Yoga for Chronic Pain

Understanding the Benefits of Yoga for Chronic Musculoskeletal Pain through the Neuromatrix Model

Capstone Project by Molly Miller

Learning Objectives

- Understand the importance of physical therapists' role of in the management of chronic pain
- Recognize common pain theories and the evolution of pain science to the neuromatrix model
- Have a basic knowledge of biologic and physiologic mechanisms that contribute to chronic pain
- Identify risk factors that might predispose someone to developing pain chronicity
- Know basic yoga principles and components that can be utilized in physical therapy practice
- Comprehend the current scope of evidence related to the benefits of yoga for chronic musculoskeletal pain

Why is this topic relevant today?

- Opioid epidemic[1-3]
- **#ChoosePT** campaign by APTA[4,5]
- Non-pharmacological interventions:
  - Physical Therapy[4]
  - YOGA[6,7]

What is Chronic Pain? And what causes it?[11]

- Pain lasting longer than[8]

  3 months

- Beyond normal time for tissue healing[8-10]
- Prevalence is HIGH[8,11]
- Poor Pain Management[12]

- **Posture**
- **Labor**
- **Obesity**
- **Military**
- **Sports**
- **Trauma**
- **Surgery**
- **Aging**

Chronic Pain is a burden to society[11]

- Functional impairments
- Disability
- Lost productivity
- Reduced Quality of Life

History of Pain Theories

- **Specificity Theory**[13-16]
- Gate Control Theory
- Neuromatrix Theory

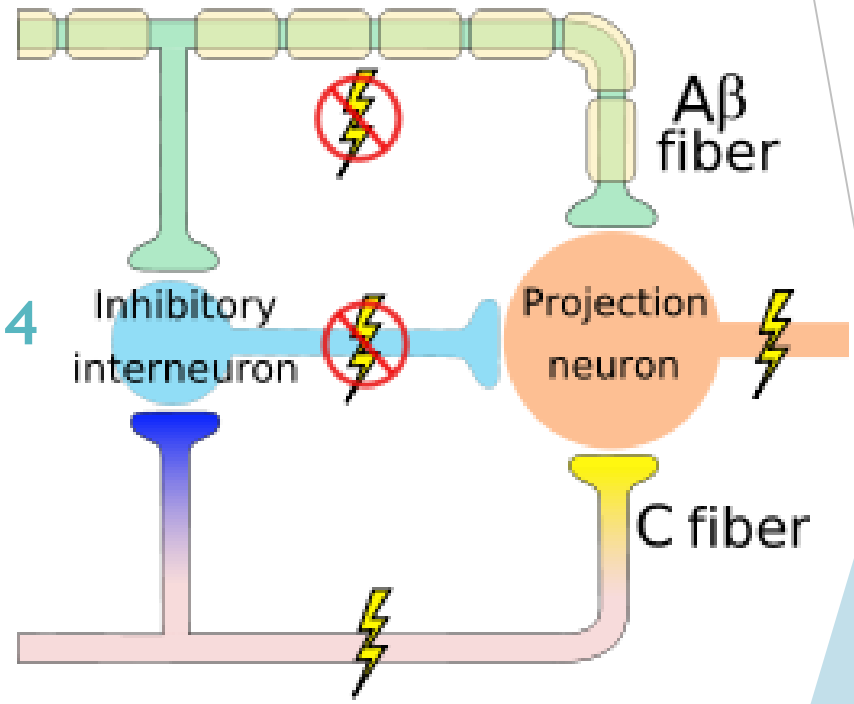
Imaging Inconsistencies[17-19]

Why do people with abnormal imaging have NO pain?

- 50% of people with no symptoms had bulging discs[17]
- 67% of people over age 50 had spinal abnormalities[17]
- **Pain is *not* proportional to tissue damage[9]**

History of Pain Theories

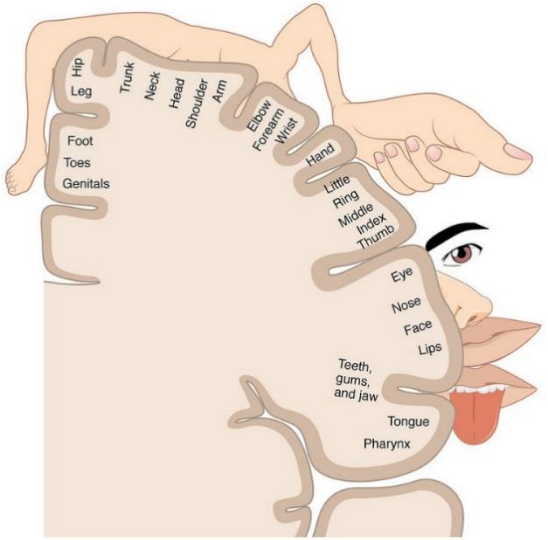
- Specificity Theory
- **Gate Control Theory**[13,14]
- Neuromatrix Theory



The Mystery of Phantom Pain

How can you feel pain in a body part that does not exist?

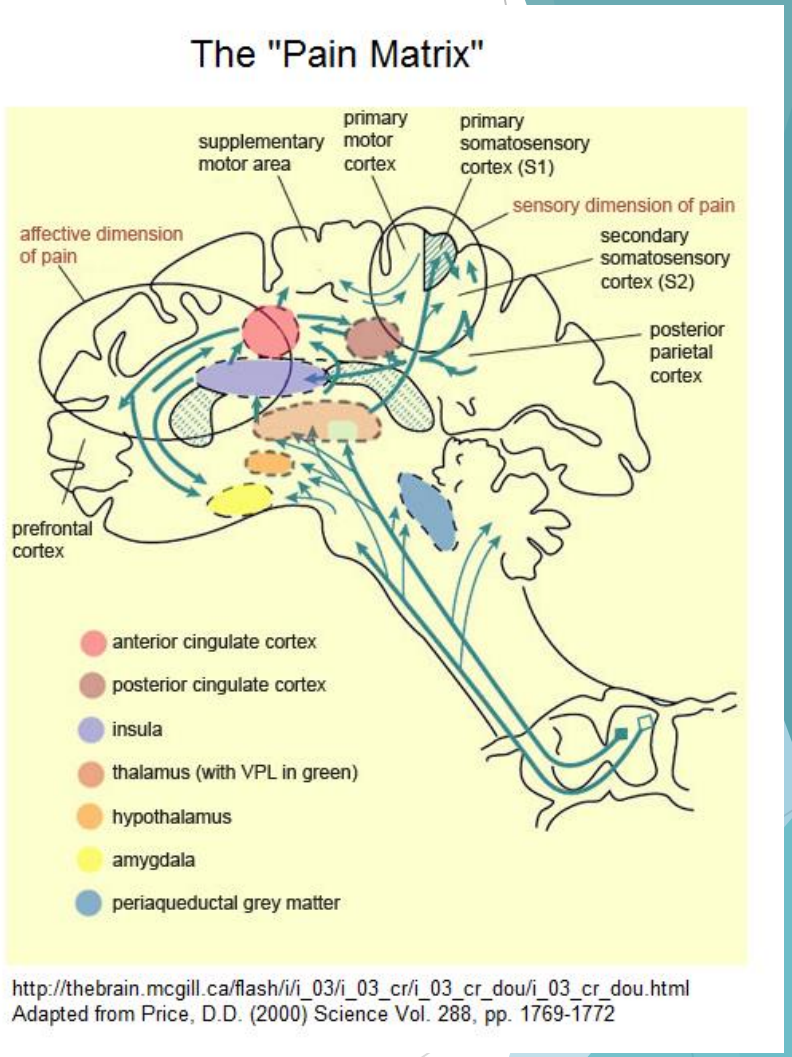
- "Virtual Body" created by genetics, modified by experience[9]
- **Pain is *not* caused by stimulation of pain receptors[9]**



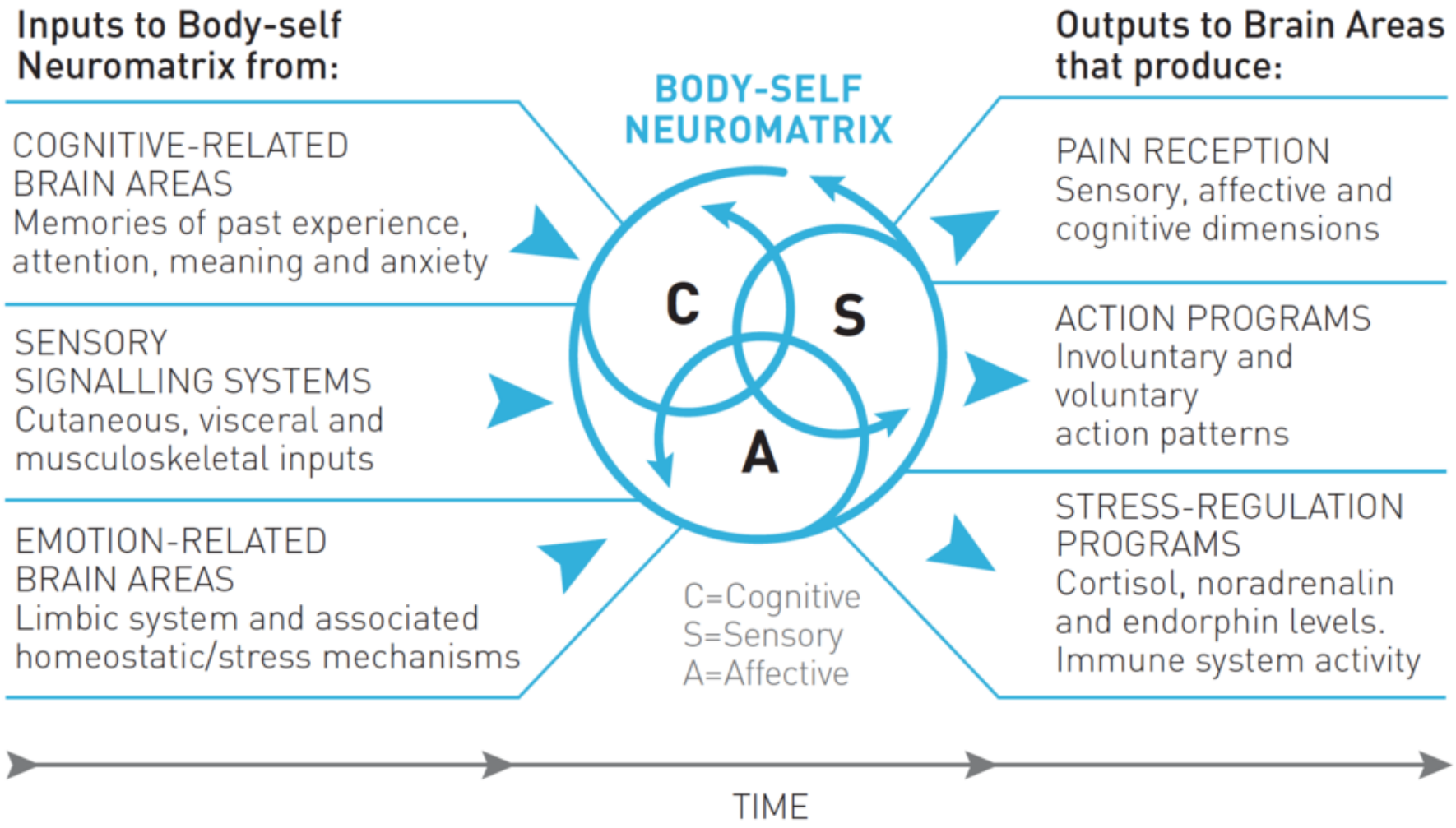
BOTTOM LINE: PAIN IS CAUSED BY THE BRAIN

History of Pain Theories

- Specificity Theory
- Gate Control Theory
- **Neuromatrix Theory**[9,20]



Neuromatrix Inputs & Outputs[20,21]



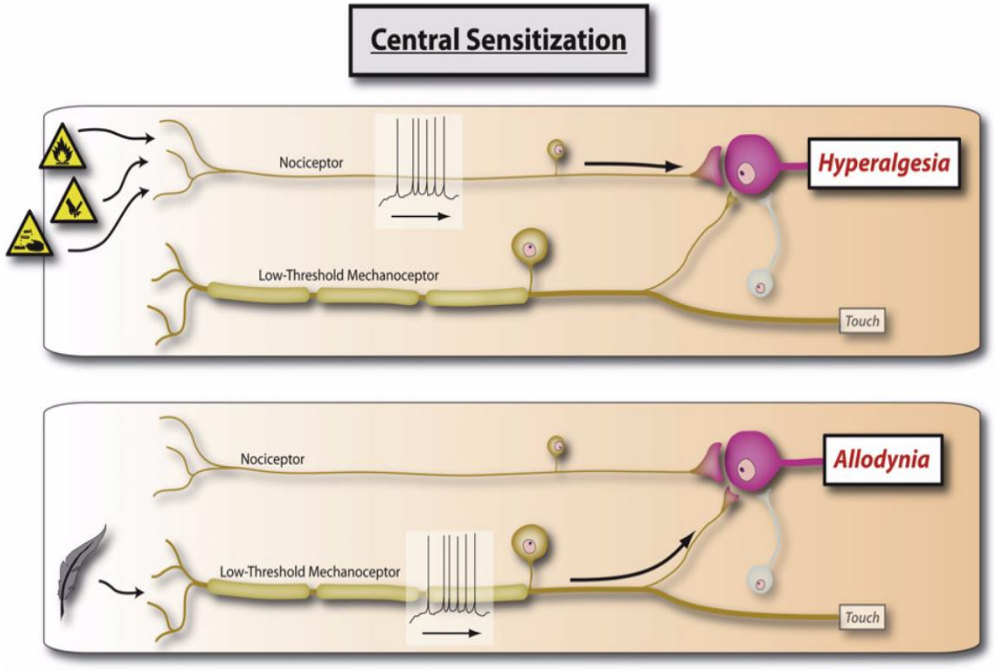
What is the greatest threat?

vs.

The Neuromatrix and Chronic Pain

Pain is an OUTPUT of the BRAIN in response to PERCEIVED threat

- Central Sensitization[22-24]
  - Hyperalgesia
  - Allodynia[23]
- Neuroplasticity[25,26]

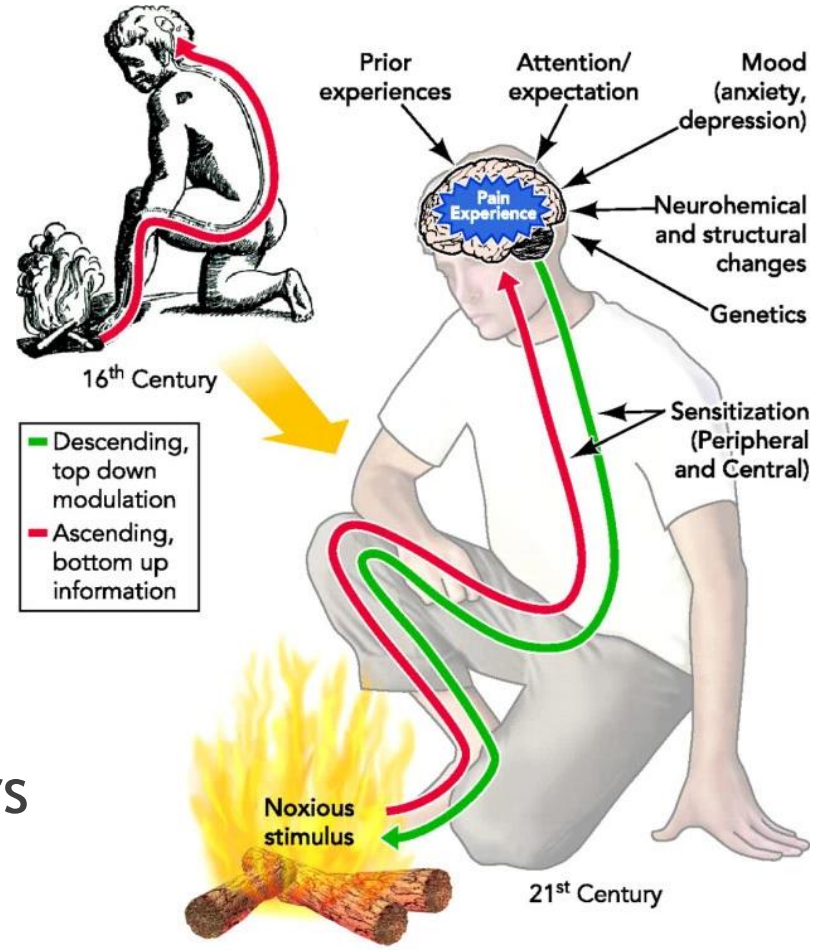


Numerous Inputs Shape the Neurotag[26-28]

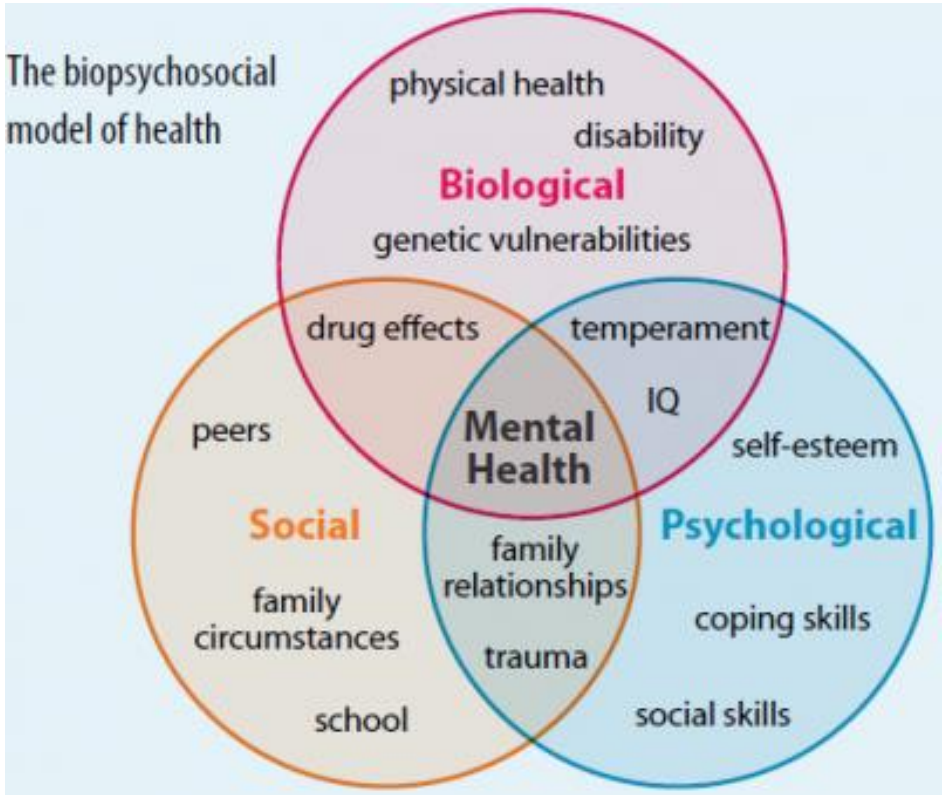
- Context
- Memories
- Past experiences

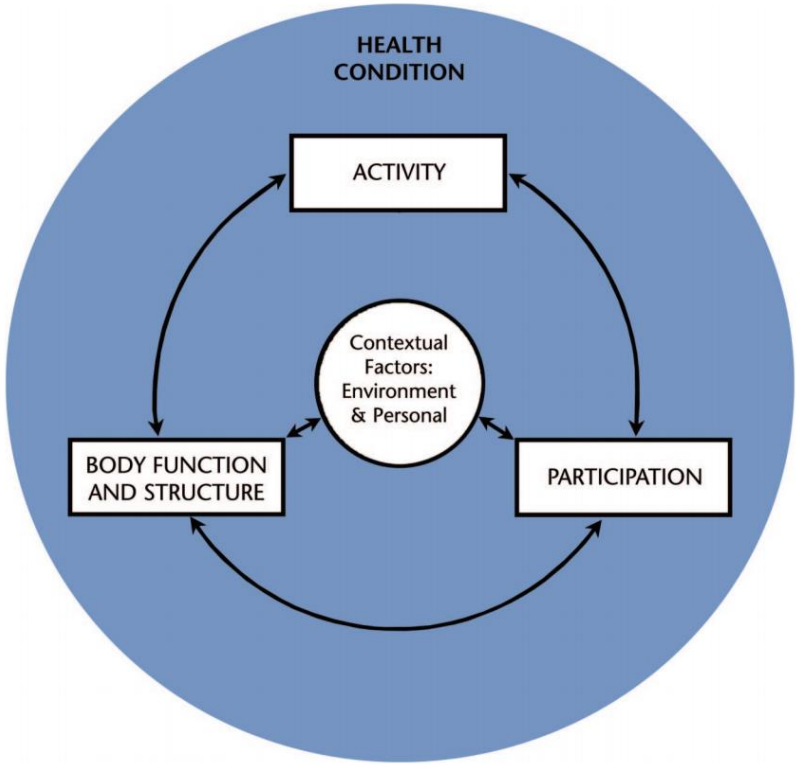
- Income
- Gender
- Education

- Environmental Stressors
- Psychological factors



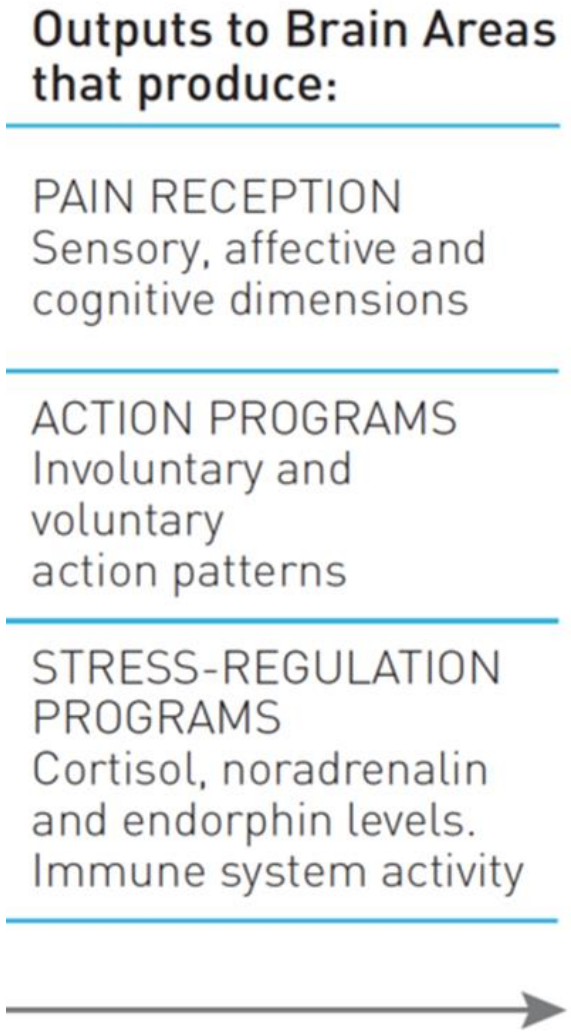
Biopsychosocial Model of Health[29,30]





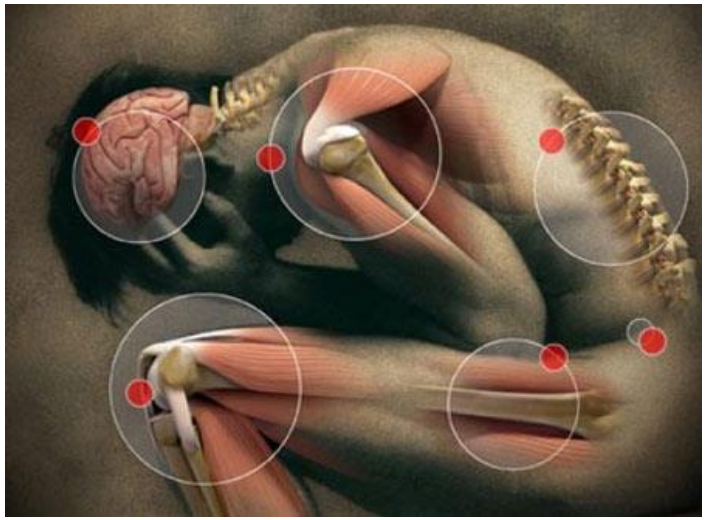
Pain affects Multiple Body Systems[27,31]

- Musculoskeletal
- Nervous
- Immune
- Endocrine



Effects on the Musculoskeletal System[31,32]

- Muscle spasms, tightness, and guarding
- Loss of mobility
- Build up of lactic acid
- Abnormal movement patterns
- Compensatory strategies
- Antalgic gait
- Atrophy and weakness
- Destruction of articular cartilage

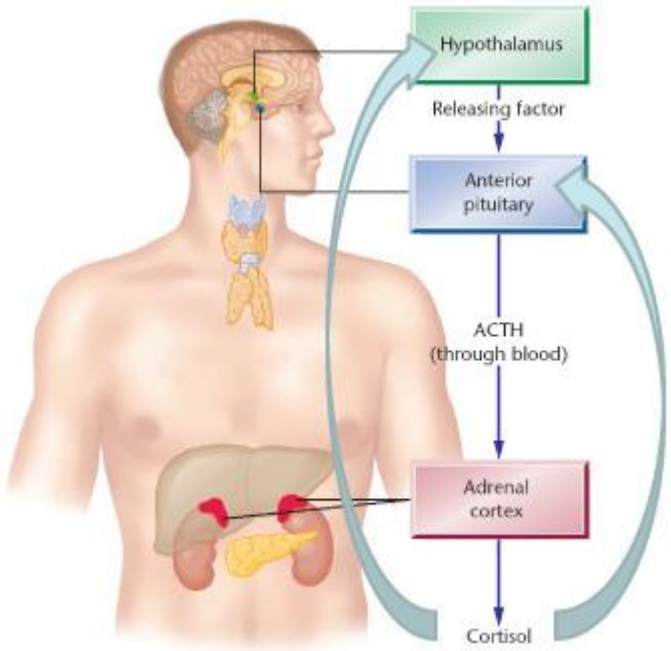


Effects on the Nervous System[27]

- Central sensitization[22]
- Sympathetic Nervous System – ALWAYS ON
- Parasympathetic Nervous System – ALWAYS OFF

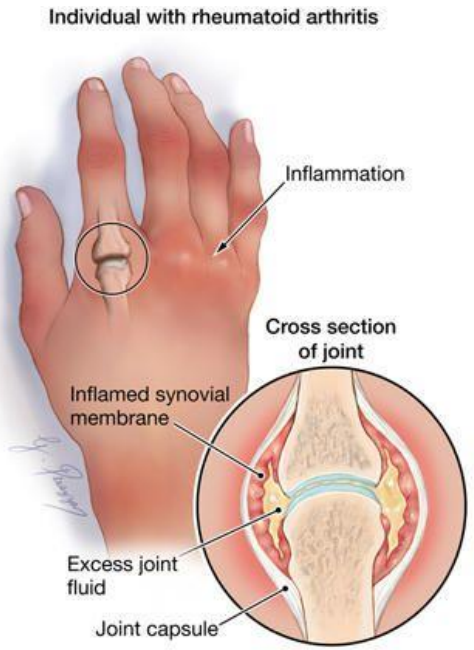
Effects on the Endocrine System[27]

- Hypothalamic-Pituitary-Adrenal Axis (HPA Axis)
- Stress hormone release in response to threat
- Persistent high levels of cortisol lead to slow healing



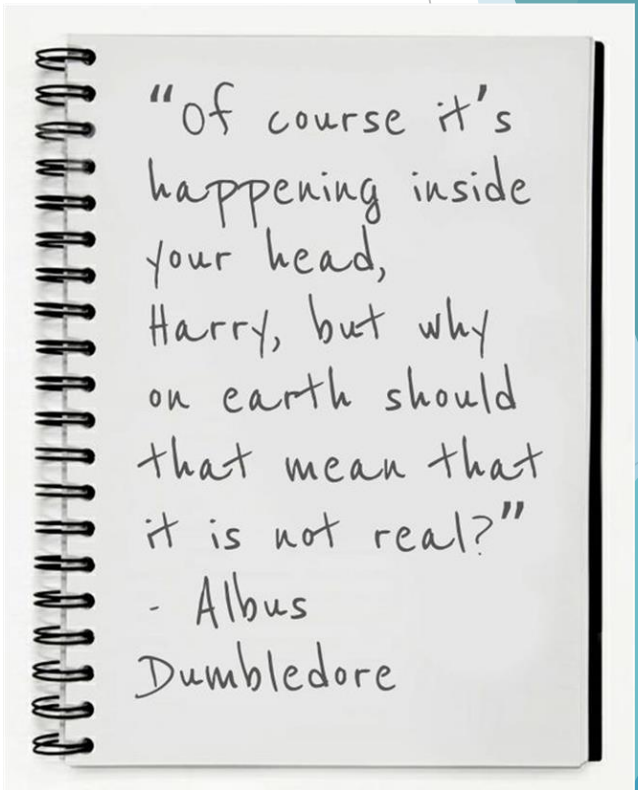
Effects on the Immune System[27]

- Pro-inflammatory cytokines → hyperalgesia[33,34]
- Cortisol lowers immune system[27]
- Chronic & Systemic inflammation
  - Osteoarthritis
  - Rheumatoid Arthritis



Malingering & Waddell's signs

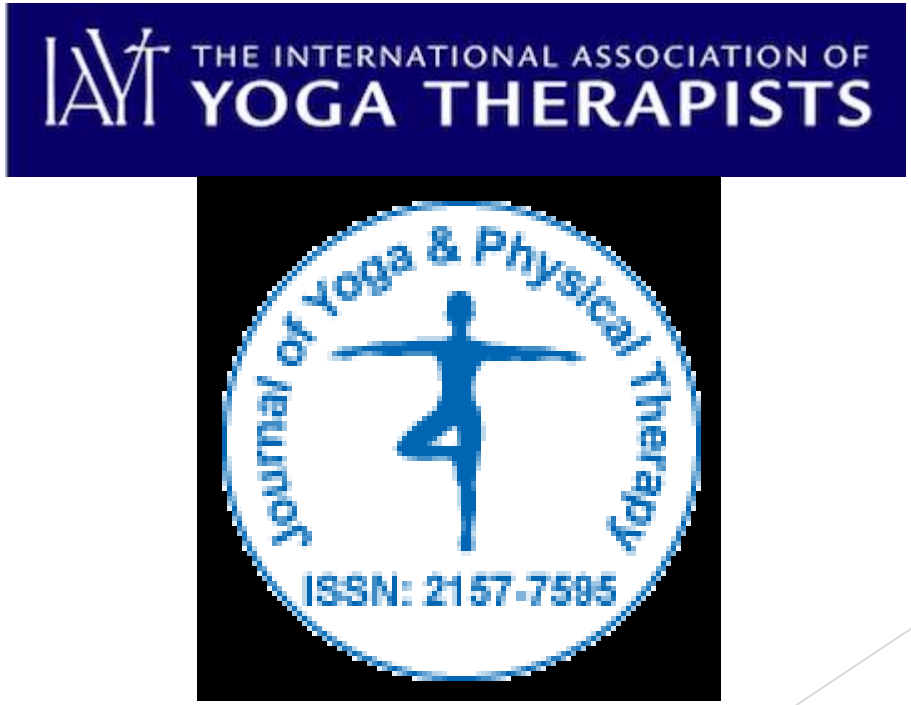
- Do not automatically assume malingering[12]
- Waddell's signs[36]
- Fear Avoidance Beliefs Questionnaire[37]
- Biobehavioral & psychosocial causes[35]



Pain is in the BRAIN and it is REAL

Why choose yoga? Relevance to PT

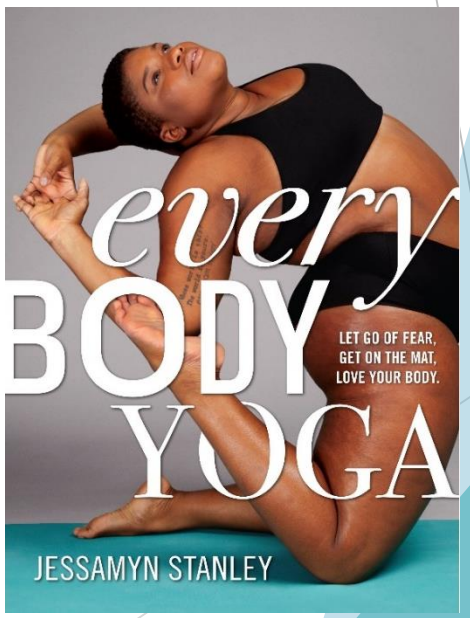
- Biopsychosocial rehabilitation for chronic pain
- Holistic approach to health and overall well-being[38]
- Yoga Therapy[39]
  - Physical injury
  - **Pain**
  - Emotional trauma
  - Mental stress



Acceptance of Yoga into Modern Medicine

- 2017 CPG for CLBP by American College of Physicians Recommendation:[41]
  - Alternative treatments, like yoga, should be initiated **prior** to pharmacologic treatment
- Yoga can be adapted for **body type, age,** or **activity level**[38]
- Plan of Care & PT Goals

YOGA is a SAFE intervention for this population



Basic Components of Yoga[38,42]

Asana	Physical Postures
Pranayama	Control of Breathing
Pratyahara	Self-awareness, Control of External Stressors
Dhyana	Meditation

8-12 weeks

Hatha - Iyengar

What's the evidence? Does yoga reduce pain?

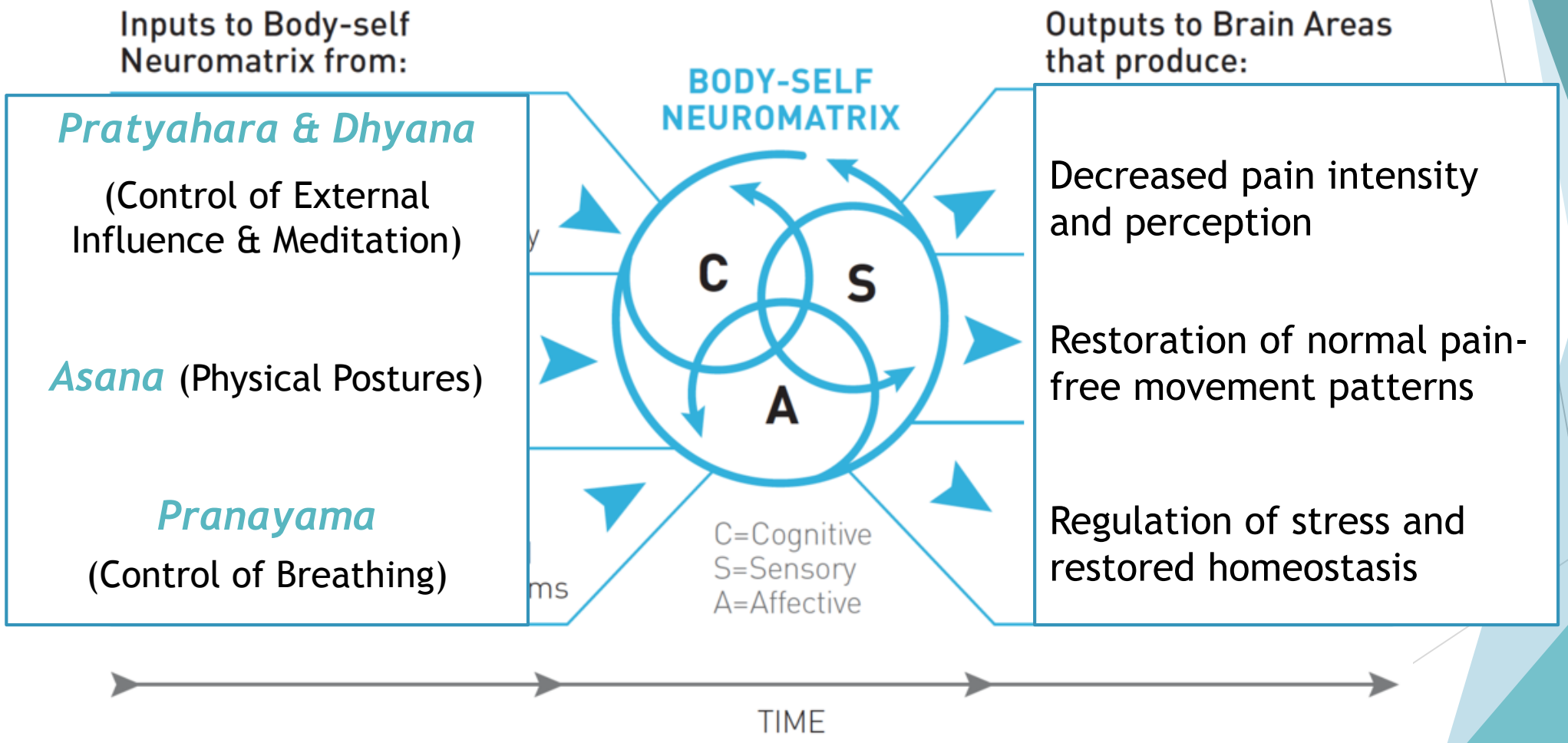
- **Moderate** treatment effect (Ward et al., 2013)[43]
- **Moderate** effect size (Bussing et al., 2012)[44]
- Equal or **superior** to exercise or usual care (McCaffrey et al., 2012)[45]
- Greater reduction in pain than controls (Posadski et al., 2011)[46]

Yoga can reduce pain in musculoskeletal conditions!

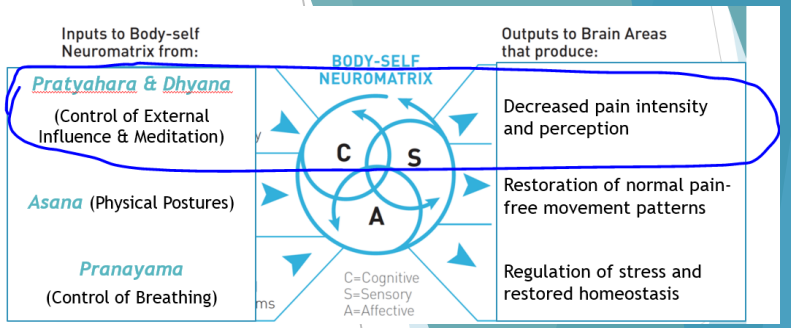
Yoga for the Big 3: LBP, OA, & RA

LBP[47-49]	OA[50-52]	RA[53-55]
• Strong evidence for short-term effects • Moderate evidence for long-term • Better than exercise	• Reduction in pain, stiffness, and swelling • Better than physical therapy exercises as adjunct to TENS • Safe for obese, over age 50 with knee OA	• Reduction in pain intensity • Decreased discomfort in joints of the hand • Significant improvements in pain disability

Yoga seen through the Neuromatrix[20,38]

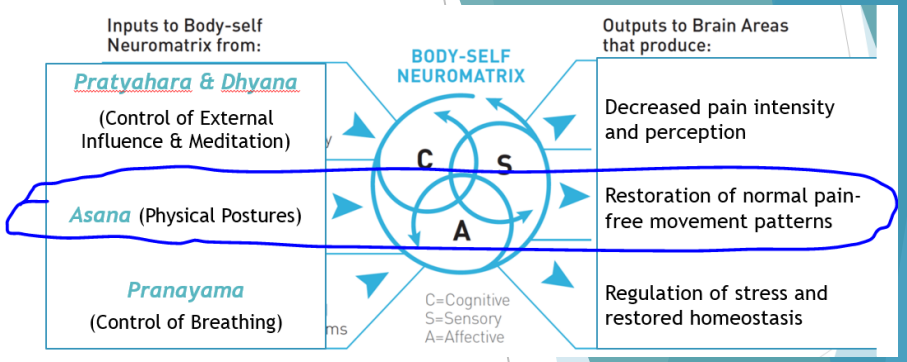


Pratyahara reduces threatening inputs & increases pain tolerance



- Therapeutic Neuroscience Education[56,57]
- Self-efficacy regarding movement and exercise[58]
- More effective tx for depression than physical therapy[59]
- Decreases fear-avoidance beliefs and anxiety[60]
- Increases acceptance and tolerance of pain[61]

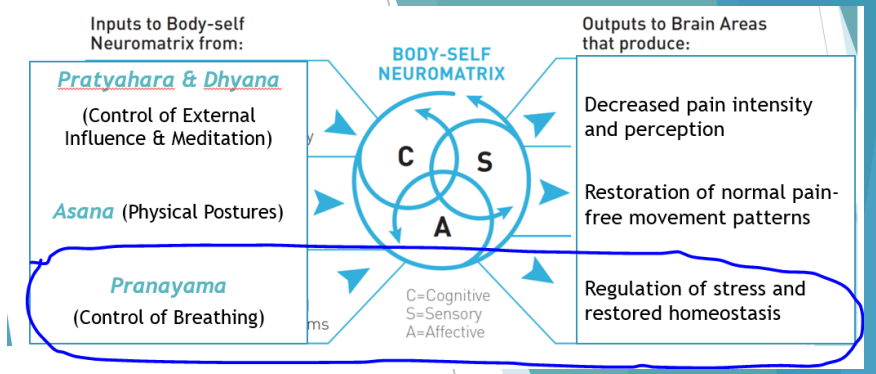
Asana restores normal movement & decreases pain-related disability



- Strength[62]
- Flexibility[60,62]
- Gait[6,64]
- Lumbopelvic stability[38]
- Postural Control & Balance[6,64]
- Functional Mobility[43]

Figure 6. Downward Dog Preparation

Pranayama restores homeostasis & decreases stress levels



HOMEOSTASIS

- Diaphragmatic breathing → Vagus nerve stimulation → Parasympathetic activity[65]
- Slower breathing increases HRV (Heart Rate Variability) to promote relaxation[66,67]

STRESS REGULATION

8-12 weeks of Hatha yoga:

- Decreased cortisol levels[70,73]
- Decreased adrenalin levels[71]
- Decreased inflammatory markers[72,73]
- Increased antioxidants[71]

Which ALL decrease stress and improve immune system function

Additional Considerations

- Refer to Psychologist or Psychiatrist
- Find a restorative yoga class or yoga teacher with experience with individuals with chronic pain
- Encourage Dhyana (meditation) as adjunct to therapy

Restorative Poses

Assistive devices:

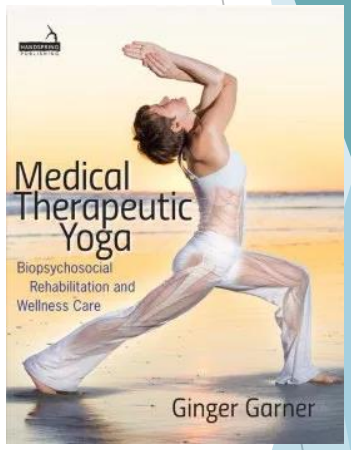
- Chairs
- Blocks
- Straps
- Mats
- Benches
- Blankets

Resources related to Chronic Pain and Yoga

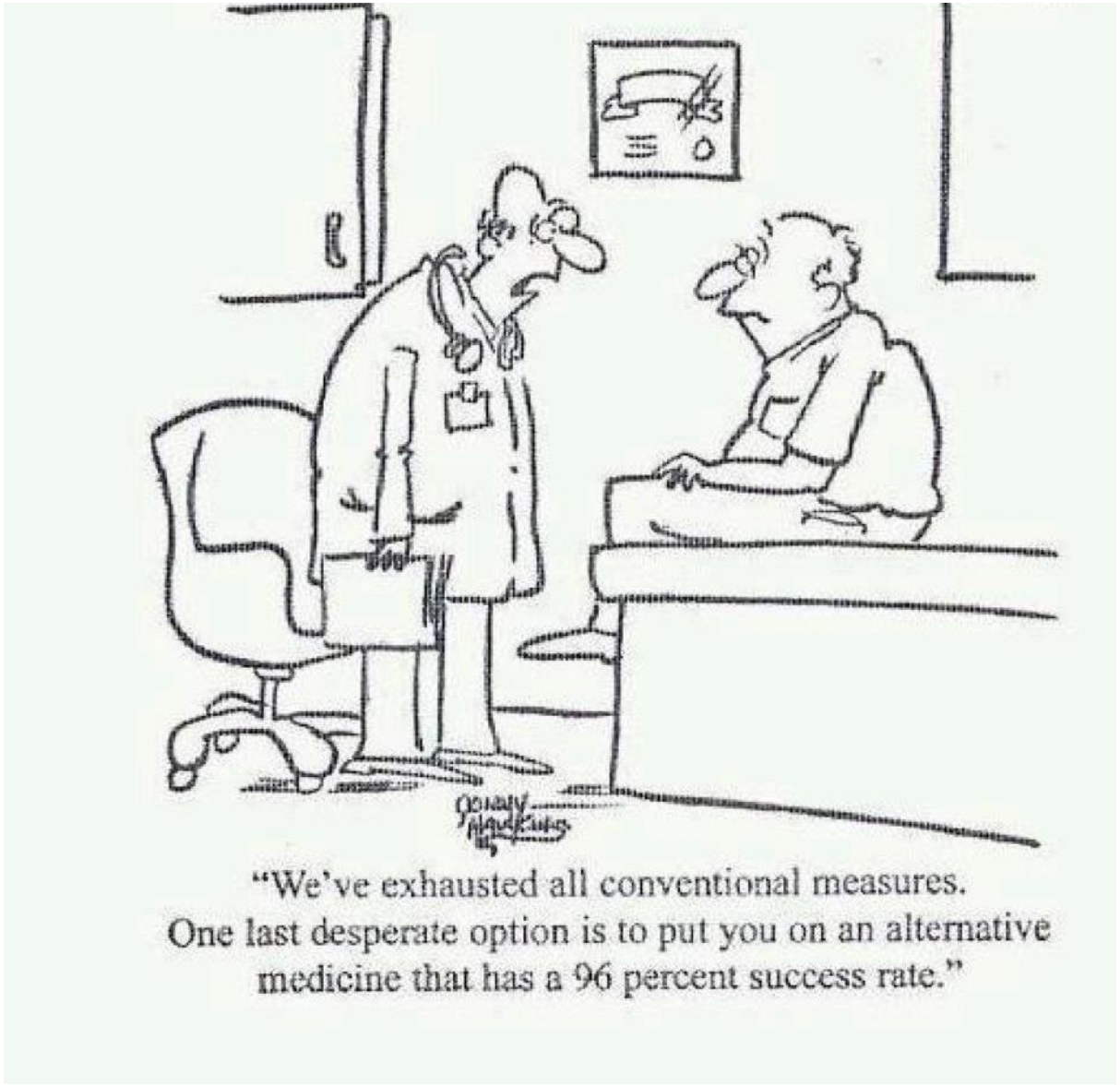
- Painful Yarns
- Explain Pain by D. Butler & L. Moseley[27]
- Medical Therapeutic Yoga by Ginger Garner[38]
- Professional Yoga Therapy Institute

  https://proyogatherapy.org/
- International Association of Yoga Therapists (IAYT)

  http://www.iayt.org/



Thank you for listening!



"We've exhausted all conventional measures.
One last desperate option is to put you on an alternative medicine that has a 96 percent success rate."

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