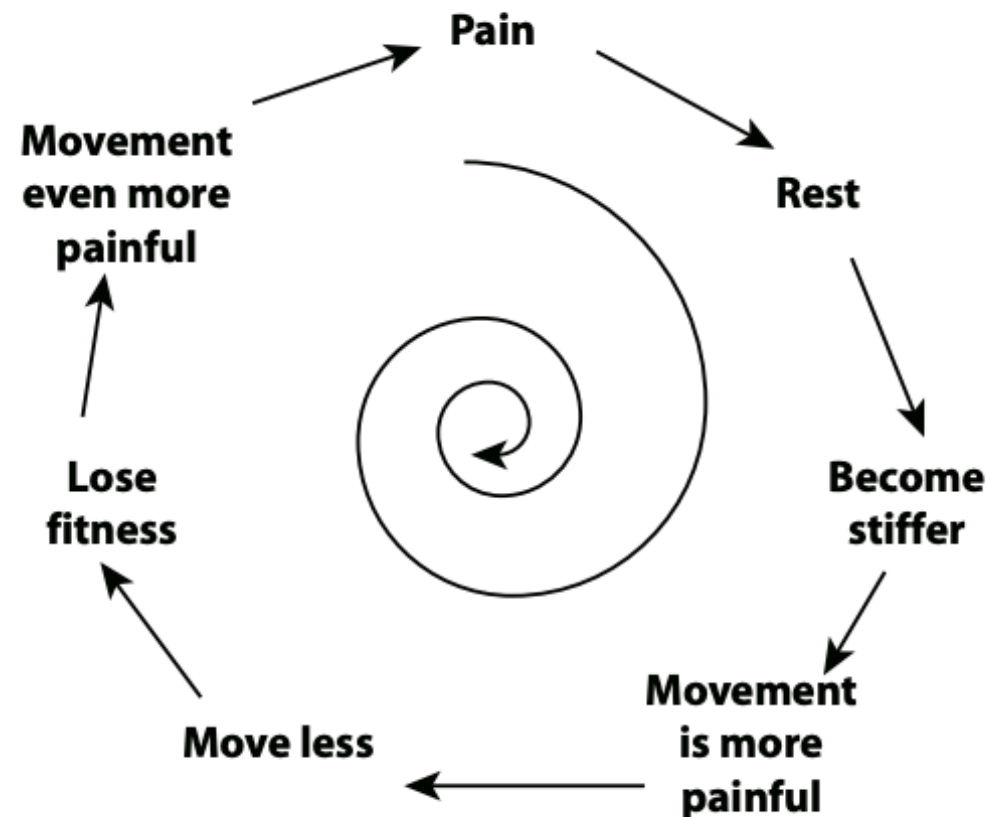


□ Sham+LW ○ Sham+RW ■ CCI+LW ● CCI+RW



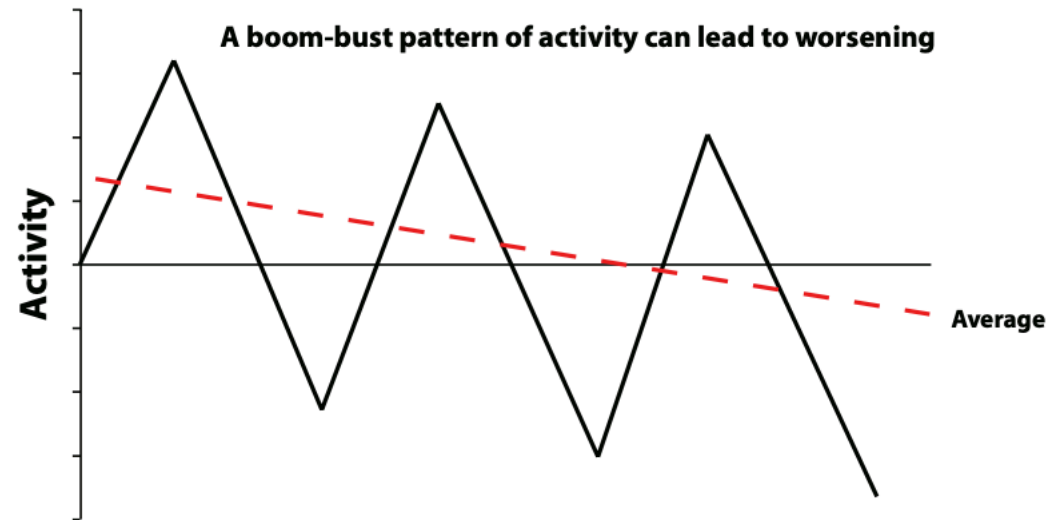
Inactivity and Chronic Pain

- Sedentary lifestyle increases the risk of developing chronic pain
- Patients with chronic pain have lower levels of physical activity than healthy control subjects
- In humans, physical activity associated with reduced pain sensitivity; may modulate central excitability and inhibition
- Numerous international clinical guidelines for chronic musculoskeletal pain recommend exercise and physical activity



Pacing and Chronic Pain

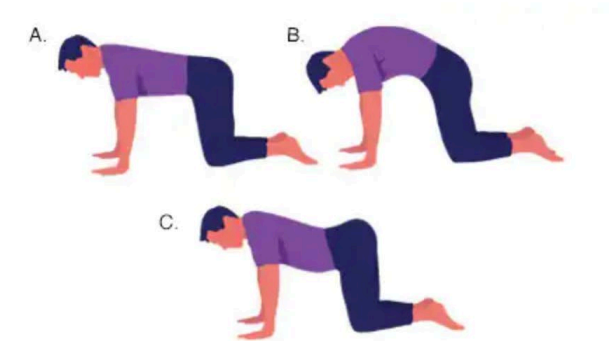
- **Consistent** activity is the goal
- Know when to stop based upon time rather than pain
 - Take a break BEFORE you need to
- Frequent breaks
- Gradually increase activity



Resources

- <https://www.mayoclinic.org/healthy-lifestyle/adult-health/multimedia/back-pain/sls-20076265>
- <https://fibroguide.med.umich.edu/pain-care/self-care/exercise/>

Slide show: Back exercises in 15 minutes a day



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Cat stretch

Position yourself on your hands and knees (A). Slowly arch your back, as if you're pulling your abdomen up toward the ceiling (B). Then slowly let your back and abdomen sag toward the floor (C). Return to the starting position (A). Repeat 3 to 5 times twice a day.



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Knee-to-chest stretch



Lower back rotational stretch



Lower back flexibility exercise



Bridge exercise



Cat stretch