Augsburg ECHO
Neck and Back Pain
Courtesy of Dr Peter Stiles, Tria Orthopedics

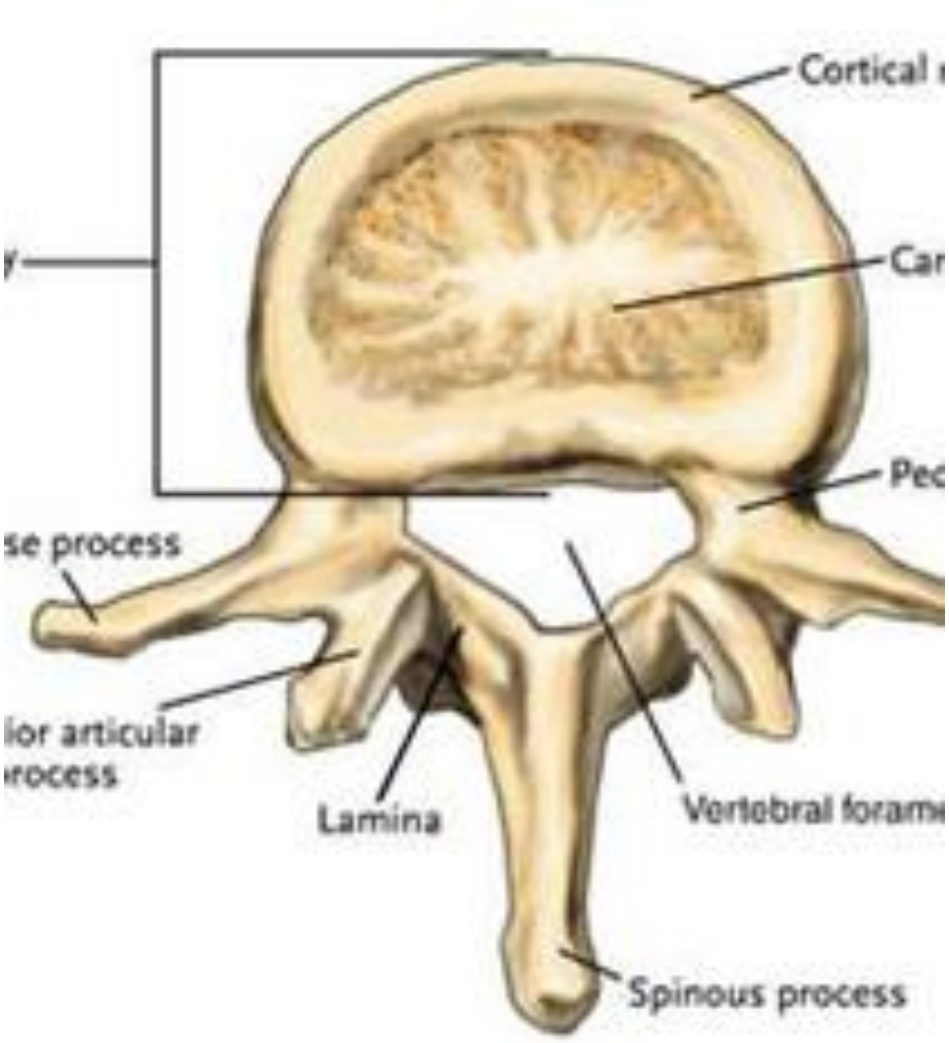
February 26, 2020

We still do not have disclosures

Objectives

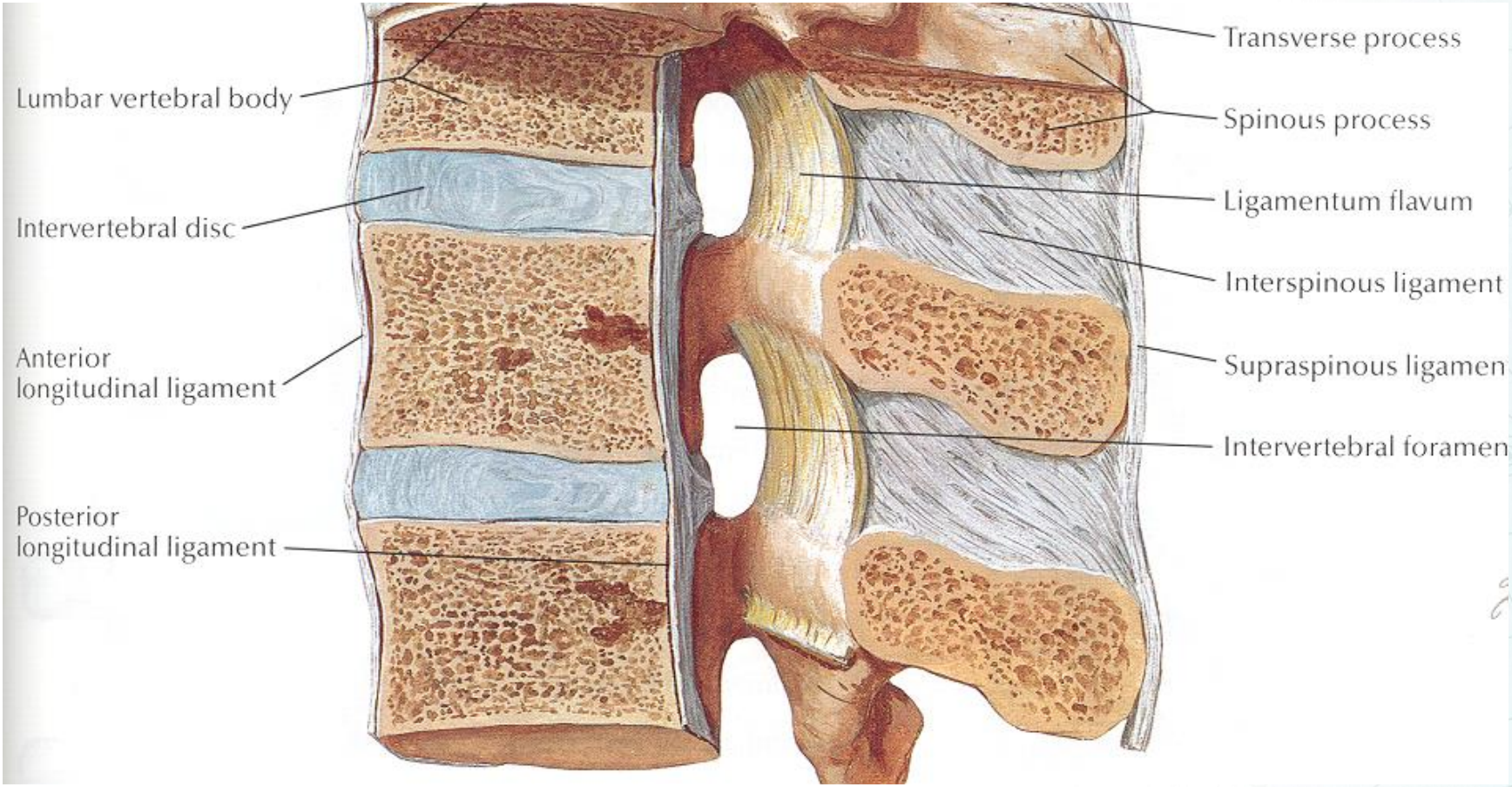
- **Neck and Back Pain**
  - Review relevant anatomy
  - Review of prevalence statistics
  - Evaluation of acute neck and back pain
    - Differential diagnosis and imaging indications
  - Evaluation of chronic neck and back pain
    - Differential diagnosis and imaging indications
  - Identify indications for opioid treatment
  - Identify and list non-opioid medication treatment options
  - Identify and list non-medication treatment options

Anatomy



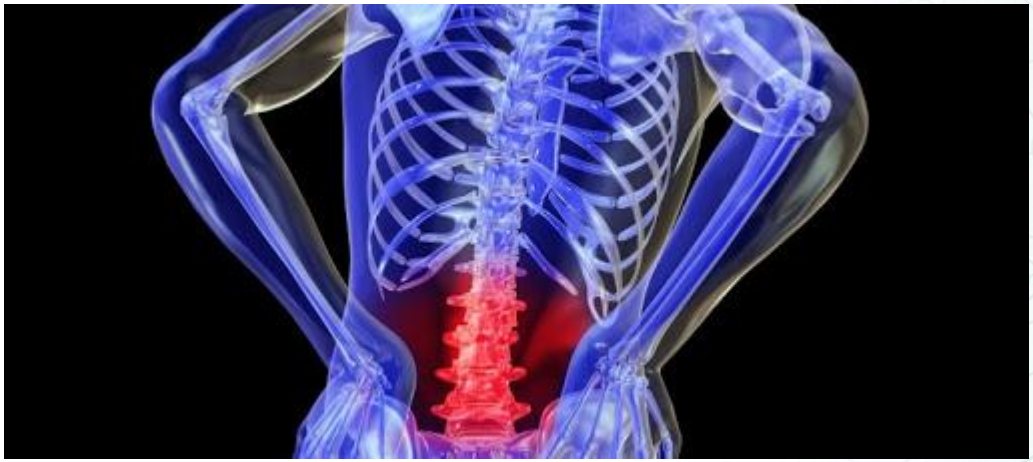
- Anterior Column
  - Ant. Longitudinal Ligament
  - Vertebral Body (ant. ½)
- Middle Column
  - Vertebral Body (post. ½)
  - Post. Longitudinal Ligament
- Posterior Column
  - Pedicles
  - Transverse Process
  - Facet Joint
  - Lamina
  - Spinous Process

Anatomy- lumbar



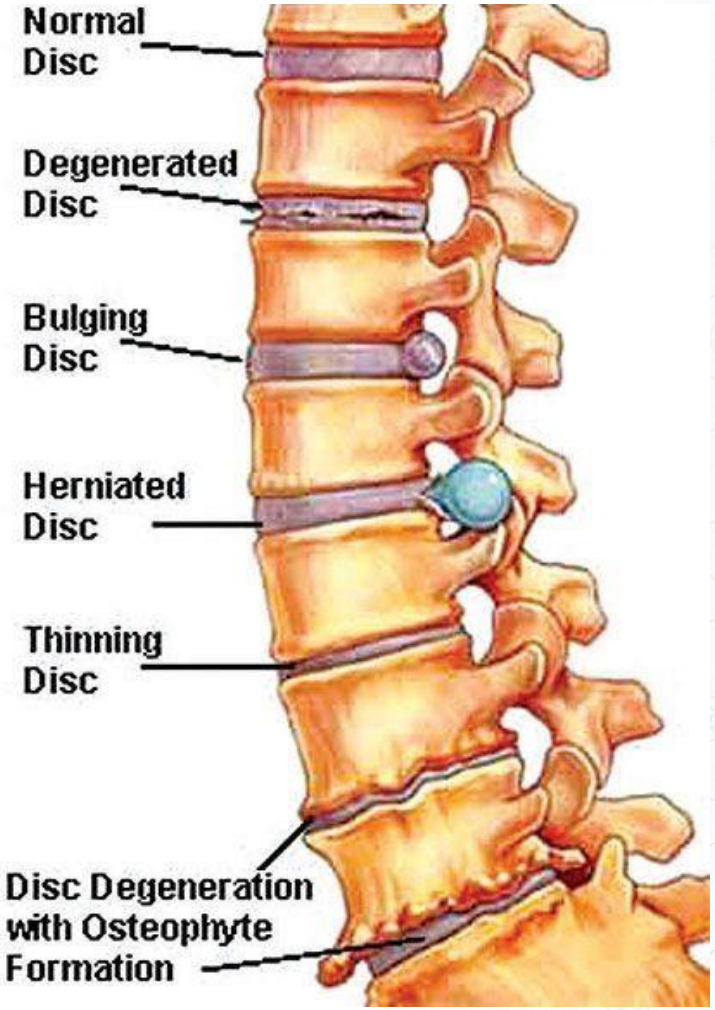
Lumbar

- Sprains (over stretching/tearing of ligaments) and Strains (tears in tendon/muscle) most common
  - Caused by:
    - Twisting
    - Lifting improperly (too heavy)
    - Overstretching
  - Can result in back spasms

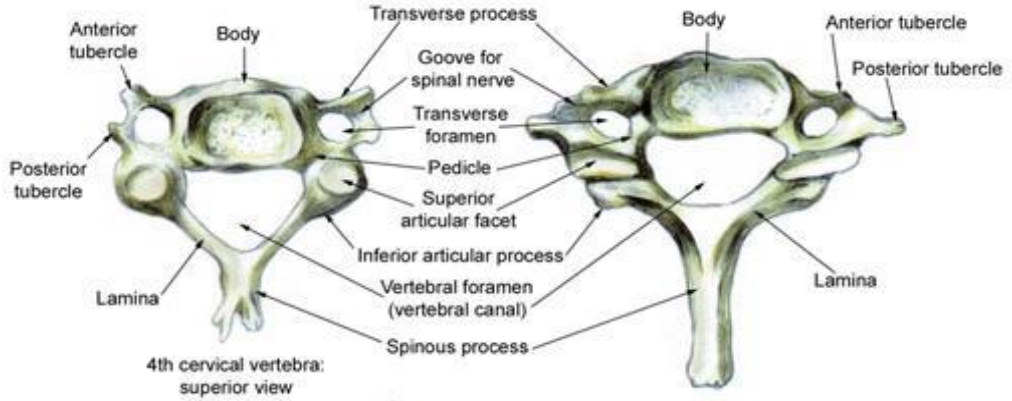


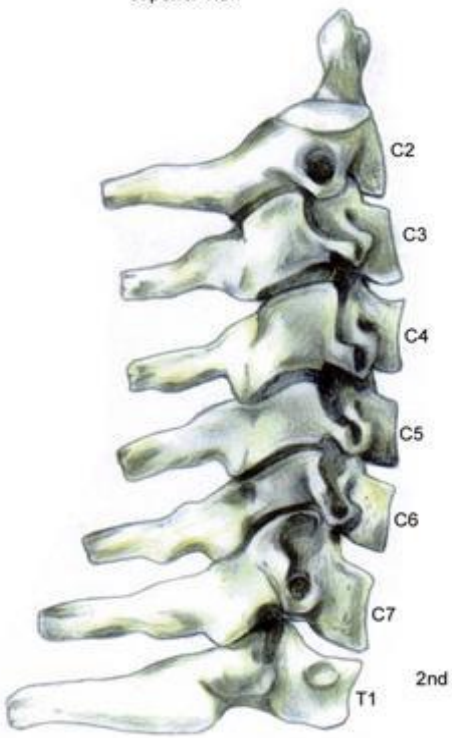
Lumbar

- Less common:
  - Disc degeneration
    - Normal process of aging
    - Discus lose integrity
  - Herniated/ruptured disc
  - Radiculopathy
  - Sciatica
  - Spondylolisthesis
  - Trauma
  - Spinal stenosis
  - Skeletal irregularities



Anatomy- cervical



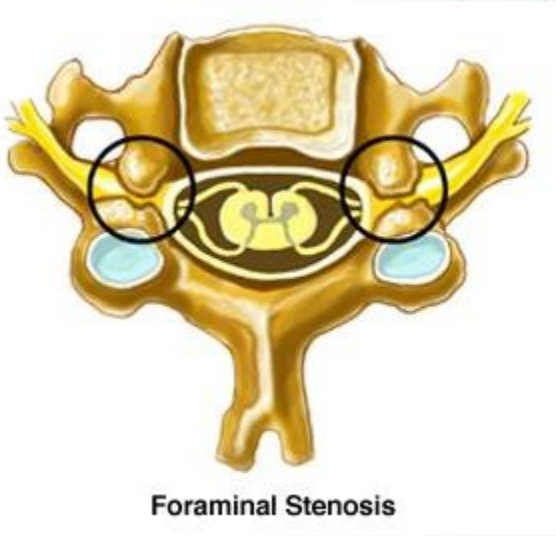


Cervical

- Somatic (poorly localized and dull aching)
  - Spondylosis
  - Discogenic
  - Facet joint pain
  - Myofascial pain

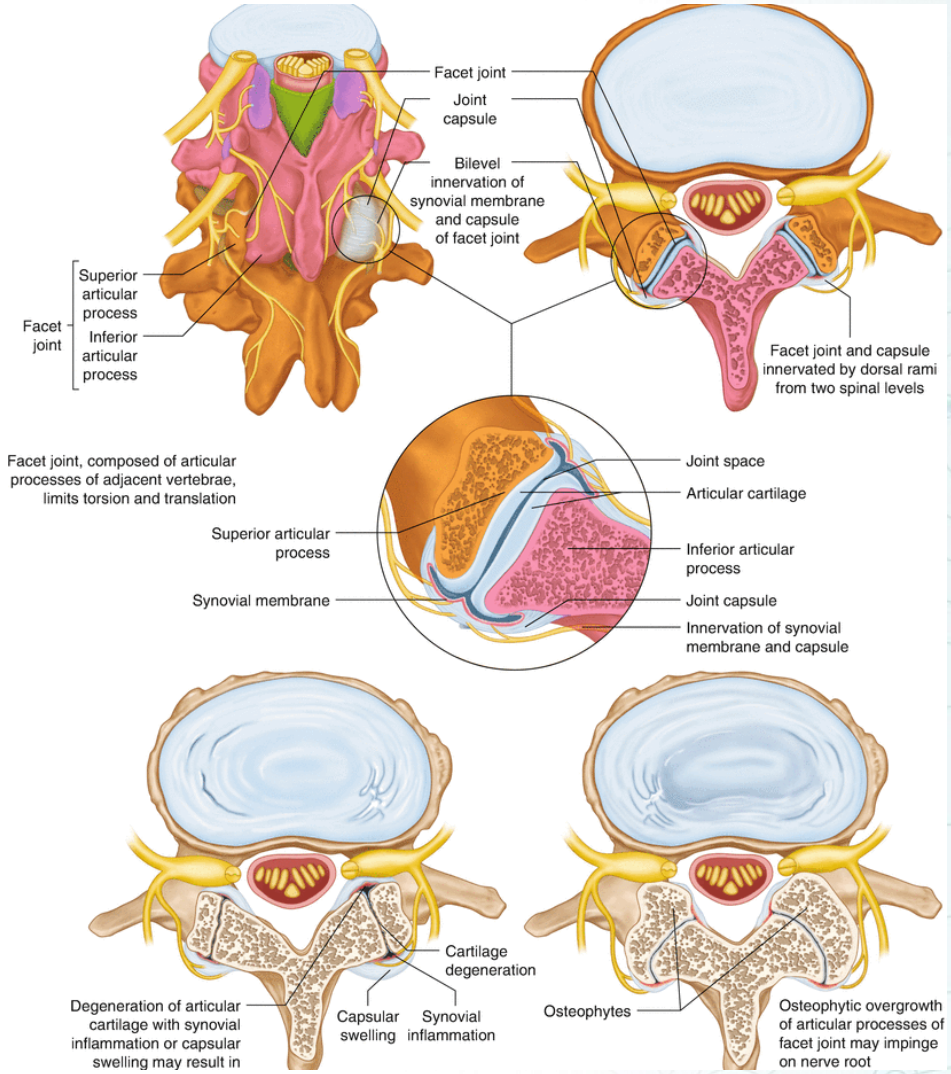
Cervical

- Radicular pain (neurogenic- dermatome distribution)
  - Spondylotic myelopathy
    - Degenerative that narrow spinal canal
  - Cervical radiculopathy
    - Foraminal stenosis
    - Disc herniation



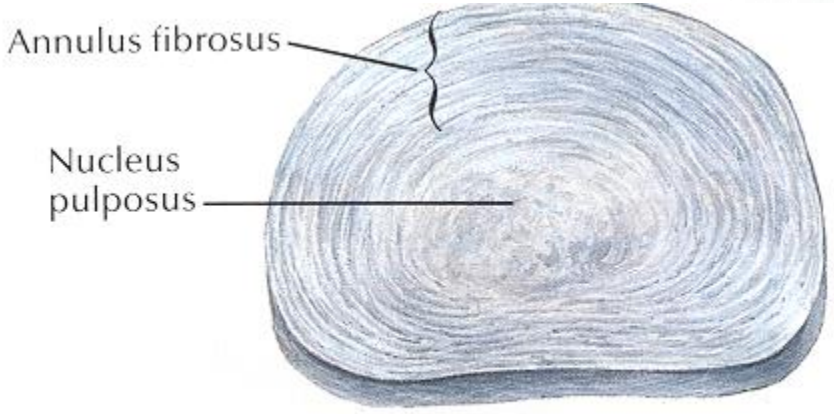
Anatomy- facet joint

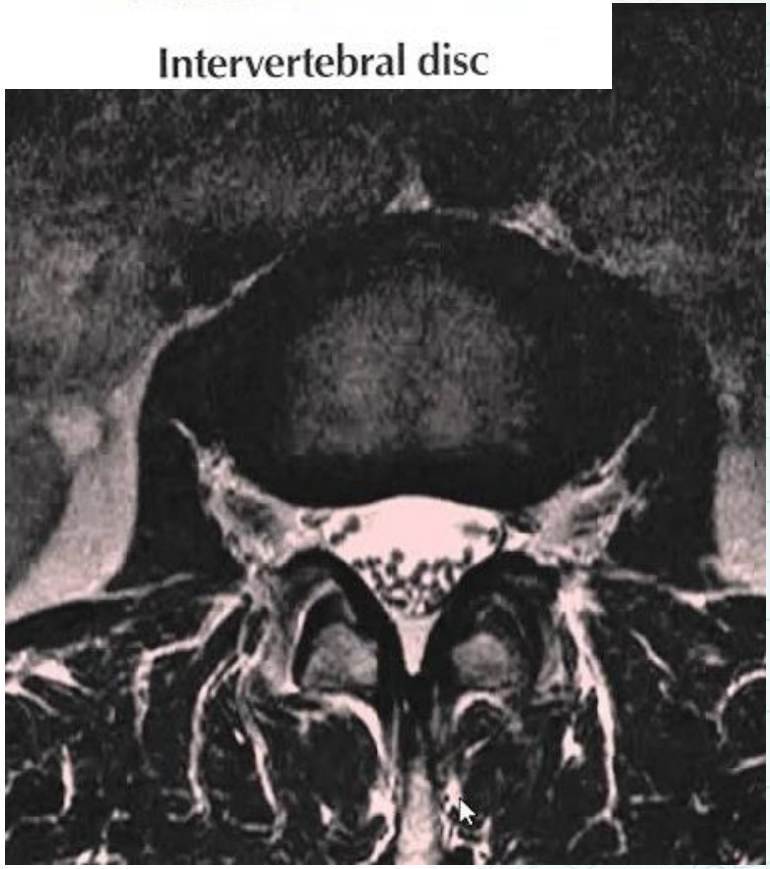
- True synovial joint:
  - Joint space, Hyaline cartilage, Synovial membrane, Fibrous capsule
- Variable alignment based on spine level



Anatomy- disc

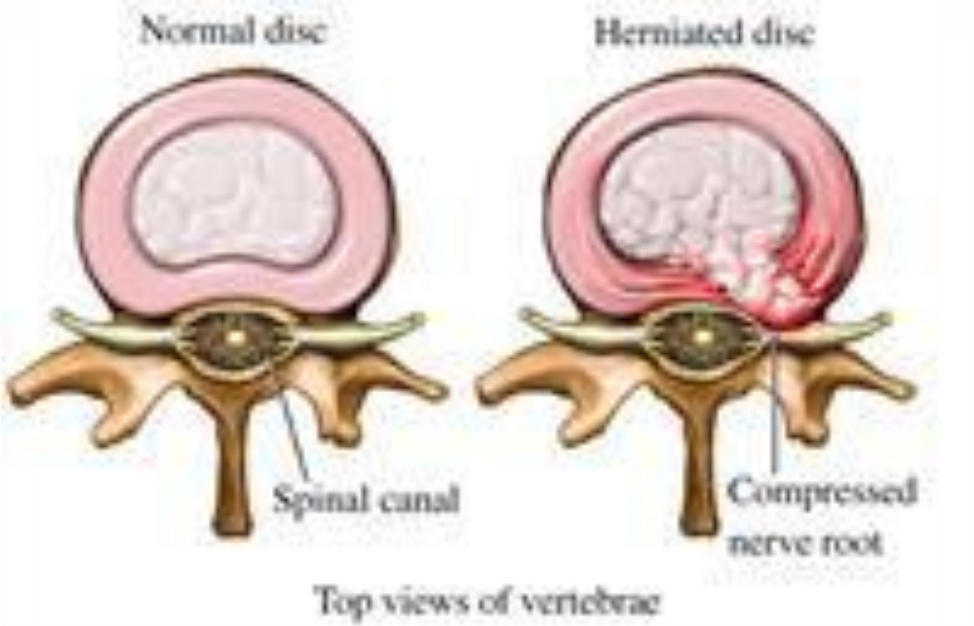
- Nucleus Pulposus
  - Glycosaminoglycans
  - Water
  - Type 2 Collagen
- Annulus Fibrosis
  - Fibrocartilagnous Lamellae
  - Type 1 Collagen





Disc Statistics

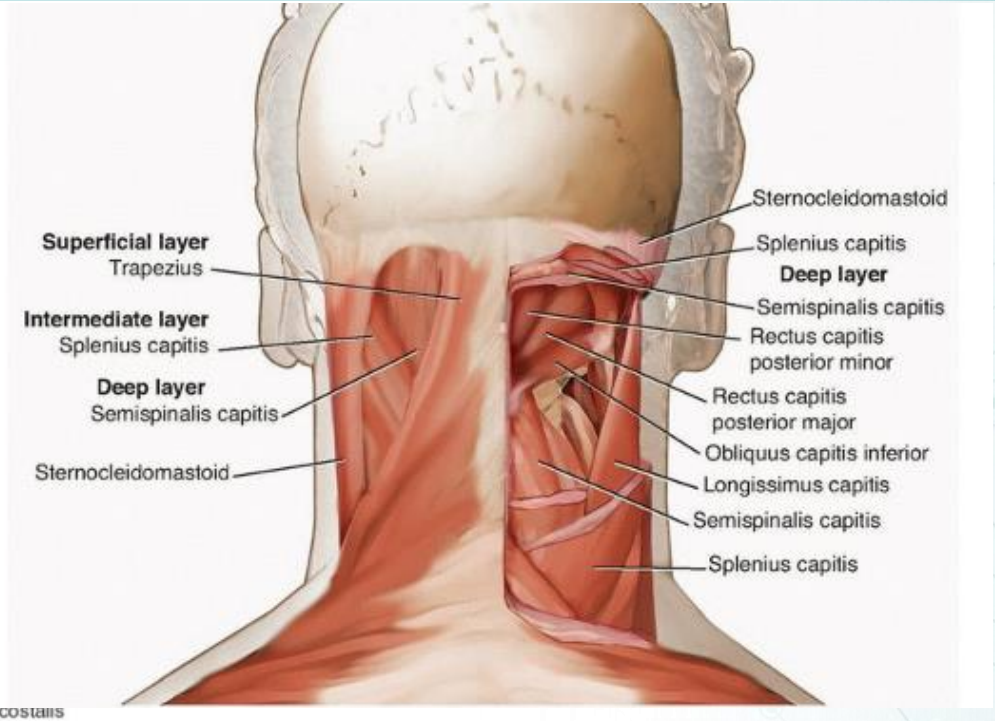
- Estimated prevalence: ~1 to 3%
- Most common: 30 to 50 year
- Men : Women 2 : 1

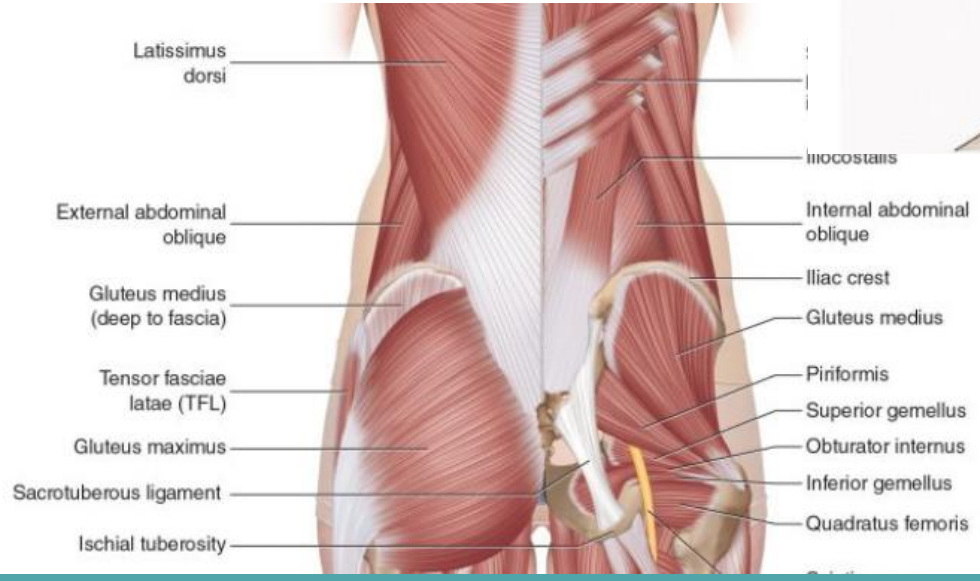


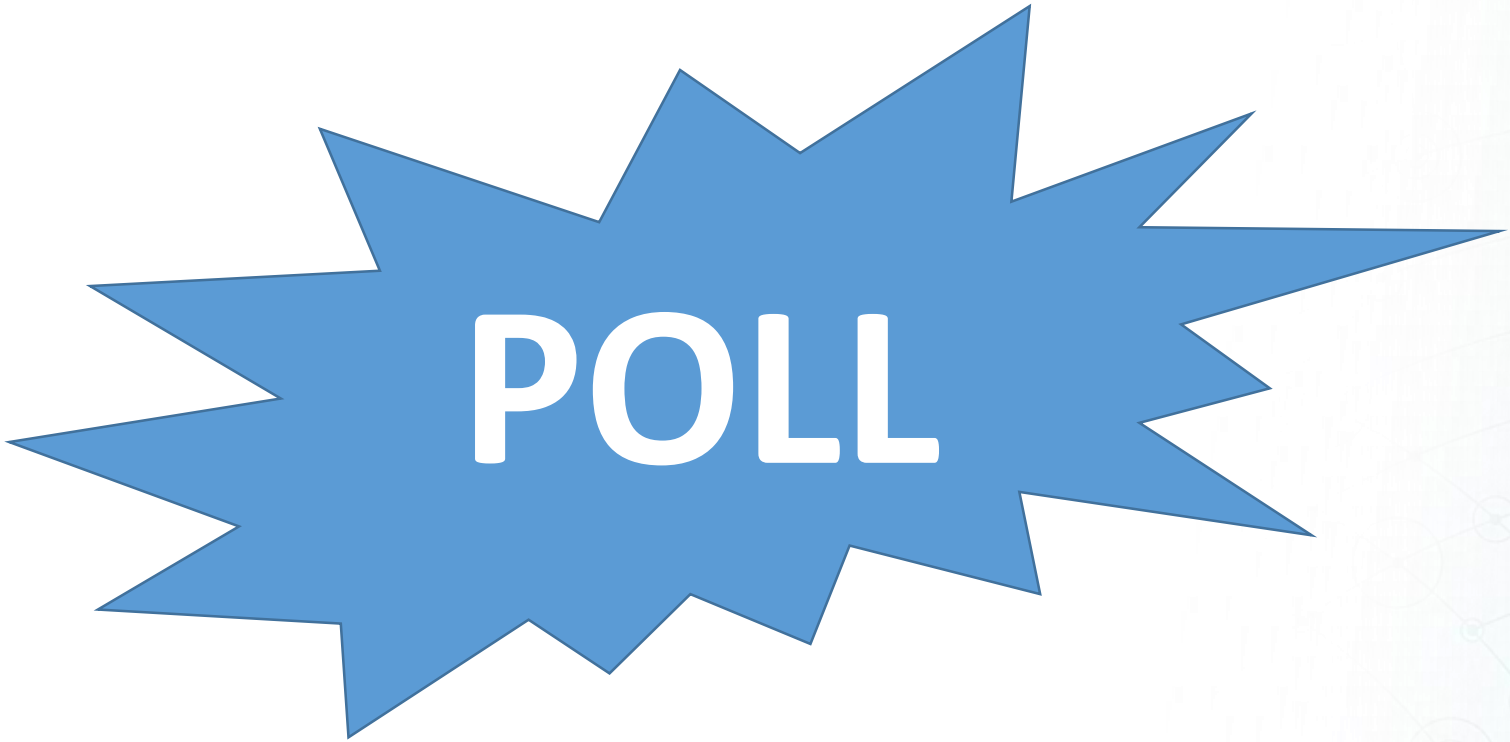
Anatomy- sacroiliac joint

- Synovial joint:
  - Fibrous capsule, joint space, synovial fluid
- Ligaments
  - Anterior sacroiliac ligament
  - Interosseous sacroiliac ligament
  - Posterior sacroiliac ligament
  - Sacrotuberous ligament
  - Sacrospinous ligament
- Varied innervation
  - Ventral rami L4 and L5
  - Sup gluteal nerve
  - Dorsal rami L5-S2

Anatomy- lots of muscles



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Prevalence

- In the **adult population**
  - At some point, 60% to 80% experience “interfering” back pain and 20% to 70% with neck pain
  - At any given moment, 15% to 20% of adults report current back pain and 10% to 20% report current neck pain.
- The **vast majority** of back and neck pain complaints are characterized in the literature as non-specific and self-limiting
  - However, there is a high frequency of recurrence.
- Back and neck pain consistently rank in the **top five disabling disorders** in the United States.
- In low back pain, long term recurrence and outcome is associated with **duration and experience with the first episode** is associated with the probability and severity of recurrence.


Observational Study

Medicine

OPEN

Trends in diagnosis of painful neck and back conditions, 2002 to 2011

Patricia L. Sinnott, PT, PhD, MPH[a,*], Sharon K. Dally, MS[a], Jodie Trafton, PhD[b], Joseph L. Goulet, PhD[c], Todd H. Wagner, PhD[d]

Back Pain Recurrence

- Make more likely:
  - Age
  - Fitness level
  - Pregnancy
  - Weight gain
  - Genetics
  - Job type
  - Mental health factors
    - Anxiety
    - depression

DDX: acute lumbar

Axial pain

- Discogenic
- Facetogenic
- SI joint
- Compression fracture
- Spondylolisthesis
- Muscular
- “Other” (i.e. kidney stone, etc)

Radicular pain

- Herniated disc
- Stenosis
- Facet cyst, hypertrophy
- Piriformis syndrome

DDx- Acute cervical

Axial pain

- Discogenic
- Facetogenic
- Spondylolisthesis
- Muscular
- Whiplash syndrome
- “Other” (i.e. neoplasm)

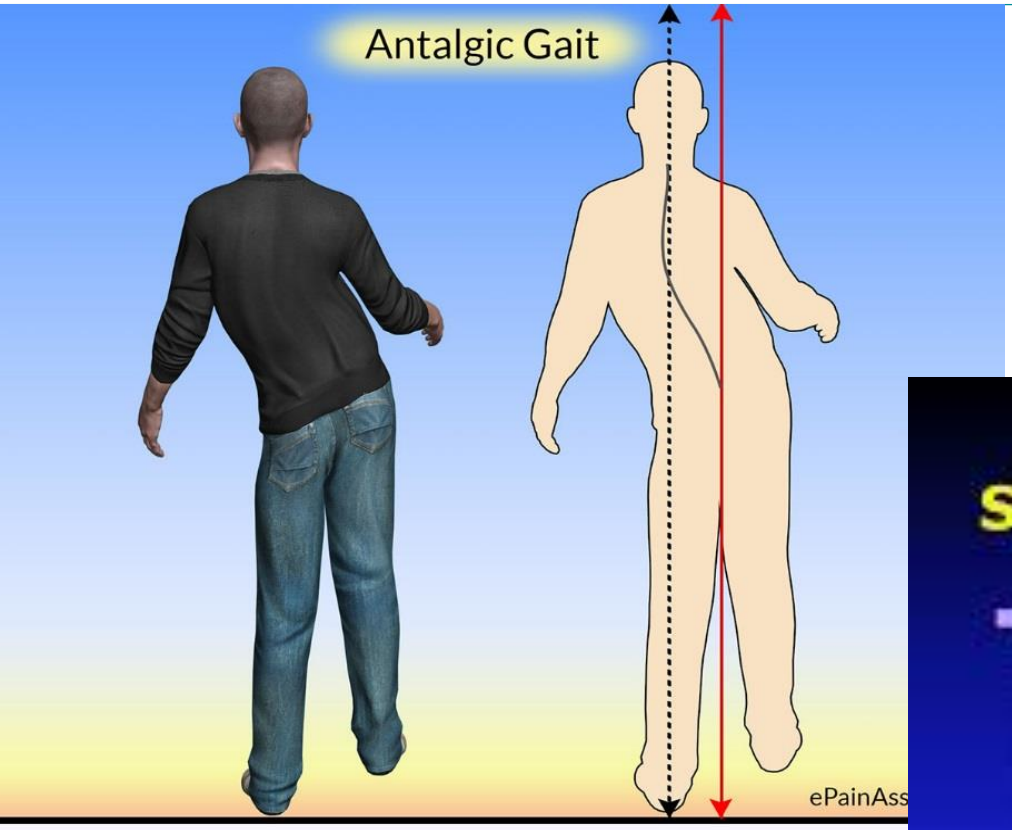
Radicular pain

- Herniated disc
- Stenosis
- Facet hypertrophy

Exam

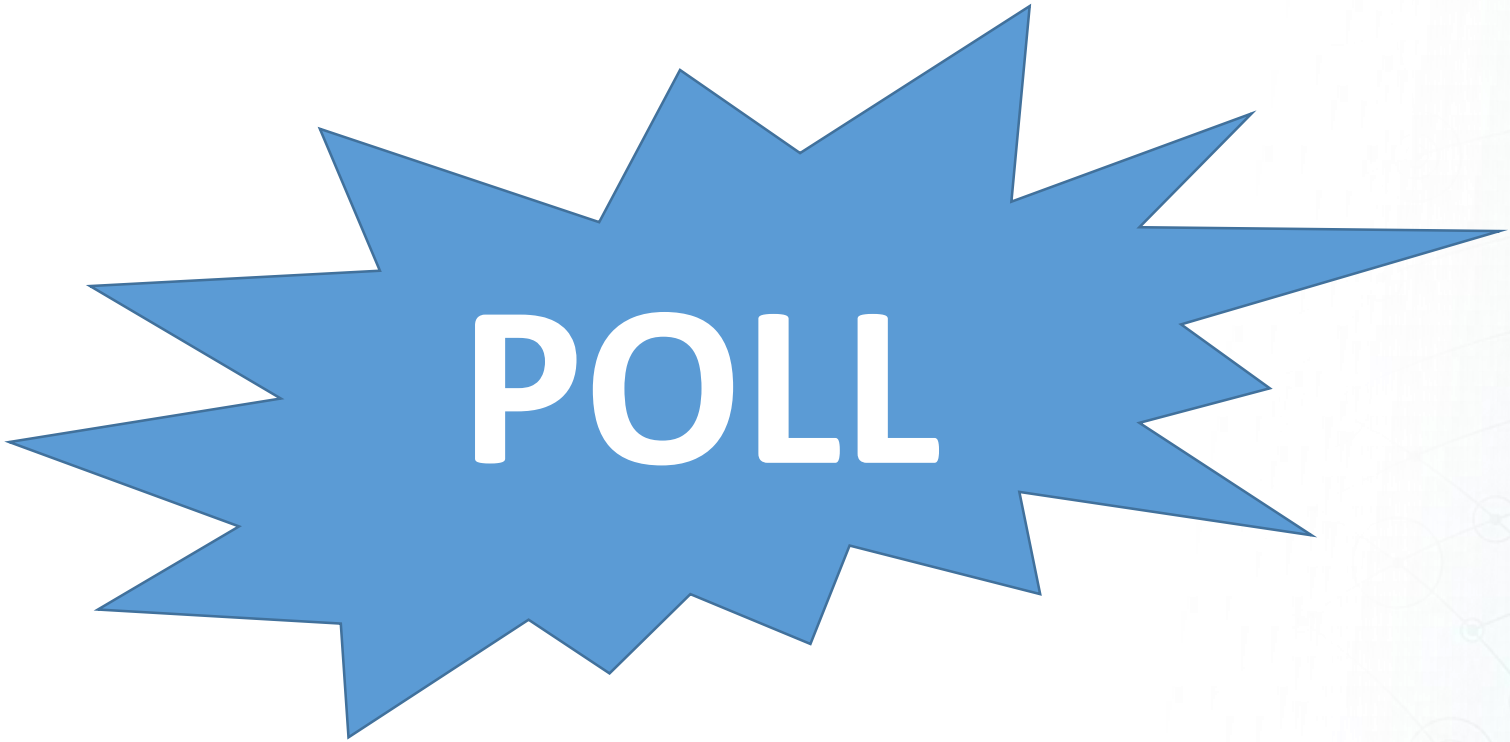
- Inspection/Observation: posture, bulk, symmetry
- Gait: antalgic, steppage, Trendelenburg
  - Toe / heel walking
- Range of motion: quality, quantity
- Palpation
- Neurologic exam: strength, sensation, reflexes
- Special tests
  - Facet loading, Stork test
  - Straight leg raise
  - SI provocative test

Abnormal Gaits



Steppage gait

- foot drop where the foot hangs with the toes pointing down, causing the toes to scrape the ground while walking, requiring someone to lift the leg higher than normal when walking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Exam

- Flexion based
  - Discogenic
  - Disc herniation
  - Compression fx
  - Muscular
- Transitional
  - Discogenic
  - Spondylolisthesis
  - SI joint

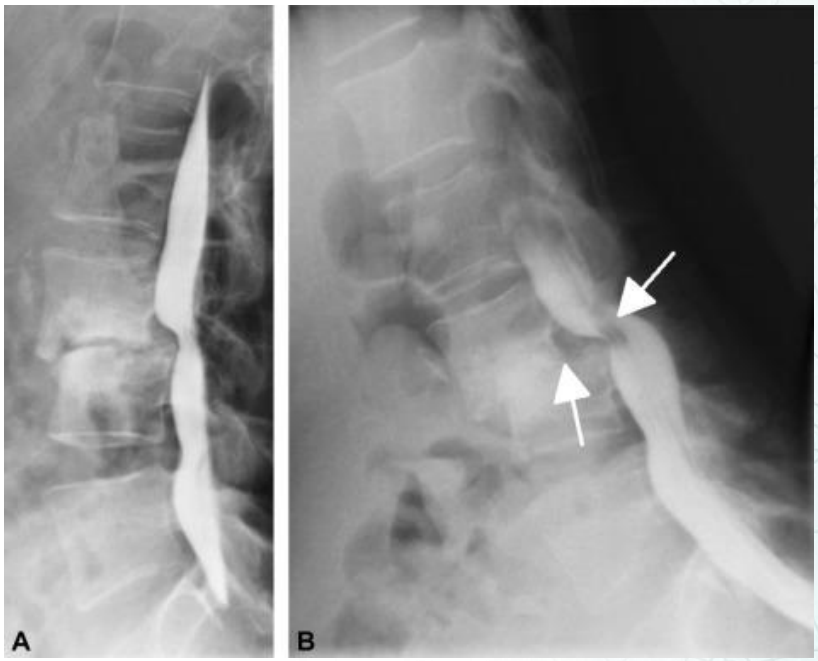
- Extension based
  - Spinal stenosis
  - Facetogenic
  - *Baastrup's

*Baastrup's:

kissing spine syndrome: close adjacent spinous processes due to degenerative changes. usually lumbar (L4-L5)

Imaging/Studies

- X-ray
- MRI
- CT
- Myelography
- Discography
- Electromyography/Nerve Conduction Studies

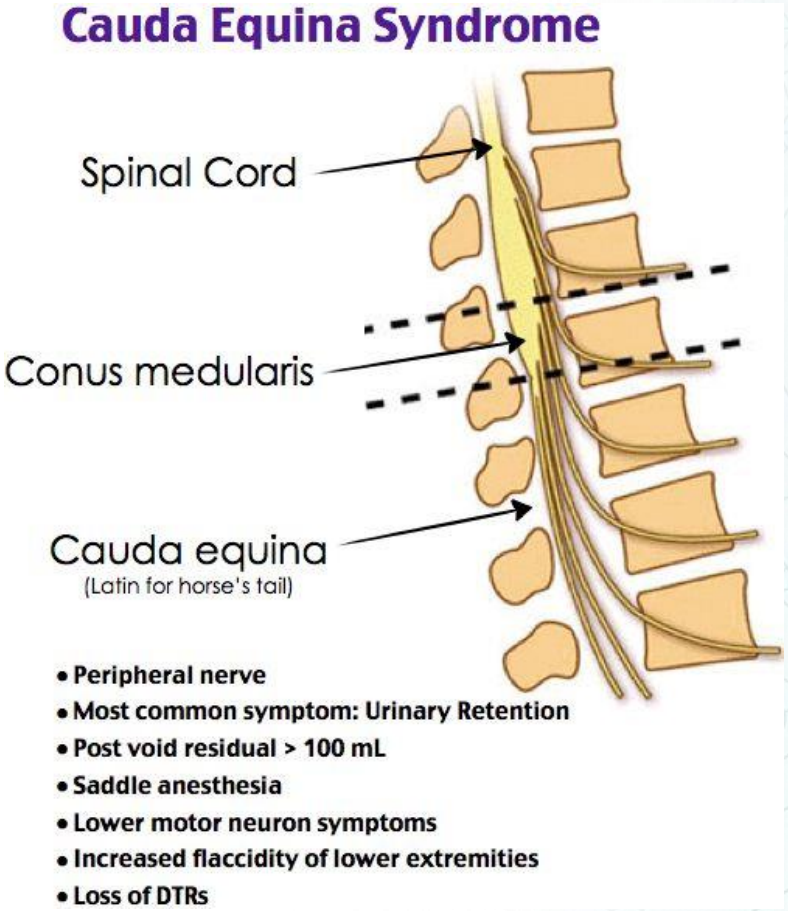


Imaging/Studies

- Indications:
  - Severe/progressive neurologic deficits
  - Suspected compression fracture
  - Red flags, cancer suspicion
  - Related to trauma
  - Persistent despite conservative treatment

Imaging/Studies

- Immediate/red flags LUMBAR: *rare
  - Infection concerns
  - Tumors (cancer mets)
  - Cauda equina
    - Loss of bowel function
    - Loss of bladder function
  - AAA
  - Kidney stones



Imaging/Studies

Description: Disruption of the atlanto-occipital junction involving the atlanto-occipital articulations.

Mechanism: Hyperflexion or hyperextension.

Radiographic features:

1. Malposition of occipital condyles in relation to the superior articulating facets of the atlas.

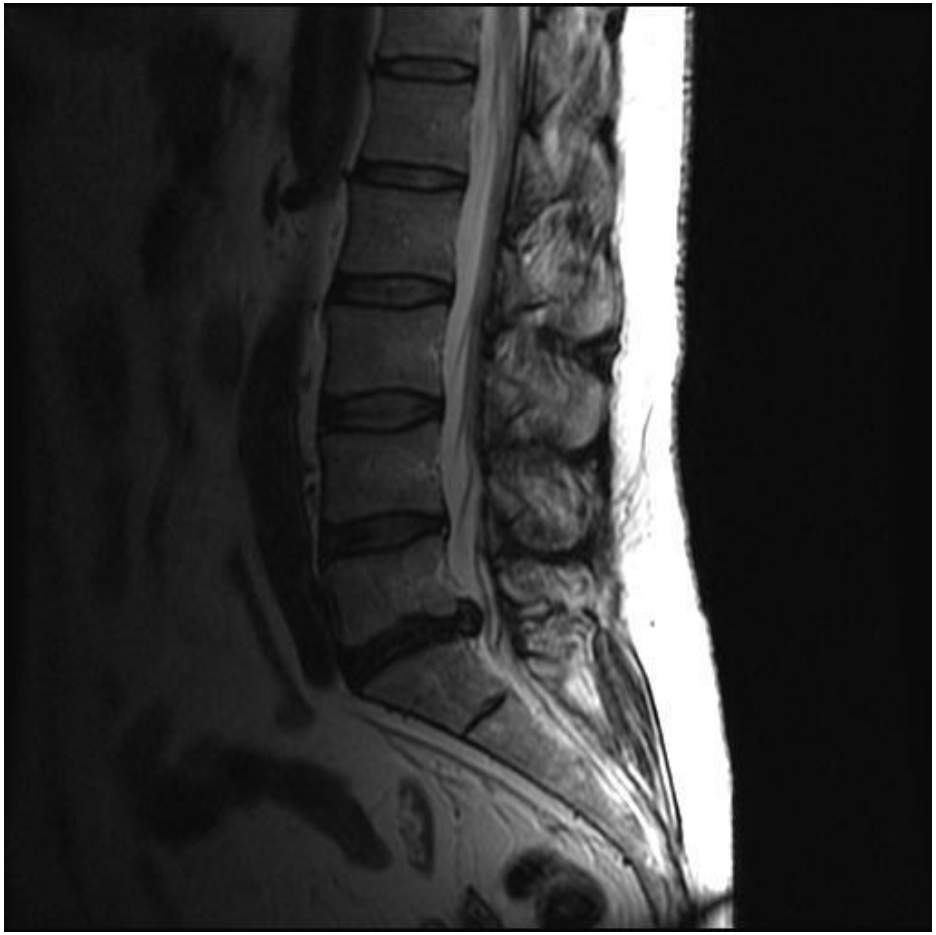
2. Cervicocranial prevertebral soft tissue swelling.

Stability: unstable

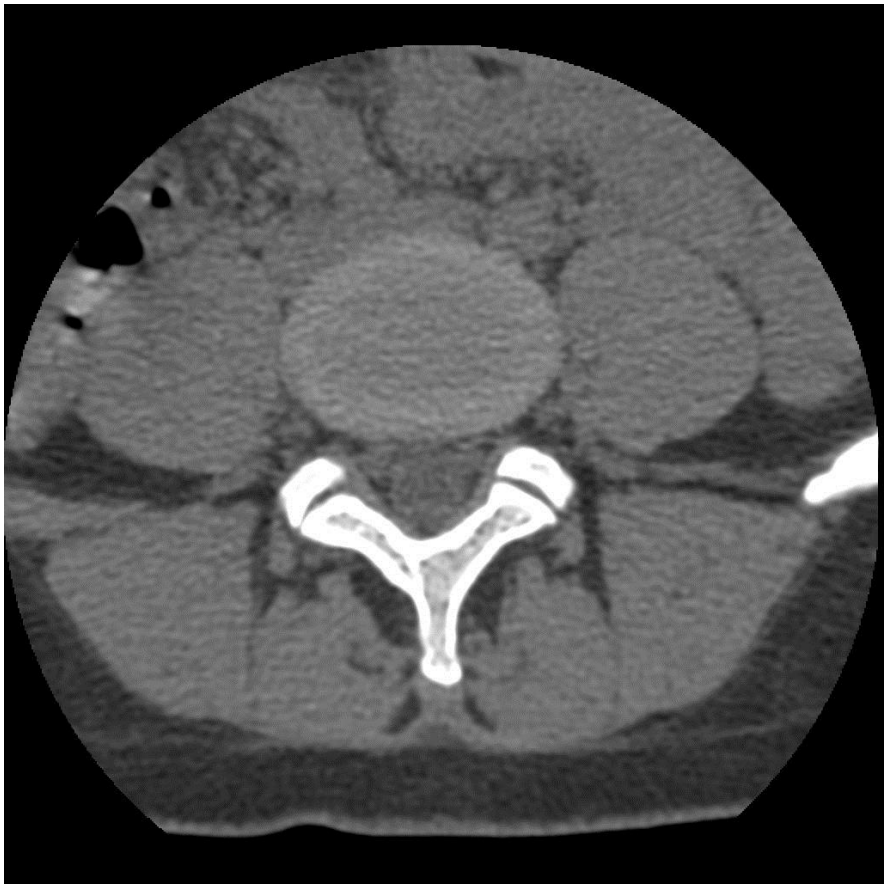
- Immediate/red flags CERVICAL: *rare
  - Infection concerns
  - Tumors (cancer mets)
  - Significant trauma
  - History of rheumatoid arthritis (atlanto-axial disruption)
  - Demyelinating process
  - Arterial dissection
  - Chest pain, shortness of breath: MI

Diagnostic Testing: X-Ray

Diagnostic testing- MRI



Diagnostic testing- CT



Comparison

- CT:
  - Detects differences in electron densities
  - Best detail for osteoarthritis and fracture
- MRI:
  - Tissue contrast is significantly more sensitive
  - Abnormalities of
    - Spinal cord/discs
    - Nerves
    - Soft tissue

Chronic Pain Eval and Treatment OVERSIMPLIFIED

Step 1: Rule out bad stuff

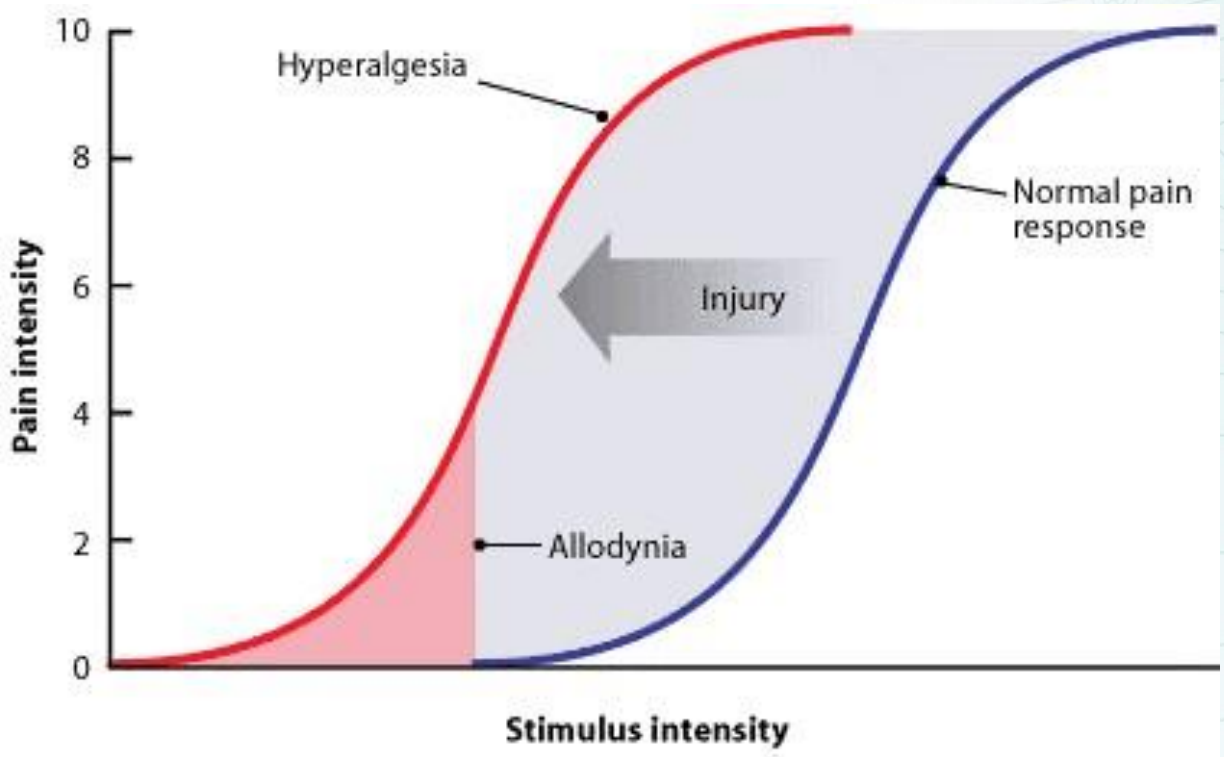
-DDx is the same, but more likely degenerative etiology and/or central sensitization

-Often already have images – debate over “updating” imaging

Step 2: Assess function

Step 3: Educate patient and set realistic goals

- Look for:
  - Normal sensation
  - Hyperalgesia



Normal Sensation

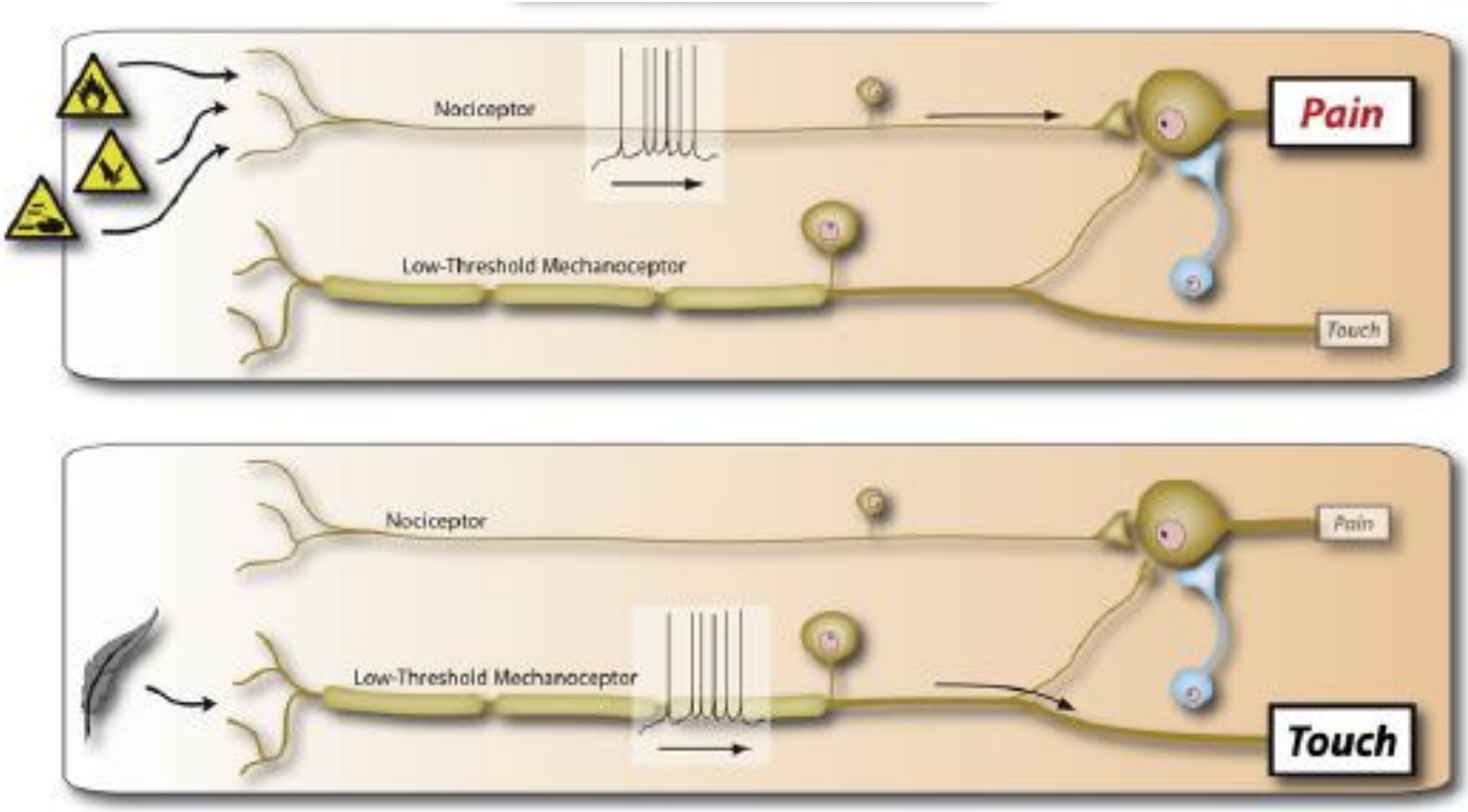


Fig. 1. Normal sensation. The somatosensory system is organized such that the highly specialized primary sensory neurons that encode low intensity stimuli only activate those central pathways that lead to innocuous sensations, while high intensity stimuli that activate nociceptors only activate the central pathways that lead to pain and the two parallel pathways do not functionally intersect. This is mediated by the strong synaptic inputs between the particular sensory inputs and pathways and inhibitory neurons that focus activity to these dedicated circuits.

Woolf, CJ. *Central sensitization: Implications for the diagnosis and treatment of pain.* Pain, 2011 Mar;152(3 Suppl):S2-15.

Hypersensitization Chronic Pain Model

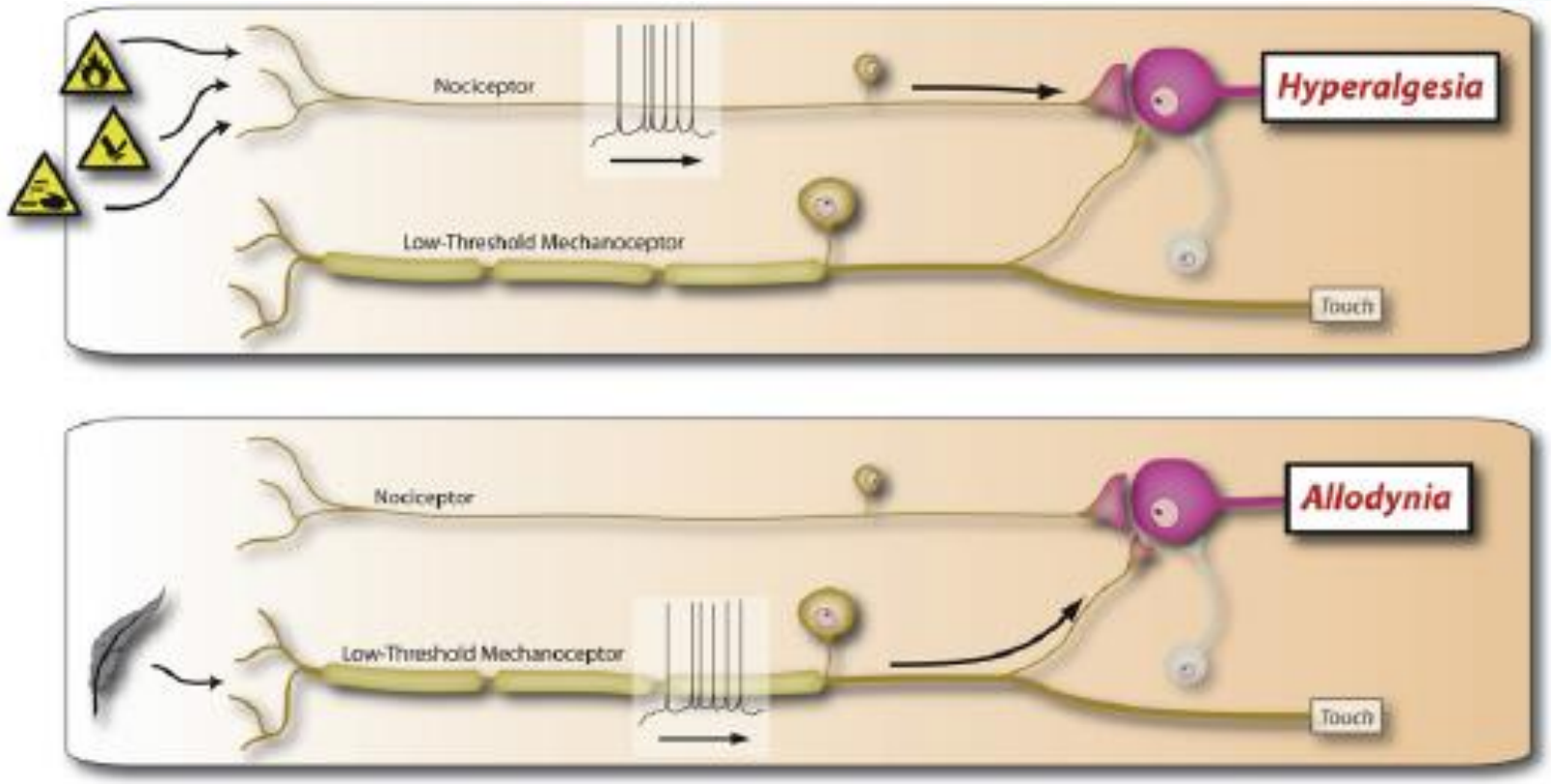


Fig. 2. Central sensitization. With the induction of central sensitization in somatosensory pathways with increases in synaptic efficacy and reductions in inhibition, a central amplification occurs enhancing the pain response to noxious stimuli in amplitude, duration and spatial extent, while the strengthening of normally ineffective synapses recruits subliminal inputs such that inputs in low threshold sensory inputs can now activate the pain circuit. The two parallel sensory pathways converge.

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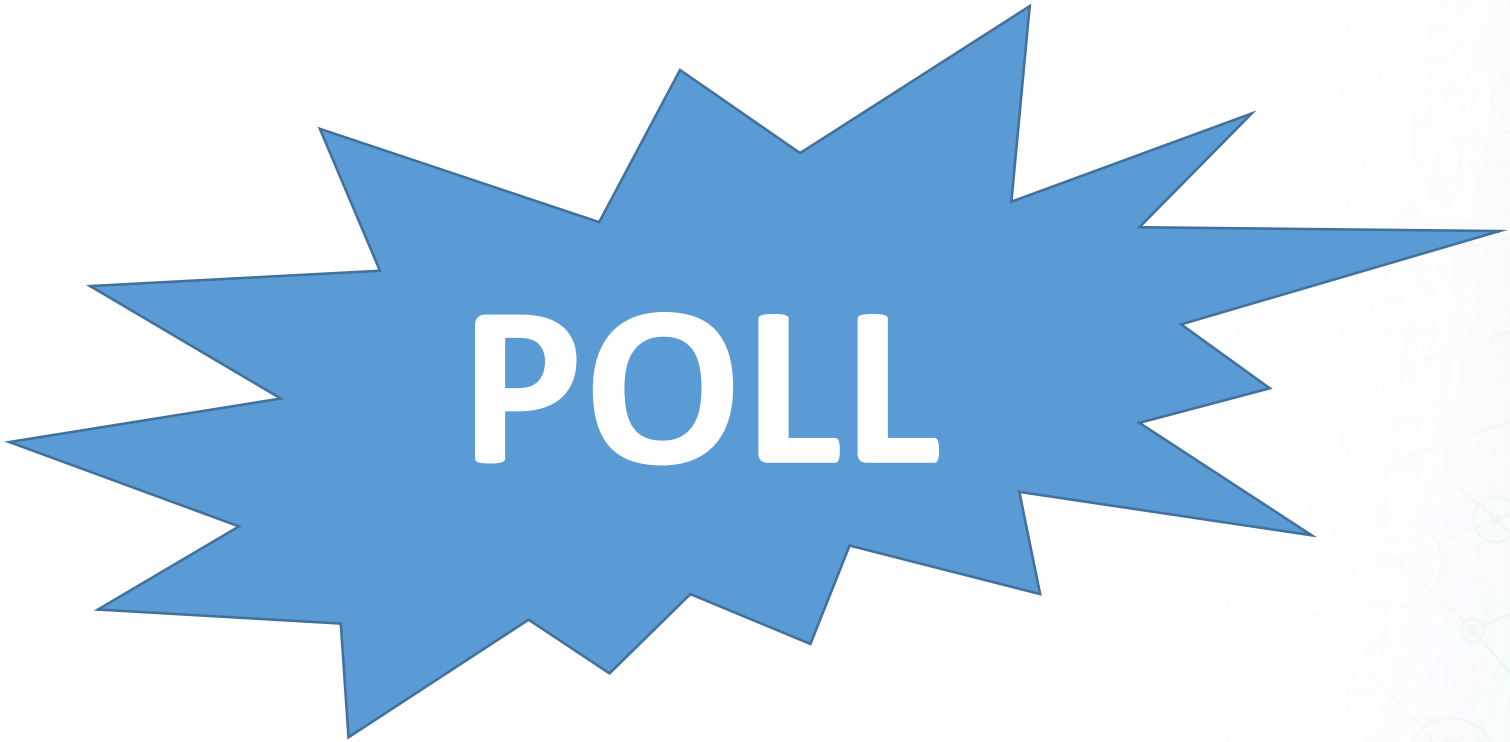
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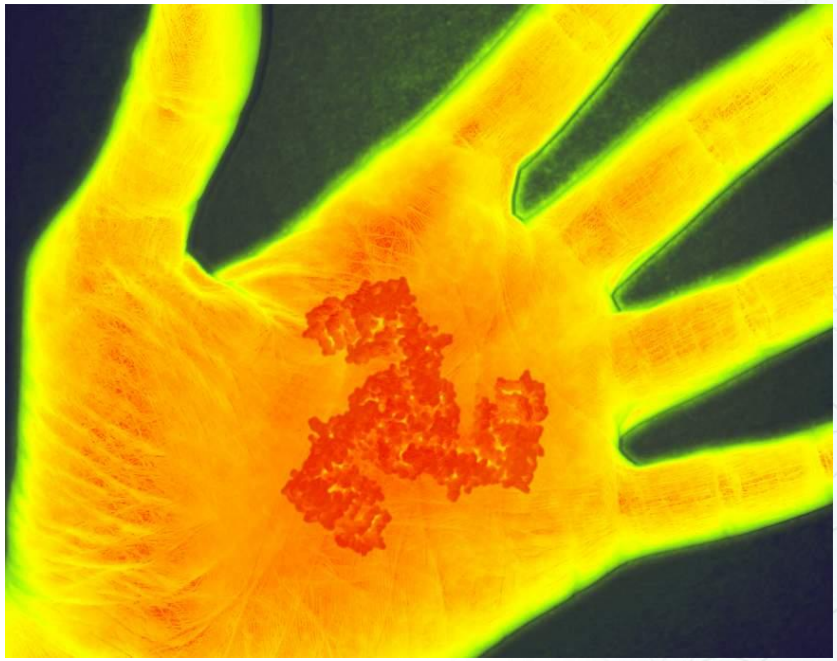
Allodynia

- **Tactile allodynia:**
  - Touch.
  - Clothing against the skin
    - Waistbands
    - Bra straps
    - Socks
  - Hug

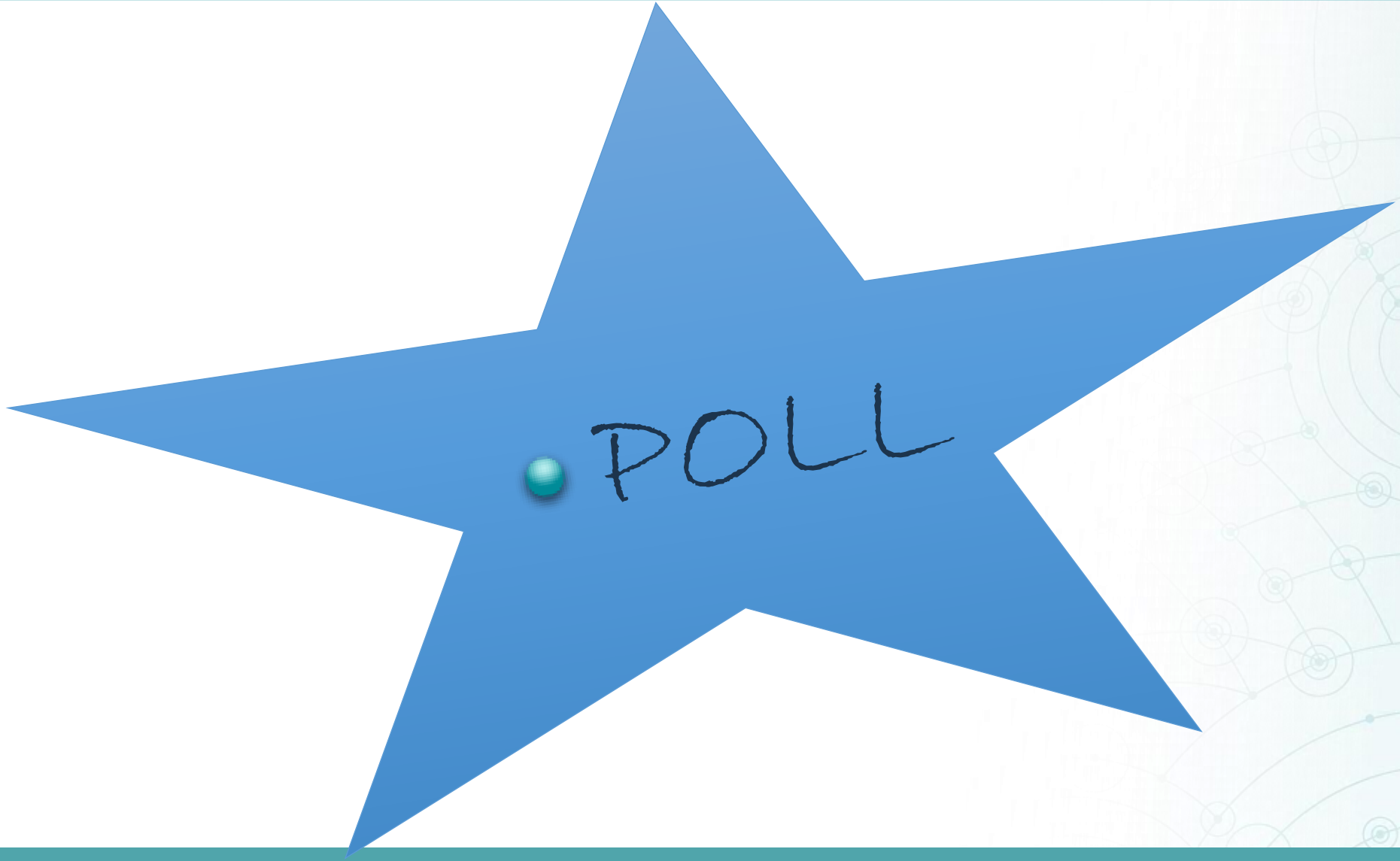


Allodynia

- **Mechanical allodynia:**
  - Movement across the skin
    - Towel
    - Bedsheets
    - Air from a fan

Allodynia

- **Thermal (temperature-related) allodynia:**
  - Heat or cold (not extreme enough to cause damage)
  - Hands and feet may burn if they get chilled
  - Too hot may make them ache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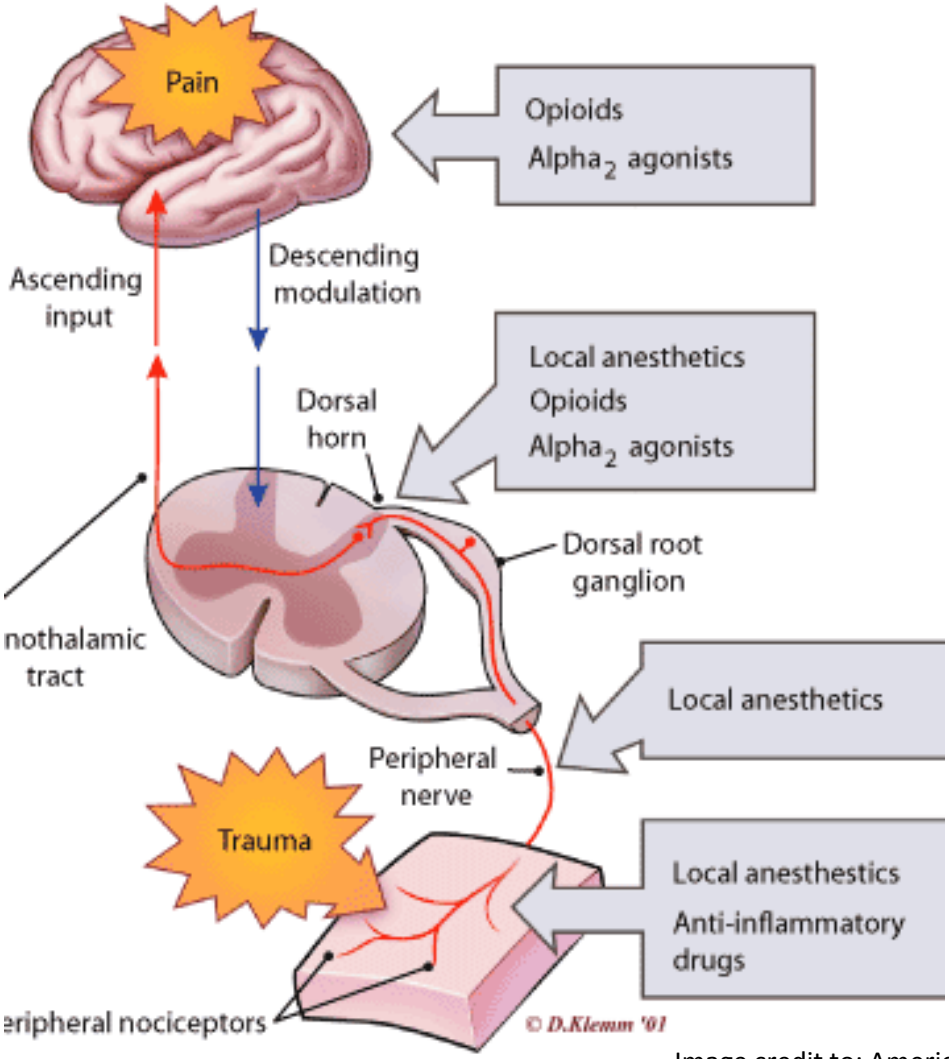
Acute Pain and Opioids

- Assess severity
- Opioids are a consideration – but…
  - Check PMP, prescribe judiciously, assess risk, set expectations, consider the cause (Dx)
- Craft a plan – the unknown is often more distressing than pain
- Abandon the concept of "staying ahead of the pain"

Non-opioid Medication Options



Multimodal Meds

- Treat at multiple sites on pain pathway
- Improved pain control
- Opioid-sparing
- Decreased side effects

Image credit to: American Academy of Family Physicians - www.aafp.org/afp/2001/0515/p1979.html

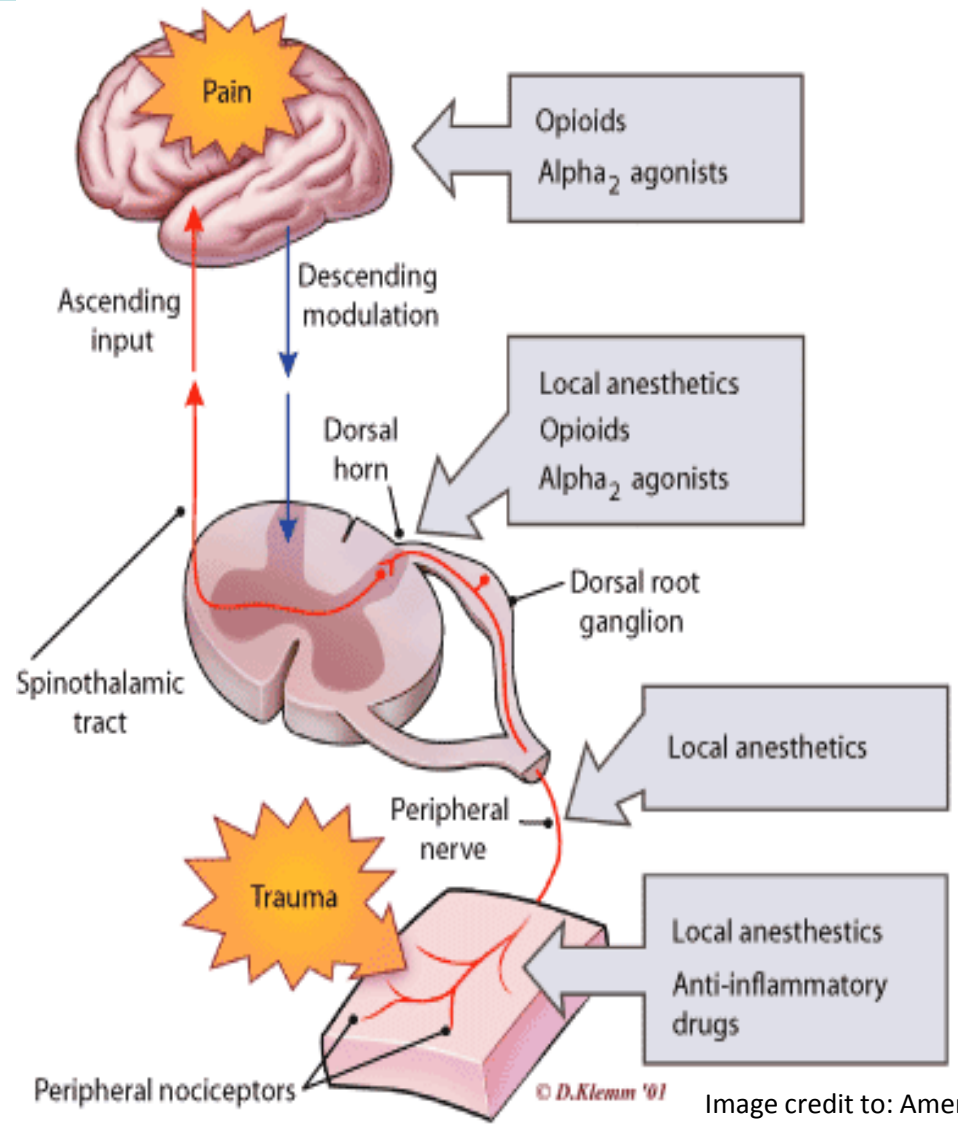
Treatment

- Conservative treatments:
  - Heat
  - Ice
  - Activity
  - Strengthening exercises
  - PT
  - Meds:
    - NSAIDs
    - Acetaminophen
    - Anticonvulsants
    - Antidepressants

Treatment

- More invasive treatments:
  - Acupuncture
  - Biofeedback
  - Nerve blocks
  - Epidural steroid injection
  - TENS

Non-opioid Medication Options



- ~~Opioids~~
- Acetaminophen
- NSAIDs
- Norepi modulators
- Alpha-2 agonists
- Membrane stabilizers
- Supplements
- Muscle Relaxants
- Steroids
- Topicals
- Low dose naltrexone
- And more…

Image credit to: American Academy of Family Physicians - www.aafp.org/afp/2001/0515/p1979.html

Pharmacologic Alternatives

- Live with the pain
- Functional therapy
- Behavioral care and modifications
- Injections/Interventions
- Surgery
- Integrative Medicine
- Internet/App-based care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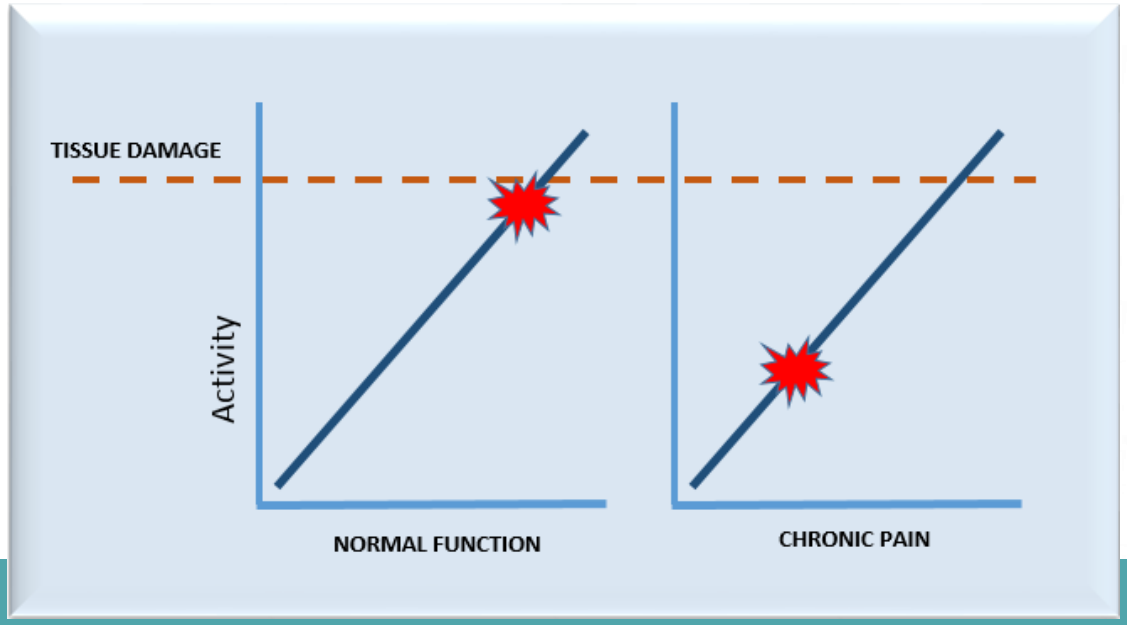
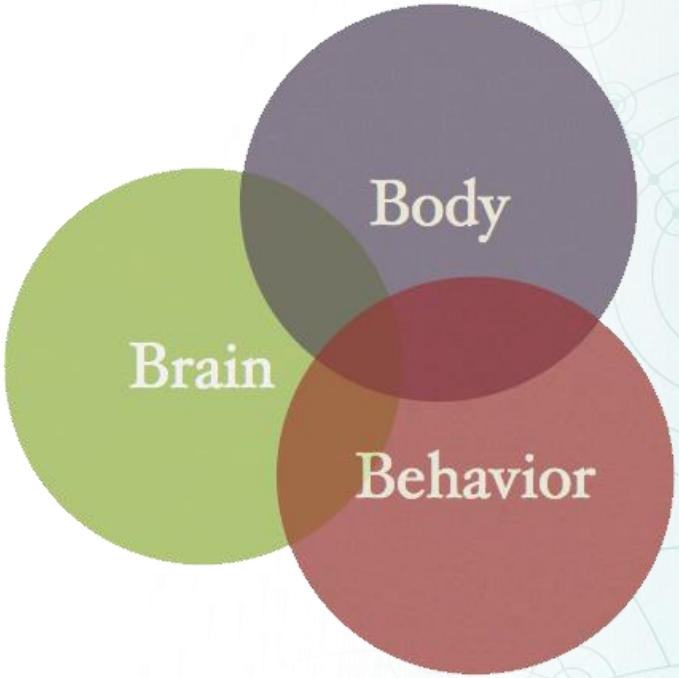
Functional Therapy

- Lack of activity and exercise will make pain worse
- It will get worse before it gets better
- Physical therapy is not a place you go, or even a thing you do, it is a lifestyle



Pain Psychology

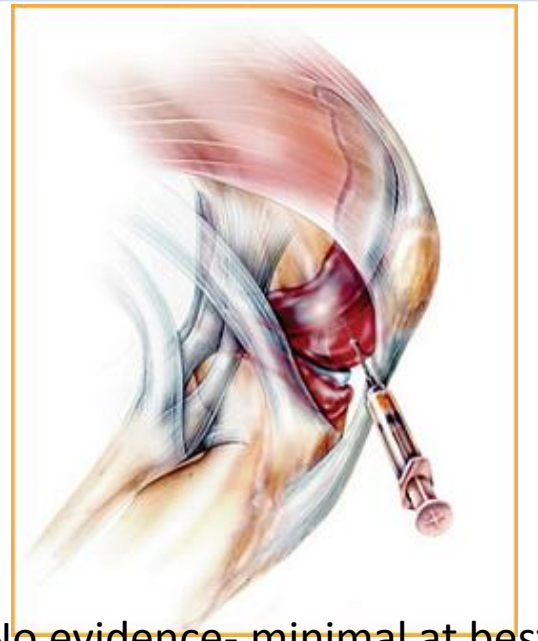
"So you think it's in my head"

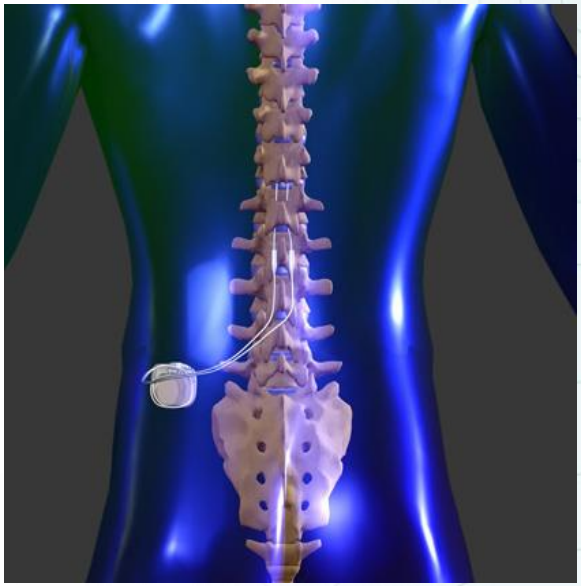


- At the very least, this must be recognized
- Sometimes, it must be addressed professionally
- Mindfulness: make the rest of your world larger!

Broad Interventional Categories

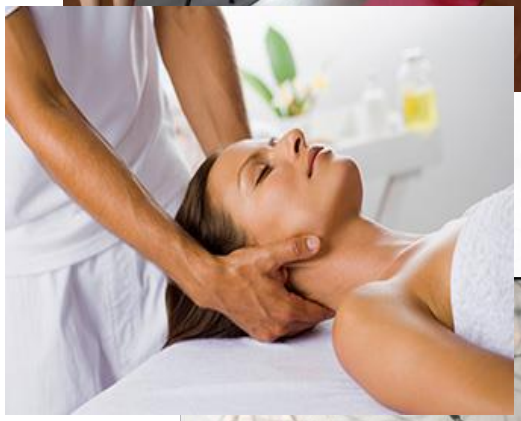
Decrease Bad Stuff	Increase Good Stuff	Other Stuff
• Steroid Injections • Radiofrequency Neurotomy	• “Prolotherapy”* • Stem Cell Therapy*	• Neuromodulation • Intrathecal drug delivery

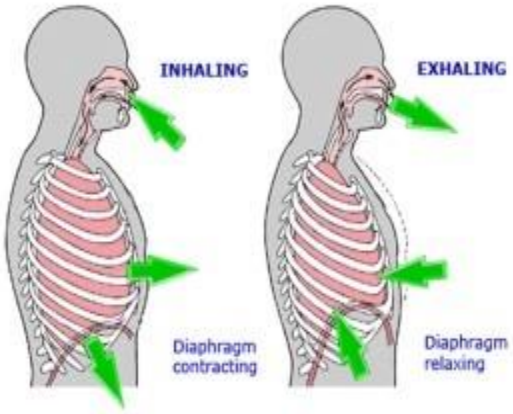




*No evidence- minimal at best

Integrative Medicine





Q&A