How Does Acute Pain Become Chronic?

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Disclosure

- Nothing to Disclose

Learning Objectives

- Describe a patient-centered approach to the formulation of the patient with acute pain
- Review risk factors/predictors of chronic pain
- Identify rational treatment approaches to reduce the risk of developing chronic pain

New Chronic Pain

- Who develops it?

Case Example

- 45 y/o Korean woman s/p OTJI with foot crushed by heavy equipment for depression & disability
- Immediate reconstructive surgery for stability
- Poor compliance with physical therapy
- High levels of acute pain pre- and post-op
- Treated with SAO's and acetaminophen
- Prescribed multiple agents for insomnia & anxiety
- After 6 months, referred to Orthopedics for BKA

Chapman CR, Vierck CJ. *J Pain.* 2017.

Typical Risk Factors

- Demographic variables
- Pain characteristics
- Psychological factors
- Contextual details

Miller RM, Kaiser RS. *Curr Pain Headache Rep. 2018.*

Demographics

- Age
- Gender
- Education
- Employment
- Health status

Pain Characteristics

- High pain intensity
- Long pain duration
- Radiation of pain
- Prior episodes of pain
- Multiple sites of pain
- Multiple somatic symptoms

Psychological Factors

- Negative emotion
- Depression
- Anxiety
- Anger
- Fear
- Stress
- Distress
- Catastrophizing
- Hypervigilance
- Self-efficacy
- Neuroticism
- Pain sensitivity
- Somatization
- _____

Context

- Injured at work
- Work safety
- Work satisfaction
- Compensation
- Litigation
- Social support
- External attributions of responsibility

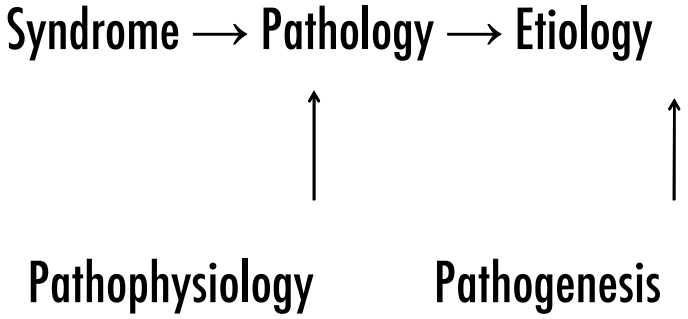
Risk Factors for New Chronic Pain

- Why does it matter?

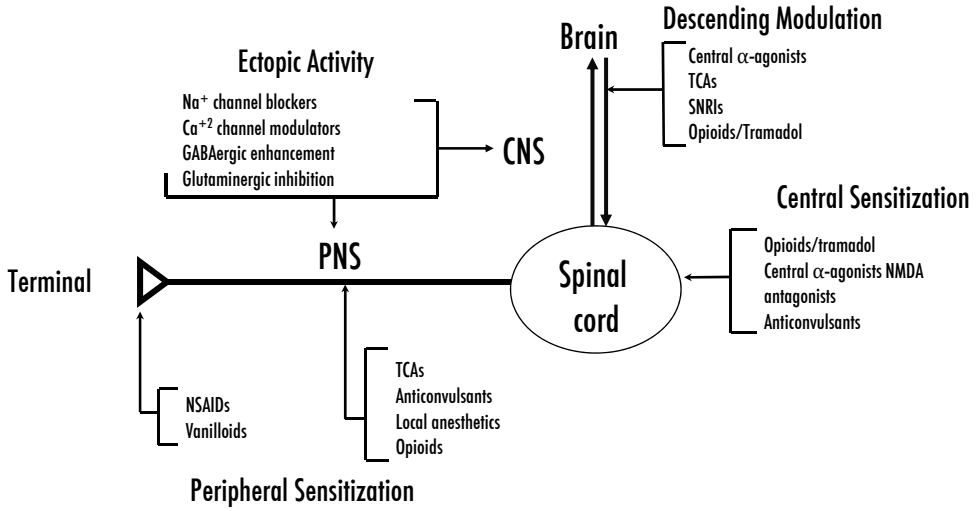
Perspectives of New Chronic Pain

- Diseases
  - —Pain sensitization
  - —Major depression
- Dimensions
  - —Pain modulation
    - Diffuse noxious inhibitory control (DNIC) efficiency
    - Temporal summation
  - —Somatic symptoms
- Behaviors
  - —Fear and avoidance
  - —Substance use
- Life stories
  - —Catastrophizing
  - —Post-traumatic stress disorder (PTSD)

Diseases



Pharmacological Targets in Pain



Khalid S, Tubbs RS. *Cureus.* 2017; Woolf C, Max M. *Anesthesiology.* 2001.

Depression in Patients with Chronic Pain

- Which one really came first?

Longitudinal Relationships

- Majority of the data support the diathesis-stress model (depression is a consequence of chronic pain)
- Treatment of depression improves pain and disability
- Directionality depends on the type of "depression"
  - —Affective disorders (MDD, Dysthymic Disorder, Bipolar)
  - —Adjustment disorders, Grief reactions, Demoralization

Polatin P, et al. *Expert Rev Clin Pharmacol*. 2017; Velly AM, Mohit S. *Prog Neuropsychopharmacol Biol Psychiatry*. 2017; Sheng J, et al. *Neural Plast*. 2017.

Longitudinal Relationships

- Depressive disorders at baseline doubled the risk for new onset back pain 13 years later
- Severe depression (impairment) tripled the risk for incident back pain 12 years later
- Major depression + dysthymic disorder (excluding dysphoria) still increased risk for incident back pain 13 years later by 75%

Larson S, et al. *Psychol Med*. 2004.

Summary of Negative Analyses

- Current depression did not increase the risk for incident back pain; odds ratio (OR)=1.70, (0.71, 4.08)
- Depression at baseline did not increase the risk for incident back pain 1 year later
- Back pain at baseline was not associated with depression at baseline
- Back pain at baseline was not associated with incident depression at any time point

Larson S, et al. *Psychol Med.* 2004.

Behaviors

Drive → Choice → Learning

Fear and Avoidance

- Can we unlearn what we learn?

Kroska EB. *Scand J Pain*. 2016; McLean SA, et al. *Psychosom Med*. 2005.

Patients With Substance Use Disorder

- What can we learn with a paradigm shift?

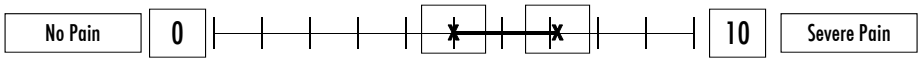
Susceptibility To Chronic Pain

- A history of substance use increases abuse of pain medications
- Cold pressor pain tolerance is ↓ in current opiate and cocaine users compared with former users
- Alcoholics and families of alcoholics have ↑ pain sensitivity and ↑ pain reduction with EtOH

Witkiewitz K, Vowles KE. *Alchol Clin Exp Res*. 2018; Webster LR. *Anesth Analg*. 2017; Clark, et al. *Can J Psychiatry*. 2008.

Brief Pain Inventory (BPI)

- Patients reporting pain = 61%
- Pain intensity
  - —Pain right now 5.1
  - —Average 5.8
  - —Worst 7.2
  - —Least 4.6



Clark , et al. *CPDD.* 2007.

BPI Treatment

- Receiving treatment for pain outside ATS = 14%
- Average relief provided by pain treatment = 51%
- Types of pain treatment being received:
  - —Analgesics (NSAIDs, opioids): 12% (89% of treated)
  - —Other (PT, blocks, epidurals): 7% (53% of treated)
- No one received adjuvant analgesics (ADs, AEDs)

NSAIDs. nonsteroidal anti-inflammatory drugs; PT, physical therapy; AEDs, antiepileptic drugs.
Clark , et al. *CPDD.* 2007.

Dimensions

Potential → Provocation → Response

Pain Modulation

- How are we different?

Central Pain Modulation

- Endogenous analgesia system (individual trait)
- Capability assessed via the Diffuse Noxious Inhibitory Control (DNIC) test paradigm
- Lower DNIC efficiency is associated with pain
  - Healthy people with pain
  - Chronic pain syndromes
    - Primarily those postulated to be due to central sensitization
    - Fibromyalgia syndrome, multiple sclerosis, temporomandibular disorder, migraine, tension headache, irritable bowel syndrome

Hermans L, et al. *Pain Pract*. 2016; Bannister K, Dickenson AH. *J Physiol*. 2017; Granot. *Curr Opin Anes*. 2009.

Incidence Of Post-thoracotomy Pain

- 62 patients undergoing thoracotomy
  - 38 men, mean age = 62 +/- 14 years, multiple causes
  - 36 patients → chronic pain, no med/surg predictors
- Mean follow-up = 29 +/- 17 weeks
- Acute post-op pain = 49 +/- 21 (0-100 NPS)
- Chronic post-op pain = 55 +/- 27 (0-100 NPS)
- Acute post-op pain correlated with chronic pain
- DNIC efficiency correlated with chronic pain

NPS, numerical pain scale.
Rodriguez-Aldrete D, et al. *J Cardiothorac Vasc Anesth*. 2016; Yarnitsky, et al. *Pain*. 2008.

Predictors of Post-thoracotomy Pain

- Acute postoperative pain intensity (modifiable?)
  - OR = 1.80 (1.28 – 2.77)
  - Change of 10 units on scale of 0 to 100
- DNIC efficiency (dynamic preoperative trait)
  - OR = 0.52 (0.33 – 0.77)
  - Change of 10 units on scale of -100 to +100
  - Probability of chronic post-thoracotomy pain
    - DNIC 0 → 80%; DNIC 40 → 23% ; DNIC 50 → 12%
    - No correlation with acute postoperative pain (independent)

Humble SR, et al. *Eur J Pain*. 2015; Yarnitsky, et al. *Pain*. 2008.

Somatic Symptoms

- How do symptoms become chronic?

Somatization ↔ Chronic Pain ?

- Prospective population-based follow-up survey
- 1658 people without chronic widespread pain
  - (No pain = 825; Some pain = 833)
- Somatic symptoms, psychological distress, fatigue, health anxiety, illness behavior
- 1404 respondents at 12-month follow-up
- New chronic widespread pain
  - 4.4% of men; 6.8% of women
  - One-third of new cases were men

Sharma MP, Manjula M. *Int Rev Psychiatry*. 2013; McBeth, et al. *Arthritis & Rheumatism*. 2001.

Predictors of Chronic Pain

- 8% of people with some pain vs 2% w/o pain
- Health anxiety: NS
- Fatigue: OR = 2 (univariate only)
- Psychological distress: OR = 2 (univariate only)
- Somatic symptoms >2: OR = 4 (1.5 – 7.4)
- Illness behaviors: OR = 4 – 9 (1.8 – 22.2)
  - Frequent healthcare visits for symptoms that disrupt normal activity

McBeth, et al. *Arthritis & Rheumatism*. 2001.

Life Stories

Setting ⟶ Sequence ⟶ Outcome

Post-traumatic Stress Disorder

- What events are traumatic?

PTSD and Chronic Pain

- Criteria
  - Re-experiencing the event
  - Avoidance of reminders of the event
  - Hyperarousal
- Motor vehicle collisions ⟶ whiplash
  - Great variation across countries
  - Decreases if financial benefits are reduced
  - Rare for same magnitude collisions in other contexts
  - No dose effect of trauma intensity and probability

Siqveland J, et al. *Front Psychiatry.* 2017; McLean ,et al. *Psychosom Med.* 2005.

Pain Catastrophizing

- Why are these people so distressed?

Pain Catastrophizing

- An exaggerated negative mental set brought to bear during an actual or anticipated painful experience
- An expectation or worry about major negative consequences from a situation, even one of minor importance
- Multidimensional cognitive construct
  - Magnification: "I am afraid that something serious will happen."
  - Rumination: "I cannot stop thinking about how much it hurts."
  - Helplessness: "There is nothing I can do to reduce the intensity of the pain."

Schutze R, et al. *J Pain*. 2018; Sullivan, et al. *Clin J Pain*. 2001.

Modifying Outcome

- Catastrophizing predicts
  - Acute pain intensity and sensitivity
  - Development of chronic pain, disability, ↓QoL
- Treatments for catastrophizing
  - Cognitive behavioral therapy and adaptive coping skills training
  - Distraction, relaxation, and imagery
  - Social support
  - Education

Khan, et al. *Am J Surg.* 2011; Edwards, et al. *Nat Rev Rheumatol.* 2011.

Conclusions

- What can really be done?

Preventing Chronic Pain

- Diseases
  - —Repair and Cure
- Dimensions
  - —Guide and Strengthen
- Behaviors
  - —Extinguish and Expose
- Life Stories
  - —Rescript and Remoralize

Treatments of Predictors

- Diseases
  - —Neuropathic pain and major depression
    - Antidepressants
    - Anticonvulsants
    - Augmenting agents
- Dimensions
  - —Pain modulation and somatosensory amplification
    - Biofeedback and relaxation
    - Yoga, Tai Chi, Qigong
    - Cognitive-behavioral psychotherapy

Treatments of Predictors

- Behaviors
  - —Substance use disorders and fear/avoidance
    - Group-based behavioral psychotherapy
    - Desensitization
    - Active physical therapy
- Life Stories
  - —PTSD and catastrophizing
    - Support groups
    - Interpersonal psychotherapy
    - Insight-oriented psychotherapy

Case – Amputation was performed!

- Diseases
  - MDD: Sertraline 300 mg/d
  - PAP: Valproate 500 mg BID
- Dimensions
  - Introvert: Puppy with training
  - Amputee: Prosthetics + PT
- Behaviors
  - SUD: Opioid taper after other txs
  - F&A: Support groups (OT, Amputees, Church)
- Life Stories
  - Marital therapy → infidelity → divorce
  - Vocational rehabilitation → RTW

Hope for Preventing Chronic Pain

- Recognizing profiles of risk for new chronic pain
- Preventing the transition from acute to chronic pain
- Treating specific causes of new chronic pain
- Addressing the nature of barriers to restoring health