The Mind Matters: Psychological Approaches to Acute Pain Management

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Pain perception is modulated by psychological factors.

How can we use this knowledge to empower pain relief?

Science Translational Medicine
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The Effect of Treatment Expectation on Drug Efficacy: Imaging the Analgesic Benefit of the Opioid Remifentanil

Ulrike Bingel, *et al.*

Sci Transl Med **3**, 70ra14 (2011);
DOI: 10.1126/scitranslmed.3001244

- 22 healthy volunteers
- Placed in fMRI scanners
- Exposed to painful constant heat on legs
- IV catheter placed for administration of Remifentanil (μ-opioid agonist with half life of 3 minutes)
- Asked to rate pain on 0-100 scale

Psychology of Acute Pain Relief

(Bingel et al., 2011)

Experimental Condition	Average Pain
Baseline pain (no opioid)	66/100

**After baseline, continuous infusion of opioid*

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Received opioid without being told	55/100

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Experimental Condition	Average Pain
Baseline pain (no opioid)	66/100
Received opioid without being told	55/100
Told that they would begin to receive opioid *(positive expectancy/placebo)*	39/100

**After baseline, continuous infusion of opioid*

Psychology of Acute Pain Relief

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Experimental Condition	Average Pain
Baseline pain (no opioid)	66/100
Received opioid without being told	55/100
Told that they would begin to receive opioid *(positive expectancy/placebo)*	39/100
Told opioid would be stopped, but it wasn't *(negative expectancy/nocebo)*	64/100

**After baseline, continuous infusion of opioid*

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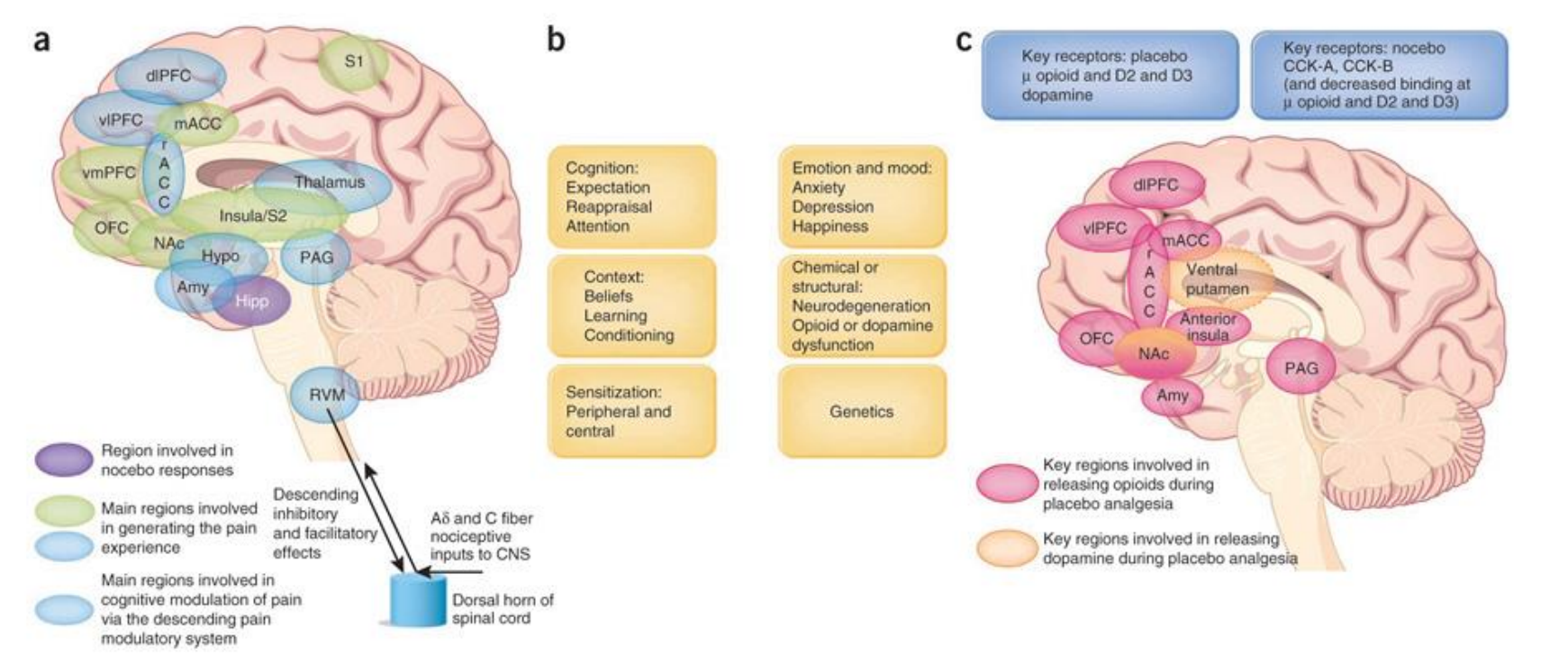


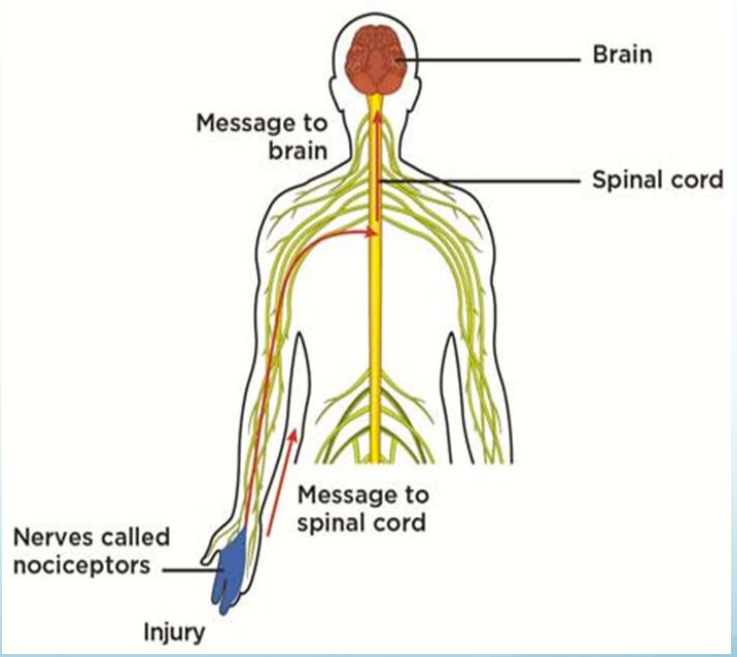
Positive expectancy = activation of endogenous pain modulatory system
Negative expectancy = activity in the hippocampus (↑ subjective anxiety)

What if we could purposely activate the descending inhibition of pain network?

Descending Inhibition of Pain via endogenous opioid network

Descending Facilitation of Pain via endogenous cholecystokinin (CKK) system

Placebo
Pain
Relief



Nocebo
Hyperalgesia

Fueled by
anxiety

Most surgery is planned.

When would you rather learn skills for pain relief?

Preparation for Surgery

Pre-Surgical Acceptance and Commitment Therapy (ACT)

American Pain Society
RESEARCH
EDUCATION
TREATMENT
ADVOCACY
PUBLISHED BY ELSEVIER

The Journal of Pain, Vol 00, No 00 (00), 2018: pp 1–11
Available online at www.jpain.org and www.sciencedirect.com

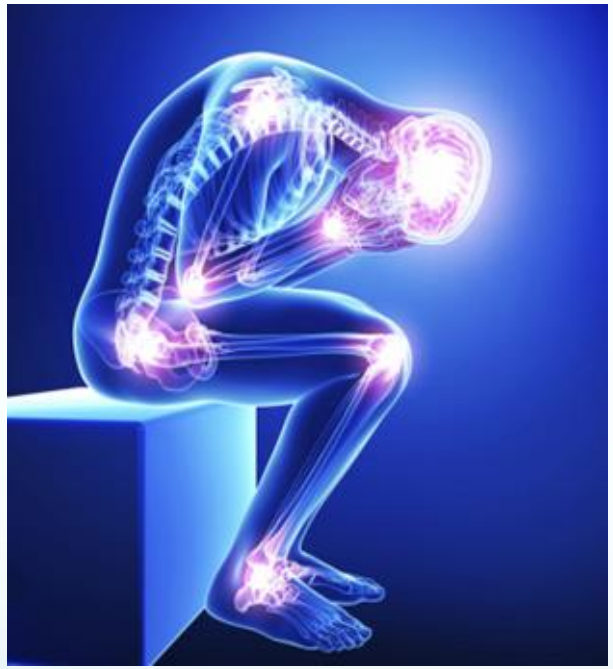
Original Report

Acceptance and Commitment Therapy for Prevention of Chronic Postsurgical Pain and Opioid Use in At-Risk Veterans: A Pilot Randomized Controlled Study

Lilian Dindo,[*,†] M. Bridget Zimmerman,[‡] Katherine Hadlandsmyth,[§] Barbara StMarie,[¶] Jennie Embree,[¶] James Marchman,[‖] Toni Tripp-Reimer,[¶] and Barbara Rakel[¶]

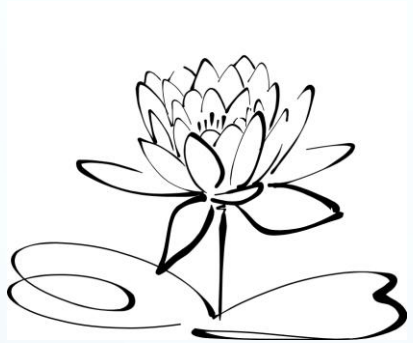
[*]*Menninger Department of Psychiatry and Behavioral Sciences, Baylor College of Medicine, Houston, Texas,* [†]*Center for Innovations, Quality, and Effectiveness, Michael E. Debakey Veterans Affairs Medical Center, Houston, Texas,* [‡]*College of Public Health, University of Iowa, Iowa City, Iowa,* [§]*Department of Anesthesia, University of Iowa, Iowa City, Iowa,* [¶]*College of Nursing, University of Iowa, Iowa City, Iowa,* [‖]*Department of Psychology, University of Iowa, Iowa City, Iowa*

Pre-Surgical Acceptance and Commitment Therapy (ACT)



- N = 88 American veterans undergoing orthopedic surgery (knee/hip replacement)
- Selected because they were at risk of persistent post-surgical pain:
  - moderate pain before surgery
  - significant anxiety/depression
- Randomized to TAU or TAU + 1-day (6 hr) ACT workshop

Acceptance and Commitment Therapy Workshops (Dindo, Weinrib, & Marchman, in press)



ACCEPTANCE of what we cannot change

- Pain
- Emotions
- Thoughts
- Circumstances

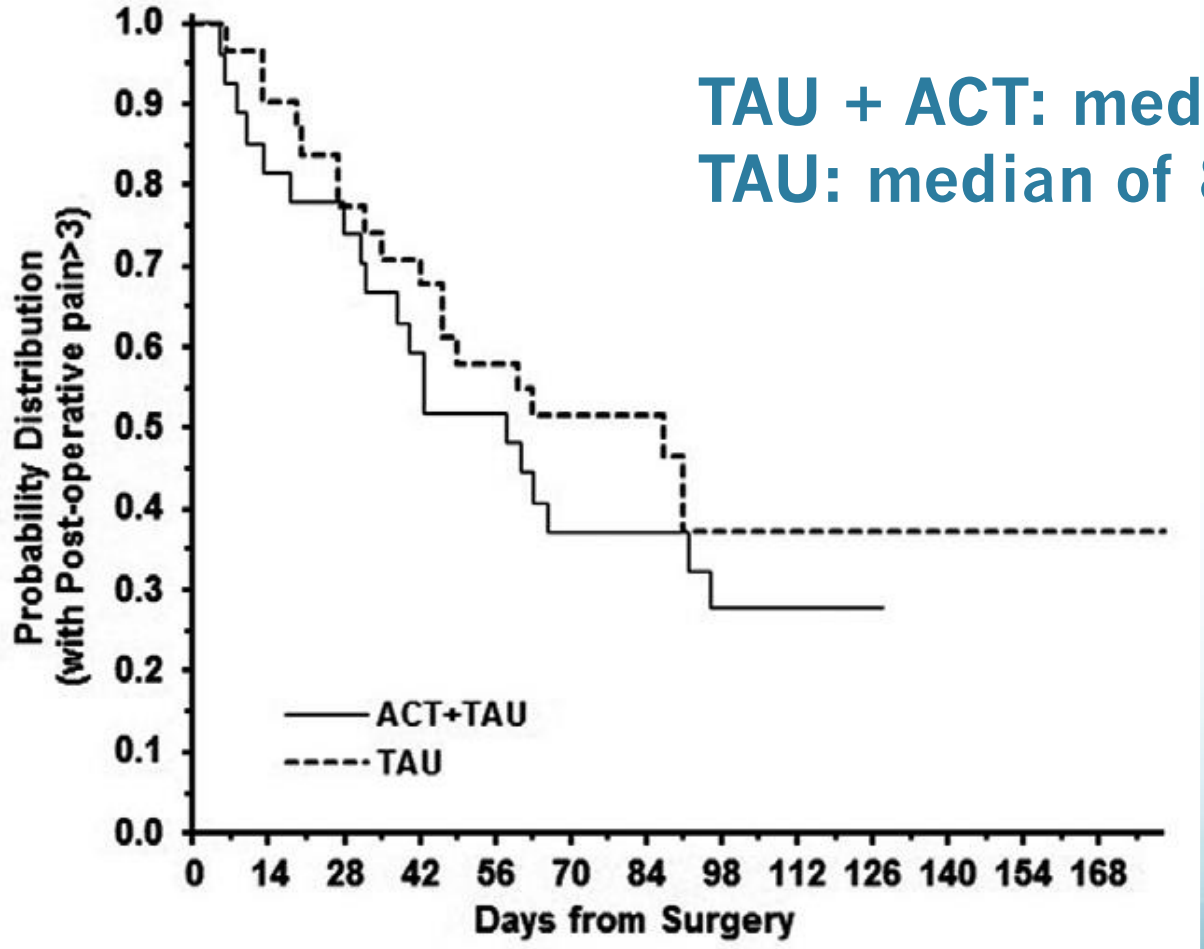
COMMITMENT to acting on what matters

- Relationships
- Health
- Work
- Leisure

For patients without complications…

Pain Cessation After Surgery

(Dindo et al., 2018)



TAU + ACT: median of 58 days
TAU: median of 87 days

Improved Opioid Weaning (Dindo et al., 2018)

- 7 weeks after surgery:
  - 52% of TAU patients were taking opioids
  - 29% of TAU + ACT patients were taking opioids

What is possible with CBT?

(Salomons, Moayedi, Erpelding & Davis, 2014)

- Healthy volunteers received 8 1-hr sessions of painful heat (45 x 8-second intervals per hr)
- Randomized to 5-minute CBT for pain before each session or control training

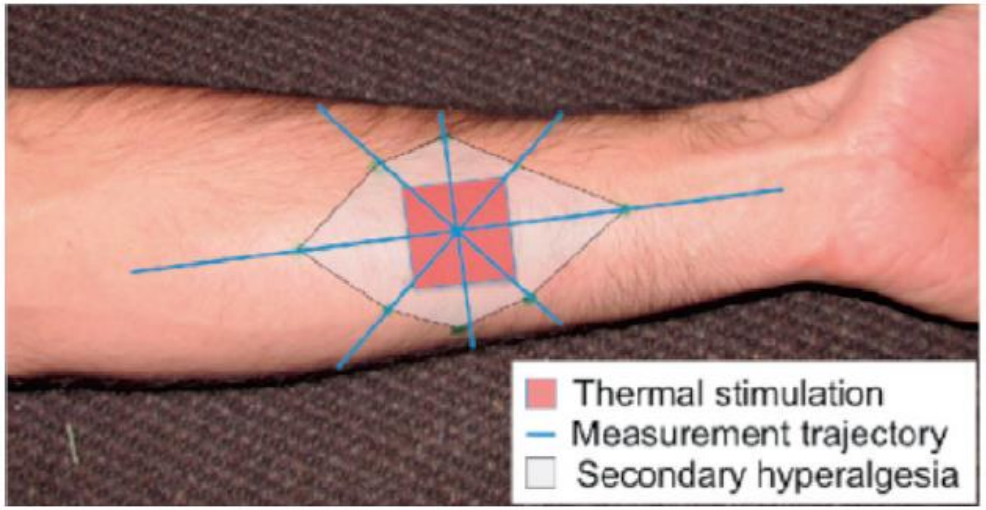
"Taught about relationship between sensory, cognitive, and emotional responses to pain and were trained to reduce their stress responses to pain by identifying negative cognitions that arose and reappraising their situation to focus on potential benefits of training (e.g., ability to cope with future pain, financial compensation)"

What is possible with CBT?

(Salomons, Moayedi, Erpelding & Davis, 2014)

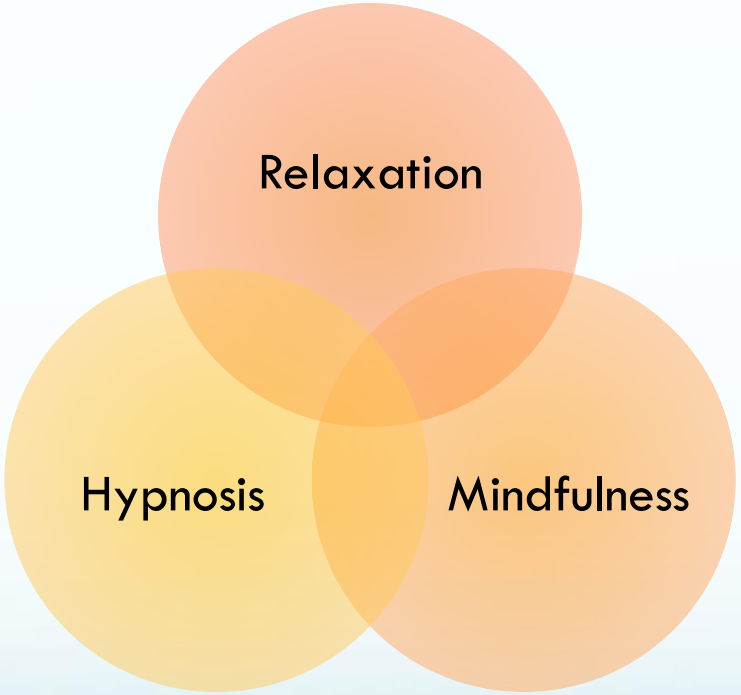
- CBT group
  - No difference in pain intensity
  - Significantly less pain unpleasantness
  - Secondary hyperalgesia was reduced

- Can we influence central sensitization in clinical settings?



Acute Post-Surgical Care

Behavioral Neuromodulation After Surgery



Mindfulness

Clinical Hypnosis

Deep breathing

Progressive relaxation

Inner absorption in special place

Suggestions for pain relief

Post-hypnotic suggestions

Alerting or sleep

Journal of General Internal Medicine
October 2017, Volume 32, Issue 10, pp 1106–1113 | Cite as

Randomized Controlled Trial of Brief Mindfulness Training and Hypnotic Suggestion for Acute Pain Relief in the Hospital Setting

Authors Authors and affiliations

Eric L. Garland, Anne K. Baker, Paula Larsen, Michael R. Riquino, Sarah E. Priddy, Elizabeth Thomas, Adam W. Hanley, Patricia Galbraith, Nathan Wanner, Yoshio Nakamura

- N = 244 hospital patients reporting “intolerable pain” or “inadequate pain control” as a result of disease or surgical procedures
- Randomly assigned to 15 minutes of hypnosis, mindfulness, or CBT-based pain coping education

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Participants in the hypnosis condition reported significantly less desire for opioids. All patients reported reduced anxiety.

The Effectiveness of Adjunctive Hypnosis with Surgical Patients: A Meta-Analysis

Guy H. Montgomery, PhD*, Daniel David, PhD*, Gary Winkel, PhD*, Jeffrey H. Silverstein, MD†, and Dana H. Bovbjerg, PhD*

*Biobehavioral Medicine Program, Cancer Prevention and Control, Derald H. Ruttenberg Cancer Center and †Department of Anesthesiology, Mount Sinai School of Medicine, New York

Table 2. Population Effect Size as a Function of Clinical Outcome Category

Clinical Outcome Category	No.	*D*	Var*D*	95% Confidence Interval of *D*
Negative affect	18	1.07	1.38	0.53–1.61
Pain	13	1.69	4.37	0.56–2.82
Pain medication	19	1.17	2.85	0.41–1.93
Physiological indicators	23	0.27	0.08	0.16–0.38
Recovery	12	3.61	24.0	0.85–6.37
Treatment time	21	0.76	2.15	0.14–1.38

Mindfulness for Patients Undergoing Chemotherapy (Reynolds et al., 2017)

- N = 68 patients undergoing chemotherapy
- Randomized to mindfulness or relaxation (3 x 90 mins)

- At the end of treatment, the mindfulness group reported
  - ↑ symptom distress
  - ↑ social avoidance
  - ↓ quality of life

"Be wary of applying body awareness techniques with patients experiencing acute somatic distress, as many are already hypervigilant regarding their bodily sensations."

Hypnosis & CNS Activation

Pain Unpleasantness (Rainville et al., 1997)

- Painful heat to hand while undergoing PET scan
- Hypnotic suggestions to alter pain unpleasantness
- Changes in activity in anterior cingulate cortex (ACC) in limbic system, but not in primary somatosensory cortex

Pain Intensity (Hofbauer, Rainville, et al., 2001)

- Painful heat to hand while undergoing PET scan
- Hypnotic suggestions to alter pain intensity
- Changes in activity in the primary somatosensory cortex, but not in the ACC

What is possible with early hypnosis?

IASP

PAIN® 146 (2009) 235–237

PAIN®

www.elsevier.com/locate/pain

Topical review

Hypnosis for chronic pain management: A new hope

Mark P. Jensen *

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"It is possible that the benefits of self-hypnosis training could be enhanced if it were provided very soon after an injury or the onset of pain; it is also possible that this treatment could buffer some of the negative long term effects of pain on the CNS."

Current TPS Hypnosis Trial

(Weinrib et al, still collecting data)

- 92 surgical oncology patients randomized to TAU or TAU plus hypnosis
- Clinical hypnosis for pain relief
  - One in-person session before surgery
  - One in-person session after surgery
  - Access to audio-recordings
- Very much acceptable to patients – “How can I get this too?”
- Pain and opioid outcomes to follow…

Behavioral Intervention for Opioid Tapering

Opioid Medication fuels Central Sensitization

Inaugural Review Series
Translational Pain Research

OPEN

PAIN REPORTS

The dark side of opioids in pain management: basic science explains clinical observation

Cyril Rivat[a], Jane Ballantyne[b,*]

Abstract

Introduction: In the past 2 decades, opioids have been used increasingly for the treatment of persistent pain, and doses have tended to creep up. As basic science elucidates mechanisms of pain and analgesia, the cross talk between central pain and opioid actions becomes clearer.

Objectives: We aimed to examine the published literature on basic science explaining pronociceptive opioid actions, and apply this knowledge to clinical observation.

Methods: We reviewed the existing literature on the pronociceptive actions of opioids, both preclinical and clinical studies.

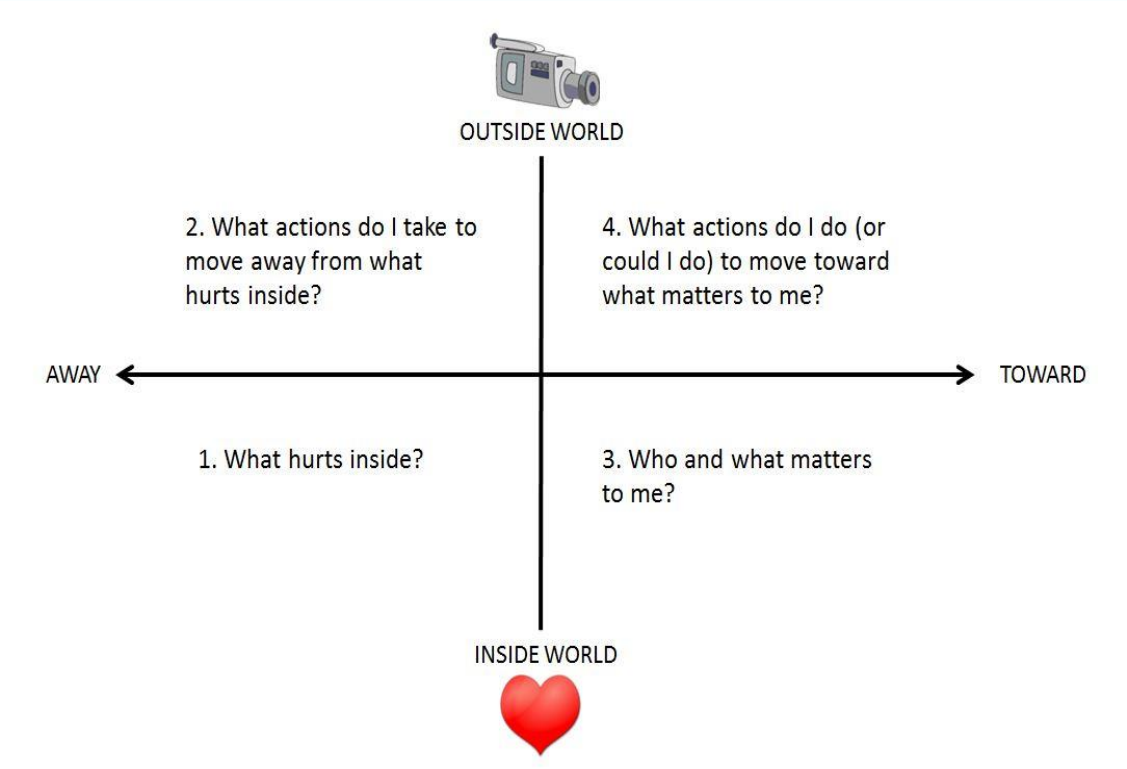
Results: Basic science provides a rationale for the clinical observation that opioids sometimes increase rather than decrease pain. Central sensitization (hyperalgesia) underlies pain chronification, but can also be produced by high dose and high potency opioids. Many of the same mechanisms account for both central pain and opioid hyperalgesia.

Conclusion: Newly revealed basic mechanisms suggest possible avenues for drug development and new drug therapies that could alter pain sensitization through endogenous and exogenous opioid mechanisms. Recent changes in practice such as the introduction of titration-to-effect for opioids have resulted in higher doses used in the clinic setting than ever seen previously. New basic science knowledge hints that these newer dosing practices may need to be reexamined. When pain worsens in a patient taking opioids, can we be assured that this is not because of the opioids, and can we alter this negative effect of opioids through different dosing strategies or new drug intervention?

Keywords: Opioids, Hyperalgesia, Central sensitization, Pain chronification

The ACT Matrix: Getting Perspective on Opioids

(Weinrib, Burns et al., 2017; Weinrib, Azam et al., 2017)



Future Directions

- Before surgery, there is an opportunity for learning skills that can change the pain trajectory.
- Before and after surgery, behavioral interventions for acute pain can take many forms (psychoeducation, CBT, ACT, mindfulness, hypnosis).
- "What is the correct dose?" (e.g., how many hypnosis sessions?)
- How can we get the most impact for the most patients with the least use of resources? (e.g., videos, apps)