Does Understanding=Analgesia?

Explaining Pain Neuroscience & Physiology

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Disclosure

- Nothing to disclose
- The opinions expressed in this presentation do not represent the official position of the US Department of Veterans Affairs

Learning Objectives

- Review research supporting the use of neuroscience education in rehabilitation of patients living with pain
- Discuss at least 1 didactic technique using a metaphor or story to explain pain to a patient
- Restate the benefits of framing pain from a nervous system perspective, rather than strictly an anatomical one

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What patients want to know

(still have)

Why do I have pain?

How long will it take?

What can I do for it?

What can you do for it?

Verbeek J, Sengers MJ, Riemens L, Haafkens J. Patient expectations of treatment for back pain: a systematic review of qualitative and quantitative studies. SPINE 2004; 29(20): 2309-18.

Cherkin, D.C., 1998. Primary care research on low back pain: the state of the science. *Spine*, *23*(18), pp.1997-2002.

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Explain pain, not (just) anatomy…

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Explain Pain (EP)
Pain Neuroscience Education (PNE)

CURRICULUM CONTENTS

- Nociception and nociceptive pathways (neurons, synapses, action potentials)
- Spinal inhibition and facilitation
- Peripheral and central sensitization
- Plasticity of the brain and nervous system

Moseley, Hodges, et al., 2004; Van Oosterwijck, Nijs et al., 2011

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Explain Pain (EP)
Pain Neuroscience Education (PNE)

TEACHING ELEMENTS

- ✓No reference to anatomical models
- ✓No discussion of emotional or behavioral aspects of pain
- ✓Use prepared examples and metaphors
- ✓Include illustrations (hand drawings or other visual aides)

1. Gallagher L, McAuley J, Moseley GL. A randomized-controlled trial of using a book of metaphors to reconceptualize pain and decrease catastrophizing in people with chronic pain. *Clin J Pain*. 2013 Jan;29(1):20-5.
2. Adriaan Louw, Emilio Puentedura. *Therapeutic Neuroscience Education: Teaching Patients About Pain; A guide for clinicians.* USA: International Spine and Pain Institute; 2013.

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PNE for chronic MSK disorders benefits patients by:

- Reducing pain
- Improving patient knowledge of pain
- Improving function
- Lowering disability
- Enhancing movement
- Minimizing healthcare utilization

1. Louw, A., Zimney, K., Puentedura, E.J. and Diener, I., **2016**. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. *Physiotherapy theory and practice*, *32*(5), pp.332-355.
2. Louw, A., Diener, I., Butler, D. S., & Puentedura, E. J., **2011**. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. *Archives of Physical Medicine & Rehabilitation, 92(12)*, 2041-2056.
3. Louw A, Diener I, Landers MR, Puentedura EJ., **2014**. Preoperative Pain Neuroscience Education for Lumbar Radiculopathy: A Multi-Center Randomized Controlled Trial With One-Year Follow-Up. *Spine.* May 28.

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PNE works best in combination

- Manual therapy (Moseley, 2002; Ryan et al, 2010; Puentedura & Flynn, 2016)
- Tigger point dry needling (Tellez-Garcia et al., 2014)
- Aerobic exercise, including circuit training (Ryan et al, 2010)
- Stabilization exercise/motor control
  (Moseley, 2002, 2003; Ryan et al 2010; Beltran-Alacreu et al, 2015)
- Aquatic exercise (Pires et al, 2015)
- Movement exercise (Vibe Fersum et all, 2013)
- Graded exposure and pacing strategies for daily tasks
  (Meeus et al., 2010, Vibe Fersum et al., 2013)

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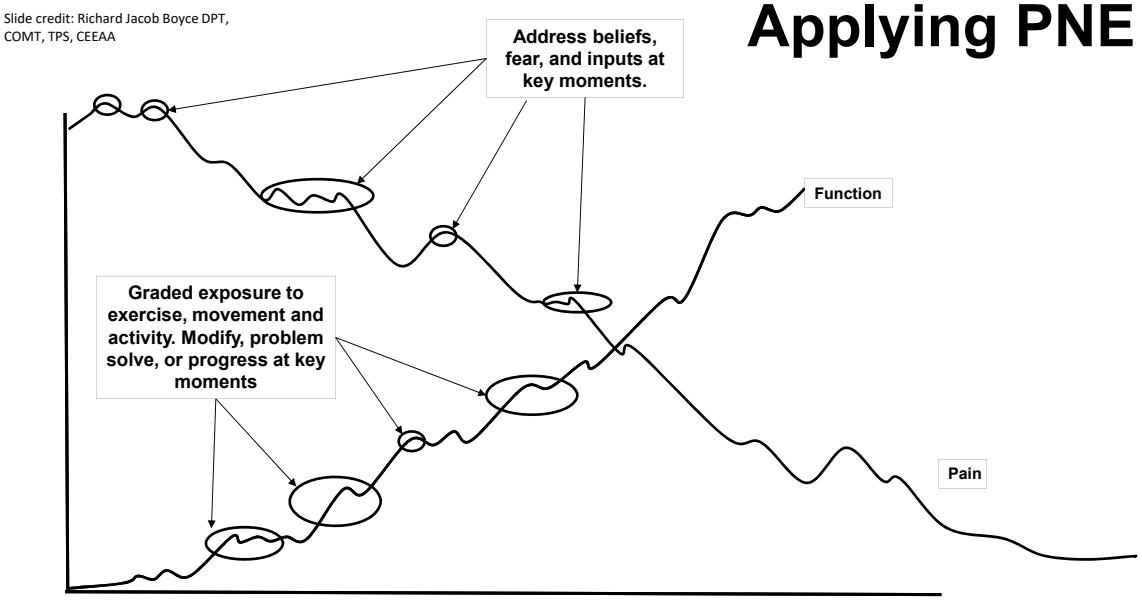
Slide credit: Richard Jacob Boyce DPT, COMT, TPS, CEEAA

Applying PNE



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PNE: Key Messages

- Persistent pain is not just about the “tissue issues”
- The central nervous system plays a big role (in all pain states)
- Pain is an output of the brain, which influences inputs
- Pain is modulated by physical factors AND *meaning, context, expectations, and experience*
- Nociception is neither sufficient nor necessary for pain production
- Sensitization is a natural adaptive feature of the nervous system, which can become unhelpful
- Neuroplasticity or bioplasticity principles are used to reverse some unhelpful adaptations in the nervous system

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In the room with a distressed patient….now what?

The Teaching Part

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Purpose of Pain?

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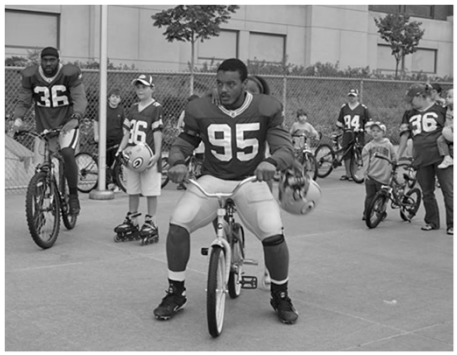

This bike does not have an alarm.

Thankfully, our bodies do!

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Pain is an alarm.

It is a multisystem output used by our body to warn us about actual or potential danger.

Pain is usually useful, because it's designed to protect us.

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Sometimes our body's alarm system becomes too sensitive, meaning it is not a helpful alarm and goes off for no reason. Kind of like a smoke alarm alerting you when a single candle is lit.

www.retrainpain.org

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Things you need to know about pain but probably don't

Pain Is Weird

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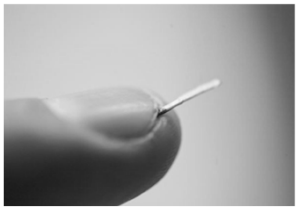
Which one hurts more?



Injury doesn't match pain much of the time.

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Pain and tissue damage don't match

Tissue damage without pain?

Pain without tissue damage?

Fisher *et al*. Minerva. *British Medical Journal*. 1995

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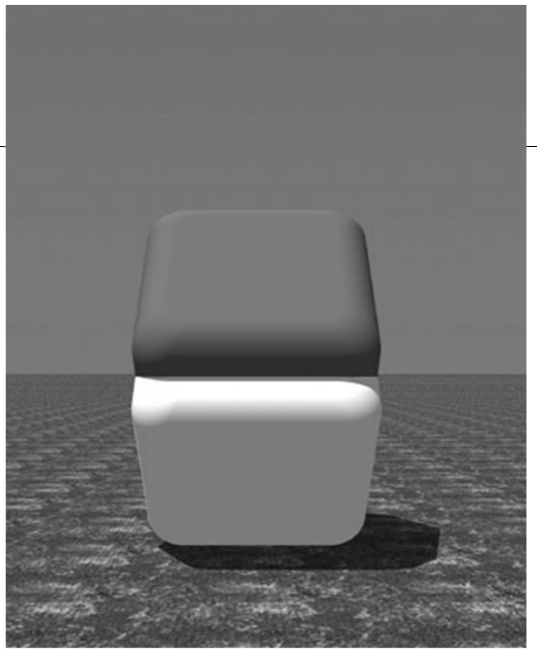
Pain is like vision

Our brains take all the information at hand and make the most sensible story to generate a sensory experience.



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Pain is like taste

Your brain produces a taste experience with more than just your tongue.

Massimiliano Z, Spence C. The Role of Auditory Cues in Modulating the Perceived Crispness and Staleness of Potato Chips. *Journ Sensory Stud.* Oct. 2004; Vol 19 (5). 347-363.

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What is pain?

- Pain is a multisystem output of the brain that is part of a suite of protective mechanisms
  - Muscle spams
  - Muscle weakness
  - Immune response
  - Inflammation
  - Behaviors or movement (running, fighting, freezing, kicking, shaking limb, etc)
- Pain is felt somewhere in the body (or a representation)
- Pain is a conscious experience produced whenever the evidence of danger to our body outweighs the evidence of safety

Moseley & Butler “Explain Pain Protectometer Workbook” 2014

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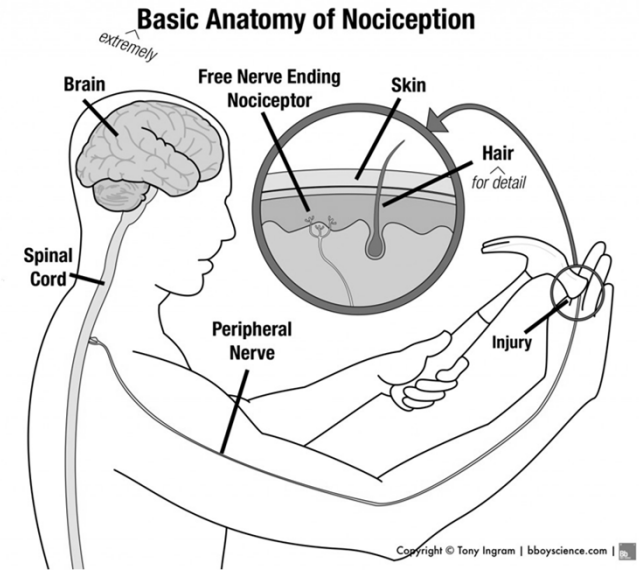

How does the brain get messages of danger from the body?

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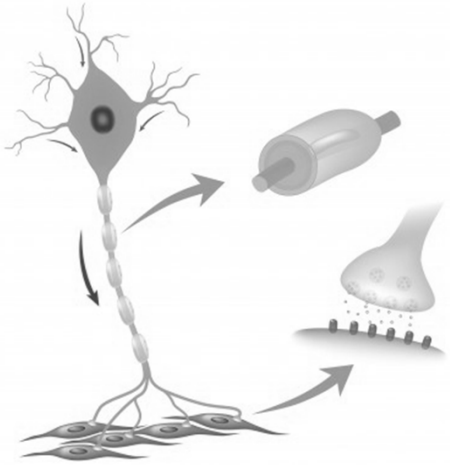
Nociceptor Cell = The Danger Sensor



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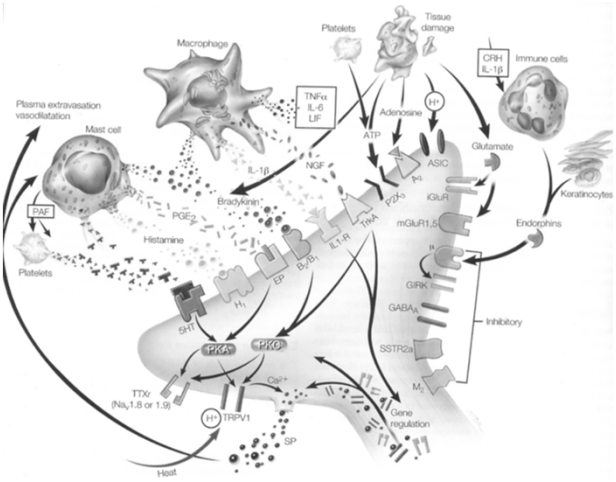

DANGER CATEGORIES

Chemical
Thermal
Mechanical

Ion channels are replaced every 48-72 hrs.

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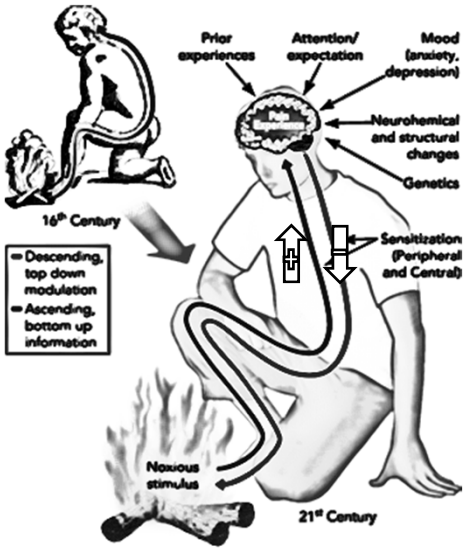
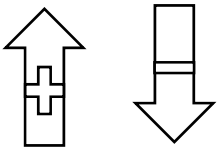


Descending Control =

actions from the brain to control nerve impulses



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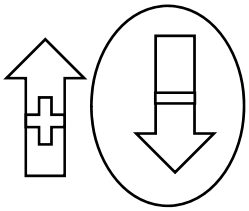
Descending Inhibition: The Helpful Kind

Stubbing your toe



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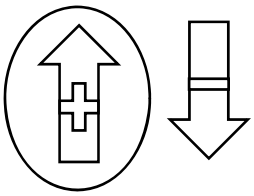
Descending Facilitation: Helpful?

Soccer drama?



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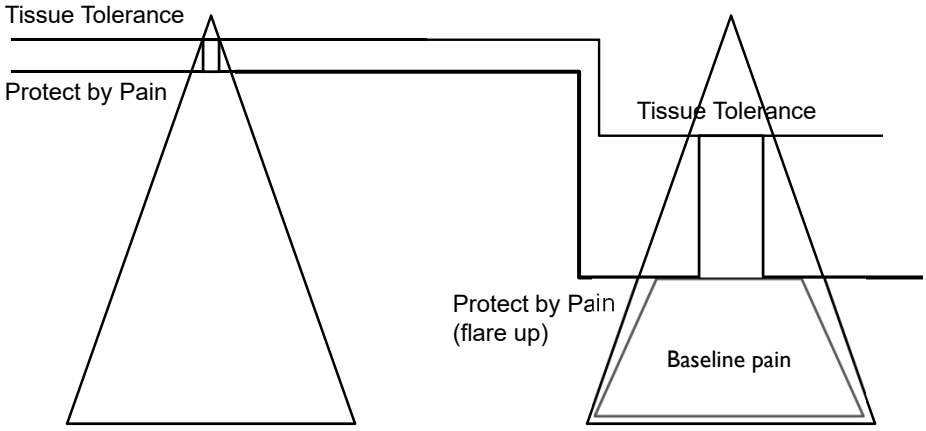
TWIN PEAKS: Patient Education



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Adapted from: *Explain Pain* (2003)

Nonphysical Pain Modulators

Context
Experience
Expectations
Meaning
Beliefs

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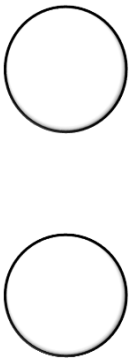
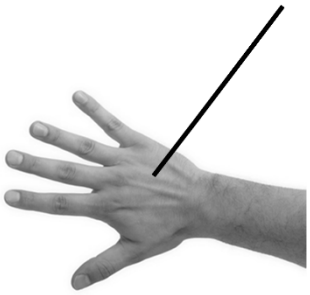
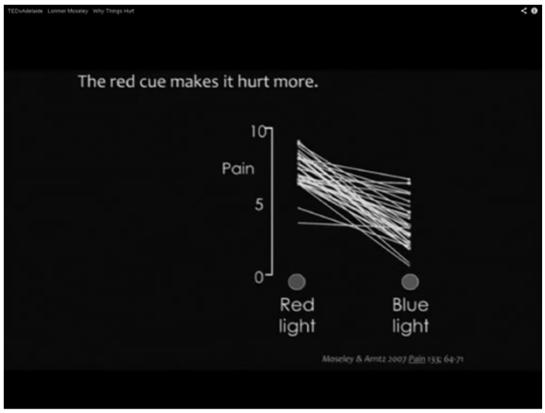
Your brain produces a pain experience with more than just nociceptors







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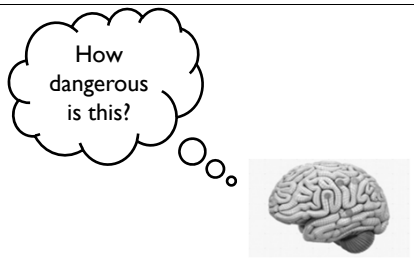
Moseley & Arntz (2007), Pain 133; 64-71

Our brain works on a priority basis



Many signals are considered at once

The brain must make the most sensible story given all the data

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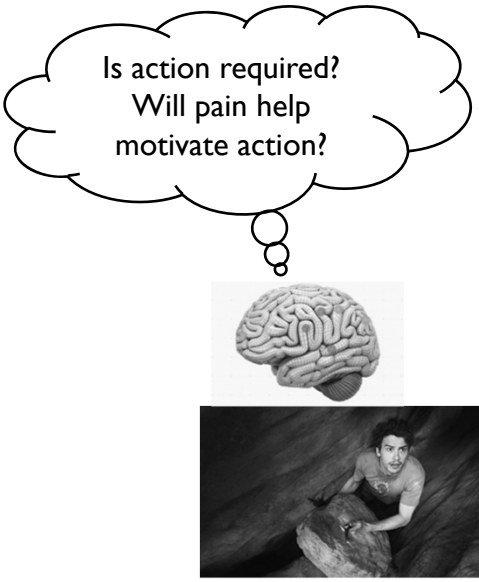

Tissue problem vs pain problem

"Pain is a call to action, not a damage meter."

~Todd Hargrove

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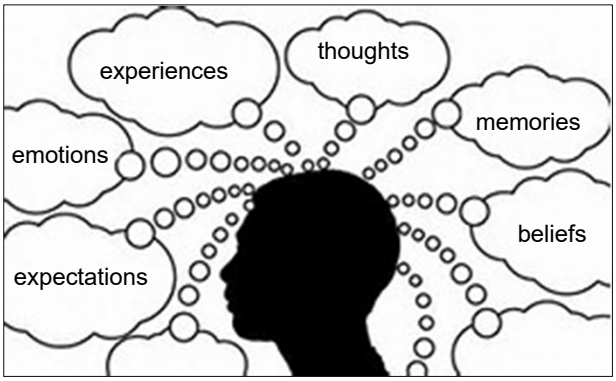
Our brains are not empty



"Thoughts and beliefs are nerve impulses in your brain!"

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How powerful are thoughts?

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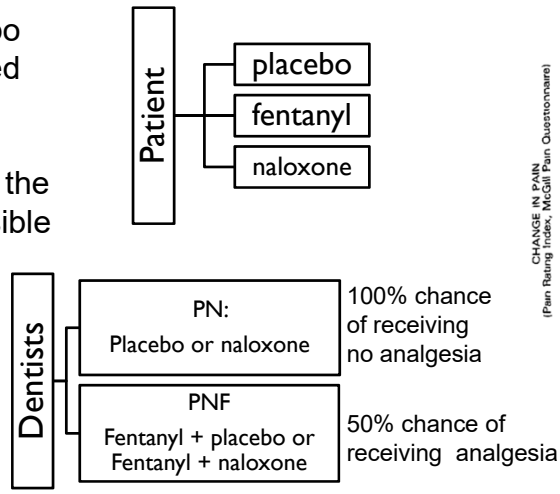
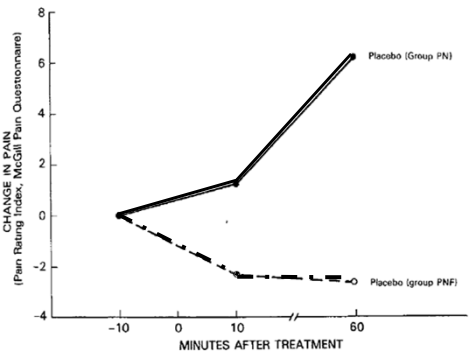
What you think, say, and do as a clinician will influence your patient's pain experience

"The 2 placebo groups differed only in the clinicians' knowledge of the range of possible double-blind treatments."





RH Gracely, R Dubner, PA McGrath WR Deeter, PJ Wolskee. *Lancet. Jan. 5,* 1985;43.

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Bones adapt in response to the loads they absorb during specific activities over a lifetime

- "Our skin shows signs of age with wrinkles and spots. Our spine show signs of age in other ways. Osteophytes and degenerative changes are like wrinkles on the inside."

—Protectometer (Moseley, Butler 2015)

The human body is more like a tree than a car.

Resilient.

Robust.

Adaptable.

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What you can say

"My exam shows me that you no longer have a significant body tissue problem, but what you have is a pain problem. We use different strategies to treat pain problems like yours than what we would use to treat a recent tissue injury."

- It's safe to move
- The nervous system is wonderfully adaptable
- Movement is Medicine
- You can be sore, but safe
- Start low, go slow
- Challenge the flare line, don't push through it

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What did we miss?

- Persistent pain is not just about the "tissue issues"
- The central nervous system plays a big role (in all pain states)
- Pain is an output of the brain, which influences inputs
- Pain is modulated by *meaning, context, expectations and experience*
- Nociception is neither sufficient nor necessary for pain production
- Sensitization is a natural adaptive feature of the nervous system, which can become unhelpful
- Neuroplasticity or bioplasticity principles are used to reverse some unhelpful adaptations in the nervous system

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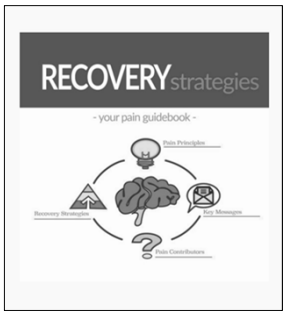
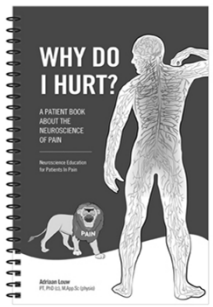
Patient Resources

www.retrainpain.org

www.tamethebeast.org



www.greglehman.ca



www.amazon.com
www.optp.com

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YouTube videos

- Pain Explained by Central London Community Healthcare NHS Trust
- Understanding Pain and What To Do About It in 5 Minutes
- Why Things Hurt (Moseley)
- Neil Pearson channel 421

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Helpful Websites for Patients and Providers

- noigroup.com
- retrainpain.org
- tamethebeast.org
- lifeisnow.ca
- bettermovement.org
- gradedmotorimagery.com
- painscience.com
- bodyinmind.org
- healthskills.wordpress.com
- aptei.ca

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Questions?

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