Physical Therapy, The Brain and Pain

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The Global Epidemic of Pain


>100 Million Americans have some form of persistent pain

Institute of Medicine 2012: Relieving Pain in America


In 2012, health care providers wrote 259 million prescriptions for opioid pain medication, enough for every adult in the United States to have a bottle of pills.

Opportunity

But...our models need updating

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Pathology

Symptoms

Intervention

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Pain is 100% produced by the brain...


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BTW: There are NO pain fibers in the human body...

- Eyes: Contain light receptors; not vision
- Ears: Contain vibration receptors; not hearing
- Tissues: Contain nociceptive receptors; not pain


Pain is 100% produced by the brain...

Pain is produced by the brain based on perception of threat

Limited efficacy decreasing pain and disability

Patients hear their back is vulnerable and should be protected

Increases fear and fear-avoidance, leading to increased pain


A fundamental problem: Our pain models


But we see this (in 1/4 of patients)...

This also happens (thank goodness)...


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Lumbar Discs

40% of people with no back pain has a bulging disc

Disc bulges absorb


Aging and LBP

Low Back Pain vs. Aging of the Spine Over Time
- Age Changes of the Spine
- Seeking Care for Low Back Pain


Rotator Cuff

- 1/3 people over age 30 has some form of RC tear
- 2/3 people over age 70 has some form of RC tear
- 1/5 people have a complete or partial RC tear after RC surgery with full range of motion and function

Knees

- 25% to 50% of MRI’s show knee degeneration in pain-free people
- MRI scans of 35% of collegiate basketball players with no knee pain show significant abnormalities
- 1/3 knee replacements may be unnecessary
The dichotomy...


The “ah-ha” moment...(for us)

Low Back Pain

**The Brain's Alarm System**


**Turning Down the Brain's Alarm System**


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The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain


The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature

A brain that feels extremely threatened, confused, hopeless…


A brain that understands, is less threatened and has hope…

Preoperative Neuroscience Education: Single fMRI case


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Resting Scan

Painful Task

Same Painful Task after 20 minute PNE session

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Words

More

Tissue Health

Images

Social

Experiences

Body Schema

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Education is Therapy...

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Plastic Maps...


Movement and use

Immobilization and limited use


Neglect and Pain

It happens fast

The Brain: “Tell me more…”

Replacing Body Parts…

- Five paraplegic patients
- At or below level pain for 4 years
- High doses of narcotics

Clinical outflow...

Decreasing Body Part Sizes

10 right-handed patients with CRPS

Re-establishing Body Parts


- Convenience sample of CLBP patients
  - Low back pain (Numeric Pain Rating Scale)
  - Fear-avoidance (Fear Avoidance Beliefs Questionnaire)
  - Disability (Oswestry Disability Index)
  - Spinal flexion (fingertip-to-floor)
- 5-minute localization of tactile stimuli treatment to the low back
- Immediate post-intervention
  - Pain
  - Spinal flexion.

Average pain rating for low back pain decreased by 1.91
Average forward flexion improved by 4.82 cm

Moving without moving...

Affected Arm

Unaffected Arm

Significant increase (mean = 9.5°) in affected shoulder flexion AROM immediately post-mirror therapy (p<0.001), which exceeded the MDC of 8 degrees.

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**Pain is a Perception of THREAT**

**Conclusion:** Although care should be taken...sham surgery has been shown to be just as effective as actual surgery in reducing pain and disability.

Every Joint Has A Brain

Alter threat...alter pain

Adapted from Gifford, L.S., Pain, the tissues and the nervous system. Physiotherapy, 1998. 84. p. 27-33.

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