Osteopathy and Pain

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Disclosures

- I have no actual or potential conflicts of interest in relation to this presentation.

Objectives

- Define pain and how the body perceives and processes pain
- Discuss how osteopathy can influence the body to better handle pain
- Discuss the structure of fascia
- Review some current research supporting use of OMT in pain conditions

Pain

noun \ˈpān\

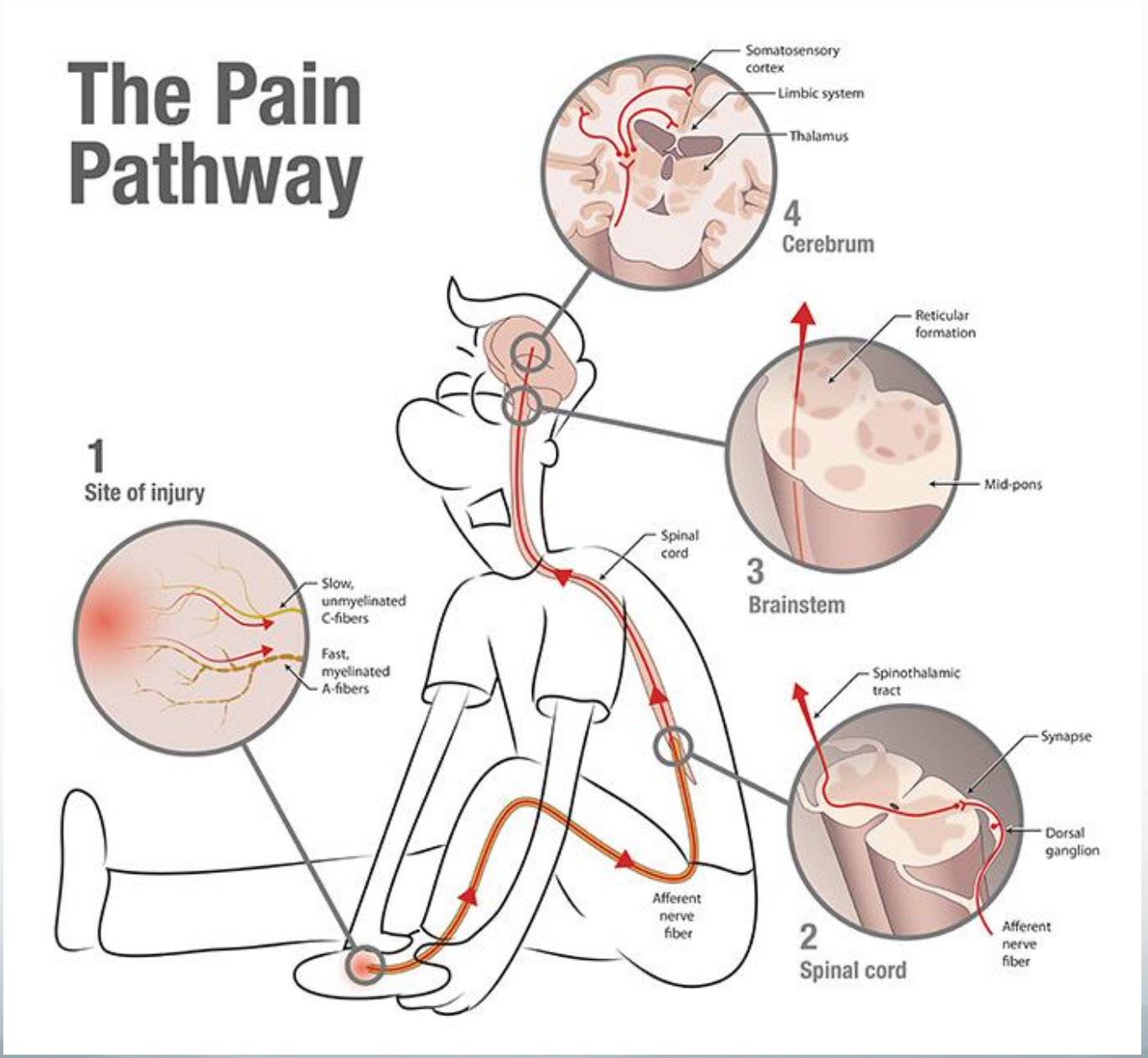
- the physical feeling caused by disease, injury, or something that hurts the body
- mental or emotional suffering : sadness caused by some emotional or mental problem
- someone or something that causes trouble or makes you feel annoyed or angry

http://www.merriam-webster.com/dictionary/pain


THE PAINYOU FEEL TODAY
WILL BE THE
STRENGTH
YOU FEEL TOMORROW

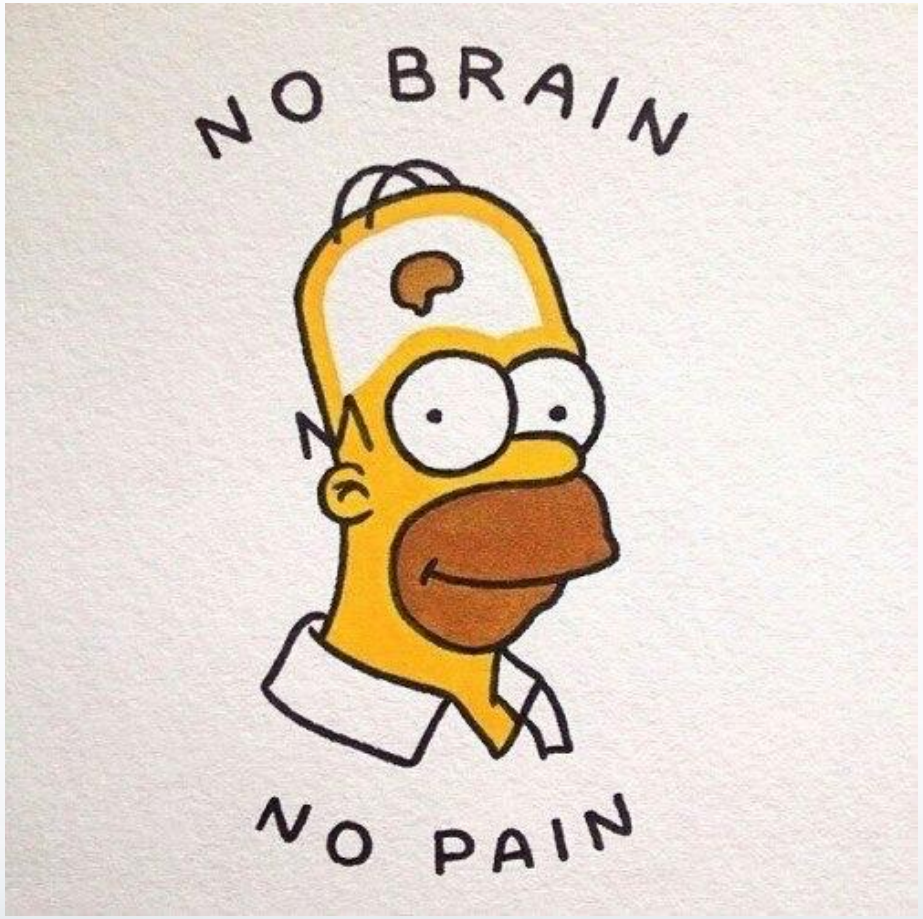

Pain is
weakness
leaving the body

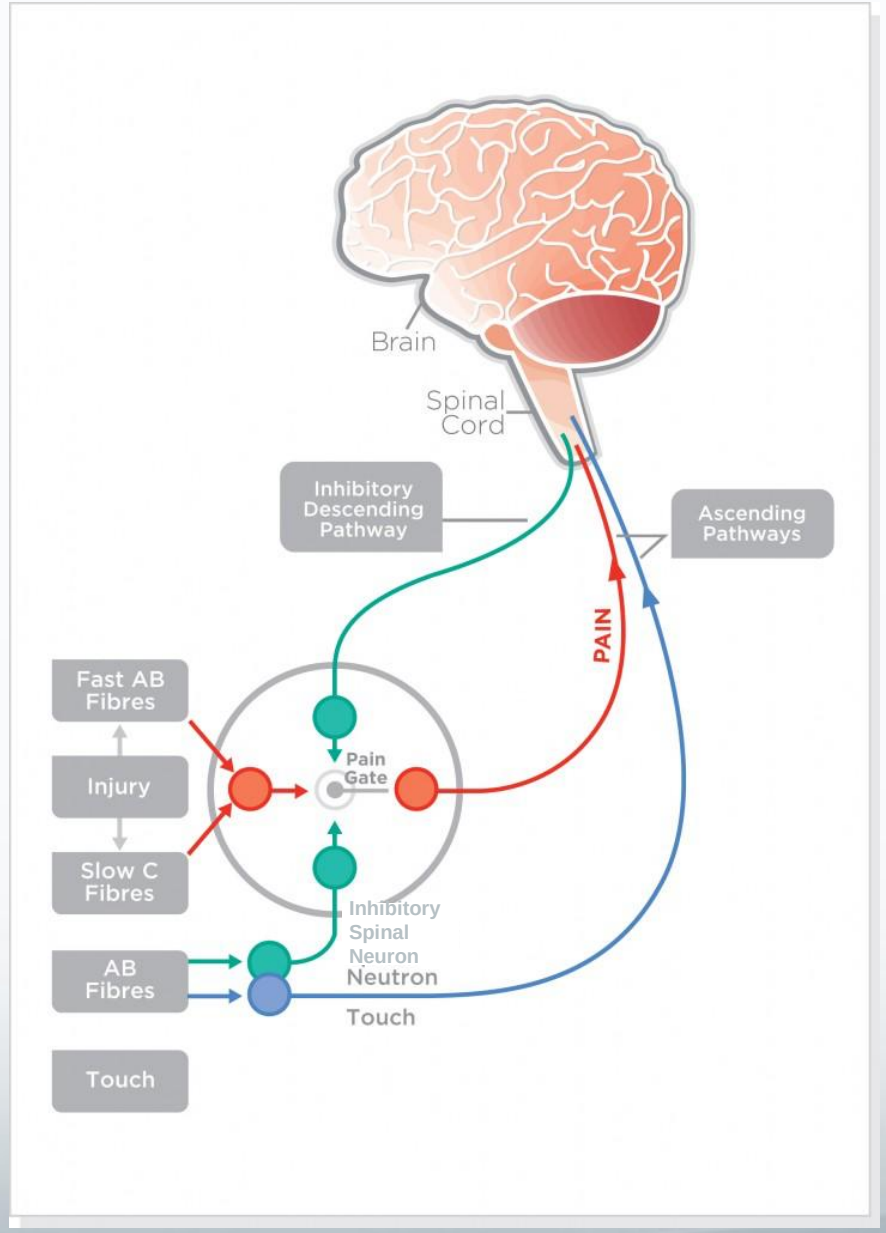

pain
medicine
day
Pain
feels
burning
lasts
sharp
gets
treatment
support
working
worse
aches
joints
knees
night
bending
sleep
better
when
head
worried
walking
bothering
dull


The Pain Pathway
Somatosensory cortex
Limbic system
Thalamus
4
Cerebrum
Reticular formation
Mid-pons
3
Brainstem
1
Site of injury
Spinal cord
Slow, unmyelinated C-fibers
Fast, myelinated A-fibers
Spinothalamic tract
Synapse
Dorsal ganglion
Afferent nerve fiber
Afferent nerve fiber
2
Spinal cord

The Experience of Pain

- Somatosensory cortices and insula
  - Encode sensory features of pain
    - Quality, location, duration, degree of pain
- Prefrontal and limbic system
  - Encode emotional and motivational response
    - Some role in affective and contextual aspect of pain
- These regions are not just activated by nociception or restricted to pain perception
  - Cognition, emotion, motivation, and sensation are functionally connected


NO BRAIN
NO PAIN

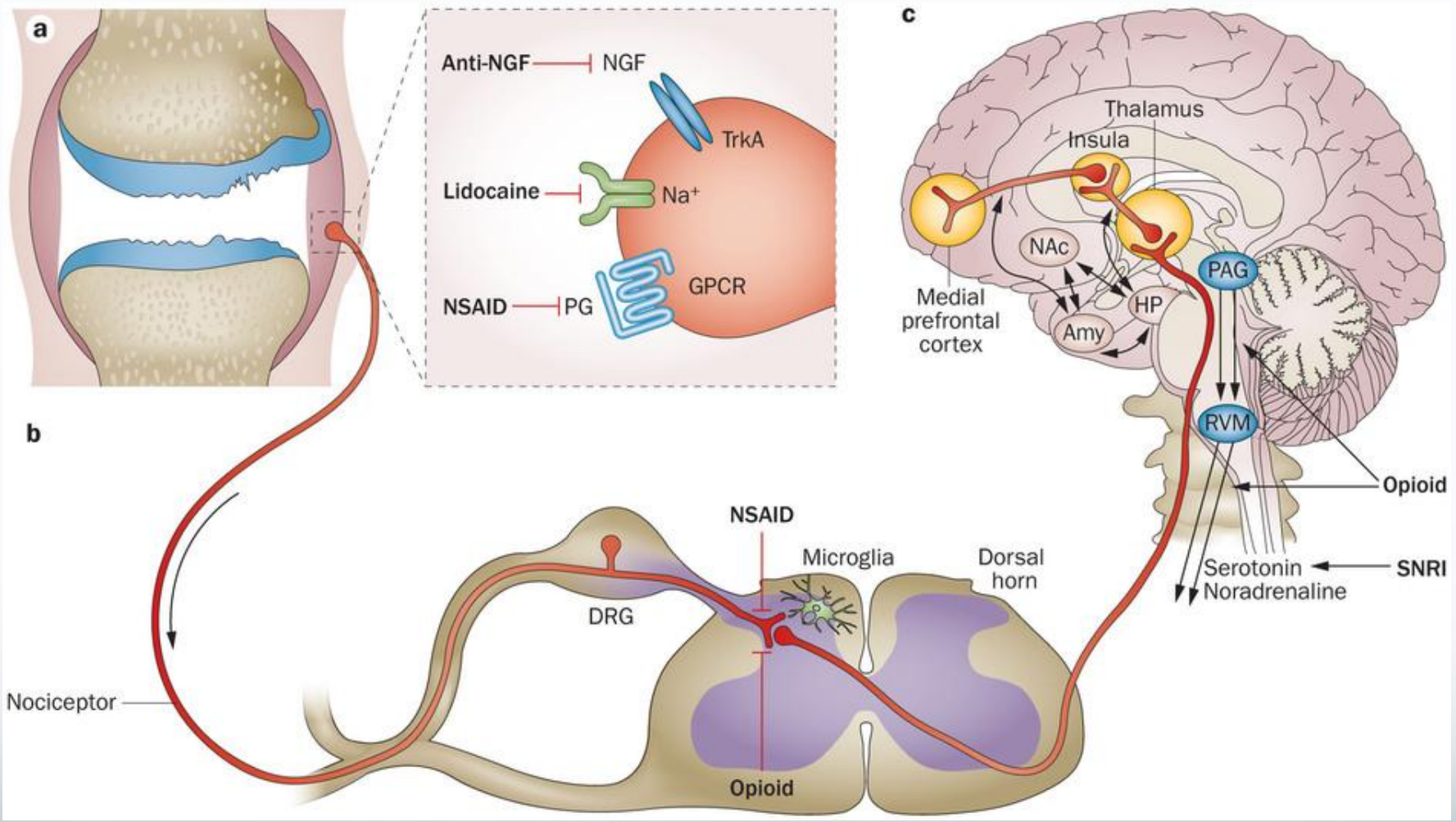


http://www.trigenics.com/new/store/cryosoothe/Gate_Theory.jpg

Descending Pain Modulation

- Inhibition and facilitation of pain
- Periaqueductal Gray (PAG)
  - Primary control center of pain modulation
  - Stimulation can cause immediate and profound analgesia
- Rostral ventromedial medulla (RVM)
  - On-cells, off-cells, neutral cells

- Periaqueductal gray (PAG)
  - Key structure in propagation and modulation of:
    - Pain
    - Sympathetic responses
    - Learning and action of defensive and aversive behaviors



http://www.nature.com/nrrheum/journal/v9/n11/images/nrrheum.2013.138-f1.jpg

- Pain is a complex, multidimensional process
- Human health machine is vibrant and resilient
- We still have much to learn!
- Osteopathy focuses to optimize physiologic functioning given the patient's condition
  - Harnessing the inherent healing capacity of the body to work better on the problem

- “Every time you correct somatic dysfunction, you return to the autonomic nervous system the ability to make appropriate moment to moment decisions.”

  - Irvin Korr, PhD.

- By normalizing or improving the structure/function relationship of the human body, you will allow the patient's physiology to better handle or resolve the problem

- OPTIMIZE STRUCTURE TO OPTIMIZE FUNCTION!

- Increased function
  - ADL's
  - Better mobility
  - Improved results with physical therapy
  - Decreased medication use
- Increased Quality of Life
  - Decreased pain
  - Better able to work/recreate
- Facilitate healing process for damaged tissue

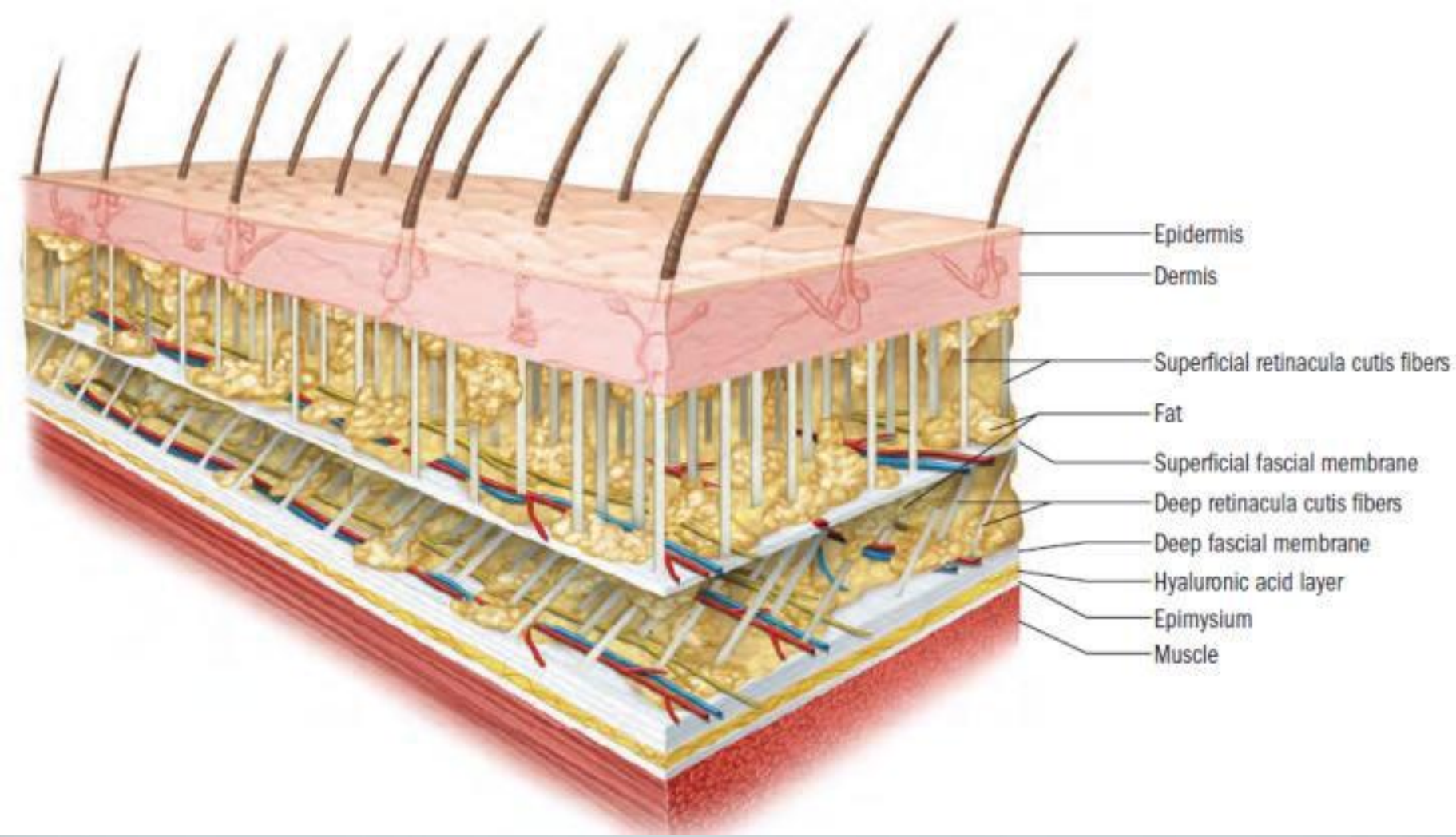
- Look at the patient as the entire organism has the complaint
  - Body part doesn't walk into your office, your patient does
- If a local anatomical cause cannot be determined, one must look outside the area
  - Complaint may be the result of compensation mechanism

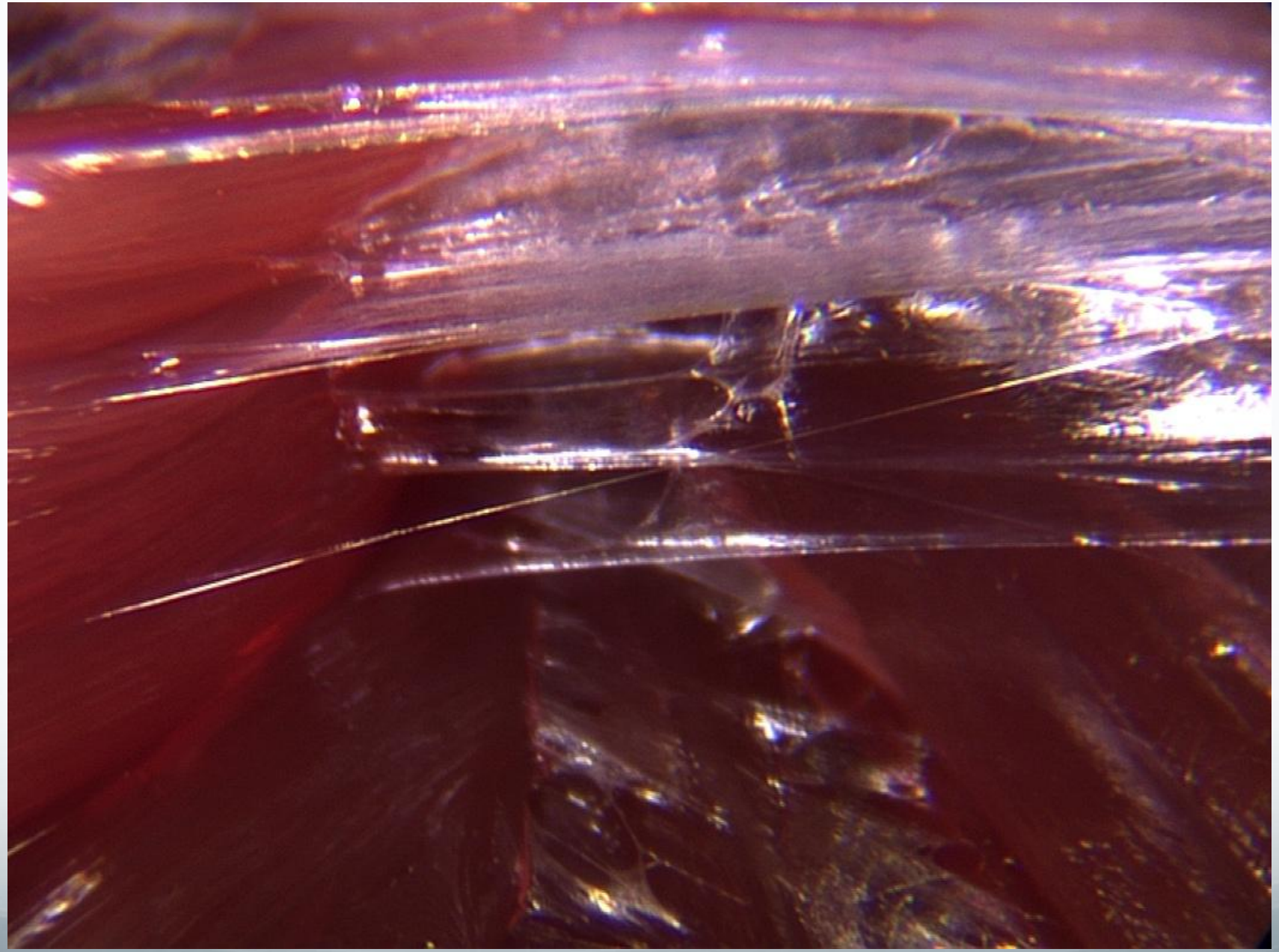
Treat the PATIENT, not just the problem!

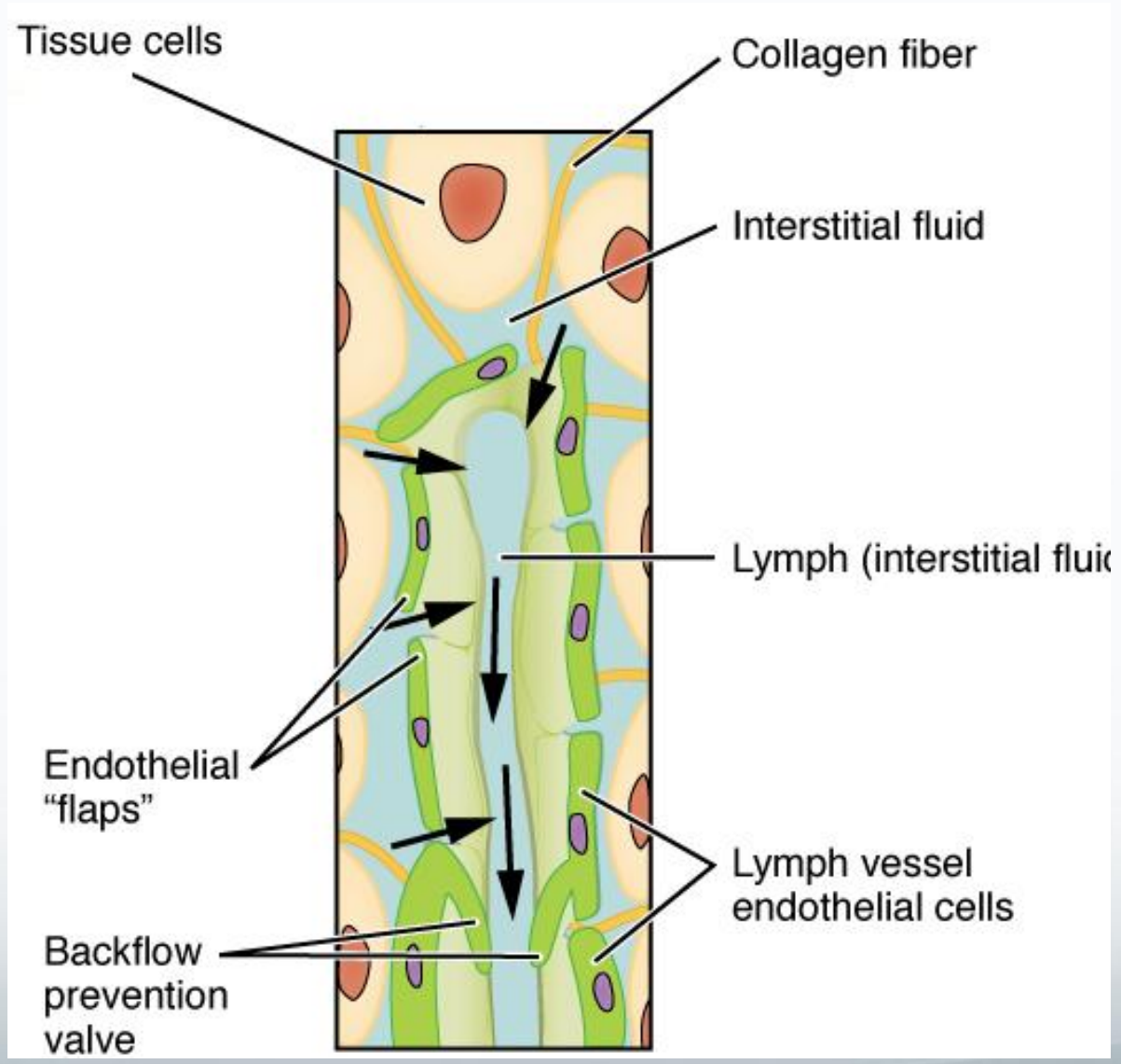
- “I know of no part of the body that equals the fascia as a hunting ground… All nerves go to and terminate in that great system, the fascia.”

A.T. Still, DO

FASCIA


Epidermis
Dermis
Superficial retinacula cutis fibers
Fat
Superficial fascial membrane
Deep retinacula cutis fibers
Deep fascial membrane
Hyaluronic acid layer
Epimysium
Muscle




Tissue cells
Collagen fiber
Interstitial fluid
Lymph (interstitial fluic
Endothelial
“flaps”
Lymph vessel
endothelial cells
Backflow
prevention
valve

Fascia

- Fascia is an uninterrupted viscoelastic tissue which forms a functional 3-dimensional collagen matrix
- It surrounds and penetrates ALL structures of the body extending from head to toe
- It is a functional organ of stability and motion
- Not a passive structure

Structure of fascia

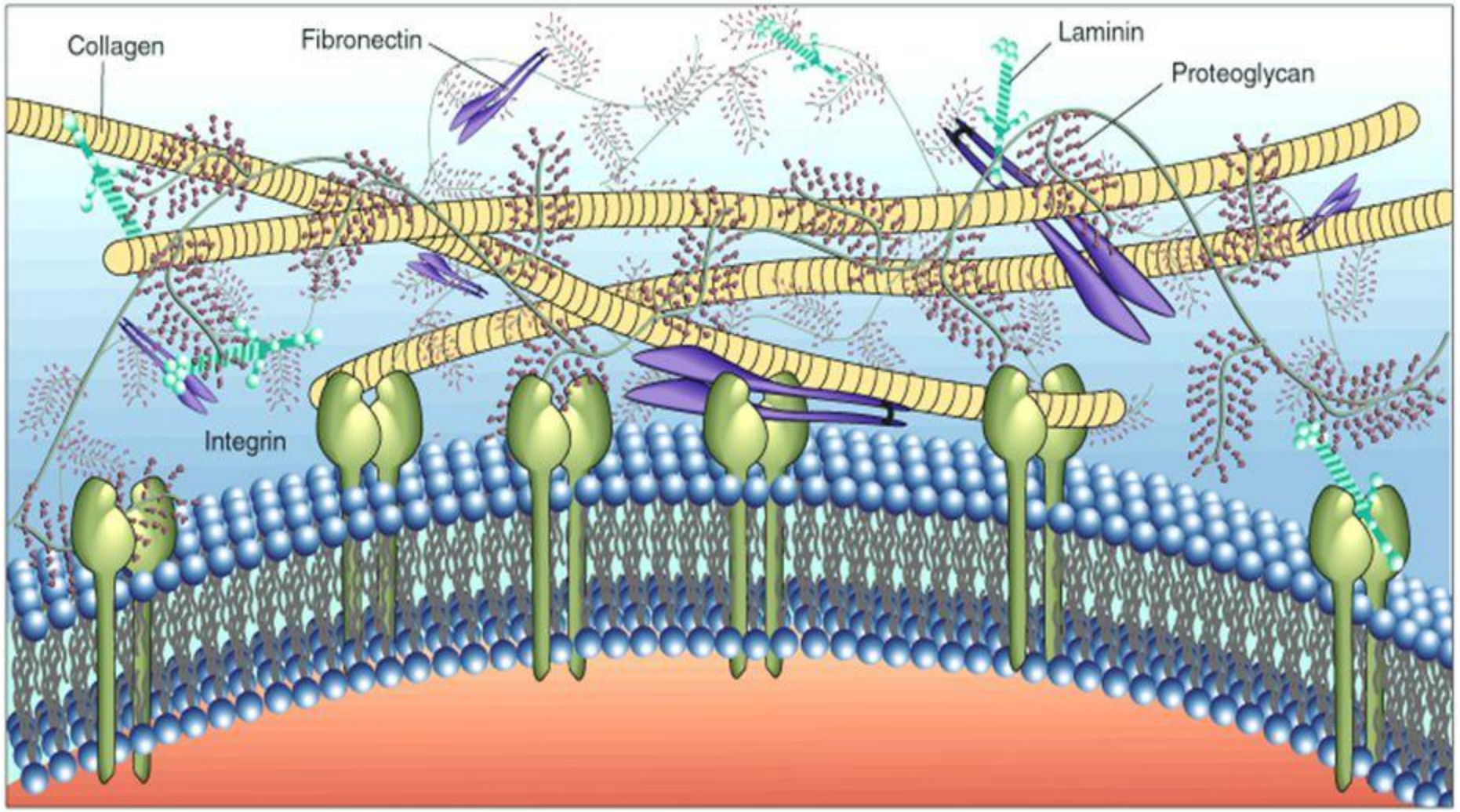
- Collagen
  - Provides resistance to tension and stretch
  - 28 different types of collagen in human, fascia has multiple combinations
- Proteoglycans
  - Major component of animal extracellular matrix
  - Involved in binding cations (Na+, K+, Ca+2) and water
  - Regulate movement of molecules through the matrix
  - Can also serve as lubricants
- Fibroblasts
  - Critical role in wound healing

Glycosaminoglycans

- Chondroitin Sulfate
  - Important structural component of cartilage
  - Provides much of its resistance to compression
- Dermatan Sulfate
  - Found mostly in skin, but also blood vessels, heart valves, tendons, lungs
  - May play role in coagulation, wound repair, fibrosis, infection, carcinogenesis, CV disesase
- Heparan Sulfate
  - Found in all animal tissue
  - Developmental processes, angiogenesis, blood coagulation, and tumor metastasis
- Keratan Sulfate
  - Cornea, cartilage, bone, CNS
  - Acts as a cushion to absorb mechanical shock, also participates in glial scar formation during CNS injury repair

What are the major proteins of the ECM?

Collagens, Proteoglycans, Elastin, Fibronectin, Laminin, Tenascin.



http://slideplayer.com/slide/4556287/15/images/4/What+are+the+major+proteins+of+the+ECM.jpg

https://www.nationalgeographic.com/content/dam/travel/rights-exempt/water-travel-photo-contest-2017/moraine-lake-view-canda.jpg

What Does Water do for You?

https://water.usgs.gov/edu/propertyyou.html

The Ocean Within

- Fetus ~ 94%
- Newborn ~ 75%
- 1 year old ~ 65%
- Adults
  - Male ~ 60%
  - Female ~ 55%
- Elderly ~ 50%

Water by Body Tissue

- H.H. Mitchell Journal of Biological Chemistry (1945)
  - White male 35 years of age

- 67.85% total body weight was water
  - Heart 73.69%
  - Brain 73.33%
  - Lungs 83.74%
  - Skin 64.68%
  - Skeleton 31.81%
  - Muscle 79.52%

More water stats

- Plasma is 92% water
  - Constitutes 55% of blood volume
  - 20% of total body water
- Recommended 2L of water per day
  - 8 X 8 rule
- 80% of intake from drinking water
  - 20% of intake from food

- People feel thirsty when they have already lost 2-3% of body's water

- Mental performance and physical coordination start to become impaired at 1%

https://www.thoughtco.com/how-much-of-your-body-is-water-609406

https://1funny.com/wp-content/uploads/2010/12/thirsty-cat.jpg

Eat your water!

- 96% Water
  - Cucumbers
  - Lettuce
- 95% Water
  - Zucchini
  - Radishes
  - Celery
- Tomatoes 94%
- Green Cabbage 93%
- 92% Water
  - Cauliflower
  - Eggplant
  - Red cabbage
  - Spinach
  - Peppers
  - Watermelon
  - Strawberries
- 87% water
  - Pineapple, cranberries, orange, raspberries

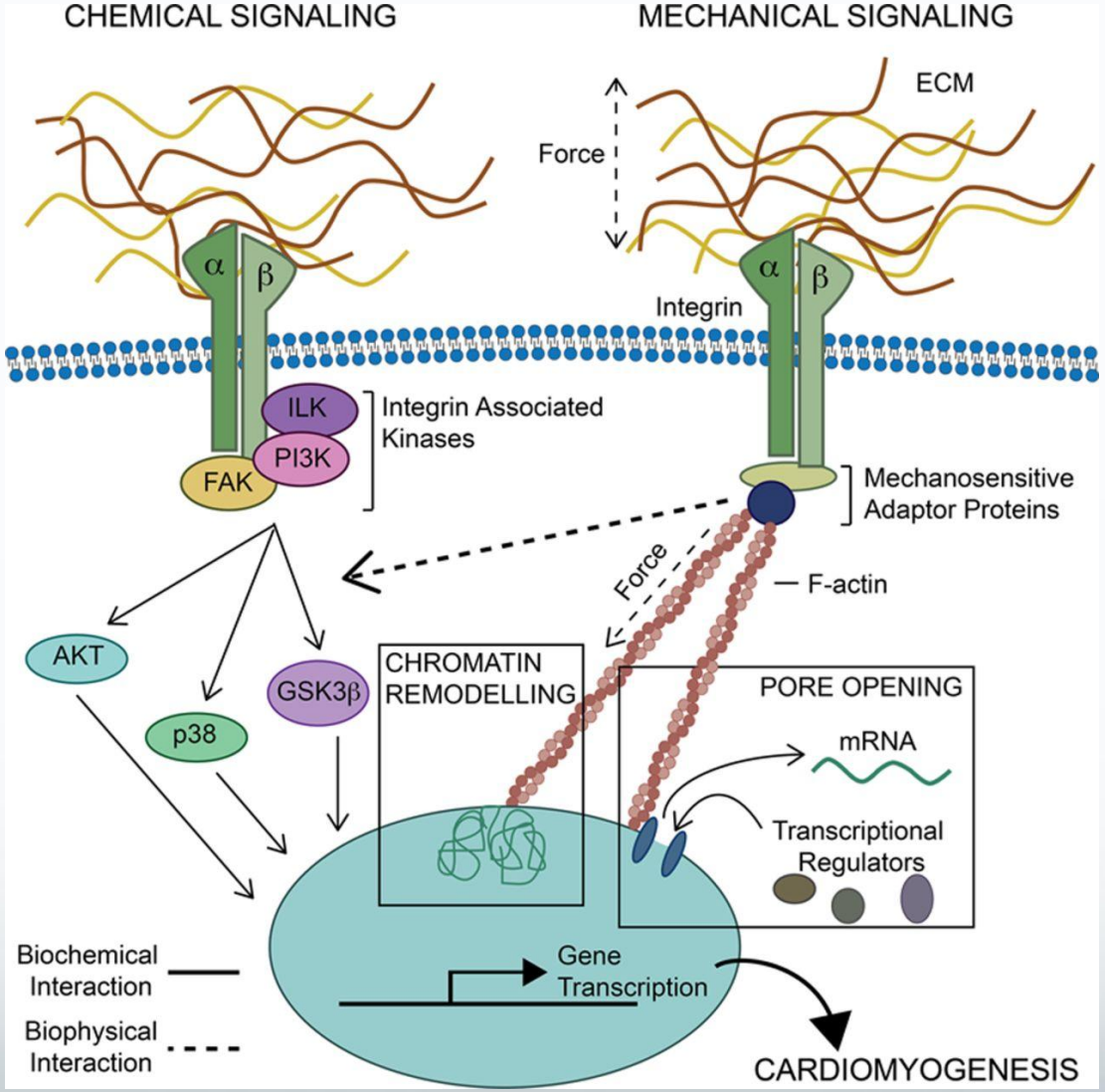
Common Dehydrators

- Alcohol
- High asparagine content vegetables
  - Asparagus, artichokes, parley, celery
- High Salt content
  - Soy Sauce
  - Bullion cubes
  - Movie theater popcorn
  - Fried foods
  - Cured meats
- Coffee/Caffeine
- High protein diet
- Sugary Drinks
  - Create acidic environment in body impeding enzyme function and straining kidneys
  - Hypernatremic effect – syphoning water from tissue

https://www.thedailymeal.com/entertain/9-foods-will-dehydrate-you-slideshow/

A Living matrix

- Fiber orientation is important
  - Fibers oriented parallel to predicted force vectors
- Mechanotransduction changes cell function
  - Through filaments of the ECM that influence activity in nucleus
  - Tissue function and morphology changes in response to tension
  - Manual pressure has been shown to change the viscoelasticity



http://circres.ahajournals.org/content/circresaha/118/2/296/F5.large.jpg

Sensory innervation

- Free nerve endings as terminal branches of the axons
  - Contribute to nociception and mechanoreception
- Encapsulated endings with non-neuronal cells
  - **Golgi receptors** - proprioception
  - **Pacinian corpuscles –** vibration and pressure
    - HVLA and vibratory techniques
  - **Ruffini corpuscles -** stretch, pressure, heat
    - Slow, deep soft tissue techniques

FASCIA SENSES!

Palpation Exercise

- Pick up object in one hand
- Feel with hand, fingertips, palmar surface of the hand
- Note texture and consistency
  - Using the surface contact of your hand and the muscles of the hand to determine the qualities and texture of this object you have picked up

Palpation Exercise

- Now add palpatory sense by bringing into play the proprioceptive fibers in the whole upper extremity
- Be conscious that you are feeling the object with the whole extremity, not just the hand contact alone
- Immediately you will note that you have an entirely different, far deeper appreciation of that same object as opposed to just observing with the hand contact alone

Research

Recovery from Chronic Low Back Pain after OMT

- Randomized double-blind, sham-controlled trial
  - 345 patients – 271 attended all sessions
  - Non-specific LBP
- 6 OMT sessions over 8 weeks
  - Recovery assessed at 12 weeks
- OMT regimen was associated with significant and clinically relevant measures for recovery from chronic LBP
  - Patients without depression were more likely to recover from chronic LBP with OMT

J Am Osteopath Assoc. 2016 Mar;116(3):144-55. doi: 10.7556/jaoa.2016.031.

Acetaminophen and Pregnancy

- JAMA Pediatrics study
- 7,796-mother examined behavior of children
- Use at 18 weeks of pregnancy
  - 42% more likely to report hyperactivity
  - 31% more likely to report conduct problems
- Use at 32 weeks of pregnancy
  - 29% more likely to report emotional difficulties in their children at age 7

http://archpedi.jamanetwork.com/article.aspx?articleid=2543281

Pregnancy and OMT

- Objective
  - To study OMT to treat back pain and related symptoms during the 3rd trimester
  - 144 patients
- Randomized, double-blinded placebo control study
  - Control, OMT, sham ultrasound
  - 7 visits
  - 30 minute treatments
- Treatment protocol included:
  - Soft tissue, MFR, ME, and ROM mobilization

Am J Obstet Gynecol. 2010 January ; 202(1): 43.e1–43.e8. doi:10.1016/j.ajog.2009.07.057.

- Results:
  - Back-specific functioning deteriorated significantly less in OMT group
  - Low back pain improved in the OMT group as well
    - Stayed the same in the sham ultrasound group
    - Worsened in the standard of care control group

Manual Treatment Study

- Spanish physiotherapists assessed use of manual techniques
- 84 patients with tension-type headache
- 4 groups
  - Suboccipital soft tissue inhibition (SI)
  - Occiput-atlas-axis (OAA) articulation
    - Cephalic decompression with circumduction on a vertical axis
  - Combined SI and OAA
  - Placebo/Control
    - No treatment – rested in supine position

- Outcomes based on:
  - Headache Impact Test-6
  - Headache Disability Inventory
  - Headache pain intensity
  - Craniocervical ROM
- Measures at baseline, at conclusion of treatment, and 8-week follow-up

Results

- Statistically significant results found at the conclusion of the treatment
  - All 3 treatment groups vs. placebo
  - Improvements maintained at the 8-week follow-up evaluation
- The OAA intervention was as effective as the combined OAA + SI and more effective than SI alone

Espí-López GV, Gómez-Conesa A, Gómez AA, Martínez JB, Pascual-Vaca ÁO, Blanco CR. Treatment of tension-type headache with articulatory and suboccipital soft tissue therapy: a double-blind, randomized, placebo-controlled clinical trial [published online January 27, 2014]. *J Bodyw Mov Ther.* 2014. doi:10.1016/j.jbmt.2014.01.001

OMT and Acute Ankle Sprain

- N = 55 (28 in treatment group, 27 control)
- Patients 18+ y.o. with unilateral ankle sprain
- Both groups received current standard of care for ankle sprains
- Treatment group had one session of OMT
- Both groups returned for F/U one week later

OMT and Acute Ankle Sprain

- Results
  - OMT group had statistically significant improvement in edema and pain and a trend towards increased ROM immediately following OMT
  - At F/U, both groups were significantly improved
    - Patients in OMT group had statistically significant improvement in ROM compared to the control

JAOA, Vol 103, No. 9, Sept. 2003, Eisenhart et. al. "Osteopathic Manipulative Treatment in the Emergency Department for Patients with Acute Ankle Injuries"

Ankle Injury Recurrence

- Epidemiologic study conducted among 3 categories of Hong Kong Chinese athletes
  - National teams
  - Competitive athletes
  - Recreational athletes
- Questionnaire sent to athletes having a history of ankle sprain

Ankle Injury Recurrence

- Only athletes involved in sports on a regular basis chosen
- All must have sprained ankle(s) at least once, with detectable swelling and pain around the injured ankle
- Athletes with acute ankle sprain within a 3-month period excluded
- 400 questionnaires distributed and collected, 20 incomplete
  - 380 for data analysis

Ankle Injury Recurrence

- 73% of all athletes had recurrent ankle sprain
- 59% of these athletes had significant disability and residual symptoms which led to impairment of their athletic performance
- Residual problems included:
  - Pain, instability, crepitus, weakness, stiffness, swelling

British Journal of Sports Medicine 1994; 28(2). MPhil et. al. An epidemiological survey on ankle sprain

Hamstring Stretching and TMJ dysfunction

- 42 amateur adult athletes with clinical diagnosis of TMD
  - No previous hamstring injury
  - Group one: Hold and release proprioceptive neuromuscular facilitation (HR-PNF)
  - Group two: HR-PNF + ischemic compression of masseter muscle
  - No control group

Espejo-Antúnez L, Castro-Valenzuela E,

Ribeiro F, Albornoz-Cabello M, Silva A, Rodríguez- Mansilla J. Immediate effects of hamstring stretching alone or combined with ischemic compression of the masseter muscle on hamstrings extensibility, active mouth opening and pain in athletes with temporomandibular dysfunction [published onlineJanuary 7, 2016]. *J Bodyw Mov Ther*. doi:10.1016/j.jbmt.2015.12.012.

Results

- After stretching techniques, both groups had significantly improved ($P<.01$):
  - Hamstring extensibility
  - Active mouth opening
  - Pressure pain thresholds
  - Pain
- Ischemic compression of masseter muscle offered no statistically significant difference in outcomes

Mind-Body Connection

- 24 participants randomized
  - Chiropractic spinal manipulation (6)
  - Spinal mobilization (8)
  - Therapeutic touch (10)
- Exercise-injury protocol to induce LBP
- fMRI brain analysis pre and post treatment

Gay CW, Robinson ME, George SZ, Perlstein WM, Bishop MD. Immediate changes after manual therapy in resting-state functional connectivity as measured by functional magnetic resonance imaging in participants with induced low back pain. J Manipulative Physiol Ther. 2014;37(9):614-627. doi:10.1016/j.jmpt.2014.09.001

Mind-Body Connection

- Primary outcome measure:
  - Functional connectivity (FC) between:
    - Somatosensory cortex
    - Secondary somatosensory cortex
    - Thalamus
    - Anterior and posterior cingulate cortices,
    - Anterior and posterior insula
    - Periaqueductal grey

Mind-Body Connection

- Secondary measures
  - Immediate changes in pain intensity
    - 101-point numeric rating scale
  - Pain sensitivity
    - Handheld dynamometer

Primary Outcomes

- Connection between posterior cingulate cortex (PCC) and anterior insular cortex (aINS)
  - Changed from weak negative to weak positive interaction
- Left pINS and left PAG showed overall increase over time
  - PAG – descending pain modulation
  - Insular cortex:
    - Where sensation of pain is judged as to its degree
    - Where one imagines pain
    - IBS have abnormal processing of visceral pain related to dysfunctional inhibition of pain within the brain

Primary Outcomes

- Decreased left somatosensory cortex (SI) and right pINS over time
  - Moderately strong relationship prior to intervention

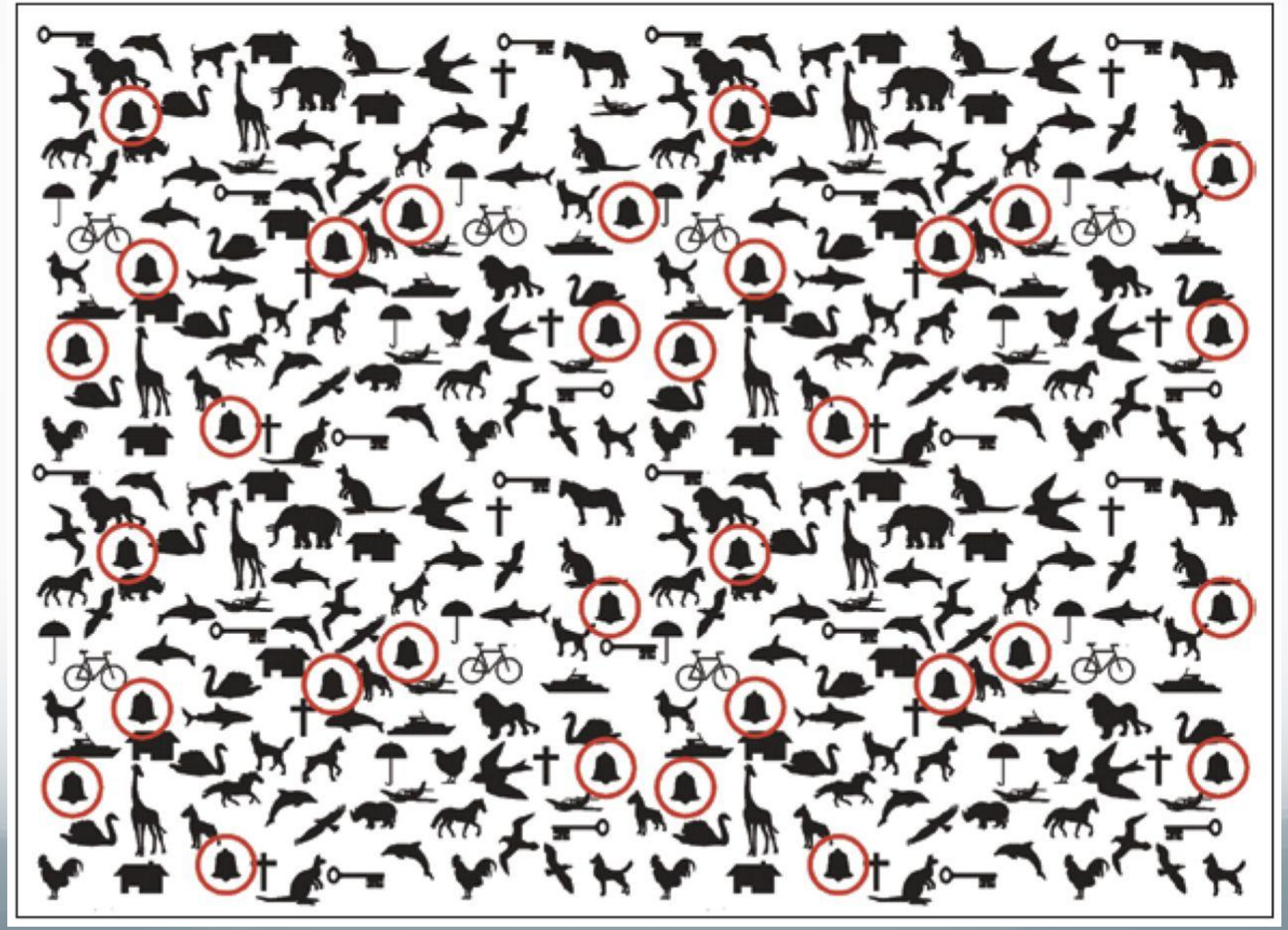
Secondary Outcomes

- No changes in remote or local pressure pain sensitivity
  - Small sample size?
- Significant reduction in exercised-induced pain intensity
  - No control group in this study

- Limitations
  - No control group
  - No natural history group
    - All groups improved equally over time
  - Acute and not chronic pain
  - Small sample size

OMT and ADHD

- Study looked at Attentive performance of children with ADHD
  - Primary diagnosis of ADHD
    - Excluded for secondary ADHD Dx or a Dx of mental retardation, anxiety, pervasive development, diphasic disorders; childhood schizophrenia, manic episode, underdevelopment of a special learning skill, organic disorders or adverse drug reactions
  - 14 treatment, 14 control
- No adverse effects noted in study
- Measured performance on Biancardi-Stroppa Test



OMT and ADHD

- OMT x 6 sessions over 10 weeks
  - First two weekly, last 4 bi-weekly
  - No protocol – left to discretion of provider
- Medications continued if present at beginning of study in both treatment and control groups
- OMT group positively associated with changes in Biancardi-Stroppa Test accuracy (β=7.948; P=0.04) and rapidity (β= 9.089 points; P=0.03)

Accorsi A, Lucci C, Di Mattia L, Granchelli C, Barlafante G, Fini F, Pizzolorusso G, Cerritelli F, Pincherle M. Effect of Osteopathic Manipulative Therapy in the Attentive Performance of Children With Attention-Deficit/Hyperactivity Disorder. *J Am Osteopath Assoc* 2014;114(5):374–381. doi: 10.7556/jaoa.2014.074.

Technique to use

- Avoid HVLA in acute inflammatory process
- Give the tissue what it needs
  - What is the goal of the treatment?
- Working WITH not ON tissue
  - We are optimizing body functioning by correcting structure

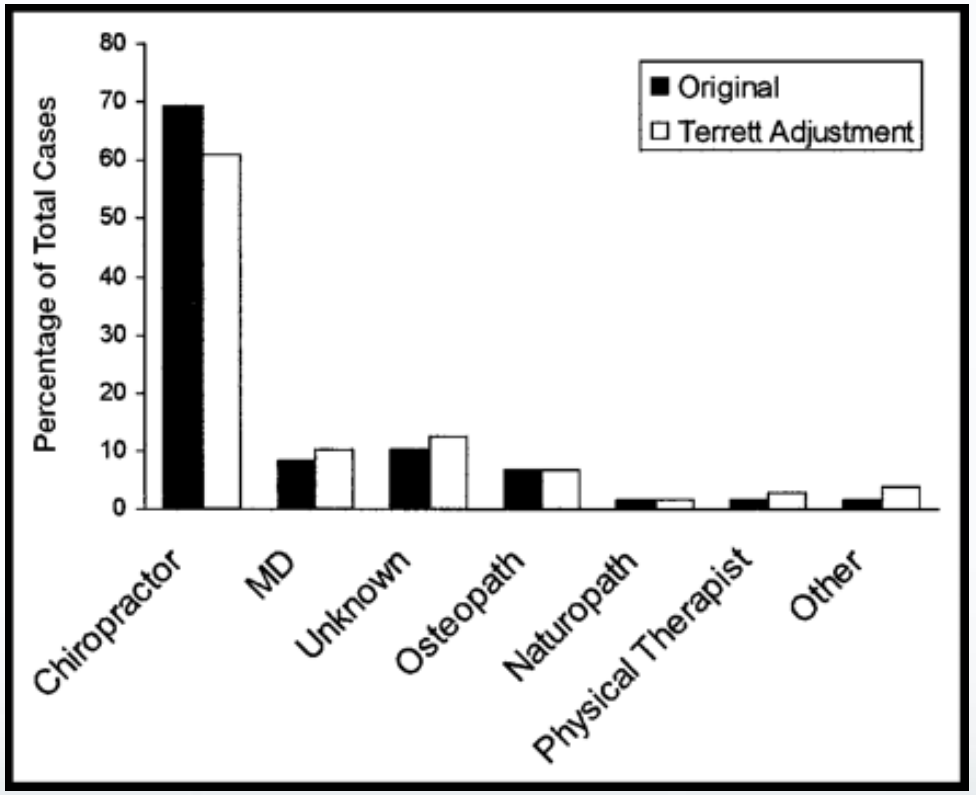
Frequency of Treatment

- Acute condition needs more immediate follow-up
  - Don't over treat the tissue
- Chronic condition
  - Do not expect correction of a chronic condition in 1 or 2 treatments
  - Manage expectations of patient
  - The patient's somatic dysfunction pattern should be changing
- Get patient involved and invested in their healing process!

Injury and Manipulation

- **The American Journal of Medicine.** Volume 112, Issue 7, Pages 566-571, May 2002
  - Estimates of the incidence of serious complications range from 1 per 2 million manipulations to 1 per 400,000.
  - High-velocity thrusting techniques were implicated
  - Search criteria included osteopathy, however no adverse events from DO's named in this study

Cervical Spine Injury by Practitioner



- **Manipulation of the Cervical Spine: Risks and Benefits.** Physical Therapy **January 1999** vol. 79 no. 1 **50-65**

A fresh look at safety

- Based on a review of articles over 6 decades, SAEs from OMT are estimated to be incredibly rare
- Prospective, randomized, placebo-controlled clin- ical trial to evaluate the actual incidence in clinical practice would be cost prohibitive, requiring thou- sands of OMT patient encounters
- Practice-based research network formed for data collection
  - Adverse events reported to researchers, not practitioners

VickDA,McKayC,ZengerleCR.The safety of manipulative treatment: review of the literature from 1925 to 1993. J Am Osteopath Assoc. 1996;96(2):113-115.

OMT is SAFE!

- Largest prospective study on patient reported adverse events
- 880 patients, with >1800 office encounters
- 43 osteopathic physicians
  - 41 US trained D.O.s, 1 MD, 1 foreign-trained osteopath
- Adverse events were generally mild
  - Pain/discomfort
- No SAE reported
- Incidence was far less than retrospective studies

DegenhardtBF,JohnsonJC,BrooksWJ,NormanL.Characterizing adverse events reported immediately after osteopathic manipulative treatment. J Am Osteopath Assoc. 2018;118(3):141-149.

When to refer?

- Patient benefits from treatment, but somatic dysfunction returns
- Somatic dysfunction identified, but treatment unsuccessful
- Time constraints
- Complex injury pattern
- Contributing systemic pathology
  - RA, DJD, DDD, connective tissue disease

How often is OMT being used?

- Survey sent to 10,000 random osteopathic physicians in August, 2018
- 1,683 (16.83%) responded
- Results:
  - 1,308 (77.74%) reported using OMT on less than 5% of patients
  - 958 (56.95%) did not use any OMT

Healy CJ, Brockway MD, Wilde BB. Osteopathic manipulative treatment (OMT) use among osteopathic physicians in the United States. *J Osteopath Med*. 2021;121(1):57-61. doi:10.1515/jom-2020-0013

How often is OMT being used?

- Barriers:
  - Lack of time, lack of reimbursement, lack of institutional/practice support, lack of confidence/proficiency
- Positive correlation:
  - Female provider, full practice owner, office-based practice setting

Healy CJ, Brockway MD, Wilde BB. Osteopathic manipulative treatment (OMT) use among osteopathic physicians in the United States. *J Osteopath Med*. 2021;121(1):57-61. doi:10.1515/jom-2020-0013

Quick Documentation Review

- OMT diagnosed by body region
  - 10 regions
    - Head, Cervical, Thoracic, Lumbar, Sacrum, Pelvis, LE, UE, Rib cage, and Abdomen
- ICD-10 Codes: M99.0 - M99.09
- Add -25 modifier to E&M code

Quick Documentation Review

- **CPT CODES:**
  - **98925** 1-2 areas treated
  - **98926** 3-4 areas treated
  - **98927** 5-6 areas treated
  - **98928** 7-8 areas treated
  - **98929** 9-10 areas treated

OMT Reimbursement rates with Medicare (2023) – KC Metro Rates

OMT Code	Non-Facility (office)	Facility
98925 (1-2 regions)	$30.74	$22.99
98926 (3-4 regions)	$44.05	$34.37
98927 (5-6 regions)	$57.04	$45.10
98928 (7-8 regions)	$70.33	$57.43
98929 (9-10 regions)	$82.67	$68.60

www.cms.gov

Annual Revenue Impact (48 weeks of work)

- 10 patients/week with 1-2 regions treated
  - $14,755.20
- 10 patients/week with 3-4 regions treated
  - $21,144
- 10 patients/week with 5-6 regions treated
  - $27,379.20

Introduction to Osteopathic Manipulative Medicine:
Integrating OMM Into Clinical Practice and Teaching

Date: May 15-18, 2025
Location: AAO Office, Indianapolis, IN
Course Directors:
Lisa DeStefano, DO; Richard G. Schuster, DO
Register online at www.academyofosteopathy.org

Need an OMT refresher?

Course Description

This course will:

- Provide basic and refresher knowledge and skills for program directors and core teaching faculty who supervise osteopathic manipulative treatment (OMT) in clinics.
- Help MD students and graduates obtain the prerequisites for entering osteopathic-recognized residencies.
- Be valuable for clinicians interested in adding OMT to their skill set.

Through a combination of lectures and hands-on workshops, attendees will learn the basics of osteopathic manipulative medicine, which encompasses osteopathic tenets, palpatory diagnosis and OMT.

The curriculum includes lessons on muscle energy technique; thoracic spine technique; articulatory techniques; functional techniques; myofascial release; and high-velocity, low-amplitude thrust.

Course registration includes one copy of Greenman's Principles of Manual Medicine, 5th edition.

Conclusion

- Pain is a complicated, multidimensional process
- People are more than just the sum of their individual parts
  - Mind, body connection
- We must offer patients alternatives to pain management other than narcotics and medication
- Research continues to emerge that supports OMT use for varieties of conditions