Care for Patients with Complex and High-Impact Chronic Pain

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Disclosures

Research Support

- National Institutes of Health
- Patient-Centered Outcomes Research Institute
Depicting the Biopsychosocial Model of Pain
Clusters of risk factors are associated with high-impact chronic pain

Women
Older age
Minority
HS Edu
Not married
Poverty
Rural
Public Health Insurance

Comorbid medical conditions
Past surgeries
Depression Anxiety Fatigue Cognitive limitations
Catastrophizing

I worry all the time about whether the pain will end.

I feel I can't stand the pain anymore.

I wonder whether something serious may happen.

A set of negative cognitions, emotions, attitudes, and beliefs related to pain.

- Rumination
- Magnification
- Helplessness
Risk factor for poor treatment outcomes

The importance of catastrophizing for successful pharmacological treatment of peripheral neuropathic pain

Cory Toth
Shauna Brady
Melinda Hatfield
Change in Catastrophizing explains 72% of the variance of Tai Chi improvement in disability.
Neural Underpinnings/Biomarkers?

**Salience Network**
Sustained activation during attention to pain

**Default Mode Network**
Suppressed when attending to pain but not when mind wandering away

**Antinociceptive System**
Increased functional connectivity during mind wandering away from pain

### Network Engagement
- **DMN**
- **SN**
- **AS**
- **SN, AS**

**State**
- Rest (no pain)
- Attend to pain
- MW from pain
Do pain-related catastrophizing and overlapping psychosocial processes contribute to this blurring?
Objective. We designed a functional MRI-based pain catastrophizing task whereby patients with chronic pain engaged in catastrophizing-related cognitions compared to affectively neutral cognitions.

Methods. FM patients (n=31) reflected on how catastrophizing statements (CAT) impact their typical fibromyalgia pain experience. Response to CAT statements was compared to matched neutral statements (NEU).
Neural circuitry supporting catastrophizing

CAT > NEU
10^{-10} 10^{-5} p-value 10^{-5} 10^{-10}

NEU > CAT

% fMRI signal change to CAT

BPI (severity)

BPI = brief pain inventory

CAQ = catastrophizing applicability questionnaire

r = 0.38

Lee et al., A&R 2018
Catastrophizing: Associations with connectivity between salience network (Insula) and DMN
And those who exhibit the largest reductions in catastrophizing also have the most substantial decreases in that connectivity . . .
CBT and Catastrophizing

Long-term effects at 6- to 12-months post-treatment:

Significant, moderate-sized effects of CBT on reduction in catastrophizing. Some evidence that effects are largest in those with the highest baseline PCS scores.
CBT: Largest effects in High Catastrophizers

Ongoing BWH Trial

% reduction in Pain Interference is almost twice as large in the high PCS group
High catastrophizing may be a phenotype associated with enhanced benefit from certain interventions (and reduced benefit from others)

Significant interaction between catastrophizing and the application of regional anesthesia:

High catastrophizers get more benefit than low catastrophizers for pain and opioid outcomes at 2 weeks post-op:

*Schreiber et al., Under Review*
Conclusions

• Patients with complex, high-impact chronic pain have clusters of risk factors, many of them linked with cognitive/affective processes.

• Psychosocial phenotypes such as catastrophizing are reflective of brain/neurobiological phenotypes contributing to chronic pain.

• Non-pharmacologic interventions exert some of their benefits by acting on catastrophizing and related process variables.

• Eventually, such mechanism-based research should help us to move in the direction of “precision pain medicine” in which psychosocial and neurobiological phenotypes are employed to optimize treatment selection for individual patients.