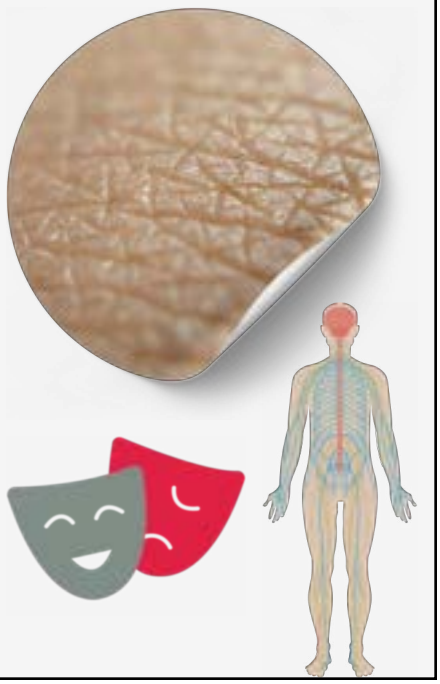
# HIDDEN CAUSES OF MSK PAIN

## UNMASKING CUTANEOUS NERVE ENTRAPMENTS AND BEYOND



Steven Capobianco, DC, MA, DACRB, CSCS

1

My attitude is gratitude


2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# My Argument

1. Could a **trigger point** present like a **peripheral nerve entrapment**?
2. What if a patient **can't tolerate** traditional manual therapy?
3. What if your standard care **isn't solving the problem**?


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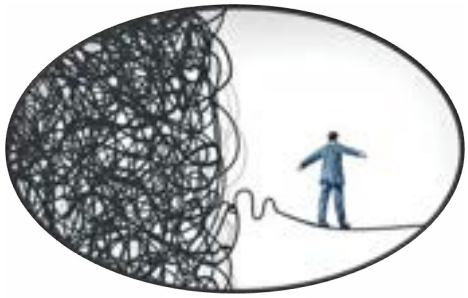

*We are fearfully and wonderfully complex*

Lorimer Moseley

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"

Simple solutions to complex problems is **NOT** working

**NOI** - Neuro Orthopedic Institute

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# World Health Org - 2021

- Approximately **1.71 billion** people have **musculoskeletal conditions** worldwide.
- **Low back pain** causes the **highest burden** with a prevalence of **568 million people.**
- Musculoskeletal conditions are the **leading contributor to disability worldwide**,
- Musculoskeletal conditions significantly **limit mobility** and **dexterity**, leading to **early retirement** from work, **lower levels of well-being** and **reduced ability to participate in society**
- The disability associated with musculoskeletal conditions has been **increasing** and is projected to **continue to increase** in the next decades.

www.who.int

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# Evolution of Pain Definition

"An unpleasant **sensory** and **emotional** experience associated with, or resembling that associated with, **actual or potential** tissue damage,"

- Pain is always a **personal experience** that is influenced to varying degrees by biological, **psychological**, and **social** factors.
- **Pain & nociception** are **different** phenomena. Pain cannot be inferred solely from activity in sensory neurons.
- Through their **life experiences**, individuals **learn** the concept of pain.
- Although pain usually serves an adaptive role, it may have adverse effects on function and **social and psychological well-being**.

- Revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises.
- PAIN: September 2020 - Volume 161 - Issue 9

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# Not Just a Piece of Meat

We are treating **human beings** attached to the meat - along with a **sensory** and **motor** nervous system, previous **experiences**, **history**, **emotions**, etc.

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# My Stance

Is it not time to reinvent **manual therapy** and **exercise**? Could we simply stop trying to study or '**fix**' structural or purely imaginary 'things'?

Could we not just **reframe** them as a way we can **interact** more with the **actual patient/client**.

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Øberg et al. 2015, Olesen 2015

# Zoom Out


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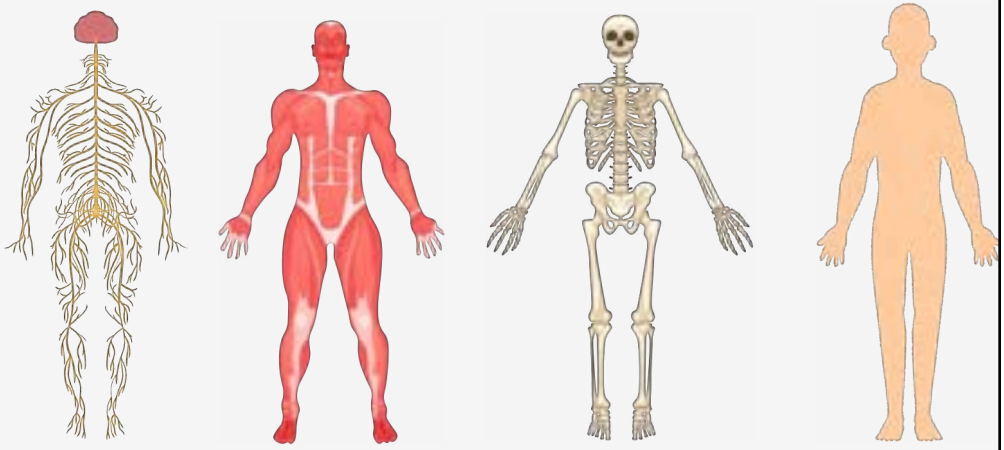
# Isolated Systems



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# Chronic (Persistent) Pain

Where the **Body** meets the **Brain**

Crofford L. J. (2015). Chronic Pain: Where the Body Meets the Brain. *Transactions of the American Clinical and Climatological Association*, *126*, 167–183.

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# Healthcare's Blind Spot

- Chronic (Persistent) Pain - pain **NOT** due to organ or structural disease
- Medically **Unexplained** Symptoms (MUS)
- **Chronic** functional syndromes (IBS, FM, CRPS, etc..)

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Dr. David Clarke - Psychophysiologic Disorders

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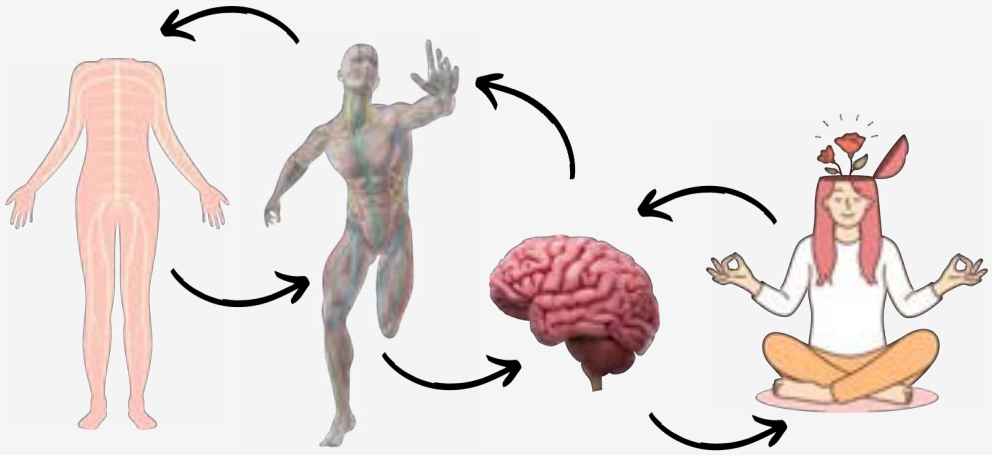
# System of Systems



The Nerves | The Envelope | The Controller | The State

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# Get Connected

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- Nerves Gone Bad
- Skin/Fascia as a Handle
- Top-Down Approach
- Affective Touch
- Practical Applications
- Therapeutic Advancements

## Guiding Theme

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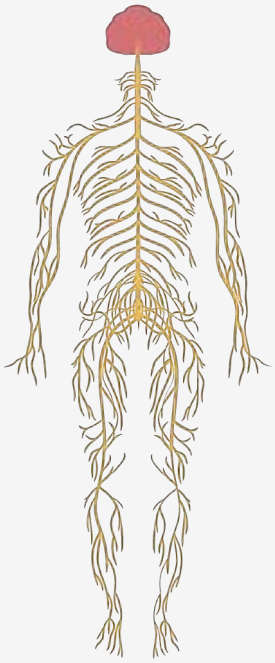
# NERVES GONE BAD



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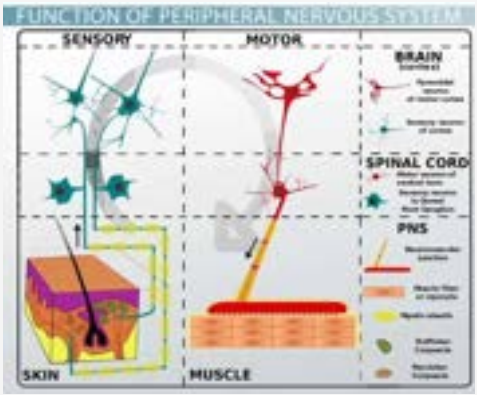
# 3 Types of Nerves




**Sensory nerves** carry signals to your brain to help you touch, taste, smell and see.

**Motor nerves** carry signals to your muscles or glands to help you move and function.

**Mixed Nerves** - combination of both

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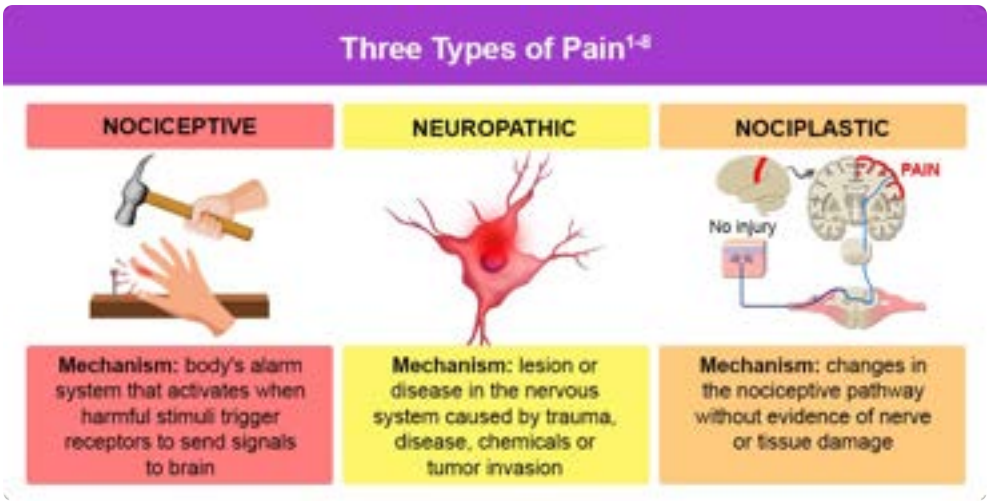
# 3 Types of Pain

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# 3 Types of Neuropathic Pain

1. **Peripheral Neuropathic Pain:** This occurs in the nerves outside the brain and spinal cord, often in the hands, feet, or legs (Diabetic Neuropathy)
2. **Central Neuropathic Pain:** It messes with the nerves right in the brain or spinal cord.
3. **Focal Neuropathic Pain:** It is a type of nerve damage in which you typically have damage to single nerves, most often in your hand, head, torso, or leg.

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# Chronic Pain & Nerves

**Chronic pain** is especially common in states of injury and disease that directly affect the **somatosensory nervous system**, such as **painful peripheral neuropathies**.

**Neuropathic pain** can result from a variety of common injury and disease states, including **mechanical trauma**, **metabolic imbalance** (e.g., diabetes), **viral infections** (e.g., shingles, AIDS), **bacterial infections** (e.g., leprosy which is caused by Mycobacterium leprae), **alcoholism**, and **chemotherapy treatment**

Despite the high prevalence (7–8% of the gen pop), treatment options are limited

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# Expanded Definitions

**Nerve entrapment** is broadly defined as **compression or entrapment** of a nerve as it passes through an anatomical structure such as a **fibro-osseous tunnel** or **fascial opening** (Flanigan et al., 2011) or below a thickened overlying **retinaculum** (Toussaint et al., 2010) that represents a **fascial reinforcement** (Stecco et al., 2010).

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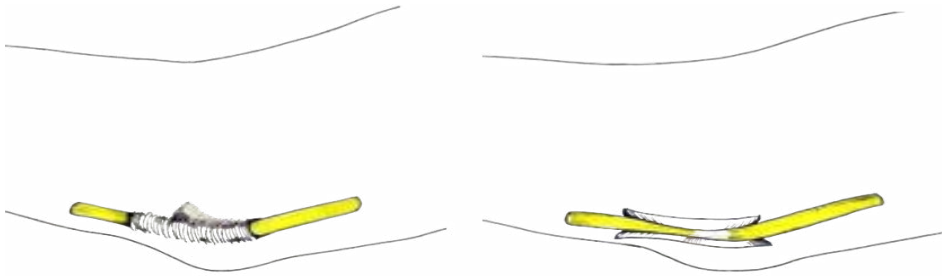
# Tunnel Syndromes

A **tunnel syndrome** is basically a cranky nerve whose tunnel has become a **compressive or tensional stress** to the neurons inside it (Lundborg 1988)

**Nociceptive neurons** embedded within the nerve walls that confine them (Bove 2008) signal "**danger**" that can lead to pain



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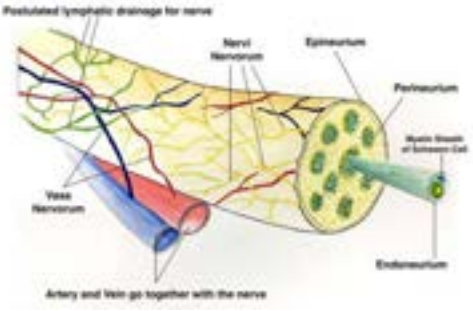
# Nerves have Nerves




**Nervi nervorum** are small nerve fibers that run through the sheaths of peripheral nerves.

The term translates to "**the nerve of the nerve**"

**Role in pain:**

- Nervi nervorum are **linked to neuropathic and chronic pain**.
- They may be involved in the pathophysiology of peripheral nerve injuries, such as trauma, stretching, and inflammation.

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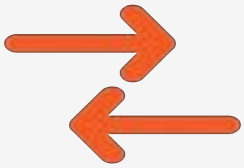
# SLIDE AND GLIDE



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# Tissue Glide/Slide

Reduced thoracolumbar fascia shear strain in human chronic low back pain

Helene M Langevin[1,2*], James R Fox[1], Cathryn Koptiuch[1], Gary J Badger[3], Ann C Greenan-Naumann[4], Nicole A Bouffard[1], Elisa E Konofagou[5], Wei-Ning Lee[5], John J Triano[6] and Sharon M Henry[7]

**Abstract**

**Background:** The role played by the thoracolumbar fascia in chronic low back pain (LBP) is poorly understood. The thoracolumbar fascia is composed of dense connective tissue layers separated by layers of loose connective tissue that normally allow the dense layers to glide past one another during trunk motion. The goal of this study was to quantify shear plane motion within the thoracolumbar fascia using ultrasound elasticity imaging in human subjects with and without chronic low back pain (LBP).

**Methods:** We tested 121 human subjects, 50 without LBP and 71 with LBP of greater than 12 months duration. In each subject, an ultrasound cine-recording was acquired on the right and left sides of the back during passive trunk flexion using a motorized articulated table with the hinge point of the table at L4-5 and the ultrasound probe located longitudinally 3 cm lateral to the midline at the level of the L2-3 interspace. Tissue displacement within the thoracolumbar fascia was calculated using cross correlation techniques and shear strain was derived from this displacement data. Additional measures included standard range of motion and physical performance evaluations as well as ultrasound measurement of perimuscular connective tissue thickness and echogenicity.

**Results:** Thoracolumbar fascia shear strain was reduced in the LBP group compared with the No-LBP group (36.4% ± 3.7% vs. 70.2% ± 3.6% respectively, $p < .01$). There was no evidence that this difference was sex-specific (group by sex interaction $p = .09$), although overall, males had significantly lower shear strain than females ($p = .02$). Significant correlations were found in male subjects between thoracolumbar fascia shear strain and the following variables: perimuscular connective tissue thickness ($r = -0.45$, $p < 0.001$), echogenicity ($r = -0.38$, $p < .05$), trunk flexion range of motion ($r = 0.36$, $p < .01$), trunk extension range of motion ($r = 0.41$, $p < .01$), repeated forward bend task duration ($r = -0.54$, $p < .0001$) and repeated sit-to-stand task duration ($r = -0.45$, $p < .001$).

**Conclusion:** Thoracolumbar fascia shear strain was ~20% lower in human subjects with chronic low back pain. This reduction of shear plane motion may be due to abnormal trunk movement patterns and/or intrinsic connective tissue pathology. There appears to be some sex-related differences in thoracolumbar fascia shear strain that may also play a role in altered connective tissue function.

Tested 121 human subjects, **50 without LBP** and **71 with LBP** of greater than 12 months duration.

**Shear strain was reduced by ~20%** in a group of human subjects **with chronic LBP.**

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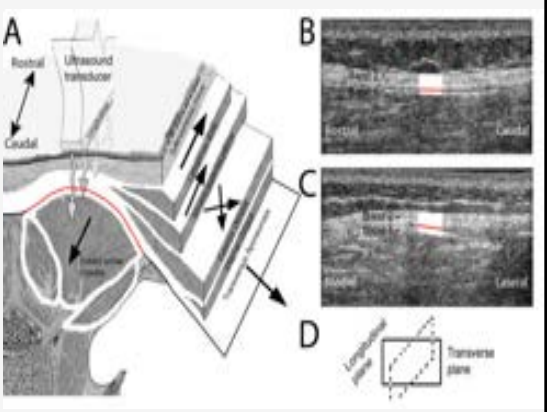
# Study Methods

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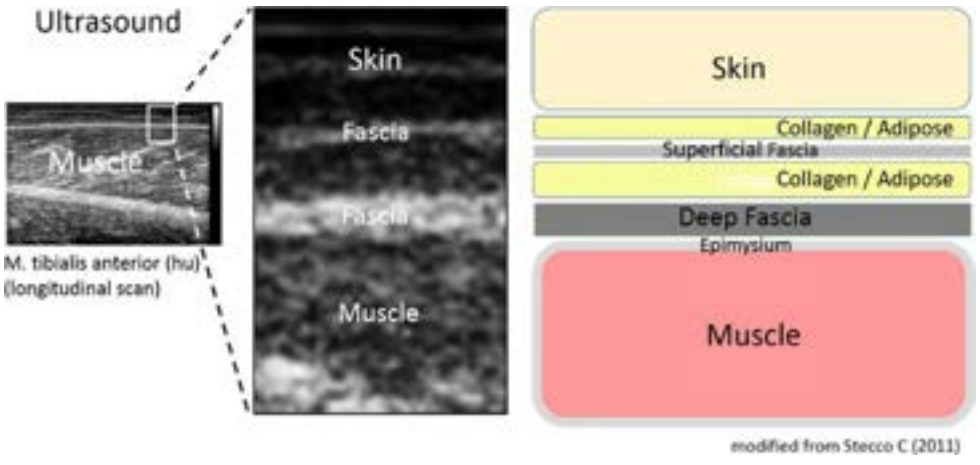
# MSK Ultrasound

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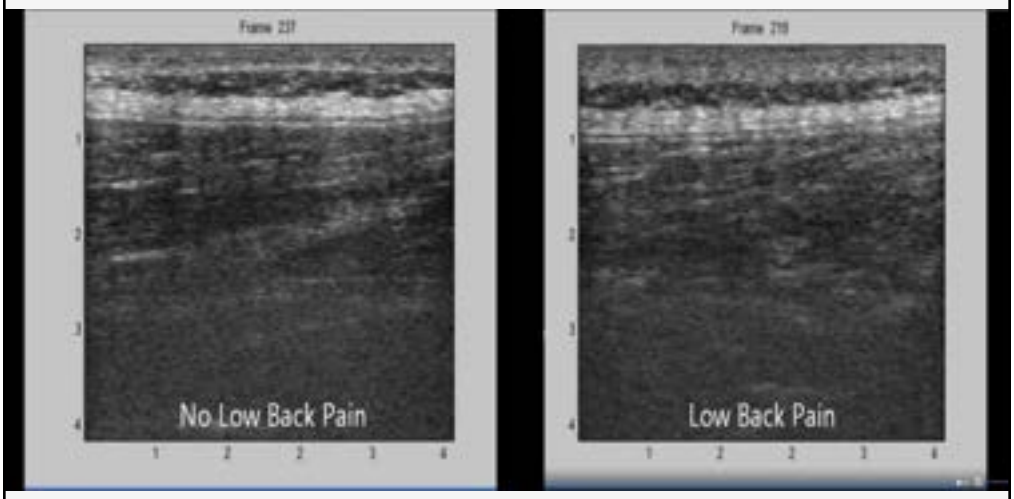
# MSK Ultrasound

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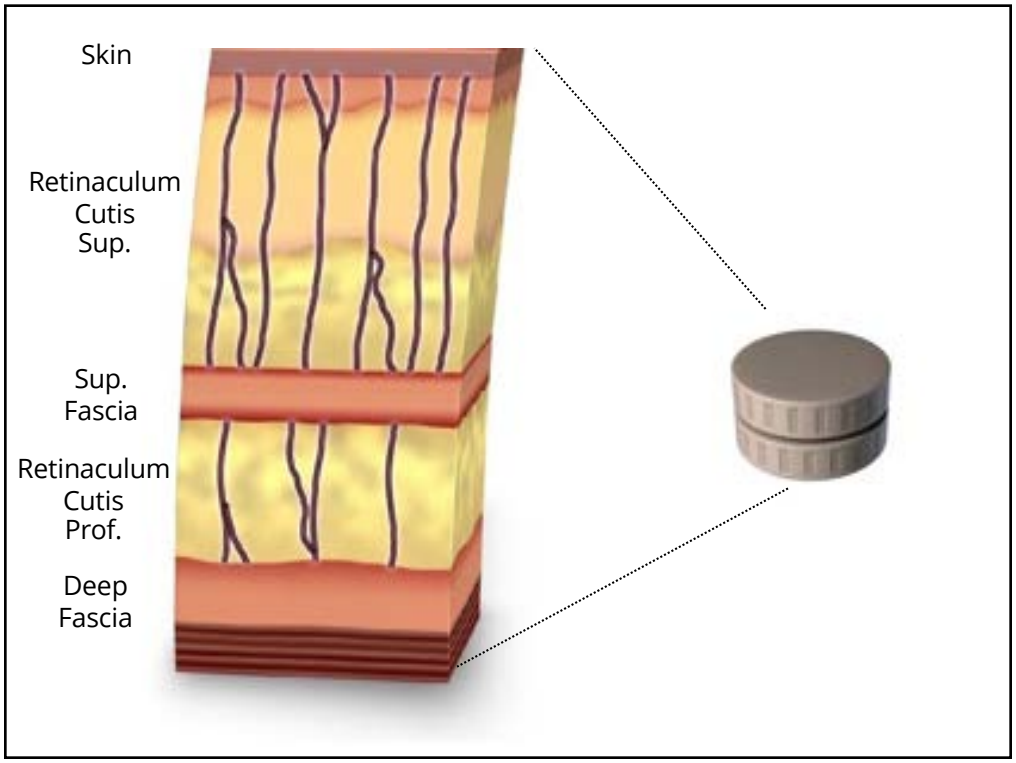
Skin
Retinaculum Cutis Sup.
Sup. Fascia
Retinaculum Cutis Prof.
Deep Fascia

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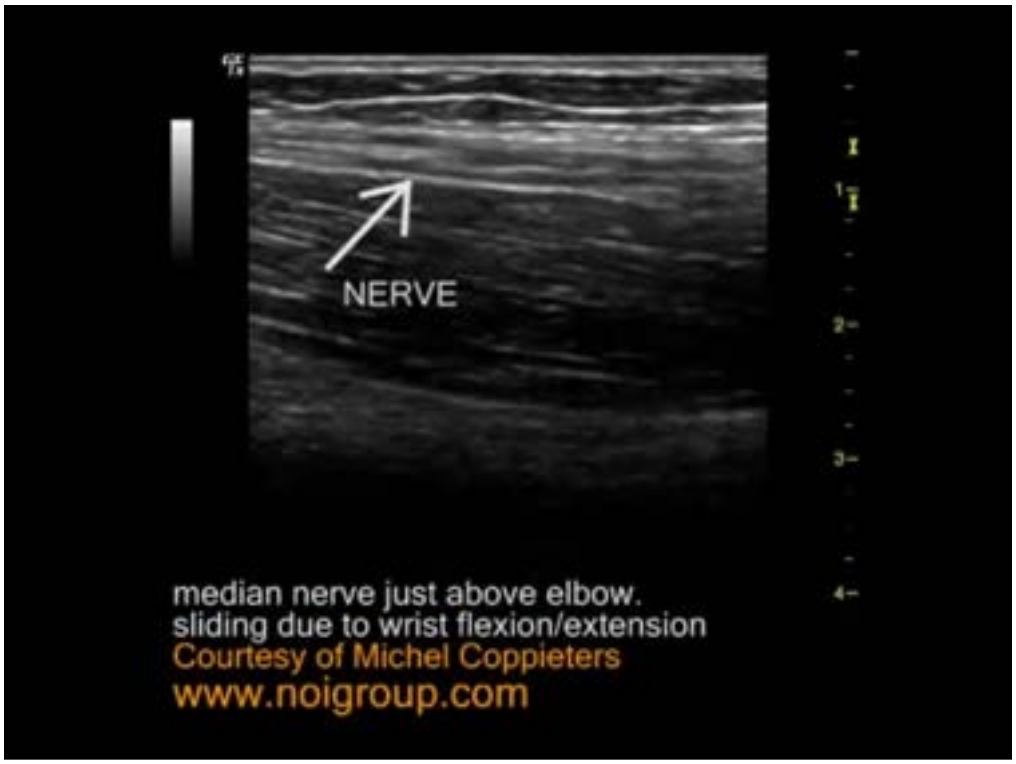
NERVE
median nerve just above elbow.
sliding due to wrist flexion/extension
Courtesy of Michel Coppieters
www.noigroup.com

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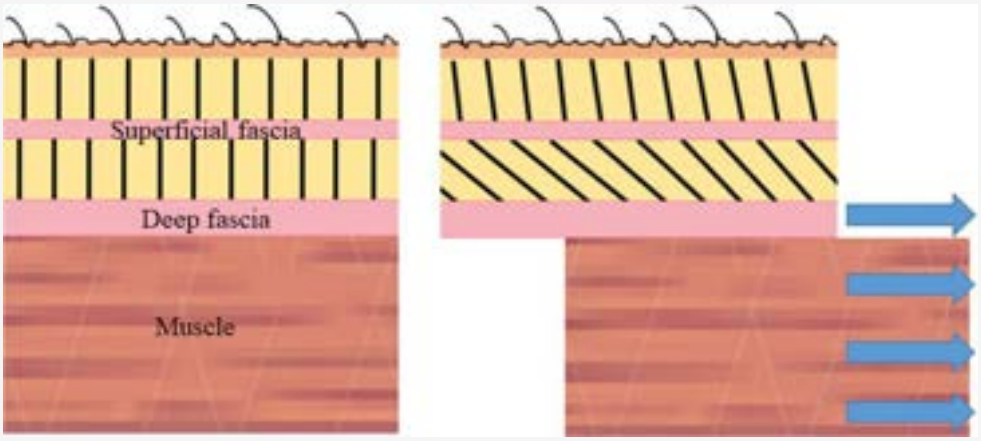
## Glide & Proprioception/Pain




**Nociception**
**Danger Signals**

**Afference**
**Proprioception**

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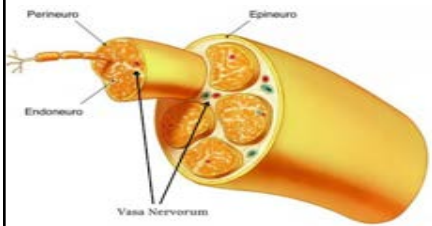
# Valleix Phenomenon




**Mechanical irritation** causes **localized swelling** that may injure the nerve directly or compromise the nerve's circulation.

Tenderness of the main nerve trunk may be **found proximal or distal** to the affected portion.

**Retrograde radiation** of pain from a distal compression neuropathy is well documented both in the upper and lower extremities and is known as the **Valleix phenomenon**, often misinterpreted as a nerve root compression or a radiculopathy.

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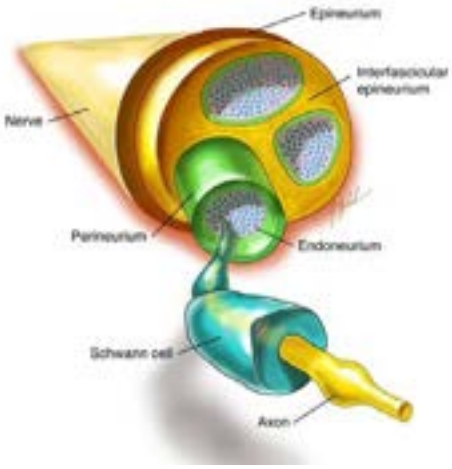


# Just Beneath the Skin

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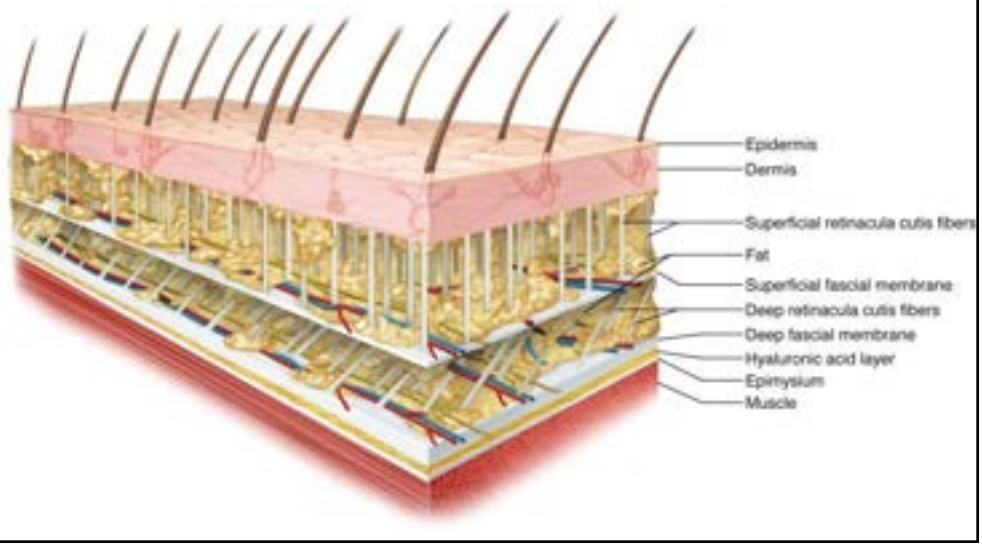
# It's All Connected

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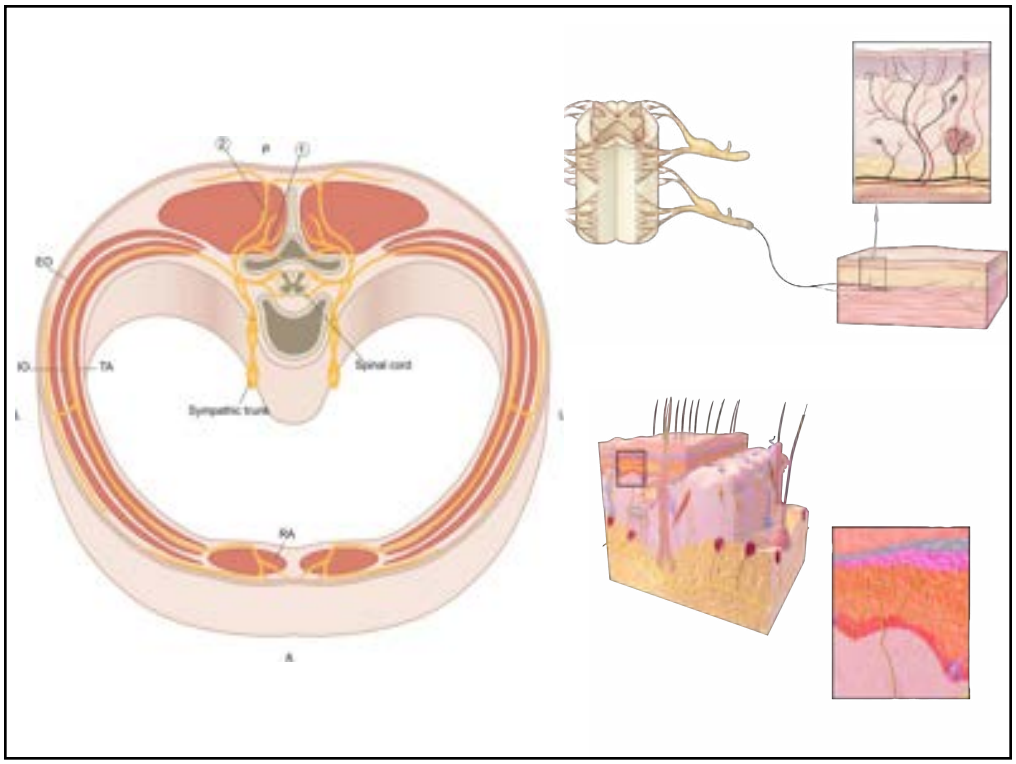


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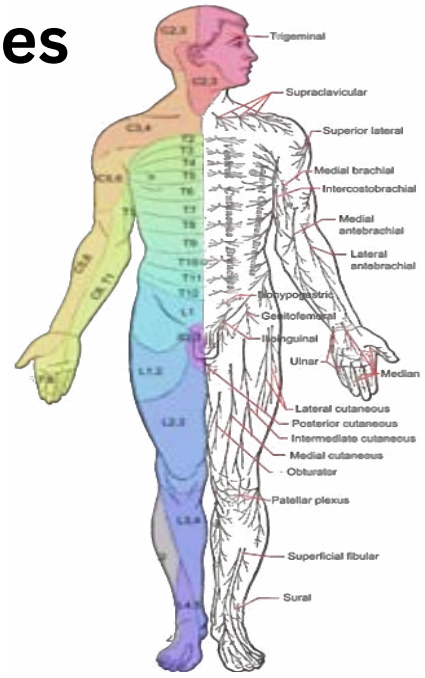
# Cutaneous Nerves

Cutaneous nerves are primarily responsible for providing cutaneous innervation, **sensory innervation to the skin**.

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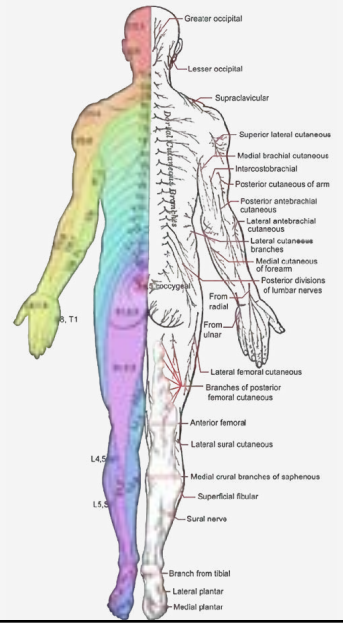
# Cutaneous Nerves




**Cutaneous nerves** are **sensory nerves** that **innervate the skin**, providing sensation to various areas of the body.

They **arise from spinal nerves** and **branch out** to supply different regions.

**Damage or compression** of cutaneous nerves can lead to **sensory loss**, **numbness**, **tingling**, or **burning pain** in the affected areas.

This can occur **due to injuries**, **infections**, **tumors**, or **certain medical conditions** (diabetes)

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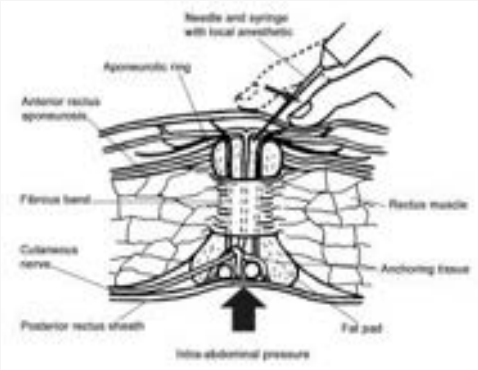
# Initial Realization




**Observation**:

First place the middle finger of one hand in the aponeurotic opening and then, without lifting the finger off the skin, move the fingertip inferiorly, cleanse the skin with alcohol using the other hand, and with that hand introduce the needle above the tip of the examining finger

Applegate W. Abdominal cutaneous nerve entrapment syndrome (ACNES): a commonly overlooked cause of abdominal pain. Perm J. 2002;6(3):20–27

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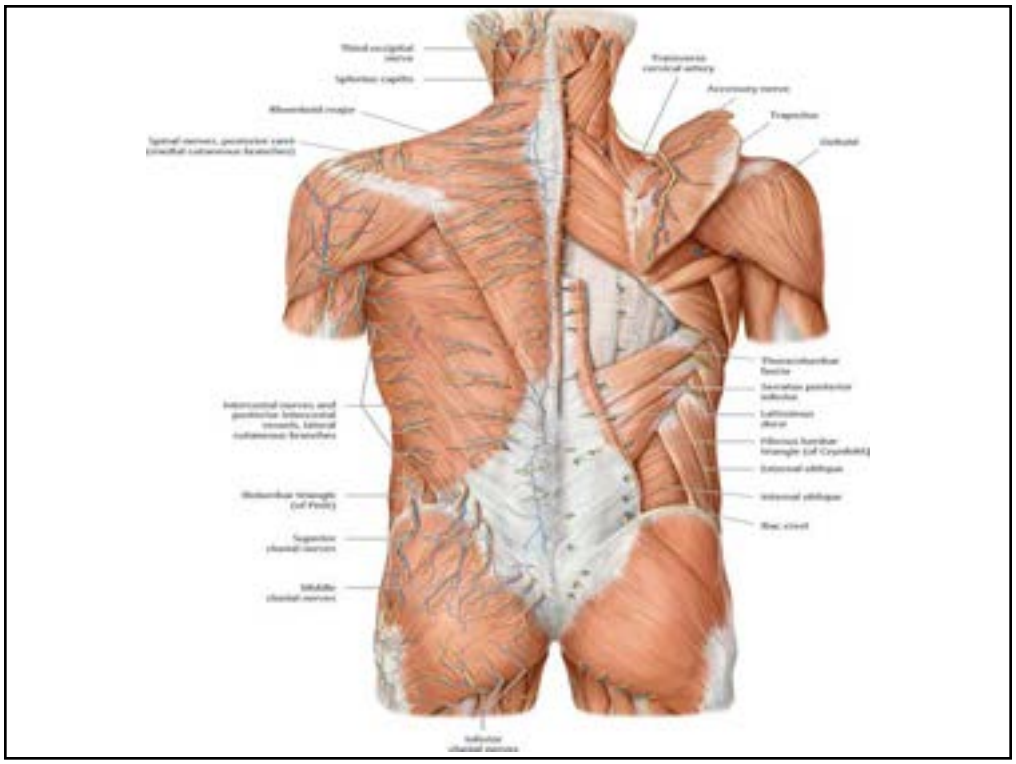

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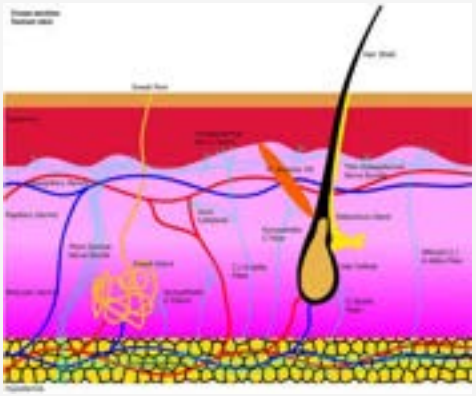
# Human Skin



The human skin is a highly specialized organ for receiving **sensory information** but also to preserve the body's **homeostasis.**

Most cutaneous nerves also contain **sympathetic efferent** (visceromotor) fibers, which innervate cutaneous blood vessels, sweat glands, and the arrector pili muscles of hair follicles

Stucky CL, Mikesell AR. Cutaneous pain in disorders affecting peripheral nerves. Neurosci Lett. 2021 Nov 20;765:136233.

Glatte P, Buchmann SJ, Hijazi MM, Illigens BM, Siepmann T. Architecture of the Cutaneous Autonomic Nervous System. Front Neurol. 2019 Sep 10;10:970.

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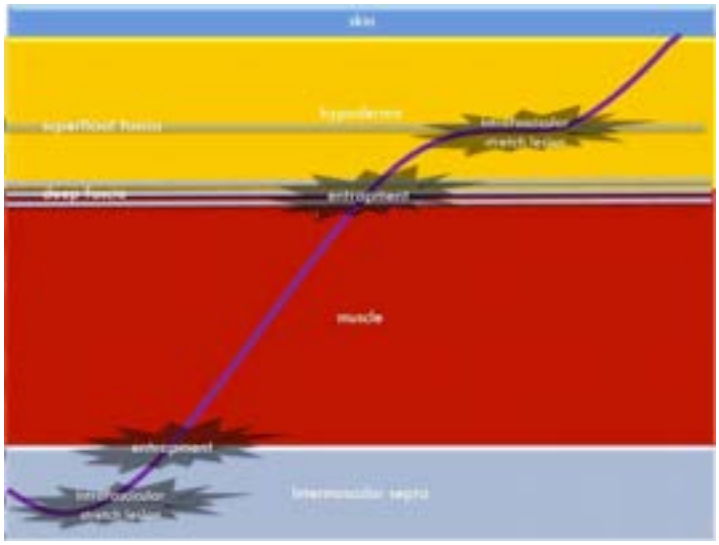
# Nerve Roadmap




Stecco A, Pirri C, Stecco C. Fascial entrapment neuropathy. Clin Anat. 2019 Oct;32(7):883-890. doi: 10.1002/ca.23388. Epub 2019 May 1.

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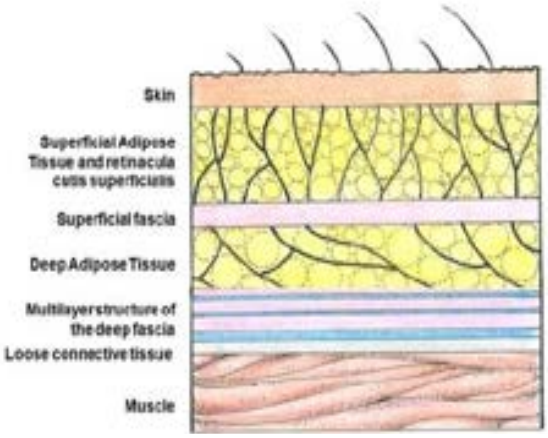
# Skin Ligaments




These 'ligaments' seem to provide an **anchorage of skin** to deep fascia that is flexible and yet resistant to mechanical loading from multi-directional forces.

Skin ligaments are also referred to as **zygomatic ligaments** (McGregor's patch), **cutaneous, accessory, transverse, suspensory and Cooper's ligaments**.

Nash, L.G., Phillips, M.N., Nicholson, H., Barnett, R., and Zhang, M., 2004, Skin Ligaments: Regional distribution and morphology. Clinical Anatomy. Vol 17 Issue 4 p 287-293

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# Cutaneous Tunnels

Nash et al. (2004) described how the **skin organ** is held against the body by thousands of small **skin ligaments**

Many **skin ligaments are hollow** and convey neural structure to the skin surface.

Hollow skin ligaments = **cutaneous rami neural tunnels**.

Nash, L.G., Phillips, M.N., Nicholson, H., Barnett, R., and Zhang, M., 2004, Skin Ligaments: Regional distribution and morphology. Clinical Anatomy. Vol 17 Issue 4 p 287-293

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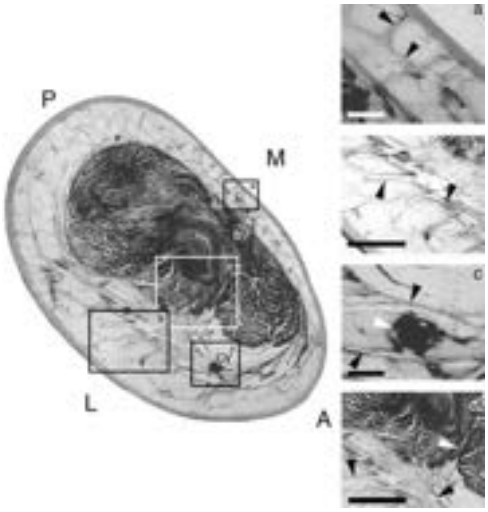
# Fibrous Sleeve




When a blood vessel or nerve was present, the fibers of the **skin ligaments formed a fibrous sleeve** around the structure/s.

Nash, L.G., Phillips, M.N., Nicholson, H., Barnett, R., and Zhang, M., 2004, Skin Ligaments: Regional distribution and morphology. Clinical Anatomy. Vol 17 Issue 4 p 287-293

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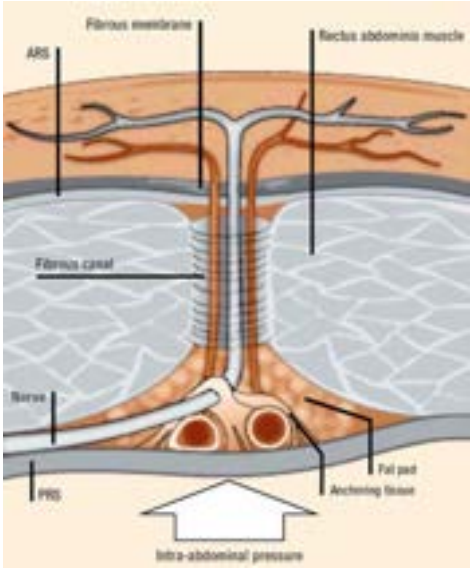
# Fibrous Canal




'Each sensory nerve has to cross the deep fascia in order to reach the skin, so **entrapment at the fascial opening site is possible**.

Even more clinically relevant are the **tunnels in the intermuscular septa where sensory and motor fibers can be entrapped**.'

Stecco A, Pirri C, Stecco C. Fascial entrapment neuropathy. Clin Anat. 2019 Oct;32(7):883-890. doi: 10.1002/ca.23388. Epub 2019 May 1. PMID: 31004463.

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# Grommet Holes

Aponeurotic Ring

Cutaneous nerves rise up out of the depths of the body, surface through dense body wall into the skin organ, and run parallel to it, behind or within it.

**Sore spots** on the surface of the body **coincide with** the "**grommet holes**" or **exit points** for these nerves that emerge from beneath and into the skin organ

Diane Jacobs

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# Signs & Symptoms

- Numbness
- Reduced Position Sense
- Tingling, Burning Pain

**Sensory**

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- Skin, Hair, Nail changes
- Skin Allodynia (pain)
- Bladder control
- Blood pressure/Heart Rate change
- Sweat abnormalities

**Autonomic**

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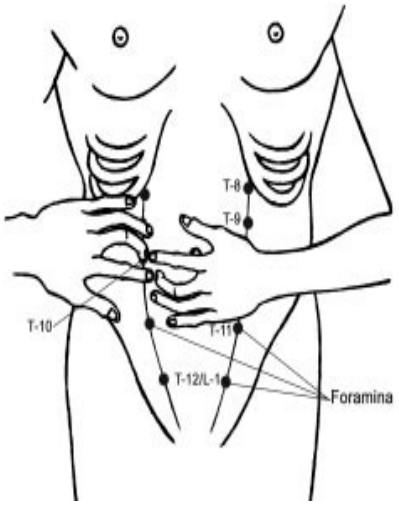
# Dermal Screening




**History**
- Sensory without Motor Findings

**Sensory**
- 2PTD, Light Touch, Sharp/Dull, Temp

**Palpation**:
- The patient usually can identify with a single finger '**hot spot**'
- Looking for changes in texture, replication of symptoms (local/referred), increase temp and edema.

**Skin Drags:**
- **Multi-Directional Vectors**
  - Seeking for palliative directions (if any)
- **Tissue States** - relaxed, lengthened, shortened/contracted
- Add **Meaningful Movement**

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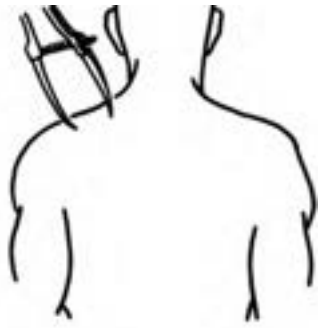


2PTD

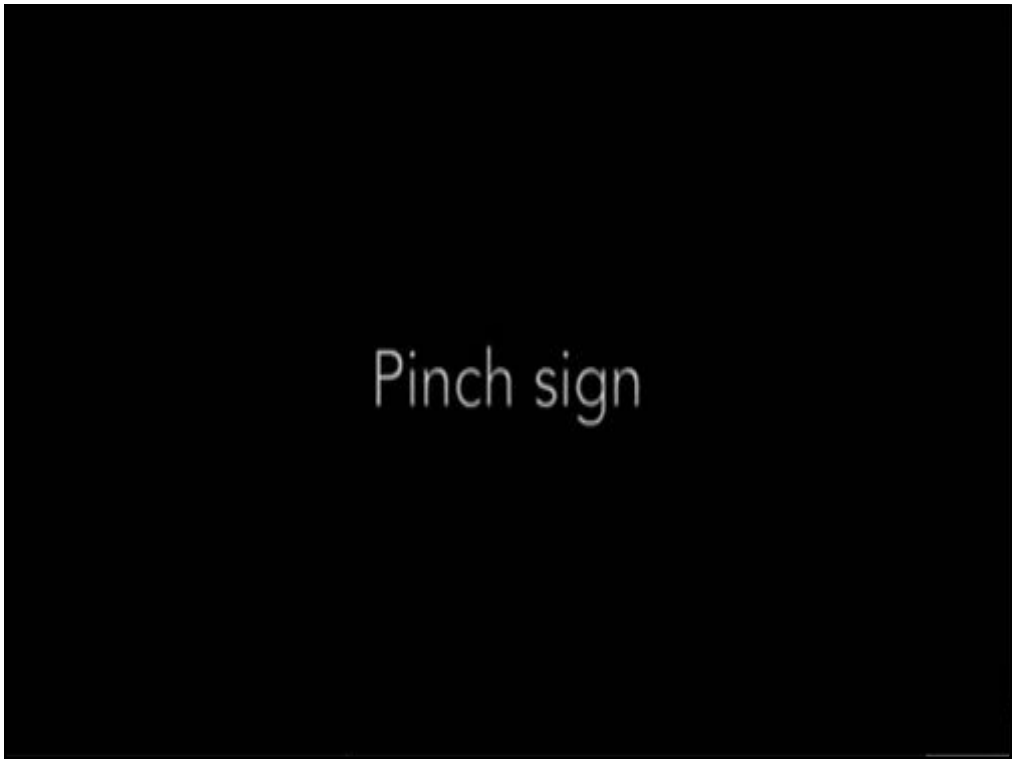
SHARP/DULL

LIGHT TOUCH

DX NERVE BLOCK

MSK US

52




53


54

# SKIN & FASCIA AS A HANDLE

55


56

# The Skin

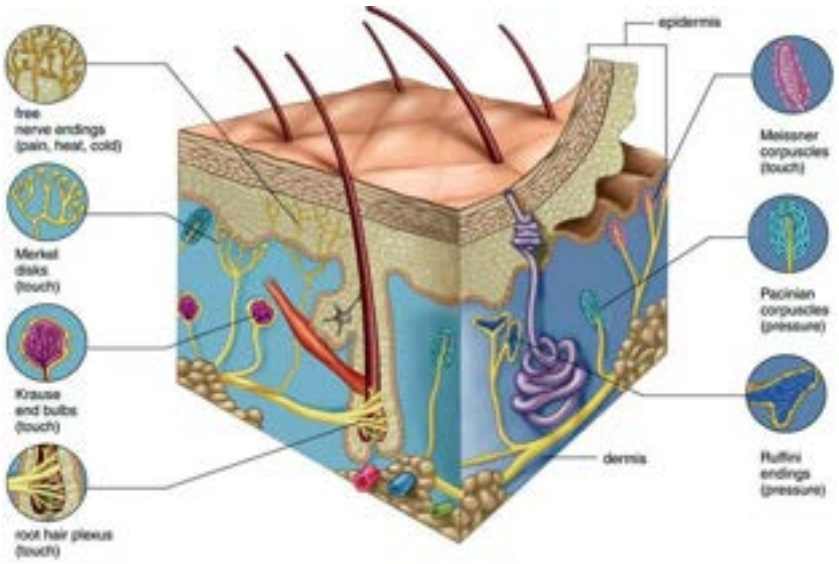
- The adult human skin covers about **21 sq/ft or 2 sq/m**
- Making it by far the **body's largest organ**
- It functions to protect and cushion, is waterproof, elastic, and breathable
- Developing from the **same fetal tissues as the brain**, skin works in active concert with hormones, vascular, immune, and nervous system.
- It serves as a **barometer for physical** (rash) and **psychological well-being** (rash)
- **Vital to survival, skin is the geography where two can meet.**

Swerdlow, 2009

57

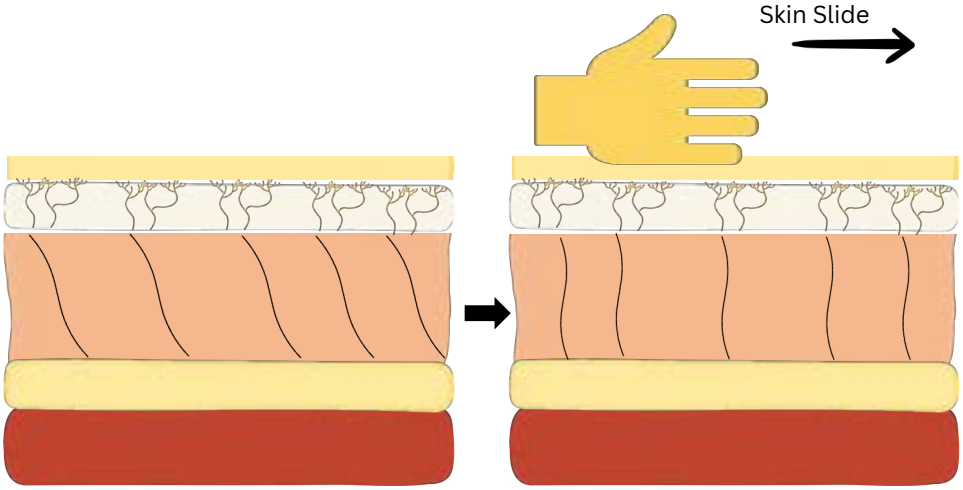

58

# Neurologically Primed



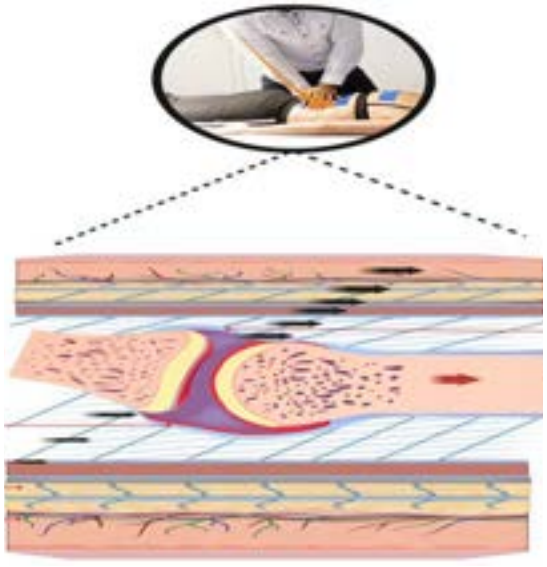

59

# Skin Drag




60

# Arthro Myofascial Complex

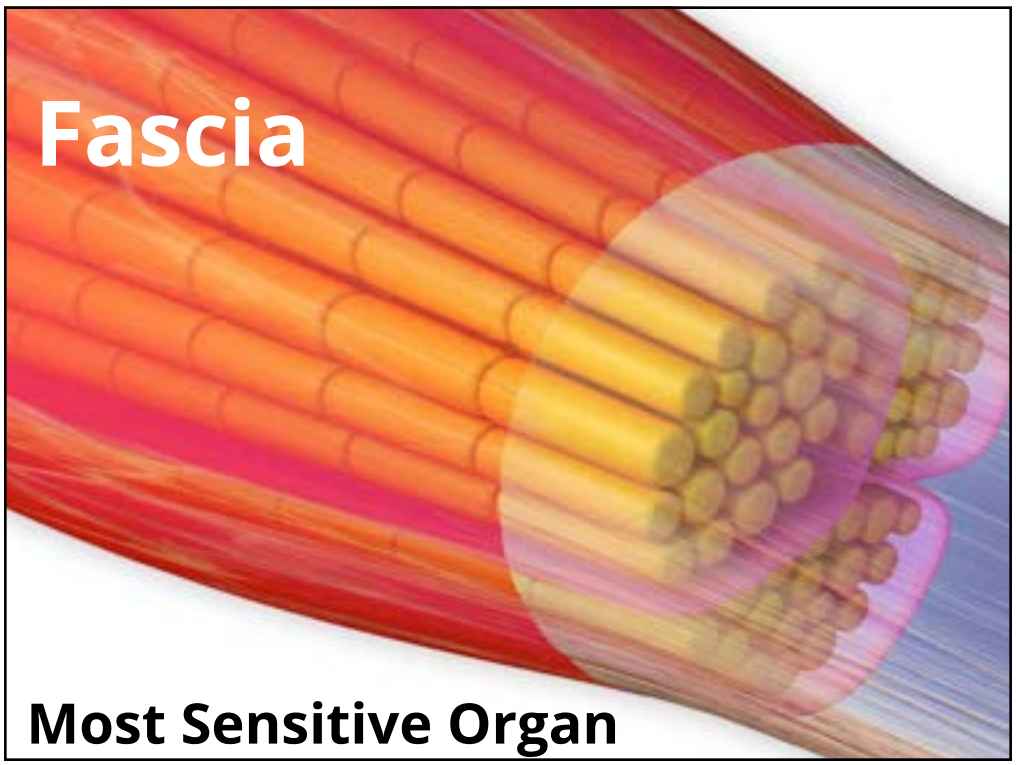


Noten, K., & Amstel, R. v. (2024). From Muscle–Bone Concept to the ArthroMyoFascial Complex: A Pragmatic Anatomical Concept for Physiotherapy and Manual Therapy. *Life*, *14*(7), 799.

61

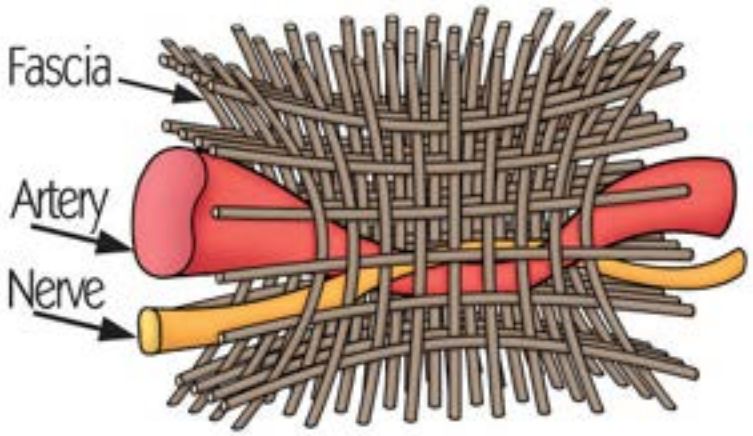
# RESTORE THE INTERNAL ENVIRONMENT

62



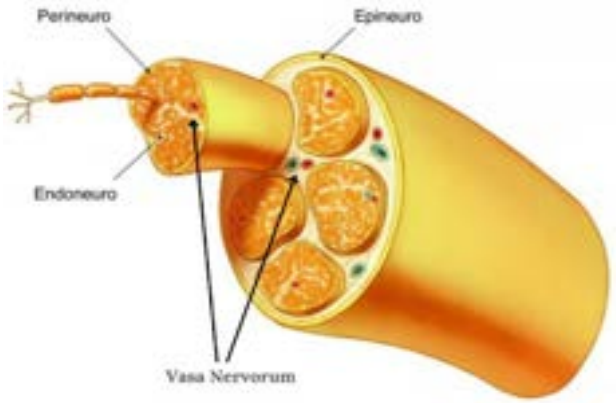

63

## Global Environment




64

# Local Environment




65

We are all working on our neurology. You just might not know you are.

Cobb - Z health

66

# Sensory Organ

- **250 Million Nerve Endings** - the fascial net
- Fascia is clearly, by far, the **richest sensory organ**
- **Superficial** might be more sensory rich


Tesarz J, Hoheisel U, Wiedenhöfer B, Mense S. Sensory innervation of the thoracolumbar fascia in rats and humans. Neuroscience. 2011 Oct 27;194:302-8.

67

# Fascia and ANS


Of the **250 million nerve endings**, the biggest subgroup are the **sympathetic fibers** (40% of fascia innervation)

What purpose?

- Micro-circulation
- Temp control

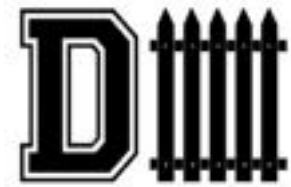
Dr. Neuhuber 2017:

- **Biomechanical function** (Body Armor)
- **Immune system** (microbiome in our fascia?)

68

# Tight vs. Taut?


Threat



69

**Fascia Is Able to Actively Contract and May Thereby Influence Musculoskeletal Dynamics: A Histochemical and Mechanographic Investigation**

Research suggests that fascia does have the **ability to contract** actively, meaning it can shorten and generate tension on its own, potentially **influencing musculoskeletal dynamics**

Studies have identified cells within fascia with characteristics similar to smooth muscle cells, which are **capable of contraction**.

The ability of fascia to contract could explain phenomena like myofascial pain, where **tight or restricted fascia** might contribute to discomfort

70

# Autonomic Heisman

Body Armor

71

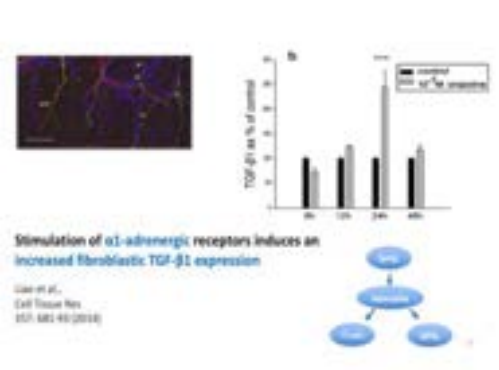
# TGF-Beta 1 + Tissue Tone

Sympathetic drive increases release of cytokine (chemical mediator) that causes fascial up regulation (increase tone)

Bhowmick, S., Singh, A., Flavell, R.A., Clark, R.B., O'Rourke, J., & Cone, R.E. (2009). The Sympathetic nervous system modulates CD4(+) FoxP3(+) regulatory T cells via a TGF-beta-dependent mechanism. J Leukoc Biol, 86(6), 1275 – 1283.

72

# Long Term Response



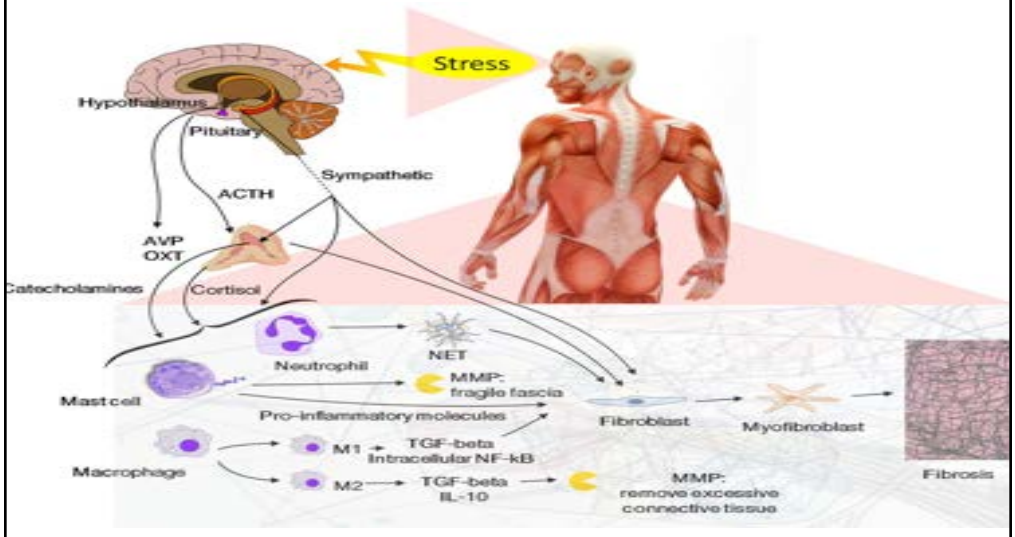

Direct link where **sympathetic activation** via increased adrenaline production can **contribute to long term tissue stiffness**

**More TGFB1** = more **myofibroblasts** in time of need

Also **strengthens the immune system** to ensure your preparedness to threat.

73

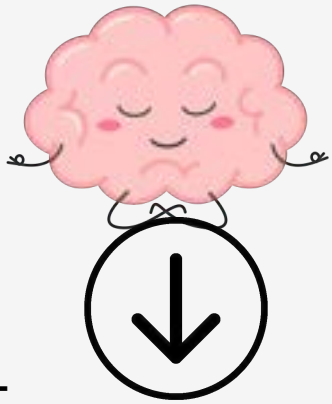
# Tissue Tone Modulation




Nicola Barsotti, Marco Chiera, Diego Lanaro, Massimo Fioranelli. Impact of stress, immunity, and signals from endocrine and nervous system on fascia. Front. Biosci. (Elite Ed) 2021, 13(1), 1–36.

74

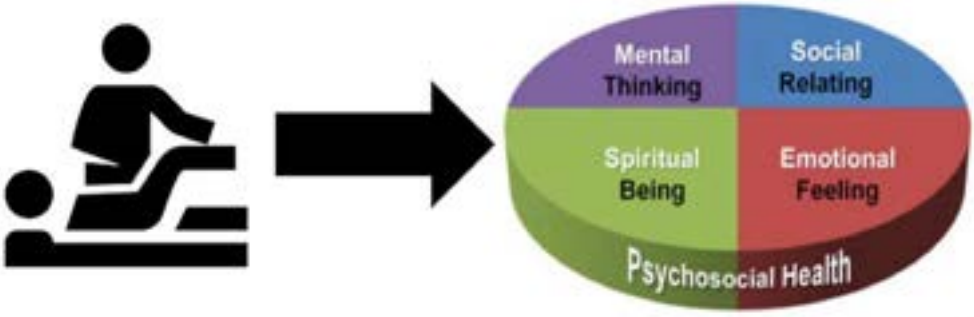
# TOP-DOWN APPROACH



THE ENVIRONMENT

75

# Bridge the Gap




BIO

PSYCHOSOCIAL

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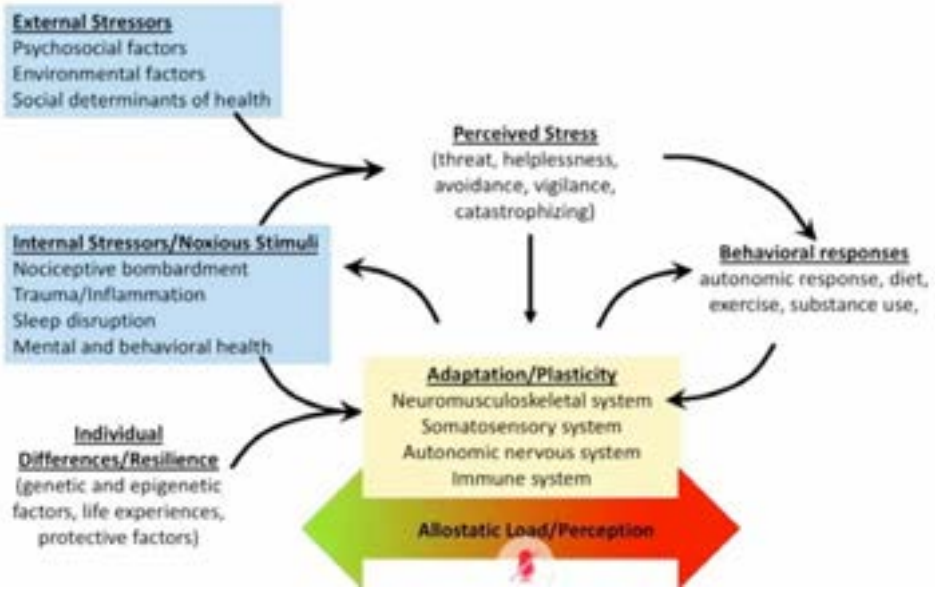
# Complex System




77

# Autonomic Recalibration

**Acute pain** activates **sympathetic arousal,** which acts as a **stress-induced analgesic** and **alleviates pain**. This pain suppression is mediated by the activation of descending antinociceptive pathways

A **prolonged adaptive sympathetic response** leads to **inadequate muscle relaxation** and **blood flow** associated with chronic pain

Seton B, Pandey R, Piscura MK, Pearson WG Jr. Autonomic Recalibration: A Promising Approach for Alleviating Myofascial Pain Explored in a Retrospective Case Series. Cureus. 2024 Jan 17;16(1):e52450.

78

# The Pain Experience

**There are four key points:**

1. Pain **does not** provide a **measure of the state of the tissues**
2. Pain is modulated by many factors from across **somatic, psychological and social** domains
3. The relationship between pain and the state of the tissues becomes **less predictable as pain persists**
4. Pain can be conceptualized as a conscious correlate of the implicit perception that **tissue is in danger.**

Lorimer Moseley

79

# Brains #1 Job


80

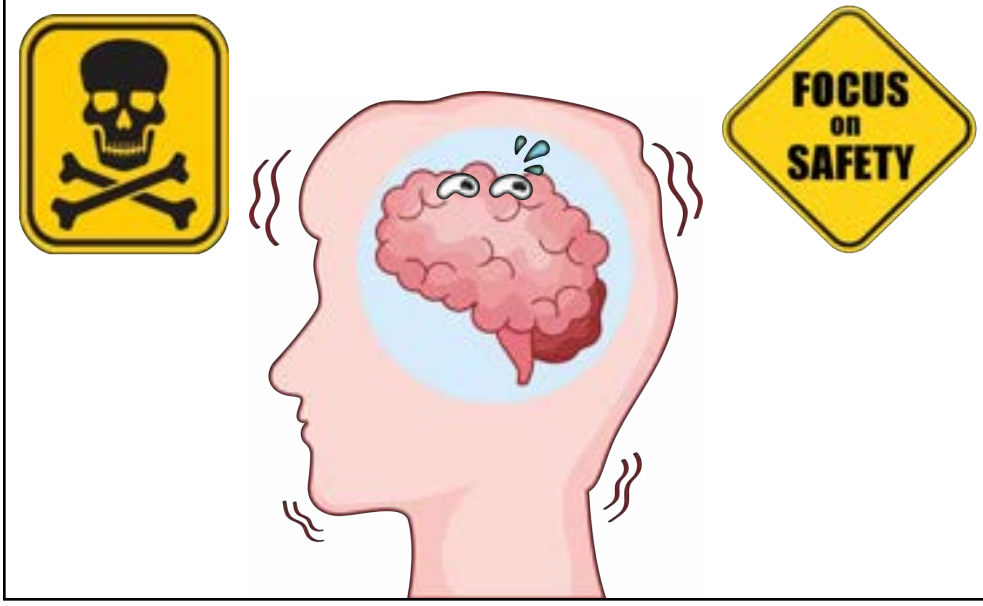
# Busy Brain


**The Brain** = Continuous Calculations

**Predicting** the **Future**
(e.g. *Threats*)

81

# Predictive System

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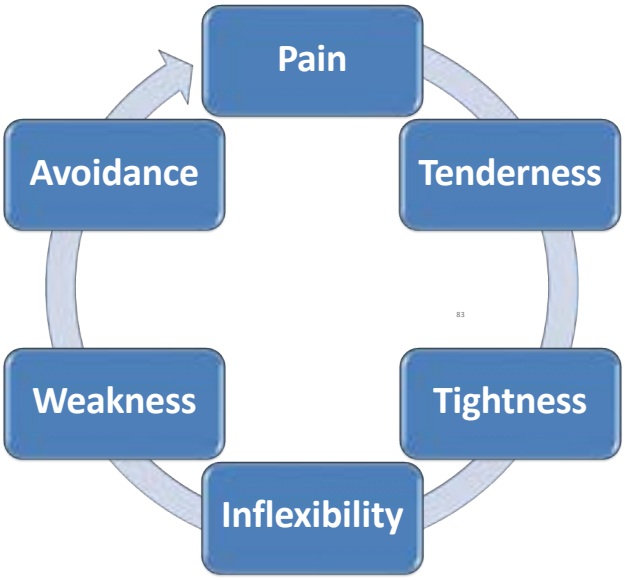
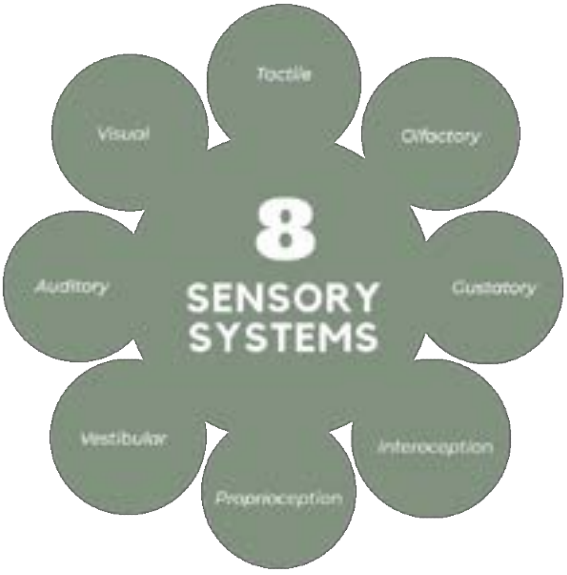
# When you Can't Predict




Common Presentations in Chronic/Persistent Pain Sufferers

83

# Sensory System




84

# Hole in our Awareness

**Expectation** of the brain that **there will be a body**:

1. Fragmented body maps (Smudging)
2. Absence of an area/region that your brain is expecting to have
3. That **void/absence is filled by pain** as a method to increase information to that region (theory)

EG: **Phantom limb pain example** - somethings is not there, brain interprets it as a “threat” and fills the void with **pain**.

85

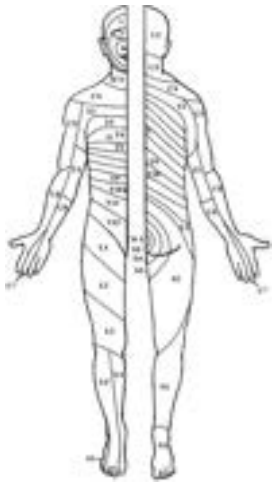
# Maps and Confidence



CLARITY = Confidence in Movement

86

# 3 Map Systems



Outer Map
(Exteroception)

Movement Map
(Proprioception)

Inner Map
(Interoception)

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# 3 Maps Defined

**Exteroception** is the sensitivity to stimuli that are **outside the body**.

Sight, Smell, Hearing, **Touch**, and Taste

**Proprioception** the **sense of body movement and position**,

**Spatial** Orientation in **Motion**

**Interoception** refers to the process by which the nervous system senses, interprets, and integrates signals **originating from within the body**

**Internal** Landscape - How do you **Feel**?

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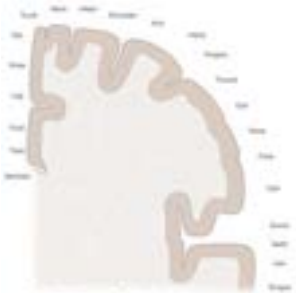
# Map Clarity



Exteroceptive Cortex

Smudged
&
Unfiltered

Insular Cortex

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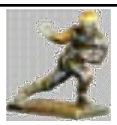
# Threat Signs (Heismans)



Heisman Signs

- Poor Body Maps
- Uncertainty
- <u>Decreased</u> Confidence
- Threat
- Pain
- Compromised Movement

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# Validated Threat Screens

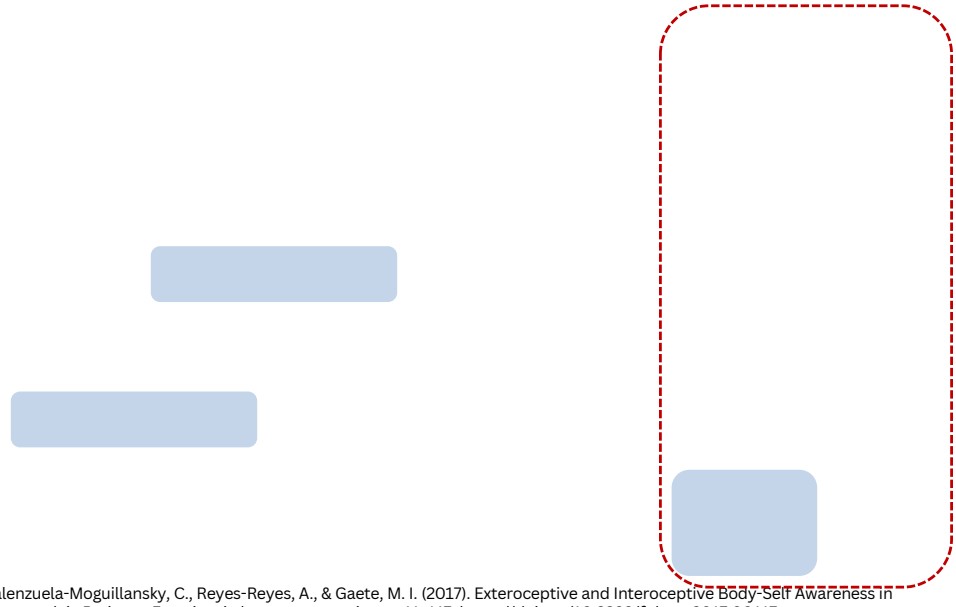
FABQ

Tampa Scale

91

91

# Map Resolution & Chronic Pain



Valenzuela-Moguillansky, C., Reyes-Reyes, A., & Gaete, M. I. (2017). Exteroceptive and Interoceptive Body-Self Awareness in Fibromyalgia Patients. Frontiers in human neuroscience, 11, 117. https://doi.org/10.3389/fnhum.2017.00117

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# Exteroception – Outer Map

How clear is your Outer Map?

93

93

# 2PT Discrimination Tools

Common Clinical Tools

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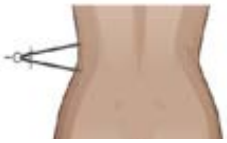
# Map Resolution – 2PTD

Normally, a person should be able to recognize two points separated by:

- 2 to 8 mm on fingertips
- 8 to 12 mm on palms
- 30-40 mm on shoulder
- 35–45 mm on the legs
- 40-55 mm on the back
- 15-25 mm on the foot

Knee



Low Back

Shoulder

Bickley, Lynn; Szilagui, Peter (2007). Bates' Guide to Physical Examination and History Taking (9th ed.). Lippincott Williams & Wilkins.

95

95

# Interoception – Inner Map

How clear is your Inner Map?

96

96

# Somatic Symptom Disorder

**Somatic symptom disorder (SSD)** within DSM represents a consolidation of a number of previously listed diagnoses (MUS - Multiple Unexplained Symptoms).

Defines the disorder on the basis of persistent somatic symptoms associated with **disproportionate feelings, thoughts, and behaviors** related to these symptoms.

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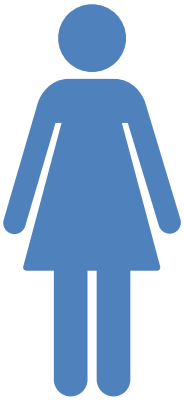
# Interoceptive Accuracy



Heartbeat tracking encompasses a suite of **quick and easy** methods designed to measure **cardioception** by requiring participants to report the **number of heartbeats per min**.

Carroll D, Whellock J. 1980. Heart rate perception and voluntary control of heart rate. *Biol. Psychol*. 11, 169–180

98

# Interoceptive Awareness

The Multidimensional Assessment of Interoceptive Awareness (**MAIA**)

https://osher.ucsf.edu/research/maia

99

# Myofascial Tissue & Depression

Measuring stiffness of traps/upper back of depressed patients:

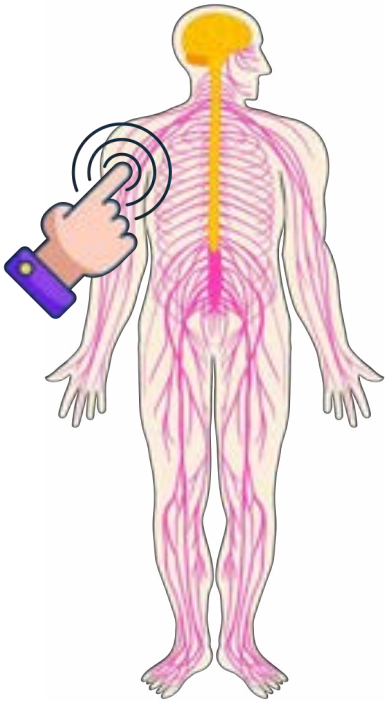
They have **more dampening/less recoil**

- Memory recall (given 100 words) leaning more towards negative words
  - Didn't hear positive words (no positive filter)

Treated depressive with foam rolling:

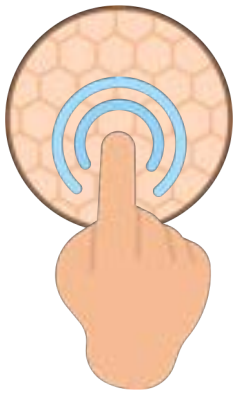
- Memory recall of positive words improved
- Cognitive filter (noticing it more) has changed.


100



# Touch + Non-Judgmental Attention

101



"just touching skin in a properly prepared patient will send a **cascade of novel sensory** information through to the brain and to **all its maps**."

Diane Jacobs - DermoNeuroModulation (DNM)

102

# Role of Human Touch

The semantic of touch is characterized by the **physical and emotional properties** of the applied stimulus.

The **physical properties** encompass the deep knowledge of anatomy and biomechanics.

The **emotional properties** are related to the sympathetic contact with the patients which allows to administer the technique using a different **"affective tone"** based on non-verbal relationship and communitive skills.

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# Spotlight Concept

Let **nervous systems** figure out how to do all their own **heavy lifting**, self-correction, positive feedback loop dismantling.

Hold up a **kinesthetic flashlight (touch + curiosity)** so that a brain can see a pain problem well enough to realize it represents a waste of its energy.

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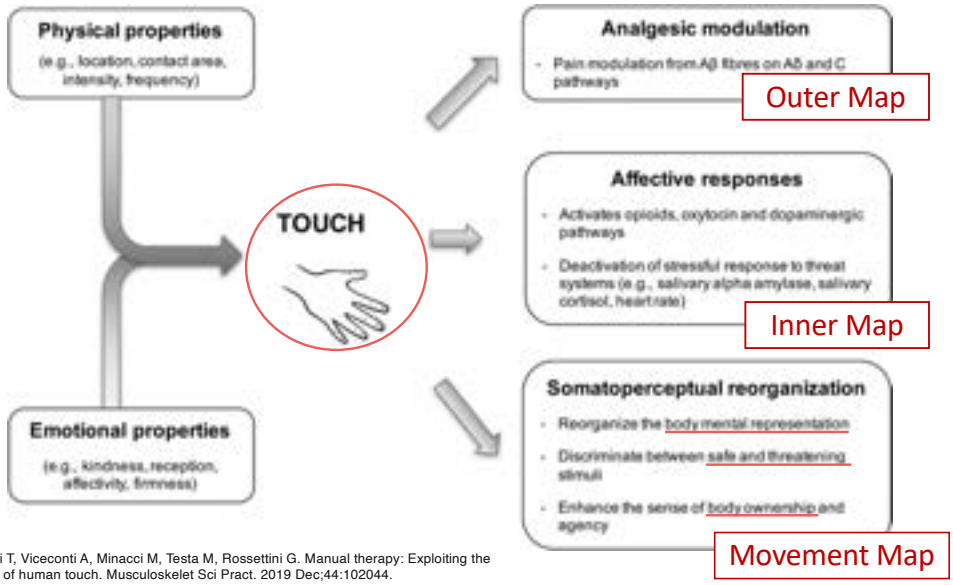
# Somato-Perceptual Touch




Geri T, Viceconti A, Minacci M, Testa M, Rossettini G. Manual therapy: Exploiting the role of human touch. Musculoskelet Sci Pract. 2019 Dec;44:102044.

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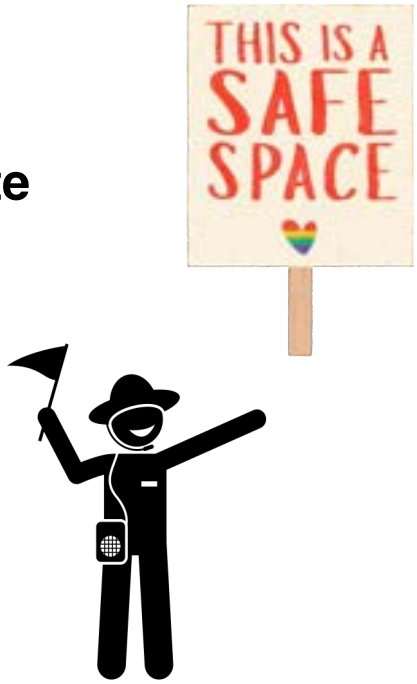
# Clinician's Job

## Holding Space/Validate

- Safest Place
- Validate
- Listen
- Education
- Guide - Somatic Tracking
- Encourage

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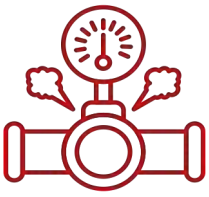
# Patient's Job

## Intentional Curiosity

- Third Person Evaluation
- Observer
- What feelings, temperature, textures, intensity, depth
- Probe deeper and deeper
- Suspend Judgement
- Pay Attention

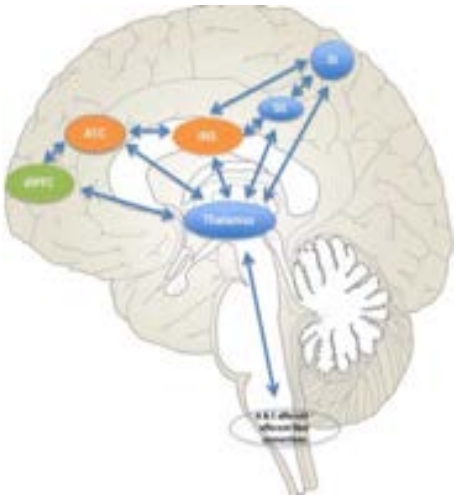


As the threat meter gets above a **7/10**

- initiate breath release (release valve)

107

Neural **networks** activated during **pain** and during other forms of **interoception** are very much the **same**



Moseley, G.L., Gallace, A.,and Spence,C. (2012). Bodily illusions in health and disease: physiological and clinical perspectives and the concept of a cortical 'bodymatrix'. Neurosci.Biobehav.Rev. 36, 34–46.

108

"**Interoceptive conditioning** has been hypothesized to be of importance in the etiology, maintenance and **treatment of chronic pain**"

DePeuter et al

De Peuter,S.,VanDiest,I.,Vansteenwegen,D.,VandenBergh,O.,and Vlaeyen, J. W.(2011).Understanding fear of pain in chronic pain:interoceptive fear conditioning as an novel approach. Eur. J.Pain 15, 889–894.

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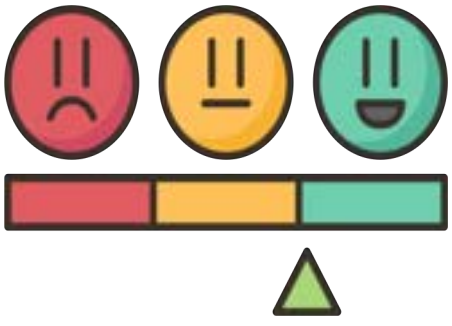
# Neuro Affective Touch



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# Affective Touch

Affective Touch:

- Refers to the emotional sensory aspects of touch
- **Mother-Infant** interactions
- Grooming primates
- Play
- Social/sexual behavior
- Texture of food in the mouth

Vallbo A˚ B, Olausson H, Wessberg J: Unmyelinated afferents constitute a second system coding tactile stimuli of the human hairy skin. J Neurophysiol 1999, 81:2753-2763.

111

# Interoceptive Organs

- **7x** more **Interoceptors** (C-Tactile Fibers) than other mechanoreceptors
- Higher concentration in **hairy skin**
- Stimulation of these receptors result in activation of an area of the brain (**Insula**) associated with **pain perception and sense of well being:**
  - Inhibitory connection between CT inputs and the substantia gelatinosa (dorsal horn) – **analgesic effect** (Delfini et al., 2013)
  - **Increased Oxytocin** during CT activation (Walker et al., 2017)
  - Modulation of the **endogenous u-opioid** receptor system (Nummenmaa et., 2016)
- 40% of these receptors are low threshold receptors which are responsive to **light touch**

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# Affective Touch

- Human Touch – Temperature Sensitive
- With Movement
- Slow Rate
- Opens Robust Medicine Cabinet in the Brain
- Down regulation of the insula and ant cingulate – responsible for pain perception (Meijer et al., 2022)

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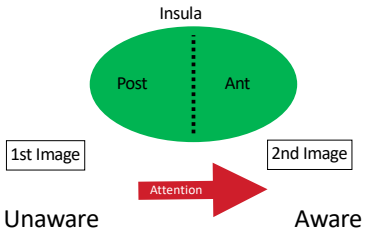
# Touch Guided Therapy

- Therapeutic Touch is **NEVER** neutral
- It's always **colored as it is filtered** through the **Insula** to give it **meaning**.
- Initial Picture (**Subconscious**) - Representation of the **Posterior Insula**
- **Anterior Insula** (**Conscious**) - Interoceptive Re-Representation
- Transient **flow from unaware to Body Aware**

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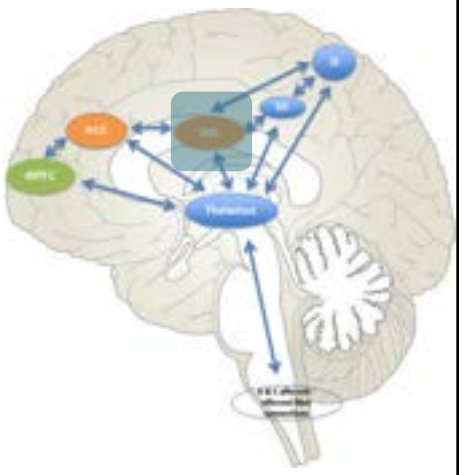
# Descending Pain Control

The **descending pain control network** comprises regions such as the Dorsolateral Prefrontal Cortex (DLPFC), rostral Anterior Cingulate Cortex, the **Insula**, and Periaqueductal gray (PAG).

**Activation** and functional connectivity between these regions are positively **correlated** with the level of **pain relief** reported.



Monroe et al (2015)

- H. Cho et al., Nat. Neurosci. 15, 1015–1021 (2012)

115

# C-Tactile Fibers

- Discovered in late 80's
- **Hairy Skin** – CT Fibers that respond to social touch
- **Project to Insula**
- Influence sleep, safety, interoception (internal sensations, **including pain**)
- The social interaction is VERY important - only works if the social **relationship is deemed safe**
- Social Touch as well as Pleasant Deep Touch:
  - **Feather Stroke** - Posterior Insula
  - **Swaddle Effect** (Floss, Compression Boots, Hug Therapy)
    - Middle/Anterior Insula (salience/meaningful regions)

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# Non-Judgmental Attention


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# Inner Landscape

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# Productive Attention

"In the future one would hope that by **selective stimulation** of areas responsible for attention to pain, we could encourage **productive forms of attention** (for example, attention to location), and **discourage counterproductive ones** (attention to intensity), to find **another weapon** in the battle with **chronic pain**". Oleg Lobanov

119

# Pain Reprocessing

Effect of Pain Reprocessing Therapy vs Placebo and Usual Care for Patients With Chronic Back Pain
A Randomized Clinical Trial

120

# Touch, Teach, Connect

Explaining Neurophysiotic Pain Sample Script

Pain is a danger signal. If you put your hand on a hot stove, the pain lets you know to move your hand so that you don't injure yourself further. But sometimes, these danger signals can get activated even in the absence of structural damage.

There's been a lot of recent research showing that learned neural pathways in the brain cause many forms of chronic pain and NOT structural problems in the body.

IF THERE WAS AN INITIAL INJURY: When you develop an injury, there is acute tissue damage. During this time, the brain creates pain pathways. But the brain doesn't simply forget these pathways once the injury has healed. So, the body can heal, but the pain pathways in the brain are still there and can still cause pain.

You see, right now, you're sitting here, and you're feeling something in your back. But I'm feeling something in my back as well.

We're sitting, we're using back muscles, so of course, we're going to feel something in our backs.

We have nerve fibers in our back that are sending messages to our brains. These messages are safe. They're neutral. They're saying, 'Just a sensation.'

But your brain is interpreting these messages as if they're dangerous.

It's like if I were to toss you a baseball, but your brain thought it was a hand grenade. You'd respond as if it was dangerous even though it's safe.

There are nerve fibers in my back that are sending messages to my brain as well. But my brain is interpreting these messages accurately: 'A light amount of pressure, just a sensation, no cause for alarm.'

Your brain is getting the same messages but is interpreting those messages as dangerous. So, as a result, it's amplifying the sensation.

So, here's the best analogy I can think of. Imagine you were wearing a hearing aid. Right now, I'm talking at maybe a 2 out of 10 volume. But imagine if you cranked that hearing aid all the way up; you'd be hearing me at like a 7 out of 10 volume.

Learning Into Positive Sensations Sample Script

I want you to make yourself comfortable and you can allow your eyes to close if that's helpful.

And I just want you to take a moment to practice bringing your attention inward and to simply familiarize yourself with your internal state.

And let's start by focusing on the physical sensation of the breath as it comes in an out.

And I want you to focus on the sensation of the breath wherever it feels most enjoyable or comfortable to you. Whether that's in the stomach, the chest, the throat, the nostrils...

And I want you to just allow yourself to enjoy this nice sensation of the breath coming in and out.

We are not trying to do anything or change anything. We are just watching... with a sense of detached curiosity... with a sense effortlessness and ease.

(insert analogy)

And just lean into this sensation in this nice and easy way, knowing that you are communicating messages of safety to your brain in the best way that you can.

And how does this sensation feel? Are you able to access a pleasant sensation?

(insert safety reappraisal/positive affect induction)

We are just enjoying the physical sensation of your breath while simultaneously giving your brain the practice to pay attention through a lens of safety.

Now just see if you can enjoy the moment... enjoy focusing on the breath... knowing that the very act of attending to this nice, easy sensation is the best thing that you can do for your primitive brain.

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Let's check it with pain for a moment. What do you notice?

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# Curiosity for the Win

Be an integrator vs. operator

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# Workshop

- Common Cutaneous Entrapments
- Threat Management
- Sensory Re-Mapping
- Autonomic Retuning
- Treatment Stack


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# Thank you

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