Change Your Brain, Change Your Pain
acute pain is a WARNING that must be heeded or you may be in serious trouble!
You’ve been warned!!
WHOA.. WHAT'S A JOINT LIKE THIS DOING IN A GIRL LIKE YOU?

BAR

CHIROPRACTOR PICK-UP LINES.
chronic pain
“One in 3 patients sees a primary care physician (PCP) for chronic pain yet most PCPs receive no training in this field.”

In the past, chronic pain patients were seen as:

- Hysterical
- Neurotic
- Hypochondriacal
- Secondary gain
- Malingering
- Attention seeking
low back pain as a subset of chronic pain

- Back pain is second only to upper respiratory conditions as the stated cause of work loss.
- Costs for treatment and compensation for LBP in industry may be greater than the total amount spent on all other industrial injuries combined.
- 80%, are incurred by about 20% of the LBP patients who then become disabled (Chou et al).

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Osteopathic Manipulative Therapy

Muscle Energy
Strain-Counterstrain
High-Velocity Low Amplitude
Myofascial Release
Lymphatic Pump
Joint Mobilization
Craniosacral
23+ more...!
Orthopedic Manual Therapy

Myofascial Release
Muscle Energy Technique
Strain-Counter Strain
Winkel
Tigny
Myofascial Release
Craniosacral Therapy
Orthopedic Manual Therapy

Cyriax Method
Evjenth
Maitland
Mulligan
Kaltenborn
McKenzie
Post-isometric relaxation
Trigger Point Therapy
And outside of manual therapy...

- Acupuncture
- Massage therapy
- Herbal treatment
- Homeopathy
- Energy Healing
- Topical products
- Splints, braces, tape
- Medication
- Injections
- Surgery, etc

all propose different mechanisms for their reported effectiveness with chronic pain...
many studies support manual therapy as an effective treatment for pain.

....but by what mechanism?

the biomechanical model – applied to chronic pain

Assumes people acquire biomechanical dysfunctions of joints i.e.: hypo- or hypermobility, joint malalignment from:

- Suboptimal postures
- Muscle weakness
- Poor muscle control
- Trauma
- Repetitive strain
flaws

- Poor reliability of clinical tests designed to detect motion, position, posture.
- Mixed evidence to suggest more than short term mechanical effect
- Forces used too small to create permanent change in tissues
posture and pain

While certainly true for acute pain, studies about posture are mixed about whether or not this phenomenon contributes to chronic pain.
tissue length, form, position or symmetry are poor predictors of who has pain and who does not.
what about findings on x-ray, MRI?

• Scoliosis
• Subluxations
• Stenosis
• Spondylolisthesis
• Degenerative discs and joints
• Disc bulges
• Herniated discs
what about abnormal movement?

The way we move (Functional Movement Patterns, Stability vs. Mobility) and it’s relation to pain is a subject of intense study and is at the forefront of manual therapy across all disciplines.
can compensation in one area lead to break down and pain in another?

Foot = Stable
Ankle = Mobile
Knee = Stable
Hip = Mobile
Lumbar Spine = Stable
Thoracic Spine = Mobile
Scapulothoracic Joint = Stable
Glenohumeral Joint = Mobile
Elbow Joint = Stable
these people have gross movement dysfunctions. Why are they not in bed writhing in pain?
“It is important to note that we are full of dysfunctions whether we are in pain or not. If we are in pain it is easy to find something wrong relevant to a precise tissue model but which may not be relevant at all to the patients state”.

Consider the most heroic intervention...

Spinal fusion surgery has the exact effect you would expect it to have if it was a placebo, around 2/3rds improve. This explains why it doesn’t matter which approach you use, whether or not you put any implants in and whether or not the spine fuses.

Andersen T, Finn C, and Bünger C: Pain 5 years after instrumented and non-instrumented posterolateral lumbar spinal fusion. European Spine Journal August 2003, Volume 12, Issue 4, pp 393-399
During a lecture an internationally renowned surgeon explained that nearly all treatments for back pain result in improvements in about 2/3 of the patients. When asked why he did spine fusions for back pain if it was no more effective than the alternatives he replied “Because it works in about 2/3 of the patients”
Oh what to do, what to dooo?
Do you have back, neck or shoulder pain that keeps recurring or won't go away?

Do you have to ‘baby’ your back?

Does muscle pain keep you from living and enjoying a full life?

If so, you may be suffering from TMS and this DVD will show you how Dr. Sarno can help you to become pain-free!
Early Acute Pain Models

**Pathoanatomical**

- Emphasizes anatomy, injury and tissue damage.
- Pain intensity equates with damage severity.
- Emphasizes further tests.
- Focus on pain rather than activity.
- Encourage passivity and dependency

**Biopsychosocial**

- There is no sign of serious disease.
- Lower back pain is may be symptom indicating that the back is somehow de-conditioned or unfit.
- Treatment can help, but long-term results depend on the patient.
- Recovery depends on restoring function- the sooner the better.
- Positive attitudes result in speedier recovery.
maybe we are barking up the wrong tree!

maybe pain isn’t in the tissues where we think it is...
450 years ago Descartes wrote, *The flame particle jumps from the fire, touches the toe, moves up the spinal cord until a little bell goes off in the brain and says, “ouch. It hurt”*. (Paraphrased)
if pain is an accurate indicator of tissue damage...

Why do 40% of the people (alert, rational & coherent and “not in shock”) admitted to an emergency room with horrific wounds feel no pain or pain of low intensity even after long delays?
Trainer John Sillick, 26, suffered fractured vertebrae (T1 to T12), a fractured femur, and a fractured pelvis after 19-year-old male Orky 2 breached on top of him while riding on another orca during a performance.
presented to dentist with a minor toothache...
all I felt was a “bump”....
and yet...

I got a paper cut on my finger and it hurts OUCH!!!!!!!!!!!!!!!!

Feel bad for me!!!!!!! :( 
there are no pain receptors

Nociceptors:
Don’t send ‘pain’ signals, they send the same signals as other receptors but just at a higher threshold.
pain is in the brain!

You will not feel pain unless and until the brain believes that there is a threat to the body and hence an action is required.
There is no single ‘pain center’ in the brain.

Pain is multisensory, experience involving areas throughout the brain (known as the Pain Neuromatrix).

Pain neuromatrix, includes the insula, the anterior cingulate cortex, the periaqueductal grey matter, the medial prefrontal cortex, and the supplementary motor area.
Pain is influenced by your experiences, thoughts, culture, beliefs and attitude.
Pain can be modulated by worry, stress and anxiety.
Neurotag = Neural Signature
Initial Response:
- Danger
- Basic Protection
- Motor
- Autonomic
Initial Response: DANGER!
- Basic Protection
- Motor
- Autonomic

Followed by higher center processing
- Past experience
- Emotions/Feelings
- Beliefs
Development of a neural signature
mouse trap game
how does acute pain become chronic?
The brain produces inhibitory chemicals such as the aminoacid neurotransmitter GABA that “down-regulate” nociception transmission.
Repeated activation of the neurosignature creates the experience of pain whether there is “danger “ or not.

70% of amputees report limb pain and sensation even years after the amputation.
Central Sensitization

Cortisol, produced by chronic stress, suppresses the production of GABA contributing to the sensitization of the pain neuromatrix.
The descending pain modulation system is disabled by stress, adrenal overactivity, & the long-term negative effects of excessive cortisol causing the central nervous system to become “sensitized”.
Central Sensitization

Central Sensitization

Living with your pain.

“Nerves That Wire Together, Fire Together”
normal sensitivity

PAIN!

ANGER!

OUCH!
more sensitive

Pain!  

ouch!
very sensitive

ouch!

Pain

anger!
Homunculus
plastic change in the brain

Figure 13.31, page 457
Sensory topography reflects repetitive use

Repetitive tapping with tip of finger 2 coupled with behavioral reward causes neuronal receptive fields in S1 to expand into neighboring cortex.

painless can change your nervous system

Plasticity = Neurological adaptations
With persistent pain (sensitization) and altered processing the brain develops a poorer view of the tissue. The map of the affected area is “fuzzy” or “smudged”.
Plasticity, sensitivity and chronic pain

The brain and nervous system has become so good at constructing the particular pain signature that you experience pain when the “fuzzy” area is even mildly stimulated.
How can we use this information to design more useful, patient centered treatment?
top-down intervention

Education
- physiology of pain
- the role of the brain in pain
- ”hurt does not equal harm”
Masterclass

How to explain central sensitization to patients with ‘unexplained’ chronic musculoskeletal pain: Practice guidelines

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Stress management: reduce the cortisol!
- meditation
- activity/hobbies
- social
- work
- diet
- lifestyle
from the “bottom” up...

Treatment which lowers or inhibits the nociceptive signals (bottom) to the brain.
why manipulation may help at this level

Novel stimulation may cause brain to:

• over-ride, decrease or “reset” nociceptive input = “control-alt-delete” or “re-boot” at joint tissue level

• down regulate the perceived threat

• creation of descending inhibition

• brain changes the (mal)adaptive motor responses it was outputting because of the pain

• decreased temporal summation
Observations on effects of manipulation on pain

- Most likely non-opioid – analgesic effect unaffected by naloxone
- Tolerance does not develop
- Sympathetic excitation occurs
- May provide non-noxious sensory input to activate descending pain inhibitory systems (DPIS)
- The above suggest stimulation of the lateral-dorsal periaqueductal gray area (PGA).
- Improvement of joint function as evidenced by post-manipulative therapy improvement in ROM
Effects of joint manipulation.

–Mechanical.

• Joint cavitation and increased ROM post treatment.
• Joint and muscle receptor stimulation.
• Breaking of joint adhesions.
• Release of connective tissue trapped in joints.
• Relief of chronic nerve compression.

–Reflex.

• Inhibition or reduction of pain signal transmission.
• Relaxation of paraspinal muscles.
• Evidence of stimulation of the autonomic nervous system.

What about chronic LBP?

• Spinal manipulation in 115 chronic LBP patients improved Oswestry scores and Roland-Morris Index scores by 50%.
• Better than acupuncture or medication.
• Also demonstrated best ROM improvement of all interventions.

– Giles, LG; Muller, R: Chronic spinal pain: a randomized clinical trial comparing medication, acupuncture, and spinal manipulation. Spine: 2003;28(14): 1490-1502
Best Practices

When exercise and manipulation are combined to treat back-related pain, a superior patient response is achieved compared to when manipulation was used alone.


caveat!

“Bottom up” only treatments may reinforce the belief that there is something wrong in the tissues and joints (and thereby raising the threat level) and may only bring temporary relief.
is there a treatment that does both?

Graded Exposure

Approach or Activity:

Gradual exposure to feared activities without causing pain lowers the threat level in the brain.
Many researchers believe that a large part of pain relief seen with exercise and other rehabilitation methods is from lowering the threat level in the brain using the graded approach.

But sometimes the pain is too great to start here...
Chronic pain causes sensitization and plastic changes in the central nervous system.

Sensorimotor training may be a promising intervention.
Addressing CNS changes

• With persistent pain (sensitization) and altered processing the brain develops a poorer view of the tissue. The map of the affected area is “fuzzy” or “smudged” = plastic change.
• The more the tissue map is altered, the more the pain.
• Correcting the brain’s view of the image is essential to manage the pain
How can we affect the neural signature, the “image” of pain?

• In the late 90’s it was shown that the same neurons which fire when performing a motor act, fire when watching another person do the same act.

• They were called “mirror neurons” ie: they reflected acts performed by another person (Gallese, Fadiga et al. 1996)
Imagined or observed movements

Wand B, Smith A, Gouke, R O’Connell, N, Moseley, G. Seeing It Helps Movement-related Back Pain is Reduced by Visualization of the Back During Movement. Clin J Pain Volume 00, Number 00, 2012
Coaching movement can act as a motor “mirror”.
Coaching “neuro-developmental” movements may act as a method of motor “mirroring” appropriate movement patterns in the CNS.
Managing Chronic Nonspecific Low Back Pain With a Sensorimotor Retraining Approach: Exploratory Multiple-Baseline Study of 3 Participants
Benedict M. Wand, Neil E. O'Connell, Flavia Di Pietro and Max Bulsara
PHYS THER. 2011; 91:535-546.
Originally published online February 24, 2011
Participant 1: 29 y.o. female with 10 year history of LBP, buttock pain and right posterior thigh pain.

Pain began following a MVA.


No “red flags”, neurologically intact. No contraindications to exercise.
Participant 2: 33 y.o. male with 14 month history of bilateral LBP, intermittent left leg pain.

Onset 1 hour after lifting a heavy object.

Course of chiropractic manipulation settled symptoms but he was constantly uncomfortable and wary of movement. Experienced three further episodes of disabling pain. Had chiropractic care after third episode that eased symptoms but not completely. Not taking any pain medications. No “red flags”, neurologically intact. No contraindications to exercise.
Participant 3: 55 y.o. female with four year history of bilateral LBP. Left sided buttock pain.

Related to a lifting mishap.

Pain was initially episodic but became constant. Treatment included several courses of PT and chiropractic which she thought were helpful. More recently she began Pilates which she believed worsened her condition. Medication for hypertension, acetaminophen for LBP. No “red flags”, neurologically intact. No contraindications to exercise.
Education: outline of a biopsychosocial model of chronic non-specific low back pain. All received a copy of *Explain Pain* during the first week as a take-home resource.
sensory: localization training

With, then without mirror visualization

Goal: 80% accuracy
sensory: same intervention, different probe...
Increasingly difficult letters and sums were written on the skin over the back. Subject was asked to identify or perform operation. 3 weeks.
motor: graded imagery

Graded motor imagery retraining. “Recognise®”
motor: imagined movements

Subjects watched a series of 7 minute videos twice of people doing progressively greater back and body movement 3x/day
motor: graded exercise

Maintain awareness of spinal position, pain free at all times.
graded exercise

All movements are to be pain free and involve as much variety as possible.
Figure 1.
Change in pain intensity over time for each participant. The dashed vertical lines represent the changes between experimental phases. The first period is the pretreatment phase, the second period is the treatment phase, and the third period is the posttreatment phase.
Active Care Management Summary

1. Pain Education
2. Manipulation/Manual Therapy
3. Imagery techniques
4. Sensorimotor training
5. Movement therapy
Resources:

- www.noigroup.com
- www.backfitpro.com
- www.rehabps.com