Foundations of Pain Management

BioPsychoSocial Issues

MiCCSI

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Professor of Anesthesiology, Medicine, Psychiatry and Psychology
Associate Director, Chronic Pain and Fatigue Research Center
Director, Research Development, Michigan Institute for Clinical Health Research
University of Michigan Medical Center
Ann Arbor, Michigan
Disclosures

- Consultant to Community Health Focus Inc.
- President of the American Pain Society
- Funded for research by NIH

There will be no use of off-label medications in this presentation.
100 Million Individuals in the U.S. have Chronic Pain

Relieving Pain in America
A Blueprint for Transforming Prevention, Care, Education, and Research

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES
More people have Chronic Pain than Diabetes, Heart Disease, and Cancer Combined

<table>
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</table>

= 1 Million individuals
Most Pain Care Visits occur within Primary Care

Pain Medicine Versus Pain Management: Ethical Dilemmas Created by Contemporary Medicine and Business

John D. Loeser, MD* † and Alex Cahana, MD, PhD* †

Biomedical Model
Interventional
Pain Medicine

- Procedure Driven
- Focus on curing/fixing

Patient is passive recipient

Biopsychosocial model
Interdisciplinary
Pain Management

- Focus on multidisciplinary teams
- Focus on pain management

Patient is active participant

How good is our black bag for treating chronic pain?

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Impact on Chronic Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long term opioids</td>
<td>32% reduction</td>
</tr>
<tr>
<td>Pain drugs generally (across classes)</td>
<td>30% - 40% get 40% - 50% relief</td>
</tr>
<tr>
<td>Spinal fusion</td>
<td>75% still have pain</td>
</tr>
<tr>
<td>Repair herniated disk</td>
<td>70% still have pain</td>
</tr>
<tr>
<td>Repeat Surgery</td>
<td>66% still have pain</td>
</tr>
<tr>
<td>Spinal cord stimulators</td>
<td>61% still in pain after 4 yrs. average pain relief 18% across studies</td>
</tr>
</tbody>
</table>

**Facet blocks:** Limited evidence


**Epidural steroid injections:** Limited evidence


**Biomedical Model Generally:** Limited evidence


If Patients don’t respond to the BioMedical model...

- They must be crazy
- The pain is all in their heads
- They don’t want to get better
If Patients don’t respond to the BioMedical model...

- They must be crazy
- The pain is all in their heads
- They don’t want to get better

OR perhaps

- We don’t fully understand pain
- Treatment of pain requires a different approach than the traditional biomedical model
- Effective pain treatment requires a different financial model
How is Pain Classified?

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Newest Classification: Pain Mechanisms

- **Nociceptive**
  - Peripheral damage or inflammation
- **Neuropathic**
- **Central**

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Mechanisms of Pain

Nociceptive and Inflammatory
- Noxious Peripheral Stimuli
- Inflammation

Neuropathic
- Peripheral or Central damage

Centrally Driven Pain

Adapted from Woolfe, CJ, Ann Intern Med. 2004;140:441-451
Mechanisms of Pain

Nociceptive and Inflammatory

Noxious Peripheral Stimuli

Inflammation

Neuropathic

Peripheral or Central damage

Centrally Driven Pain

Adapted from Woolfe, CJ, Ann Intern Med. 2004;140:441-451
Brain regions associated with pain processing involve both sensory and affective/cognitive regions

- **Sensory / discriminative dimension**
  - Somatosensory cortices (S1, S2)
  - Dorsal posterior insula
- **Affective / Cognitive dimensions**
  - Anterior insula
  - Prefrontal cortex
  - Anterior cingulate cortex
  - Thalamus
  - Amygdala
  - Hippocampus

Neurobiological perspective

Brain regions associated with pain processing involve both sensory and affective/cognitive regions

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I still feel pain

Chronic Pain

- Similar in mechanism to an emotion but experienced as a bodily sensation

Chronic Pain has Three Components: The BioMedical Model addresses 1 of them

Sensory
(where it is and intensity)

Historical
Biomedical
Emphasis

Pain

Affect
(emotional valence)

Cognitive
(evaluation and meaning)

CNS Neurotransmitters Influencing Pain

Facilitation

- Glutamate and EAA
- Substance P
- Nerve growth factor
- Serotonin (5HT$_{2a}$, 3a)
- Gabapentinoids, ketamine
- Anti-migraine drugs (– triptans), cyclobenzaprine

Inhibition

- Descending anti-nociceptive pathways
- Norepinephrine-serotonin (5HT$_{1a,b}$), dopamine
- Opioids
- Cannabinoids
- GABA
- Tricycles, SNRIs, tramadol
- Low dose naltrexone
- Gammahydroxybutyrate, moderate alcohol consumption
- No knowledge of endocannabinoid activity but this class of drugs is effective

References:
Neurotransmitters for Pain Processing

Norepinephrine
Concentration
Circadian rhythms
Attention
Stress
Energy
Neurotransmitters for Pain Processing

Norepinephrine
- Concentration
- Circadian rhythms
- Attention
- Stress
- Energy

Serotonin
- Well-being
- Sleep
- Affect /Mood
- Appetite
Neurotransmitters for Pain Processing

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  - Attention
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  - Reward
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Neurotransmitters for Pain Processing

**Glutamine**
Major Exciter of CNS, Synaptogenesis and neurogenesis

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Glutamine: Major Exciter of CNS, Synaptogenesis and neurogenesis.
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**GABA**
Major Inhibitor of CNS, Sleep/wake cycle

**Cognitive Function**
Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

Shared Neurotransmitters Explain

- The complexity of chronic pain presentation

- Sleep, Pain, Affect, Cognition, Energy

Shared Neurotransmitters Explain

- The complexity of chronic pain presentation
- By considering associated symptomatology, Clinicians have more targets upon which to intervene.

# How is Pain Classified?

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## Newest Classification: Pain Mechanisms

### Adaptive Pain $^{1,2}$
- Alert to Danger
  - Nociceptive Pain
- Facilitate immobility / healing
  - Inflammatory Pain

### Pain as Disease State $^{3,4}$
- Damage to the nervous system
  - Neuropathic Pain
- Augmented central pain processing
  - Central Pain

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A Closer Look at Central Pain
In U.S., More people have Chronic Pain than Diabetes, Heart Disease, and Cancer Combined

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[Image of people icons representing the number of individuals for each condition]
Chronic Overlapping Pain Conditions

<table>
<thead>
<tr>
<th>COPCs</th>
<th>US Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritable Bowel Syndrome</td>
<td>44 Million</td>
</tr>
<tr>
<td>Temporomandibular Disorder</td>
<td>35 Million</td>
</tr>
<tr>
<td>Chronic Low Back Pain</td>
<td>20 Million</td>
</tr>
<tr>
<td>Interstitial Cystitis / Bladder Pain Syndrome</td>
<td>8 Million</td>
</tr>
<tr>
<td>Migraine Headache</td>
<td>7 Million</td>
</tr>
<tr>
<td>Tension Headache</td>
<td>7 Million</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>6 Million</td>
</tr>
<tr>
<td>Vulvodynia</td>
<td>6 Million</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>6 Million</td>
</tr>
<tr>
<td>Myalgic Encephalopathy / CFS</td>
<td>4 Million</td>
</tr>
</tbody>
</table>

Central Sensitization

Clinical Assessment:

- Pain disproportionate to nature and extent of injury (not nociceptive)
- Not due to lesions or damage within CNS (not neuropathic)
- Wide-spread pain distribution
- General hypersensitivity of senses, stress, emotions, mental load,
- S.P.A.C.E.

Thinking Differently about Central Pain

- Pain is not the same as tissue damage
  - Pain is an experience based in part from nociception but formed in the brain
  - Hunger is also an experience formed in the brain
  - Central pain is a disturbance in how the experience of pain is processed
  - Fixing the identified biology won’t fix the perceptual process or the perception itself
  - Treatment needs to focus on fixing how pain is processed not fixing some body part
Functioning Detector

- Beeps when smoke is present
- Warns of fire
- Behavior:
  - Search for fire
  - Put out fire
- Detector is silent when fire is out
Functioning Detector

- Beeps when smoke is present
- Warns of fire
- Behavior:
  - Search for fire
  - Put out fire
- Detector is silent when fire is out

Broken detector

- Beeps due to processing malfunction
- Behavior:
  - Search for fire?
  - Throw water?
- Better Behavior:
  - Fix the processor in the detector
Neurology: headache
GI, Urology: IBS UCPPS
Rehab, Neurology: LBP
Dentistry: TMD
Rheumatology: FM
OBGYN: Endo, VVD
Infectious Disease: ME/CFS
Action of Non-Pharmacological Interventions across COPC’s

- Interventions that are successful at desensitizing or calming CNS activity associated with central sensitization are likely to be beneficial across conditions.

- Interventions that diminish “central load” are likely to be helpful over time. It takes time to calm (reset) a sensitized CNS.

So what’s a doctor to do?
Dually Focused Management of Chronic Pain

Symptoms of Pain, Fatigue, etc.
- Nociceptive processes (damage or inflammation of tissues)
- Disordered sensory processing

Functional Consequences of Symptoms
- Increased Distress
- Decreased activity
- Isolation
- Poor sleep
- Maladaptive illness behaviors

Pharmacological therapies to improve symptoms

Nonpharmacological therapies to address dysfunction

<table>
<thead>
<tr>
<th>Evidence Level</th>
<th>Therapies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>Dual reuptake inhibitors such as</td>
</tr>
<tr>
<td></td>
<td>Tricyclic compounds (amitriptyline, cyclobenzaprine)</td>
</tr>
<tr>
<td></td>
<td>SNRIs and NSRIs (milnacipran, duloxetine, venlafaxine?)</td>
</tr>
<tr>
<td></td>
<td>Anticonvulsants (e.g., pregabalin, gabapentin)</td>
</tr>
<tr>
<td>Modest</td>
<td>Tramadol</td>
</tr>
<tr>
<td></td>
<td>Older less selective SSRIs</td>
</tr>
<tr>
<td></td>
<td>Gamma hydroxybutyrate</td>
</tr>
<tr>
<td></td>
<td>Low dose naltrexone</td>
</tr>
<tr>
<td></td>
<td>Cannabinoids</td>
</tr>
<tr>
<td>Weak</td>
<td>Growth hormone, 5-hydroxytryptamine, tropisetron, S-adenosyl-L-methionine (SAMe)</td>
</tr>
<tr>
<td>No Evidence</td>
<td>Opioids, corticosteroids, nonsteroidal anti-inflammatory drugs, benzodiazepine and nonbenzodiazepine hypnotics, guanifenesin</td>
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Non-Pharmacological Therapies for Chronic Pain States

<table>
<thead>
<tr>
<th>Strong Evidence</th>
<th>Modest Evidence</th>
<th>Weak Evidence</th>
<th>No Evidence</th>
</tr>
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<tbody>
<tr>
<td>Education</td>
<td>Strength training</td>
<td>Acupuncture, chiropractic, manual and massage therapy, electrotherapy, ultrasound</td>
<td>Tender (trigger) point injections, flexibility exercise</td>
</tr>
<tr>
<td>Aerobic exercise</td>
<td>Hypnotherapy, biofeedback, balneotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive behavior therapy</td>
<td></td>
<td></td>
<td></td>
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</table>
How to ERASE S.P.A.C.E.

Exercise & Energy
Reframing & Relaxation
Affect & Action
Sleep & Social
Education

Sleep, Pain, Affect, Cognitive changes, Energy deficits
### Topics in Psychosocial Pain Interventions

**Exercise/Energy, Reframing/Relaxation, Affect/Action, Sleep/Social, Education (ERASE)**

<table>
<thead>
<tr>
<th>E</th>
<th>R</th>
<th>A</th>
<th>S</th>
<th>E</th>
</tr>
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<tbody>
<tr>
<td><img src="image1" alt="Exercise" /></td>
<td><img src="image2" alt="Reframing" /></td>
<td><img src="image3" alt="Affect" /></td>
<td><img src="image4" alt="Sleep" /></td>
<td><img src="image5" alt="Education" /></td>
</tr>
<tr>
<td><img src="image6" alt="Energy" /></td>
<td><img src="image7" alt="Relaxation" /></td>
<td><img src="image8" alt="Action" /></td>
<td><img src="image9" alt="Social" /></td>
<td><img src="image10" alt="Education" /></td>
</tr>
<tr>
<td><img src="image11" alt="Problem Solving" /></td>
<td><img src="image12" alt="Goal Setting" /></td>
<td><img src="image13" alt="Communication" /></td>
<td></td>
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Exercise and Energy

- Multiple reviews and meta-analyses, and professional society guidelines recommend exercise and physical activity for the treatment of chronic pain and fatigue
- Increase Fitness
- Increase Function
The Relaxation Response

- PMR
- Yoga
- Visual Imagery
- Meditation
- Biofeedback
AFFECT
Psychiatric Co-Morbidities
## Psychiatric Co-Morbidity in Chronic Pain

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Population:</strong></td>
<td>6.6%</td>
<td>18.1%</td>
</tr>
<tr>
<td><strong>Chronic Pain:</strong></td>
<td></td>
<td>30-54%</td>
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Personality Disorders in Chronic Pain Patients

<table>
<thead>
<tr>
<th>Personality Disorders</th>
<th>gen. pop: 5%-15%</th>
<th>chronic pain: 51%-58%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cluster A:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odd/Eccentric</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Paranoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Schizoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schizotypal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cluster B</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional/Erratic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antisocial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Histrionic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narcissistic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borderline</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cluster C</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxious/Fearful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Dependent</td>
<td></td>
<td></td>
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<tr>
<td>OCPD</td>
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Personality Disorders Predictive of transition from acute to chronic status
Sub clinical P.D. impacts pain and treatment compliance

Patients do not need to be mentally ill to have chronic pain.
Approaches to Resolve Negative Affect Influencing Chronic Pain

- Emotional Awareness and Expression Therapy (EAET)
- Pleasant Activity Scheduling
- Traditional Psychotherapy
Sleep
Social Challenges

Dr. - Patient

Family

Friends

Employer and co-workers
Web-based self-management “FibroGuide”

http://fibroguide.med.umich.edu/
Intervening in the PCP Encounter
Where’s the patient?
Are we losing touch — literal touch — in the doctor-patient relationship?

Sacha Pfeiffer  August 18, 2014

https://hms.harvard.edu/news/

Patients Lose When Doctors Can’t Do Good Physical Exams

By Sandra G. Boodman  May 20, 2014

This KHN story was produced in collaboration with The Washington Post

Are Doctors Losing Their Touch?

By MARLYS HARRIS / MONEYWATCH  May 2, 2011, 12:20 PM

Last Updated May 13, 2011 1:07 PM EDT
Three things you can Practice Tomorrow

1. Maximize the power of touch through physical exam

2. You don’t always need to have a psychologist deliver emotional support to patients. Just listen to the story. You will be treating the affective and social components of pain.

3. If you recommend self-management (exercise, relaxation, sleep hygiene etc.), ask about it with the same enthusiasm and regularity that you ask about drugs. Patients learn what you think is really important by what you ask about.