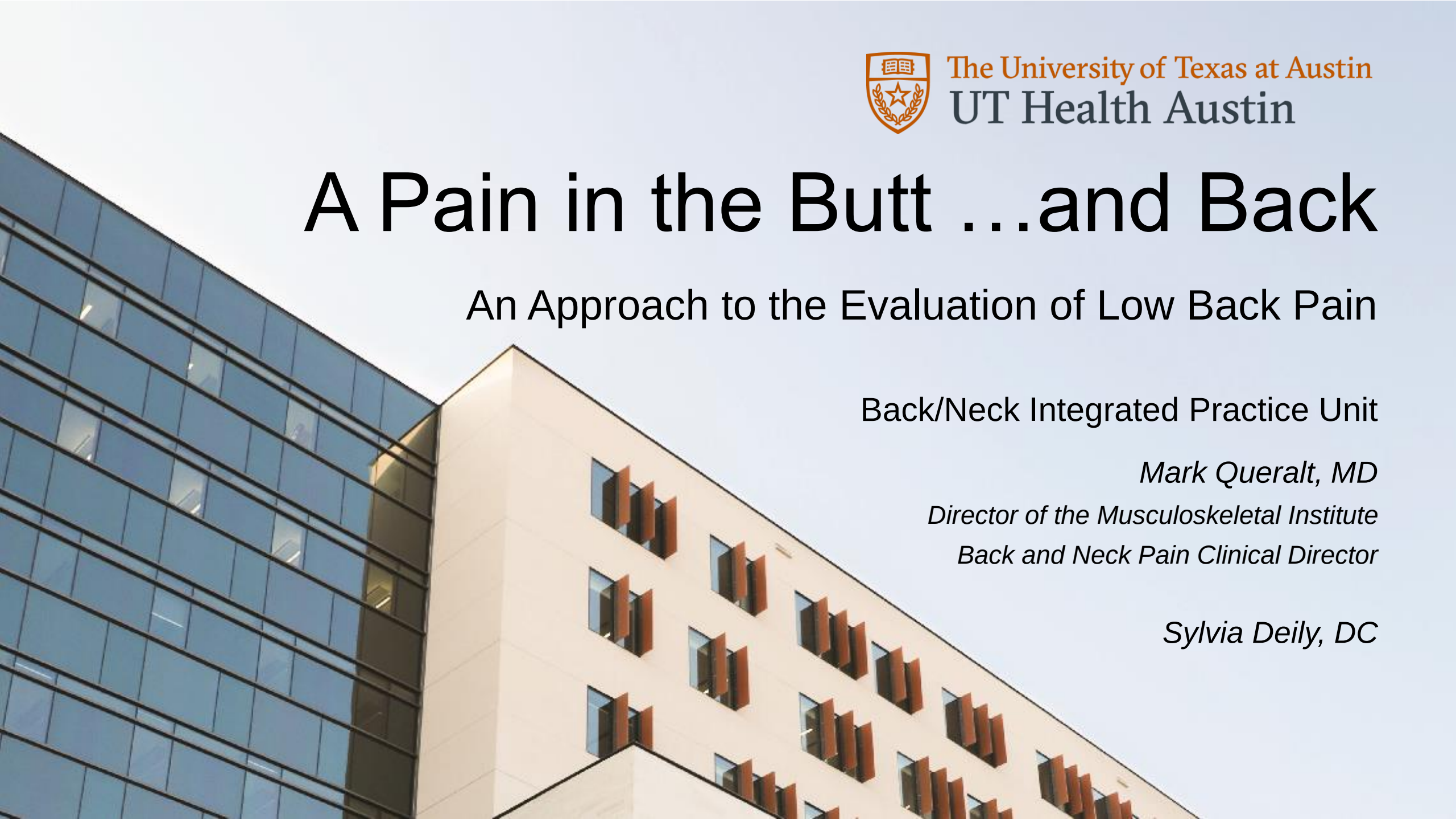

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A Pain in the Butt …and Back

An Approach to the Evaluation of Low Back Pain

Back/Neck Integrated Practice Unit

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Disclosure

- No relevant conflicts
- Common stock investments:
  - Amgen
  - CVS Health
  - Gilead Sciences
  - Lilly Eli & Company
  - United Therapeutics
  - Medicasafe

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Learning objectives:

- Describe specific vs nonspecific low back pain, and diagnosis vs classification of low back pain
- Identify key components in the history and exam to classify low back pain
- Identify red-flag symptoms that require more urgent workup and treatment
- Explain the appropriate use of imaging
- Provide patients with appropriate conservative treatment options and know when to refer for interventional or surgical treatment

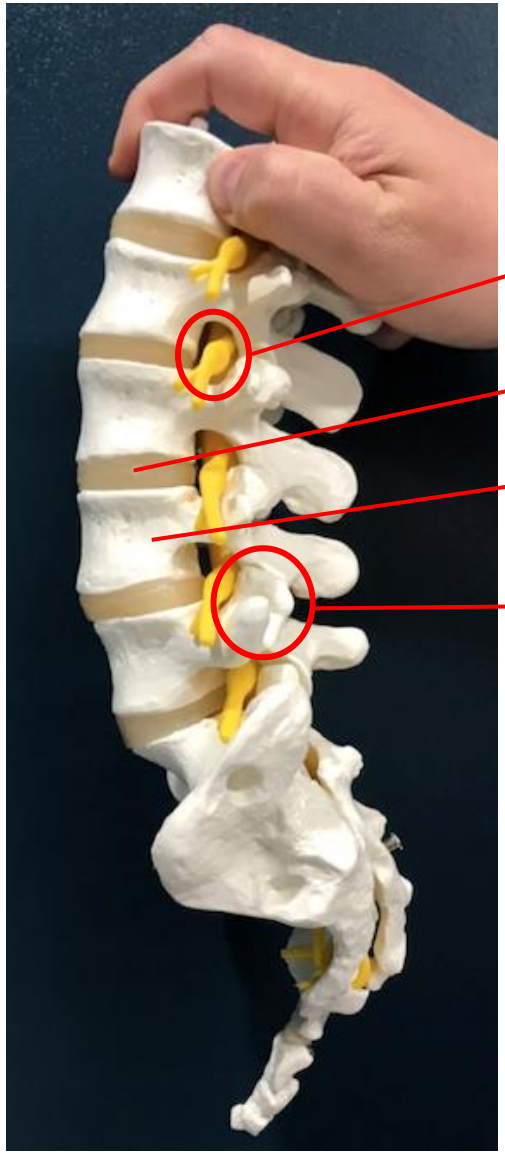
Approach to Low Back Pain

Anatomy

Cervical Spine

Thoracic Spine

Lumbar Spine



Intervertebral foramen, where nerve root exits

Intervertebral disc

Vertebral body

Facet joint

Low Back Pain - Prevalence

- Prevalence - 1 in 4 people report at least one day of back pain in the previous 3 months.[1]
- Natural history
  - Most acute episodes of low back pain improve within 4 to 6 weeks.[2]
  - 30% may progress to chronic pain.[3]

1. Deyo RA, Mirza SK, Martin BI. Back pain prevalence and visit rates: estimates from U.S. national surveys, 2002. Spine (Phila Pa 1976). 2006 Nov 1;31(23):2724-7. doi: 10.1097/01.brs.0000244618.06877.cd. PMID: 17077742.
2. Kinkade, Scott. “Evaluation and Treatment of Acute Low Back Pain.” American family physician 75.8 (2007): 1181–1188. Print.
3. Chiarotto, Alessandro, and Bart W Koes. “Nonspecific Low Back Pain.” The New England journal of medicine 386.18 (2022): 1732–1740. Web.

Low Back and/or Leg Pain - Etiology

- Specific - 10 to 20%*
  - Spinal e.g. herniated disc, spinal stenosis, compression fracture, cancer, infection, rheumatologic/auto-immune
  - Nonspinal e.g. hip OA, abdominal/pelvic disorders, vascular, systemic

- “Non-specific” - 80 to 90%*
  - Uncertain etiology

* Chiarotto, Alessandro, and Bart W Koes. “Nonspecific Low Back Pain.” The New England journal of medicine 386.18 (2022): 1732–1740. Web.

Evaluation of Low Back Pain - History

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Assess for Red Flags

- **Cancer** (<1%)*: personal history of cancer
- **Infection** (0.01%)*: history of fever, chills, a recent procedure, immunosuppression (steroids or cancer treatment)
- **Cauda equina** (0.04%)*: severe neurological compromise, including bilateral lower extremity weakness and/or perineal sensory changes and/or bladder or bladder dysfunction – usually resulting from massive disc herniation and compression of the sacral nerve roots.
- **Fracture** (4%)*: age-related trauma

* Chou, Roger et al. “Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society.” Annals of internal medicine 147.7 (2007): 478–491. Web.

Cancer in Low Back Pain

- It is very rare (< 1%).[1]
- Risk factor primarily personal history of cancer (10.6% probability); increases with unintentional weight loss (14.3%).[2]
- When present, pain commonly increases relentlessly
- The more chronic/long lasting symptoms are, the less likely something serious is occurring. Bad things get worse.

1. Henschke, Nicholas et al. “Prevalence of and Screening for Serious Spinal Pathology in Patients Presenting to Primary Care Settings with Acute Low Back Pain.” Arthritis and rheumatism 60.10 (2009): 3072–3080. Web.

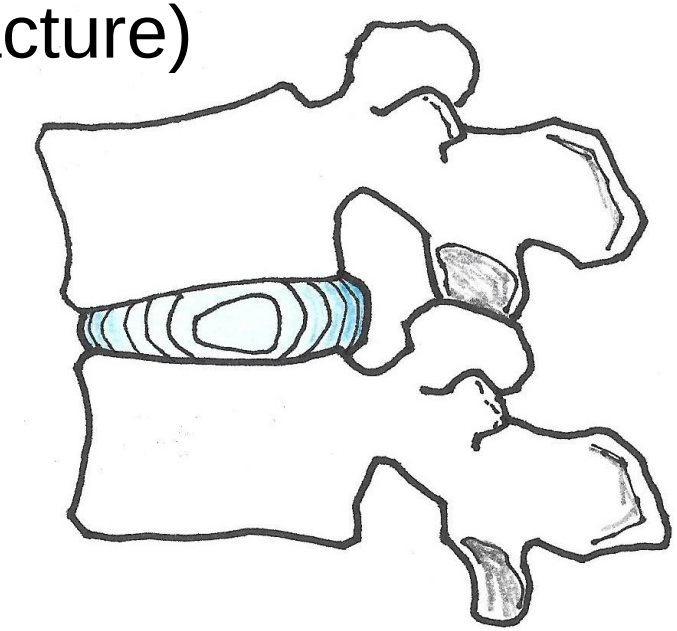
2. Premkumar, A. , Godfrey, W. , Gottschalk, M. & Boden, S. (2018). Red Flags for Low Back Pain Are Not Always Really Red. *The Journal of Bone and Joint Surgery, 100* (5), 368-374. doi: 10.2106/JBJS.17.00134.

Classify According to Characteristics

- Age
- Onset – date and mechanism
- Location/distribution
- Character
- Aggravating and alleviating positions/activities
- Associated neurological symptoms
- Status e.g. stable, worsening, or improving

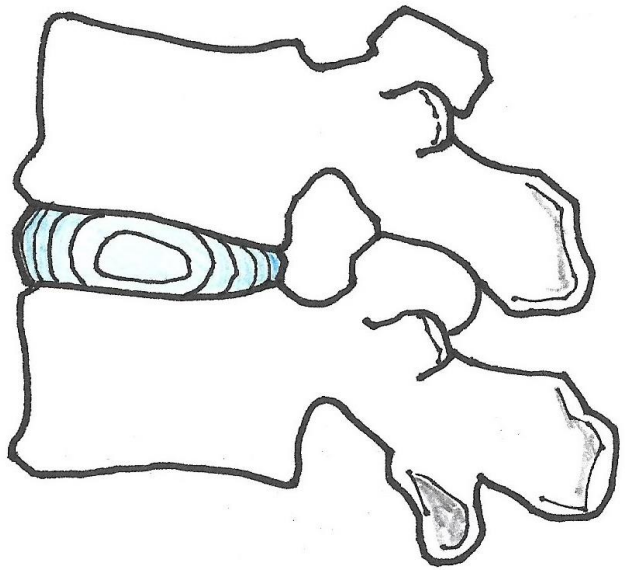
Flexion

- Loads/stresses disc posteriorly
- Loads/stresses anterior vertebral body (compression fracture)



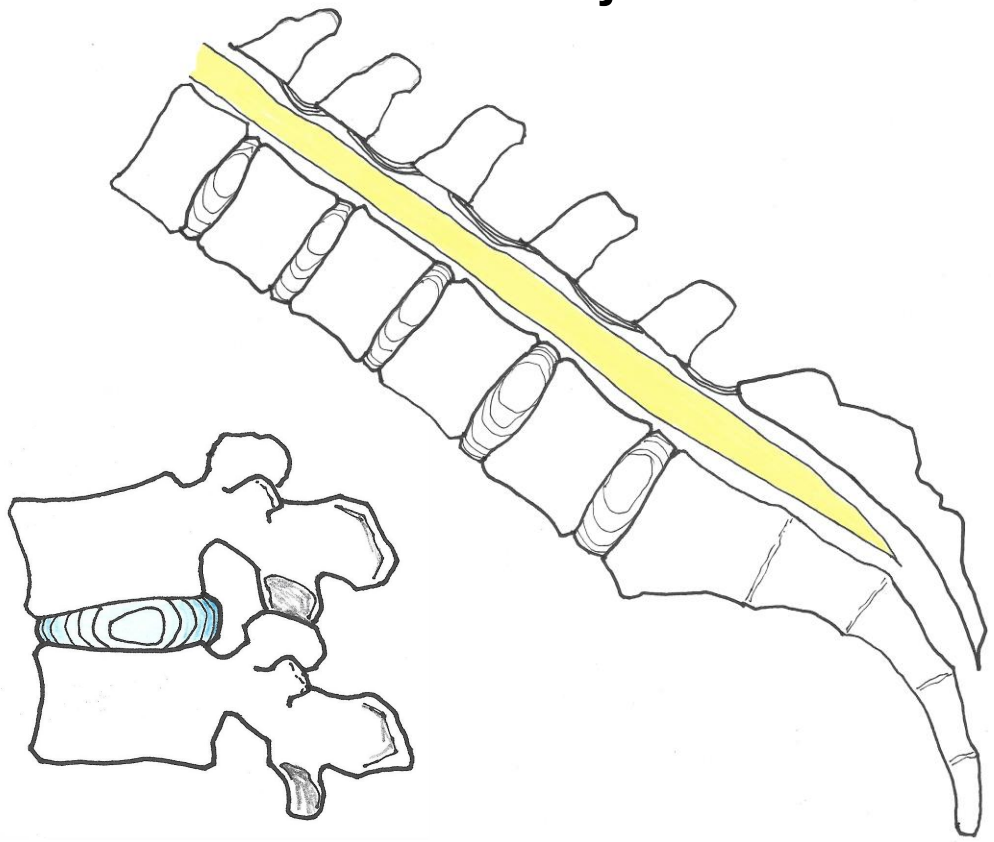
Extension

- Unloads/relieves disc pressure



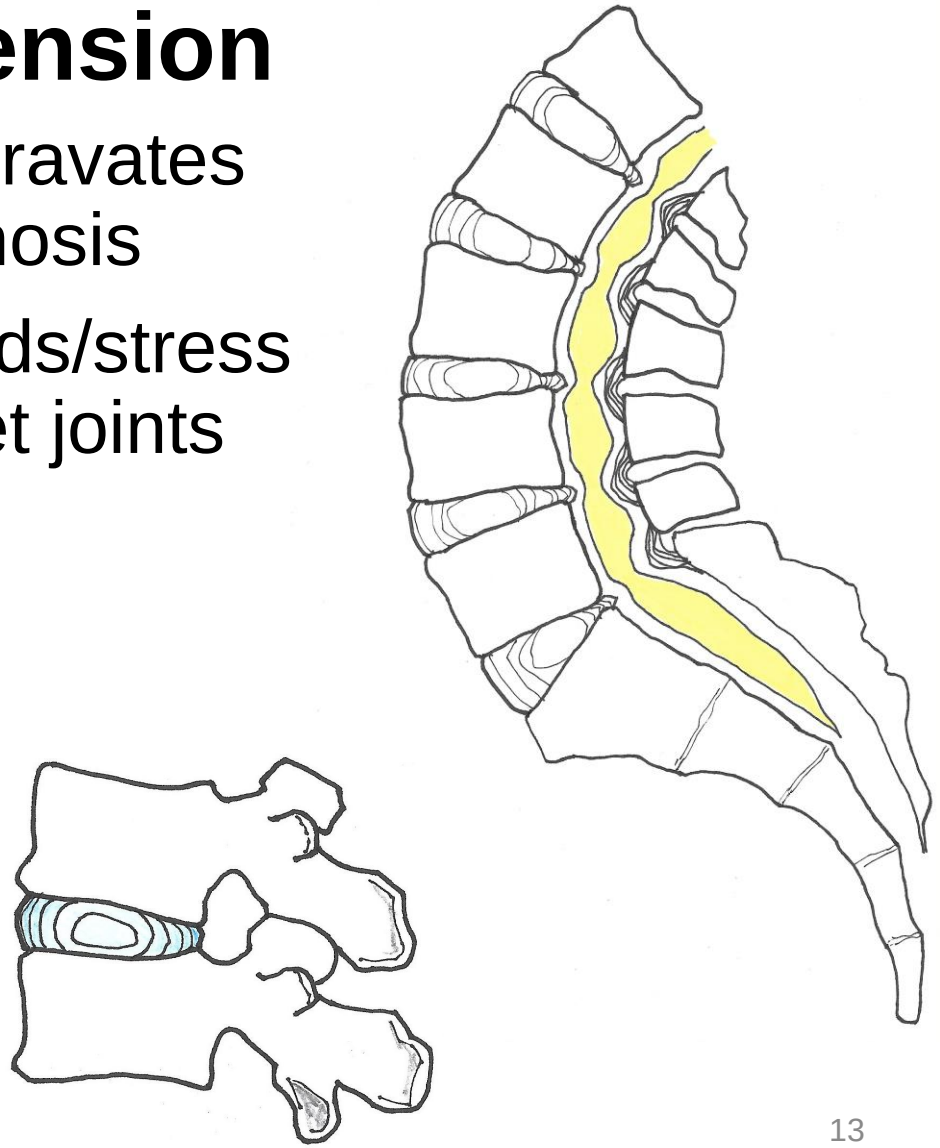
Flexion

- Alleviates stenosis
- Unloads facet joints



Extension

- Aggravates stenosis
- Loads/stress facet joints



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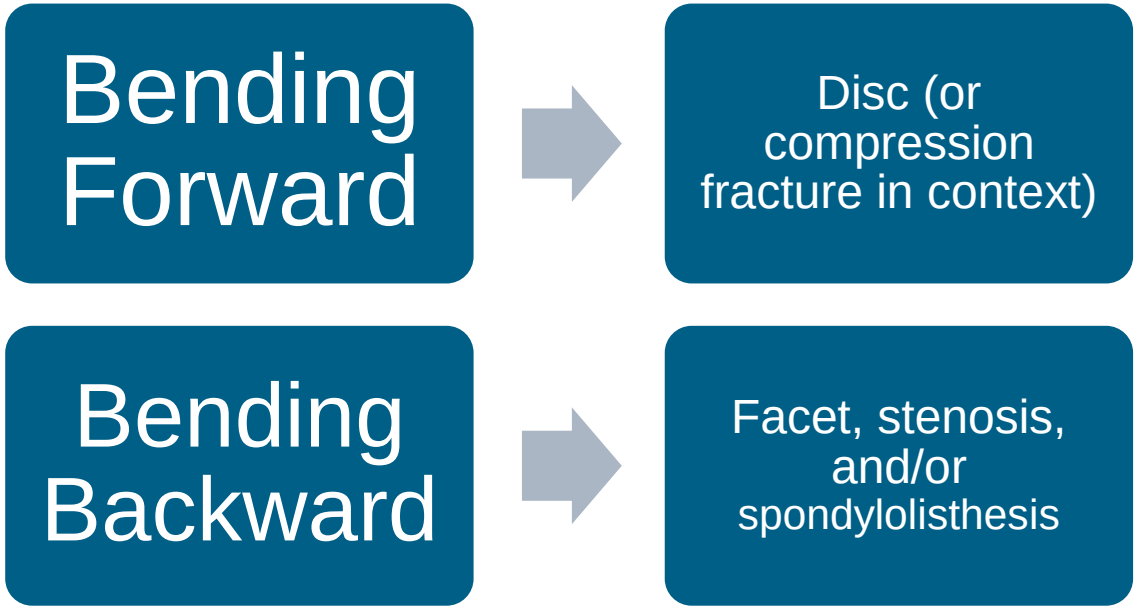
Classification by Aggravating Activity



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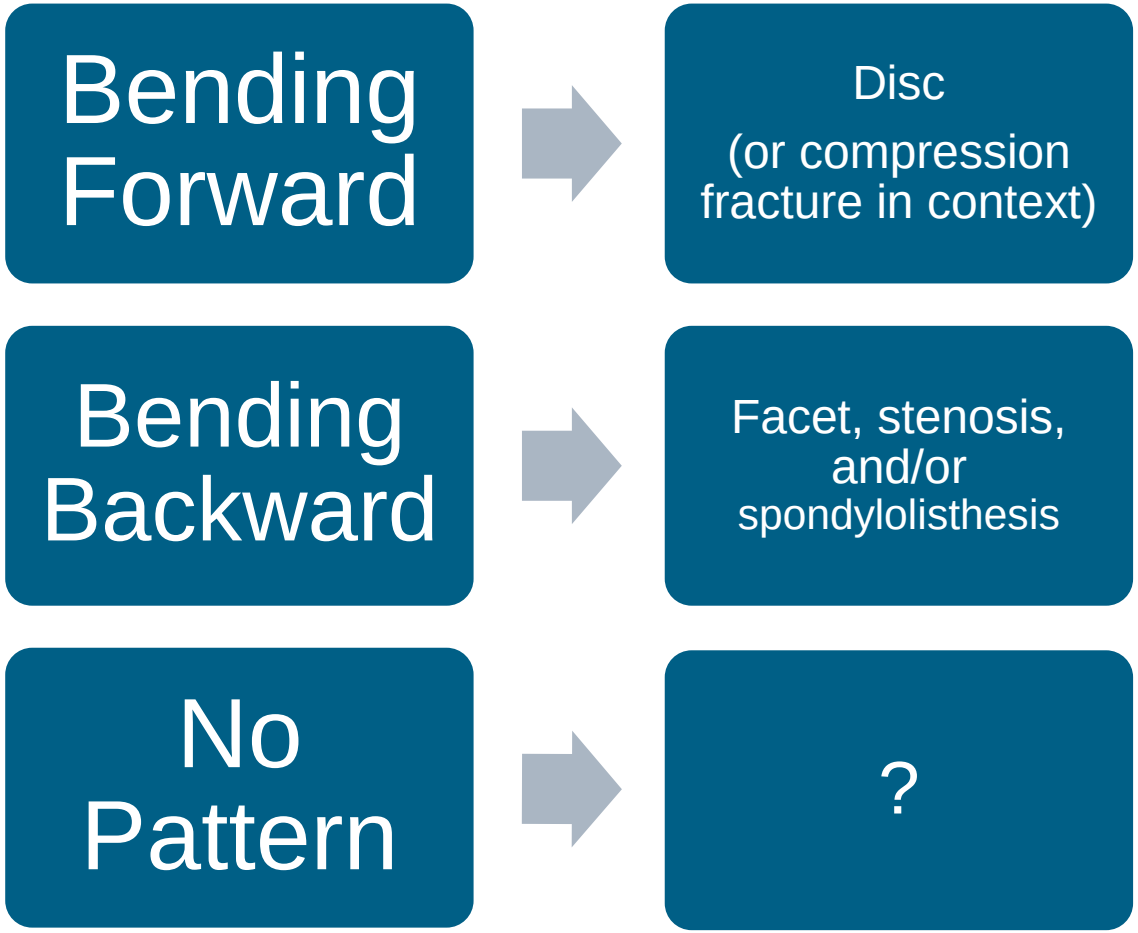
Classification by Aggravating Activity



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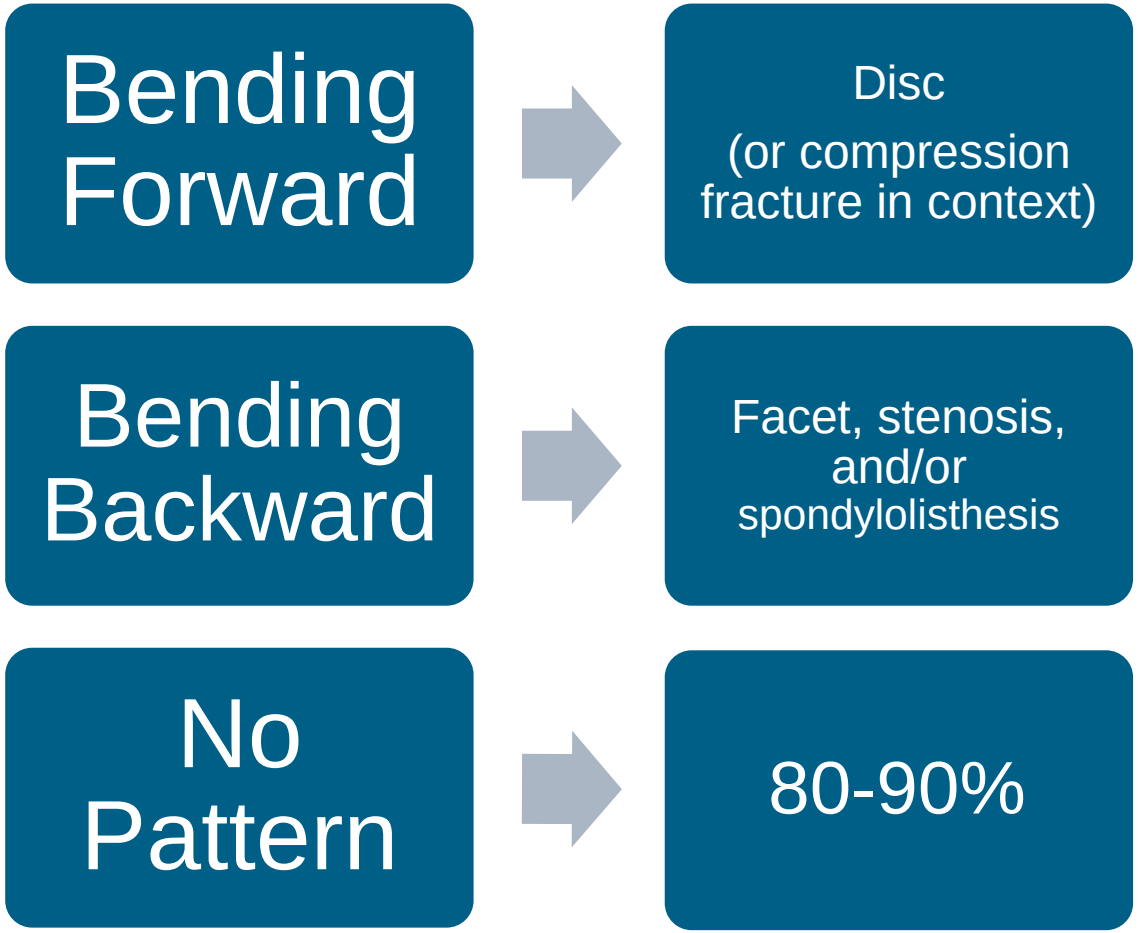
Classification by Aggravating Activity



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Non Mechanical Pattern

- No pattern
- Constant pain and/or
- Inconsistent responses to movement and/or
- Spontaneous pain
- Delayed onset exacerbation in relation to activity

* The initial onset/acute phase may present in a non-mechanical pattern; however, within weeks, if present, a mechanical pattern should emerge.

Think headache …..

Most commonly, chronic pain. but must also consider malignancy, rheumatologic, abdominal/pelvic process.

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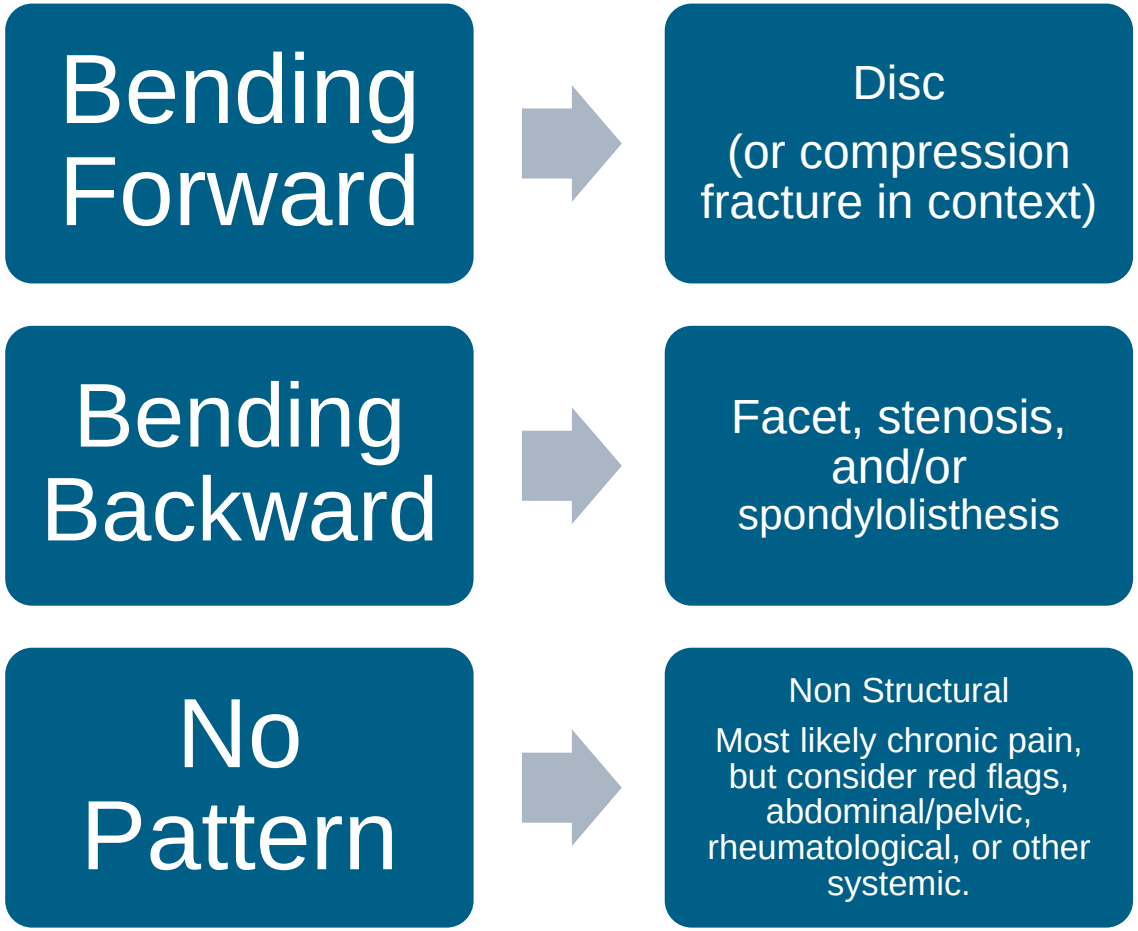
Classification by Aggravating Activity



Psychosocial History

Psychosocial factors are commonly associated with pain (not causative for) and may influence pain presentation as well as response to treatment.

- Depression
- Anxiety
- History of Abuse/Trauma
- Other mental health illness
- Social Factors

Evaluation of Low Back Pain - Physical Exam

Classify According to Characteristics

- Age
- Onset – date and mechanism
- **Location/distribution**
- Character
- **Aggravating and alleviating positions/activities**
- **Associated neurological symptoms**
- Status e.g. stable, worsening, or improving

Physical Exam

- Components:
  - Neurologic exam
    - Motor function
    - Reflexes
    - Sensation
  - Range of Motion (ROM)
  - Nerve root tension
  - Orthopedic – hip vs back
  - Palpation

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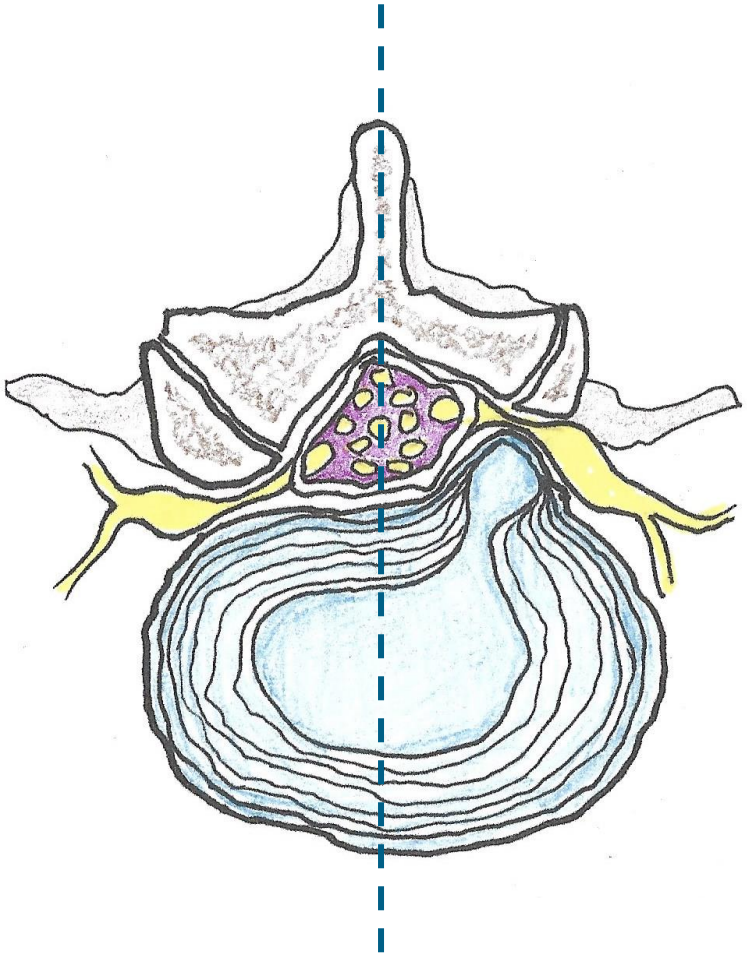
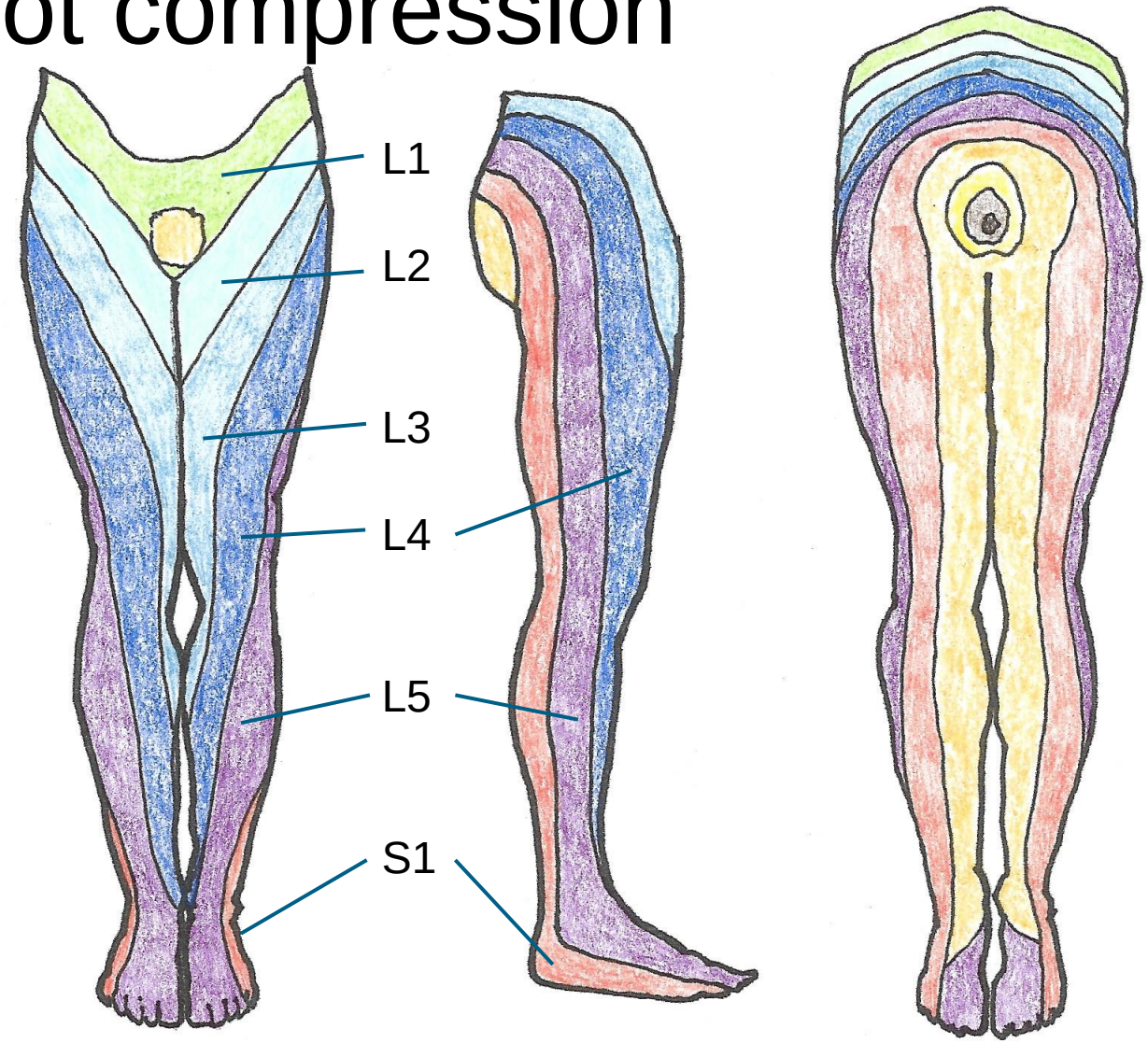
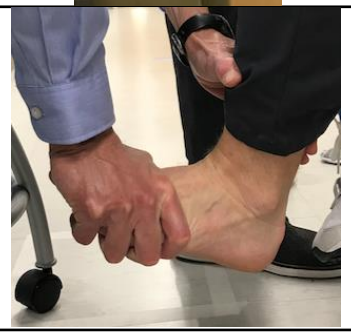
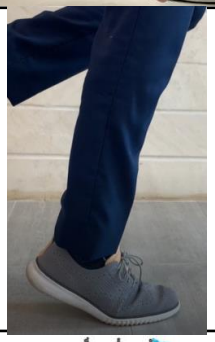
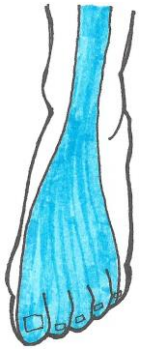
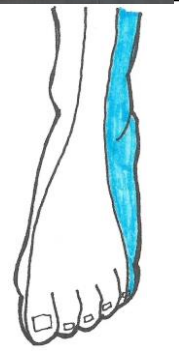
Anatomy of nerve root compression





Nerve root	L4	L5	S1
Reflex			
Strength			
Sensation			

Patellar reflex – L4

Achilles reflex – S1

Deep Tendon Reflexes

- TECHNIQUE
  - Patient relaxed
  - Strike directly, briskly, with recoil on patellar tendon or Achilles tendon
  - If reflex is absent, try a few more times
    - Patient (or provider) may need to relax
      - Providers commonly lack “bounce” or recoil in striking technique
    - Reinforcement (Jendrassik Maneuver) may be used to distract patient
      - Close eyes, look away
      - S-grip of hands, pull apart at provider’s request
      - Makes loose fists and squeeze at provider’s request

Motor testing

- Spinals levels
  - **L1, L2**, L3, L4 - hip flexion (iliopsoas), seated or supine
  - L2, **L3**, **L4** - knee extension (quadriceps)
  - **L4, L5** - ankle dorsiflexion & inversion (tibialis anterior)
  - L4, **L5** - big toe extension (extensor hallucis longus)
    - **L5**, S1 – hip abduction (gluteus medius)
  - L5, **S1** - ankle plantarflexion, “on tip toe” (gastrocnemius)
    - **L5**, **S1** – knee flexion (hamstrings)
    - **L5, S1** - ankle plantarflexion & eversion (peroneus longus and brevis)

Motor function

- Evaluated with resisted strength testing
  - “push against my hand”, “resist my force”
  - Hold 1-2 seconds
  - Provider may need to use leverage and technique if patient is larger / stronger AND may need to adjust strength if patient is smaller / weaker
    - Patients may be afraid to give maximal effort due to fear of increasing symptoms – in this case encourage patient to “push as hard as you can” for just one second
- Can also be screened by observing ability
  - Heel walk, unilateral heel raise, single leg rise from sitting / single leg wall slide

Motor scale

- As you may recall, there is a 0 to 5 point **motor scale**.
- Just remember
  - 0/5 is no movement,
  - 3/5 is full range of motion against gravity only – meaning joint cannot move against any resistance.
  - 5/5 is normal.

- Any motor 3/5 or less should probably trigger specialist consult.

Seated motor testing

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Resisted hip flexion, L2-L4

Resisted knee extension, L3-L4

Seated motor testing

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Resisted ankle dorsiflexion, L4, L5

Resisted big toe extension, L5

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Heel walk (L4, L5)

- Patient standing, provider can assist in balance or patient can use wall / counter for support
- Ask patient to walk on heels only (forefeet elevated off floor) for 4-5 steps
  - If weakness exists forefoot will drop to floor
- Weakness indicates **L4 or L5** nerve compromise, as well as muscles of anterior leg supplied by common peroneal nerve.

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Unilateral heel raise (S1)

- Patient standing, provider can assist in balance or patient can use wall / counter for support
- Ask patient to stand on one leg and come up on tiptoe three times as high as possible
  - If weakness exists one heel will not elevate as high as the other, or may be unable to lift at all
- Weakness indicates **S1** nerve, and calf muscles supplied by tibial nerve

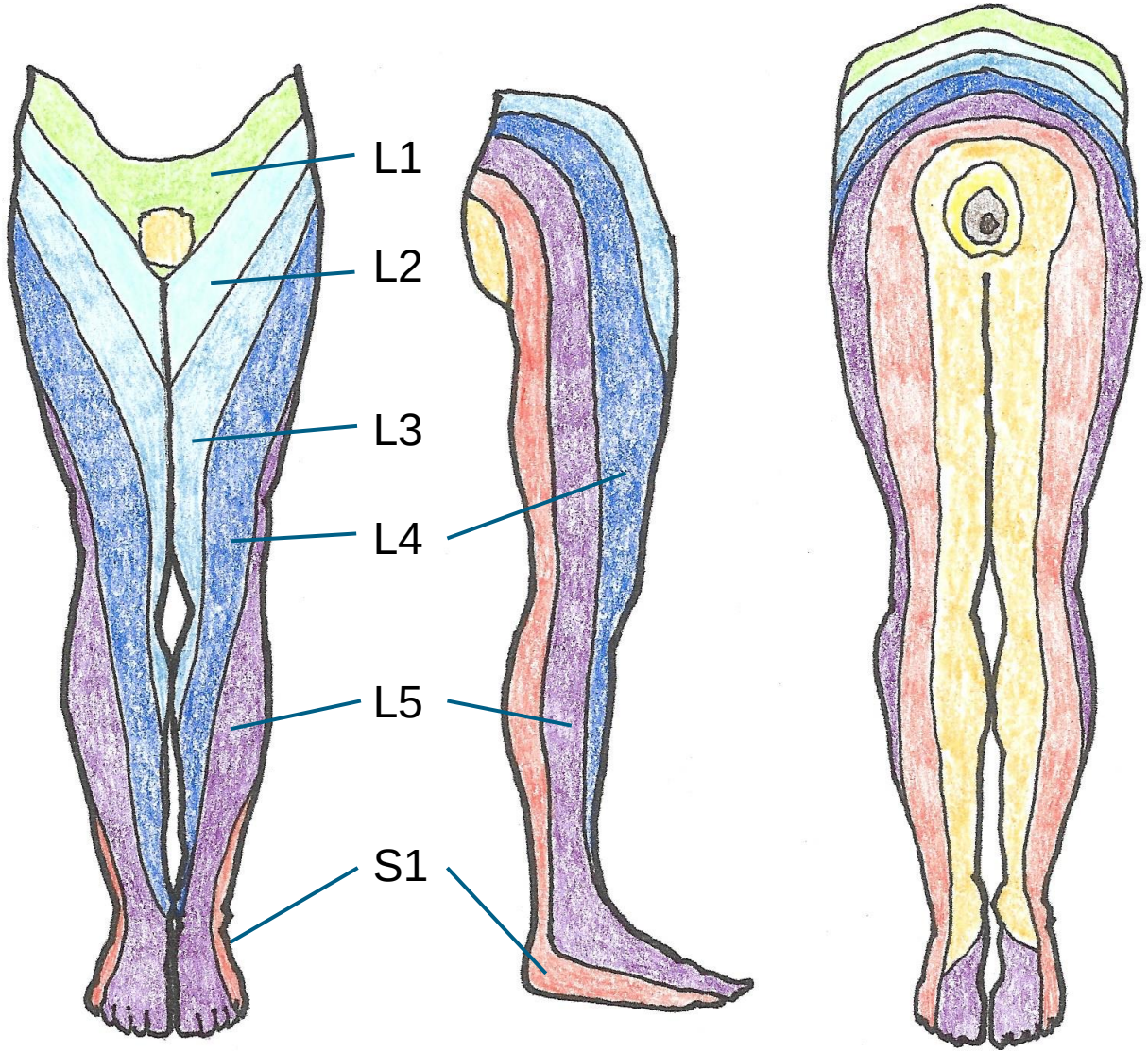
Rising from sitting (L3, L4)

- L3, L4 can be screened by rising from sitting on a single leg or performing a single leg squat against the wall
- During rising from sitting, provider should hold patient's hands for support. During wall slide provider stay close for support if needed.

Dermatomes

- Sensory distribution supplied by a single nerve root
- Slight differences occur between each person
- Dermatomes have a great deal of overlap
- Least reliable signs for determining nerve root level

- Nerve roots are more sensitive than peripheral nerves to compression, tension, chemical irritants, and metabolic abnormalities



Circulation

If the history suggests claudication, or lower leg pain with walking, check for pulses.

- If you are not suspicious of claudication, then simply checking color and temperature for symmetry is likely enough.

Active Range Of Motion (ROM)

- Flexion
  - Look for flattening or slight rounding of lumbar spine
  - Note where fingertips can reach – flexion to knees, or ankles, or toe
  - You many need to ask if that is normal for patient or restricted due to symptoms
- Extension
  - Look for movement in lumbar region vs movement in hips/knees, upper back/neck

- Kemp's test
  - Combines extension with rotation and ipsilateral lateral flexion

Flexion

Extension

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Kemp's Test

- Patient standing, begin with lumbar extension, turn into rotation and ipsilateral lateral flexion - all combined
  - "Reach for the back of your knee"
  - Patient can place hand on ipsilateral buttock for support and leverage
  - (Can be done with or without guidance/overpressure from provider)
- Motion creates foraminal narrowing of lateral foramen & loads ipsilateral facet joint

Supine Straight Leg Raise (SLR)

- Patient supine, request that patient remain relaxed while provider raises leg (unaffected leg first), then affected leg
- Test is positive when it does two things:
    1. Reproduces radicular symptoms, which are usually sharp and often provoke a withdrawal response
    2. Pain is recreated between a range of 30 to 70 degrees. SLR below 30 degrees is not thought to create enough nerve tension to aggravate radiculopathy; and over 70 degrees suggests muscular and/or hip region issues.
- If raising the well leg also provokes radicular symptoms as above this is known as a well leg raise or contralateral SLR. This finding is thought to be more specific but less sensitive that a positive ipsilateral SLR.

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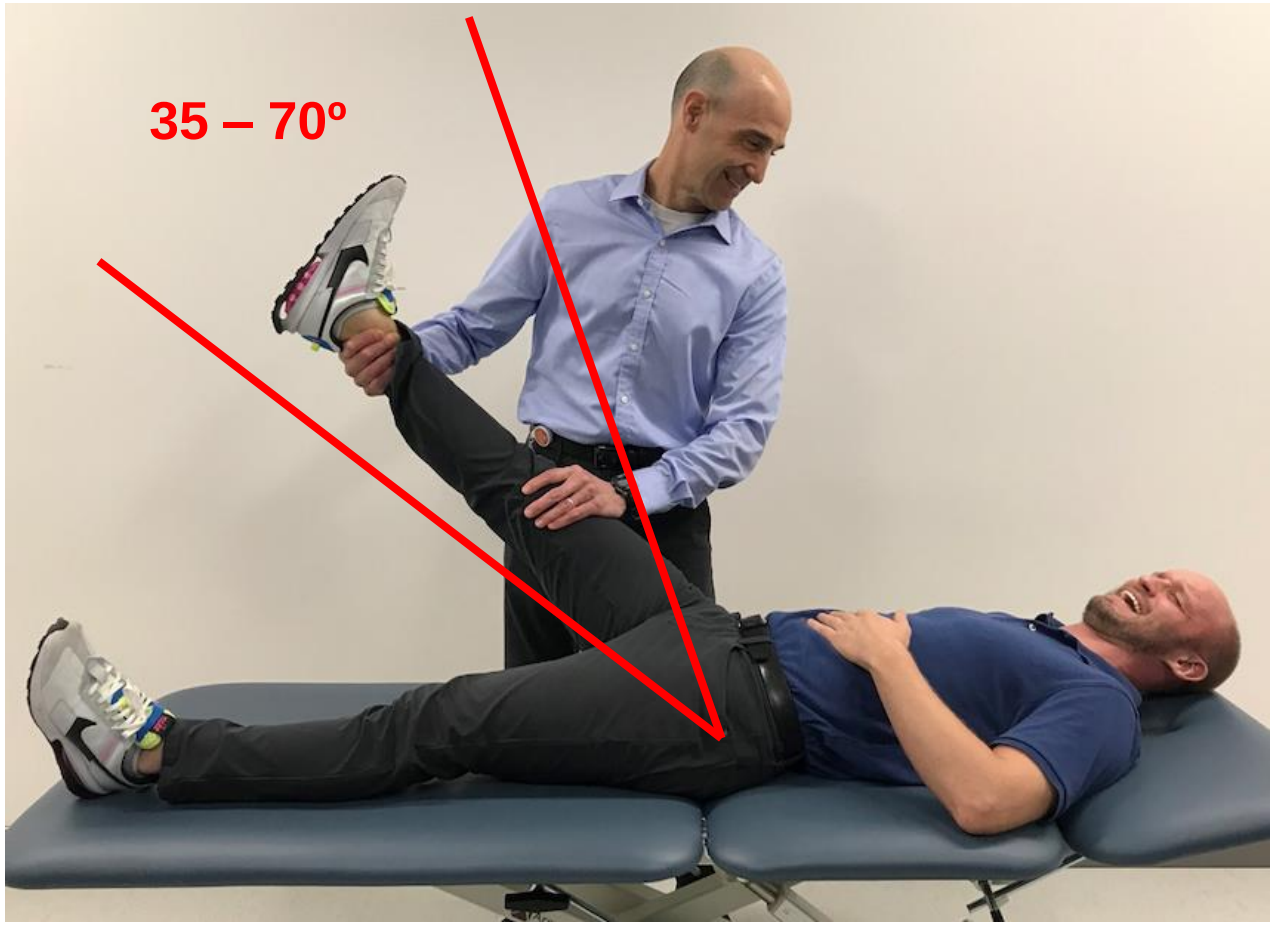
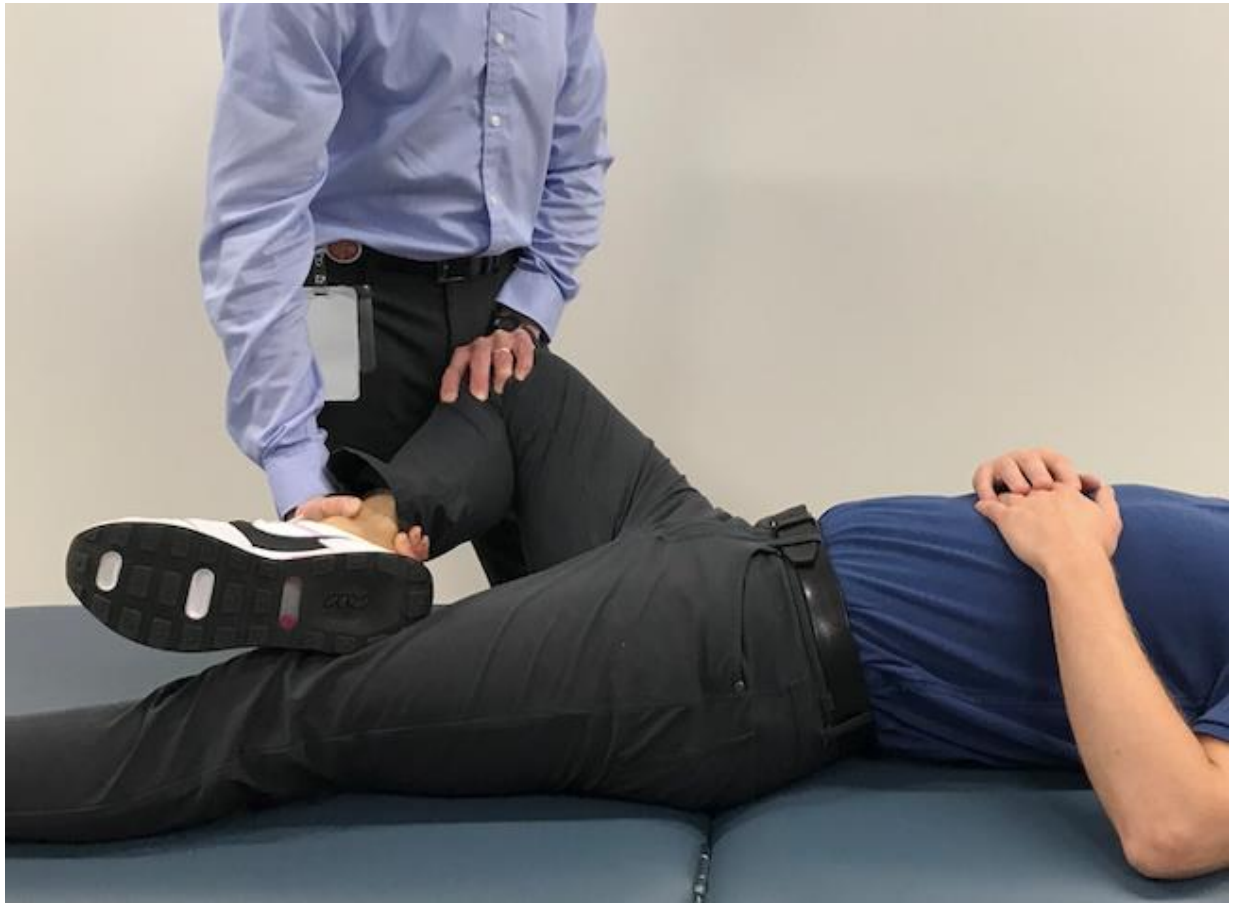
Straight Leg Raise (SLR)



- Sciatic nerve roots tense over the intervertebral disc from 35 - 70º

FABER
Flexion, **AB**duction, **E**xternal **R**otation Test

- Patient supine, provider flexes knee, then abducts and externally rotates bent knee in order to cross ankle over opposite knee
  - Stabilize opposite ASIS, apply overpressure
- Pain in hip indicates hip joint dysfunction / pathology, load can also transfer to SIJ & lower lumbar spine



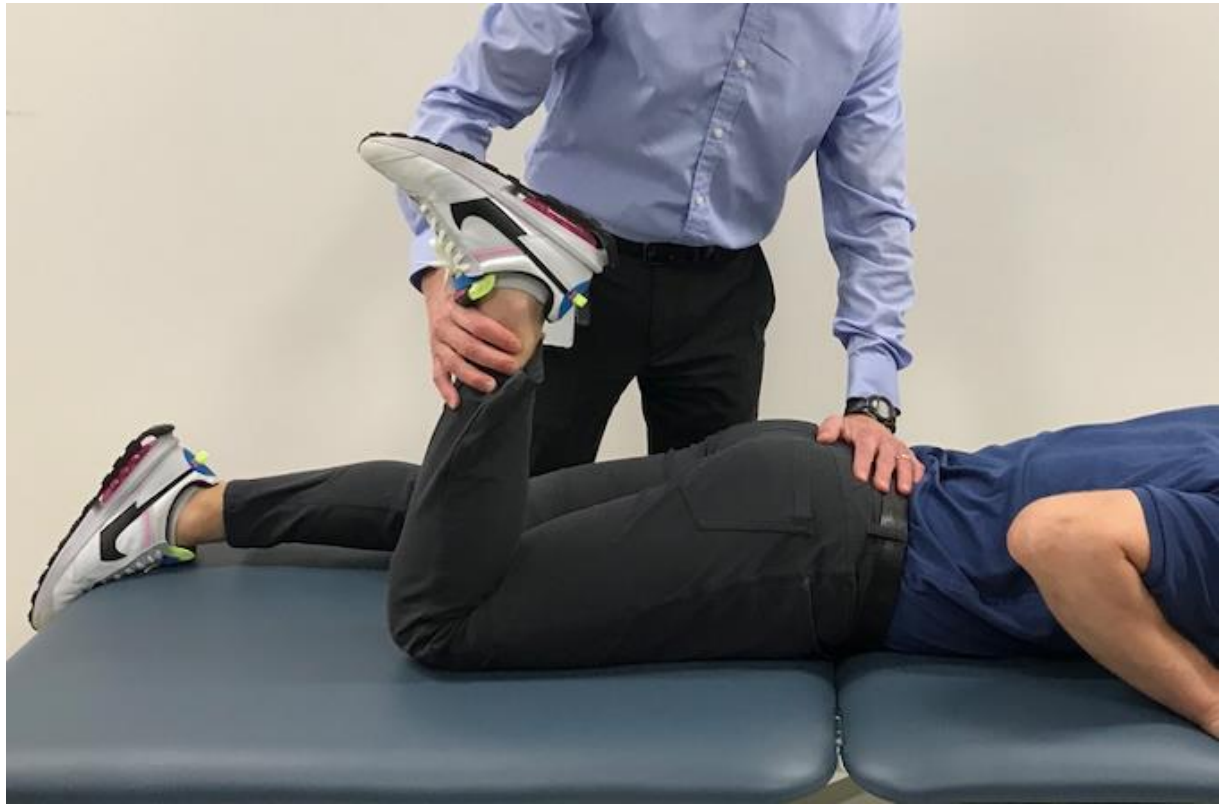
Upper lumbar exam

Since upper lumbar radiculopathies – those involving L2, L3, or L4 - are relatively uncommon and account for less than 10% of lumbosacral radiculopathies, it is usually not necessary to perform a prone exam.

However, if the patient complains of pain involving the anterior or medial thigh, a prone exam testing femoral nerve tension is indicated.

Femoral Nerve Tension Test

- Patient prone, provider slowly flexes knee to stretch femoral nerve
- Test is positive if pain radiates down anterior thigh
  - Remember acute radiculopathies have a characteristic acute pain / withdrawal response, as opposed to stretch or pulling



Patient position	Test performed	Possible findings
Standing	**Heel walk, toe walk (unilateral calf raise)**	**L4/5, S1 weakness**
	1-leg squat	**L3/4 weakness**
	Lumbar ROM	Pain, mvmt limitations
Sitting	Straight leg raise (SLR)	Radicular pain
	Reflexes, resisted muscle testing / strength	Neurologic status
	Pulses	Vascular status
Supine	SLR	Radicular pain
	Hip ROM / FABER	DDx – hip vs back
Prone	Femoral nerve stretch test	L2-4 radiculopathy
	Palpation	Non-specific

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Position	Test type	Test	Significance	Observations/Tips
Standing	Neuro / motor	Neuro strength screen: Heel walk	L5 (L4) nerve function	Observe for full lift/excursion and symmetrical ability or weakness
	Neuro / motor	Neuro strength screen: Toe walk or unilateral heel raise	S1 nerve function	Observe for full lift/excursion and symmetrical ability or weakness
	Neuro / motor	Unilateral rise from sitting or squat while resting back on wall/door	L2-4 radiculopathy	Observe for symmetrical ability or weakness. Be prepared to support patient if they are weak.
	Spine range of motion	Flexion	Flexion aggravation common with disc, compression fracture - both more likely to create acute pain and worsen with further motion/load. Increased pain during motion but better at endrange more likely myofascial.	With both flexion and extension, note extent of motion (to floor, lower leg, knee, or thigh) - normal for patient or restricted?. Note changes to baseline pain during motion and/or at end range.
		Extension	Extension aggravation noted in facet syndrome, spondylolisthesis, +/- stenosis. Similarly, increased pain during motion but better at endrange more likely myofascial.	
	Advanced - ROM	Extension with rotation/LF (Kemp's)	Position increases load on facet joints and narrows lateral foramen	Note change in baseline pain and distribution of pain (local vs leg/radicular pain)
Seated	Neuro / motor	Resisted hip flexion	L2-4 nerve function	Patient can brace with hands on seat/table for maximum effort
	Neuro / motor	Resisted knee extension	L3-4 nerve function	Motor grading scale from 0 - 5
	Neuro / motor	Resisted ankle dorsiflexion	L4-5 nerve function	0: no contraction 1: contraction but no movement
	Neuro / motor	Resisted big toe extension (EHL)	L5-S1 nerve function	2: movement, but not full range against gravity 3: full range against gravity only, but not against resistance
	Neuro / motor	Resisted ankle plantarflexion/eversion	S1 nerve function	4: movement against resistance - very examiner dependent (4-, 4, 4+) 5: normal strength
	Neuro / sensation	"Can you feel my touch equally on each side?"	Note loss of sensation, versus altered sensation e.g. hyperalgesia, dysesthesia	Observe for correlation to lumbar dermatomes
	Neuro / deep tendon reflex	Knee / patellar tendon reflex	L4 nerve function	Bounce technique. Look for symmetry / asymmetry, consider Jendrasik/distraction manuevers
	Neuro / deep tendon reflex	Ankle / Achilles tendon reflex	S1 nerve function	Bounce technique. Look for symmetry / asymmetry, consider Jendrasik/distraction manuevers *Achilles reflex commonly unobtainable bilateraly in the older age group as well as in diabetes
	Circulation	Pulses: dorsalis pedis or posterior tibial (as indicated with claudicatory symptoms)	Vascular claudication	If pulses bilaterally nonpalpable, test capillary refill and/or note symmetry of skin temperature (as clinically indicated)
	Nerve root tension	Seated SLR, can be assessed contemporaneous with circulation; assesses nerve tension with patient inattention.	Nerve tension vs hamstring tightness	Seated SLR - slumped posture (loads disc) vs upright posture (loads hamstring), observe for acute withdrawal vs subacute tension type response

Position	Test type	Test	Significance	Observations/Tips
Seated	Nerve root tension	Seated contralateral SLR	Contralateral SLR reproducing ipsilateral radicular symptoms is thought to be more specific, but less sensitive, than ipsilateral SLR	As above
	Measurement / observe for atrophy		L2-4 nerve function	Thigh - mark the thigh 10 cm proximal to the superior head of the patella, and then measure circumferentially
	Measurement / observe for atrophy		L5 nerve function	EDB - small muscle at the dorsal foot, frequently atrophic bilaterally. Look for symmetry / asymmetry.
	Measurement / observe for atrophy		S1 nerve function	Calf - most easily estimated with "hand calipers" at point of maximal girth; formal measurements at point of maximal girth as needed if asymmetric.
	Edema		DVT or other proximal mass e.g. pelvis	
Supine	Hip range of motion	Hip ROM - knee to chest and FABER	Hip versus spine for inguinal/anterior thigh differentiation	Hip and knee flexion to 90 degrees; complaints of radicular pain in neutral 90/90 suggest symptom magnification. Tip: test hip first, then SLR.
	Nerve root tension	Straight leg raise (SLR) - Sciatic nerve tension test	L5, S1 radiculopathy	Reproduction of RADICULAR pain, between 30-70 degrees typically. Acute pain with withdrawal response more indicative of positive finding vs ability to tolerate maintained stretch load. Radicular findings should aggravate with passive ankle dorsiflexion, cervical flexion; and relieve with knee flexion.
	Nerve root tension	Supine Contralateral SLR	Contralateral SLR reproducing ipsilateral radicular symptoms is thought to be more specific, but less sensitive, than ipsilateral SLR	
	Neuro / motor	Resisted SLR	L2-4 radiculopathy	
Sidelying	Neuro / motor	Resisted hip abduction	L5 radiculopathy	
Prone	Nerve root tension	Femoral nerve tension test	L2-4 radiculopathy	Reproduction of RADICULAR pain anterior thigh
Prone	Neuro / motor	Resisted knee flexion	S1 radiculopathy	
Prone, Seated or Standing	Palpation	Palpation	Most commonly nonspecific from a diagnostic standpoint, however, important from a patient perspective.	

Corroborating motor exams

If you encounter or suspect weakness, it is good practice to corroborate this finding by testing a different muscle group innervated by the same nerve or nerve root.

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L5 radiculopathy vs Peroneal neuropathy

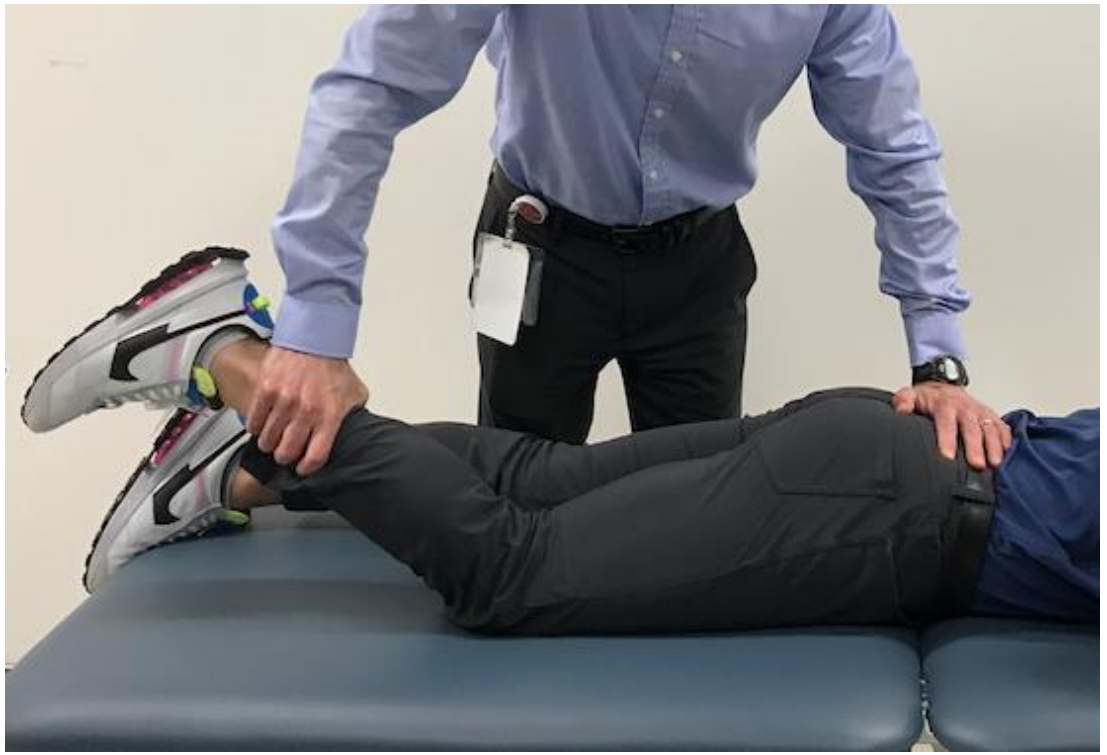
If a patient has noted weakness of ankle dorsiflexors, like a foot drop or foot slap, then testing proximal L5 motor strength with hip abduction is critical to differentiating between an L5 radiculopathy and a peroneal neuropathy.

- Patient sidelying, patient abducts or raises leg toward ceiling.
  - Make sure hip is neutral (vs flexed)
  - Apply resistance, applying pressure on lower gives provider more levarage
- Preserved proximal L5 motor in the setting of a foot drop suggests peroneal neuropathy.

S1 radiculopathy

If a patient has symptoms suggestive for S1 radiculopathy and/or noted weakness of heel raise or ankle plantar flexion, test proximal S1 strength

- Patient prone, knee flexed 30-40 degrees, apply resistance to lower leg.



Upper lumbar radiculopathies, L2 – 4

Test hip flexion in suspected upper lumbar radiculopathy in a position where the patient has less advantage than when sitting.

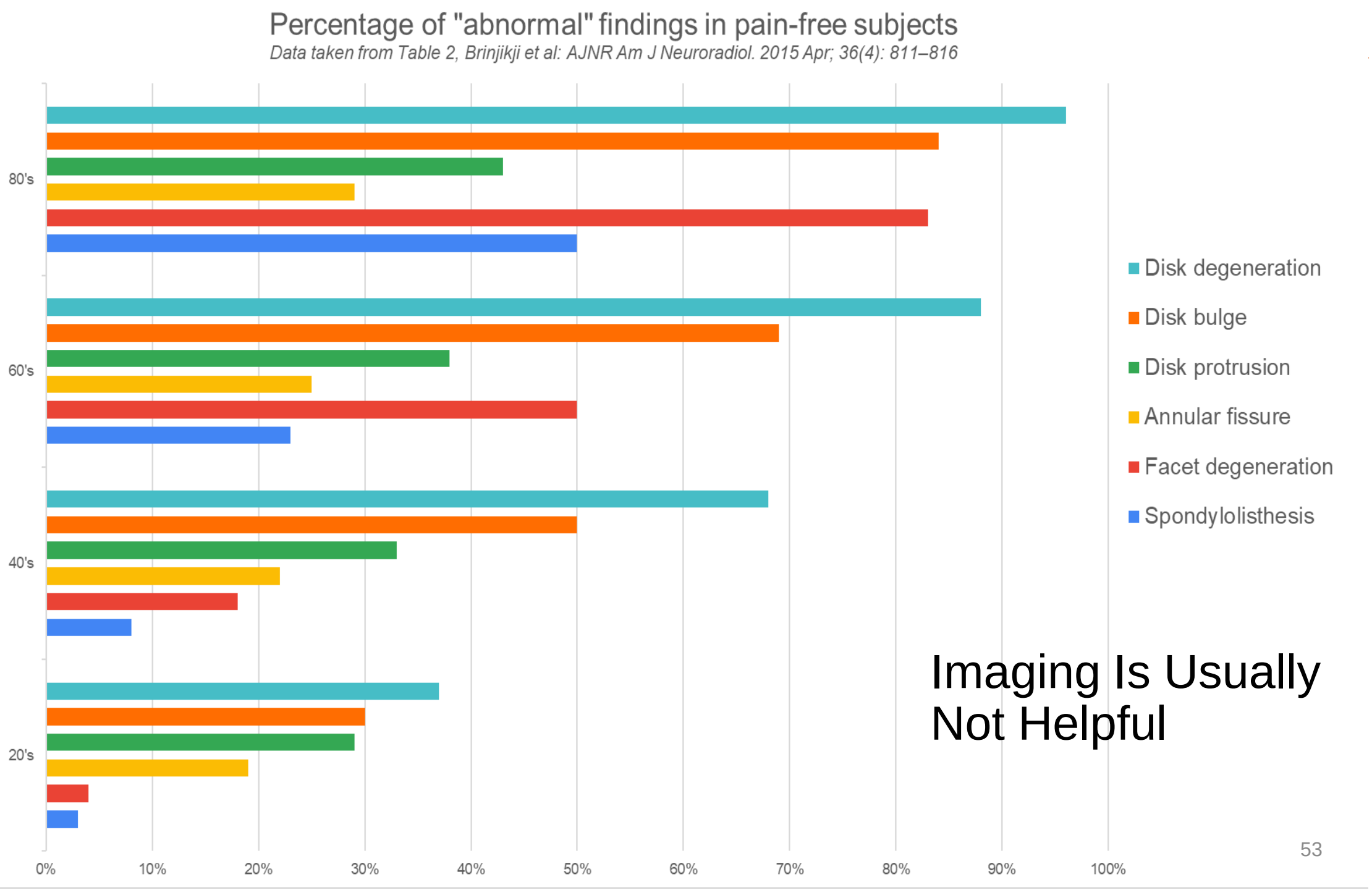
- In supine, ask patient to raise straight leg to approximately 30 degrees, apply resistance to distal thigh

Evaluation of Low Back Pain - Imaging

Imaging – Usually Not Needed

- Guidelines do not recommend x-rays in the first 4 to 6 weeks in the absence of red flags *
- Anteroposterior (AP) & lateral X-rays of the lumbar spine
  - Weightbearing / standing (alignment/spondylolisthesis can be missed with supine films)
  - Can show structural abnormalities, destructive/malignant lesions, disc space narrowing
  - Only significant if patient has symptoms that correlate

* Chou, Roger et al. “Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society.” Annals of internal medicine 147.7 (2007): 478–491. Web.



Imaging Is Usually Not Helpful

Symptoms Are More Important Than Imaging

When spine MRI findings show a disc bulge or herniation on the same side of symptoms, the history and exam is the key to determining whether the disc is the cause of symptoms.

With disc pain, stressing/loading the disc and/or related nerve should produce an immediate, consistent, and sharp response, that can be relieved by rest.

When to Image

- Red flags
- Otherwise, defer to specialist
- Imaging will not change initial management, as conservative therapy is mainstay

Evaluation of Low Back Pain - Case Studies

Case study #1

- 35 year old presents for evaluation of his first ever episode of low back and right leg pain.
- She relates symptoms beginning around 3 weeks ago gradually after an extended car ride returning home from Oklahoma.
- Pain begins in her lumbar spine and extends to the right buttock, posterior thigh, and posterior leg.
- Pain is described as sharp, radiating.

Case study #1 – History (continued)

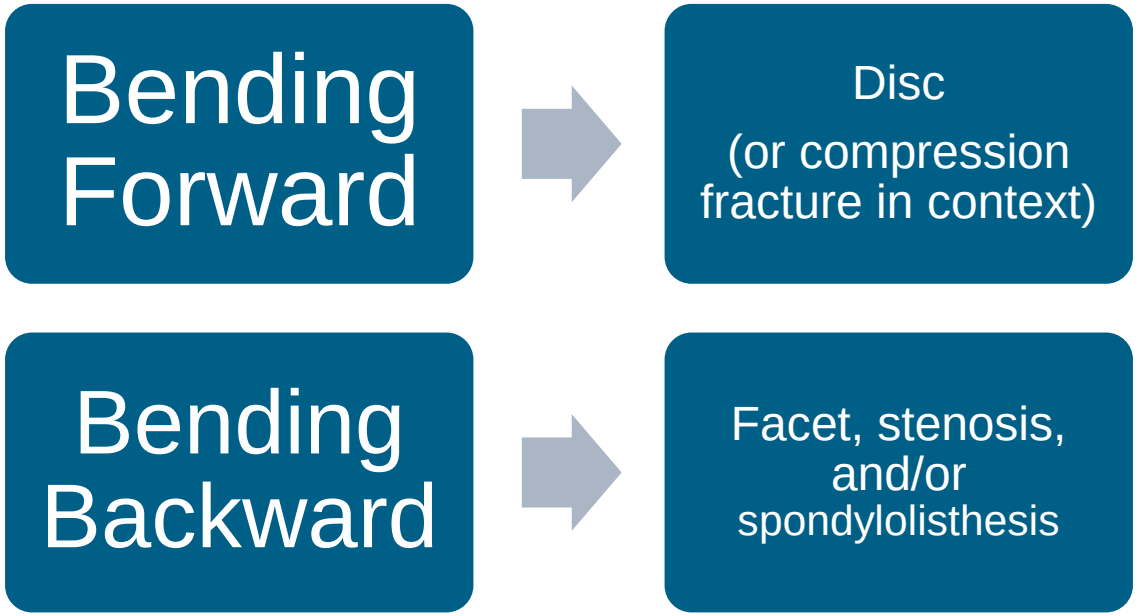
- Aggravating activity: sitting, bending, especially in the morning; sit to stand
- Alleviating activity: standing and walking
- No weakness, numbness, bowel or bladder dysfunction.
- Sleep interrupted with current pain.
- Status: stable.
- PMH unremarkable, healthy.

Case study #1 - Exam

- Limited lumbar flexion due to increased lumbar and right posterior thigh pain.
- Right straight leg raise reproduced right posterior thigh pain
- Motor exam notable for mild difficulty with ipsilateral heel raise and mildly reduced ankle reflex.
- Repeated extension produced centralization.

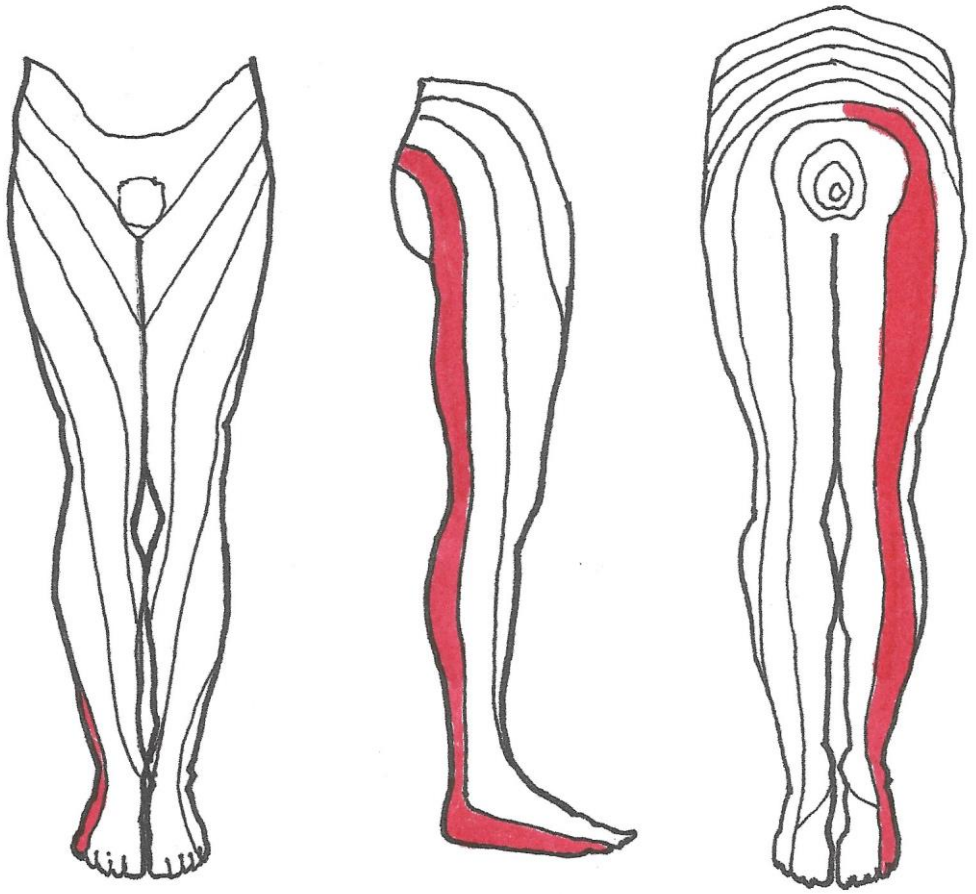
Medical Decision Making

- Rule out red flags
- Stratify according to movement pattern.



Diagnosis?

Acute S1 Radiculopathy



Case study #2

- 65 year old presents for evaluation of low back and right leg pain.
- She relates symptoms beginning several years ago, for no apparent reason, and gradually worsening in the interim.
- Pain begins in her lumbar spine and extends to the right buttock, posterior thigh, and posterior leg.
- Pain is described as aching.

Case study #2

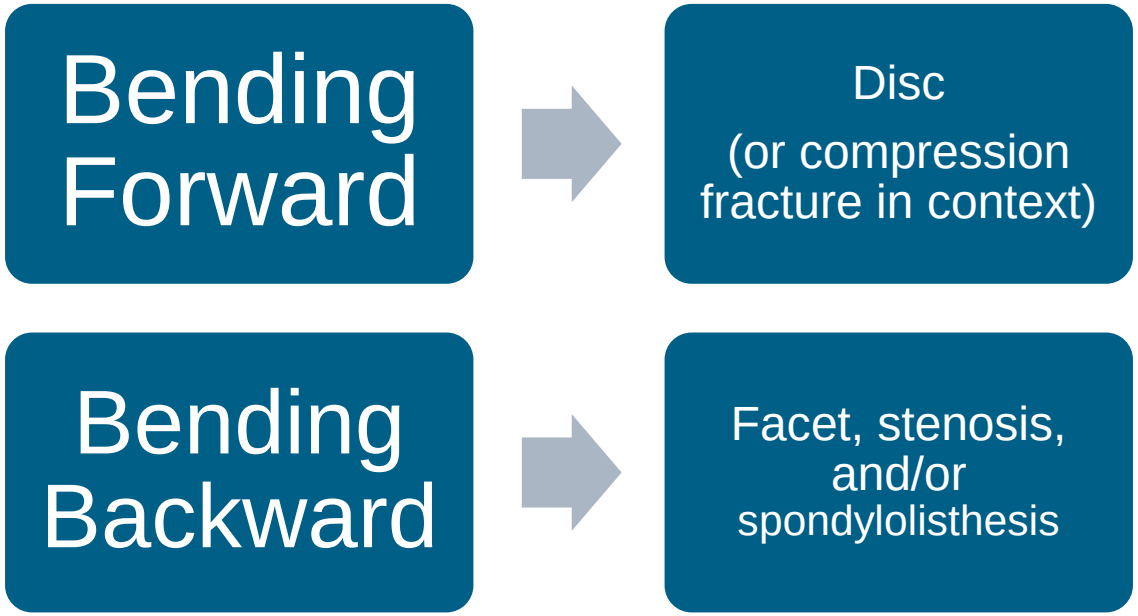
- Aggravating activity: walking with pain beginning after one block; standing more than 15 minutes
- Alleviating activity: sitting, bending; “shopping cart” sign
- No weakness, numbness, bowel or bladder dysfunction.
- Sleep interrupted with current pain.
- Status: gradually worsening over time with reduced walking tolerance
- PMH unremarkable, otherwise healthy.

Case study #2 - Exam

- Lumbar ROM within normal limits for age, mild lumbar pain with extension.
- Negative straight leg raise, femoral stretch, and faber.
- Motor exam within normal limits for age. Unobtainable bilateral ankle reflexes.
- Repeated flexion produced mild relief in lumbar ache (however, no significant pain while sitting and giving history).

Medical Decision Making

- Rule out red flags
- Stratify according to movement pattern.



Diagnosis?

Lumbar Stenosis – Neurogenic Claudication

Claudication refers to pain in the lower extremities that develops with walking and relieves with sitting.

- Neurogenic Claudication is due to lumbar stenosis, which is thought to be create secondary disturbance of blood flow to the spinal nerves resulting in painful neuro-ischemia.
- Vascular Claudication is due to peripheral artery disease.

Activity / Posture	**Neurogenic Claudication**	**Vascular Claudication**
Walking	Aggravates over time	
Sitting	Alleviates	
Standing	Aggravates over time	No effect
Seated stationary bike	No effect	Aggravates over time
"Shopping Cart sign" (walking flexed over a shopping cart)	Alleviates (allows increased ambulation without pain)	Aggravation with ambulation persists despite change in posture

Low Back Pain Management – Common Strategy

Pain and loss of function are the primary drivers of more aggressive intervention.

With an intact motor exam, you can be pretty confident to recommend a conservative approach.

- Physical rehabilitation strategy
- Medications
- Procedures/Surgery

Severe and/or progressive symptoms, especially with objective neurological findings, should trigger urgent specialist consult.

Lumbar Disc Herniation – Non-operative Management

North American Spine Society Clinical Guideline:

- In the absence of reliable evidence relating to the natural history of lumbar disc herniation with radiculopathy, it is the work group's opinion that ***most patients will improve independent of treatment.*** Disc herniations will often shrink/regress over time.
- There is insufficient evidence to make a recommendation for or against urgent surgery for patients with motor deficits due to lumbar disc herniation with radiculopathy.

Kreiner, D. Scott et al. “An Evidence-Based Clinical Guideline for the Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy.” *The spine journal* 14.1 (2014): 180–191. Web.

Standing Lumbar Extension

- Stand with feet shoulder width apart
- Place palms or fists on upper buttocks
- Bend backwards as far as you safely can
- Hold for 1-2 seconds, then slowly return to neutral
- Neck may remain neutral
- Perform 10 repetitions, 4-5 times a day

Prone on Elbows

- Lie comfortably on your stomach
- Prop up onto your forearms so that elbows rest directly beneath your shoulders
- Relax all the muscles in your body and breathe steadily
- One long hold, 1-3 minutes

Prone Press Ups

- Lie flat on your stomach comfortably
- Place hands under your shoulders like you are about to perform a push up
- Push up through your arms, but leave the rest of your body relaxed
- Push until elbows are fully extended, (or as best you can)
- Hold for 2 seconds, relax glutes and trunk
- Slowly return back to starting position
- Perform 10 repetitions, 4-5 times a day

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Lumbar Disc Herniation – Home Exercise Program

Exercises should lessen pain intensity and/or “centralize” pain, moving pain superiorly to the spine.

Exercise program should be discontinued with aggravation of pain and/or peripheralization.

Patients should avoid prolonged sitting, and/or may feel better using a lumbar roll that helps maintain “neutral spine” versus a flexed spine.

Lumbar Disc Herniation - Initial Management

NSAIDs as medically allowable (limited evidence)

- Naproxen OTC 440 mg BID x one to two weeks as tolerated; or
- Ibuprofen OTC 600 mg TID x one to two weeks as tolerated

Analgesia as medically allowable (limited evidence)

- Acetaminophen 1000 mg TID prn
- Muscle relaxants - efficacy has not been demonstrated, however, is opioid sparing. Cyclobenzaprine can be helpful for those with commonly co-morbid interrupted sleep pattern
- Avoid opioids – if needed, short duration treatment only.

Medications – Analgesia

- **Ibuprofen 400 mg plus acetaminophen 1000 mg was found to be equally effective** to three different opioid and acetaminophen combination analgesics in reducing pain intensity at two hours**.** [1]
- **Naproxen alone** was as effective as naproxen plus oxycodone/acetaminophen (Percocet) or naproxen plus cyclobenzaprine (Flexeril) for reducing pain from acute musculoskeletal low back pain at one week follow-up.[2]

1. Chang AK, Bijur PE, Esses D, Barnaby DP, Baer J. Effect of a Single Dose of Oral Opioid and Nonopioid Analgesics on Acute Extremity Pain in the Emergency Department: A Randomized Clinical Trial. *JAMA*. 2017;318(17):1661-1667. doi:10.1001/jama.2017.16190

2. Friedman BW, Dym AA, Davitt M, et al. Naproxen With Cyclobenzaprine, Oxycodone/Acetaminophen, or Placebo for Treating Acute Low Back Pain: A Randomized Clinical Trial. *JAMA.* 2015;314(15):1572–1580. doi:10.1001/jama.2015.13043

Lumbar Disc Herniation – Next Steps

After 2 weeks, without improvement,

- Consider formal physical therapy.
- Consider glucocorticoid (limited evidence)
  - Prednisone 40 mg qd x 5d, then 20 mg x 2d, then 10 mg x 2d

After 6 weeks, without improvement,

- Consider lumbar MRI in anticipation of more aggressive care.

Lumbar Disc Herniation – Epidural Steroid

- For acute radiculopathy, lumbar epidural steroid injection may offer short term relief, however, there is limited evidence for effect on long term outcome.*
- Lumbar epidural steroid injection may facilitate engagement in physical therapy and/or reduce need for analgesic medications in the short term.

* Yang S, Kim W, Kong HH, Do KH, Choi KH. Epidural steroid injection versus conservative treatment for patients with lumbosacral radicular pain: A meta-analysis of randomized controlled trials. *Medicine (Baltimore)*. 2020;99(30):e21283. doi:10.1097/MD.0000000000021283

Lumbar Disc Herniation – Surgery

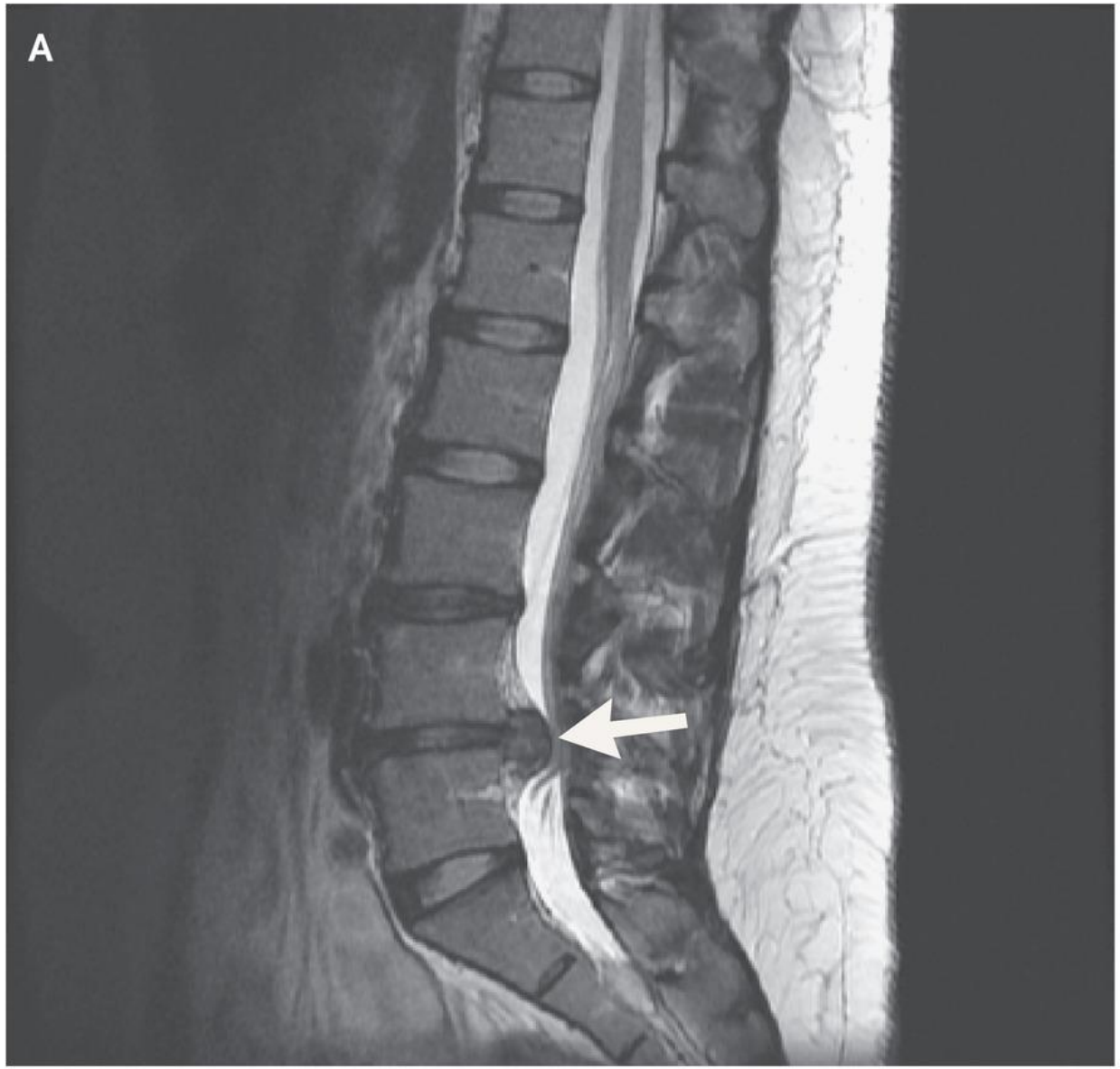
- Surgery provided faster relief than conservative care for lumbar disc herniation at 3 months, but did not show a benefit over conservative treatment at long-term follow-up.[1]
- Around 25% of patients will have chronic post operative back or leg pain.[2]

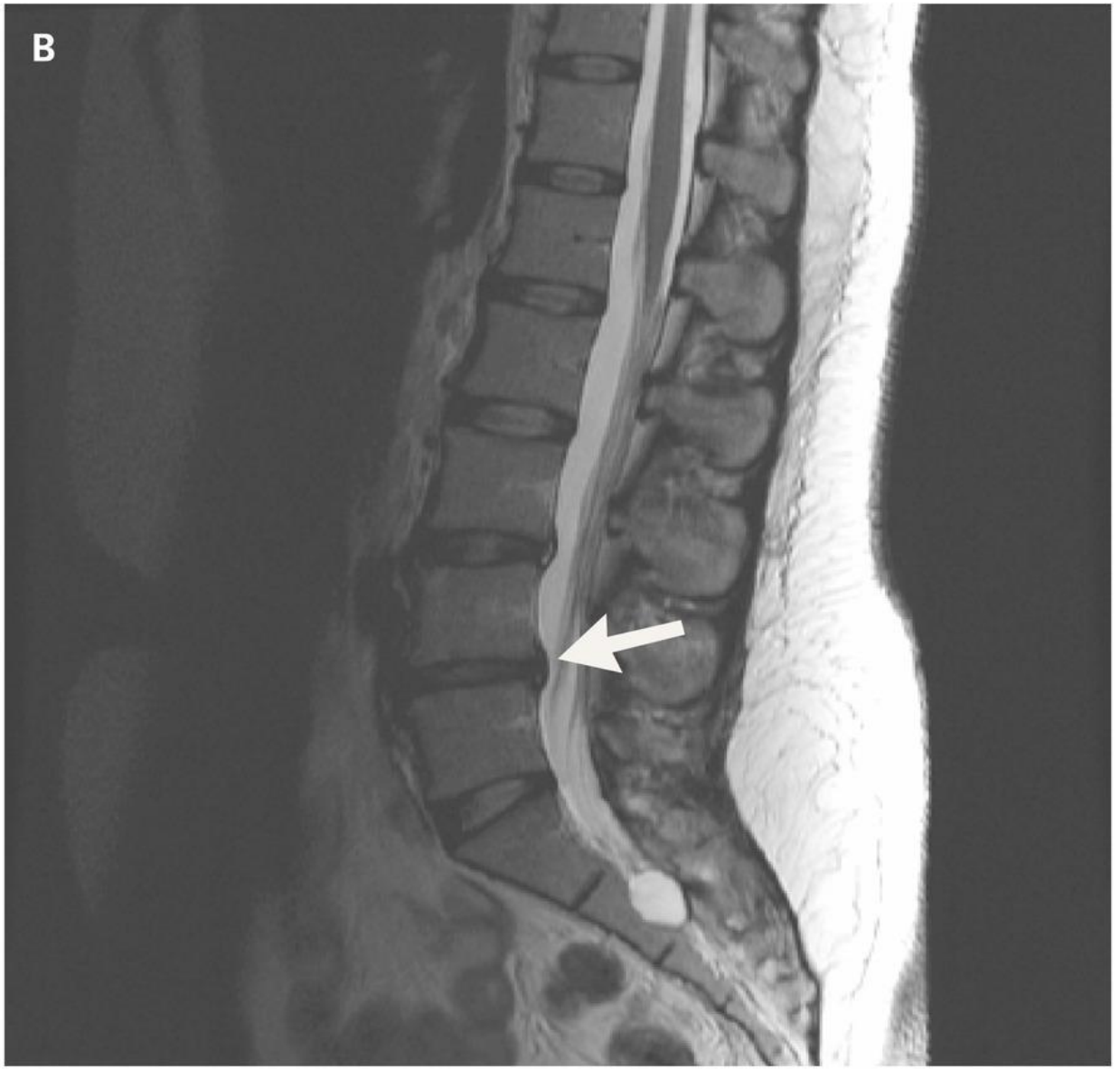
1. Gugliotta M, da Costa BR, Dabis E, et al. Surgical versus conservative treatment for lumbar disc herniation: a prospective cohort study. *BMJ Open*. 2016;6(12):e012938. Published 2016 Dec 21. doi:10.1136/bmjopen-2016-0129382.
2. Kreiner, D. Scott et al. “An Evidence-Based Clinical Guideline for the Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy.” The spine journal 14.1 (2014): 180–191. Web.

Lumbar Disc Herniation – Imaging Resolution

- 37 out of 42 patients (88%) >50% reduction of the hernia on MRI 3-12 months after onset with clinical improvement preceding imaging.*

* Takada, Eiichi, Masaya Takahashi, and Kimio Shimada. “Natural History of Lumbar Disc Hernia with Radicular Leg Pain: Spontaneous MRI Changes of the Herniated Mass and Correlation with Clinical Outcome.” Journal of orthopaedic surgery (Hong Kong) 9.1 (2001): 1–7. Web.





Hong, Jennifer, and Perry A Ball. “Resolution of Lumbar Disk Herniation Without Surgery.” The New England journal of medicine 374.16 (2016): 1564–1564. Web.

Low Back Pain Management – Common Strategy

Pain and loss of function are the primary drivers of more aggressive intervention.

With an intact motor exam, you can be pretty confident to recommend a conservative approach.

- Physical rehabilitation strategy
- Medications
- Procedures/Surgery

Severe and/or progressive symptoms, especially with objective neurological findings, should trigger specialist consult.

Double Knees to Chest

- Lie flat on your back
- Bring both knees toward your chest
- Use hands to pull knees as close to chest as possible
- Hold for 1-2 seconds, then slowly release
- Perform 10 repetitions, 2-5 times a day

Forearm Prop

- Begin by sitting in a comfortable chair
- Lean forward and rest forearms on thighs
- Hold for 30 seconds to 1 minute
- Place hands on thighs to assist back to an upright position
- Perform 4-5 times a day

Single Knee to Chest

- Lie flat on your back
- Bring one knee toward your chest
- Use hands to pull knee as close to chest as possible
- Hold for 1-2 seconds and then slowly release
- Perform with each leg, 10 repetitions, 2-5 times a day

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Lumbar Stenosis - Home Exercise Program

Exercises should lessen pain intensity and/or “centralize” pain, moving pain superiorly to the spine.

Exercise program should be discontinued with aggravation of pain and/or peripheralization.

Patients will likely need to “pace” activity – walking to tolerance then taking a sitting break. Patients may do better with aerobic exercise like stationary bike (flexed posture), treadmill on an incline (flexed posture), and swimming (reduced load from gravity).

Lumbar Stenosis - Medications

Analgesia - evidence is limited

- Sitting should be relieving!
- Acetaminophen
- Judicious NSAIDs – caution due to side effects including renal, GI, and cardiovascular, especially in the elderly.
- Avoid muscle relaxants and opiates, especially considering increased risk for falling in the elderly in addition to co-morbidities.

Lumbar Stenosis – Procedures/Surgery

Lumbar epidural steroid injection

- Consider for short term relief e.g. special event or upcoming travel, otherwise, risk/benefit may not justify.
- No long term benefits have been established.

Surgery

- Consider for moderate to severe pain and loss of function, unresponsive to conservative care.

Katz, J. N. , Zimmerman, Z. E. , Mass, H. & Makhni, M. C. (2022). Diagnosis and Management of Lumbar Spinal Stenosis. *JAMA, 327* (17), 1688-1699. doi: 10.1001/jama.2022.5921.

Lumbar Stenosis – Surgery Outcomes

Systematic Review of Outcomes Following 10-year Mark of Spine Patient Outcomes Research Trial (SPORT) for Spinal Stenosis 2020

- “Results showed significantly greater improvement through 4 year follow up in those patients that received surgical treatment, however the difference between the surgical and nonsurgical groups diminished at 8 year follow up.”

Katz, J. N. , Zimmerman, Z. E. , Mass, H. & Makhni, M. C. (2022). Diagnosis and Management of Lumbar Spinal Stenosis. *JAMA, 327* (17), 1688-1699. doi: 10.1001/jama.2022.5921.

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Patient Education Resources

- Lumbar Herniated Disc: Should I Have Surgery?
  - https://www.healthlinkbc.ca/health-topics/aa6282
- Lumbar Spinal Stenosis: Should I Have Surgery?
  - https://www.healthlinkbc.ca/health-topics/aa121240

* https://www.healthwise.org/

Case study #3

- 45 year old presents for evaluation of back and right leg pain.
- He relates symptoms beginning in his 20s, for no apparent reason.
- He describes his pain as constant, burning, and aching.
- No specific aggravating or alleviating positions or activity.
- No weakness, consistent numbness, or loss of B/B function.
- Sleep is interrupted.
- PMH notable for history of migraines and IBS.

Case study #3 - Exam

- Limited lumbar flexion equal to extension due to increased lumbar pain with both movements.
- Right and left straight leg raise as well as faber and femoral stretch also increased low back pain.
- Motor exam and reflexes intact.
- Repeated flexion as well as extension both aggravated low back pain.

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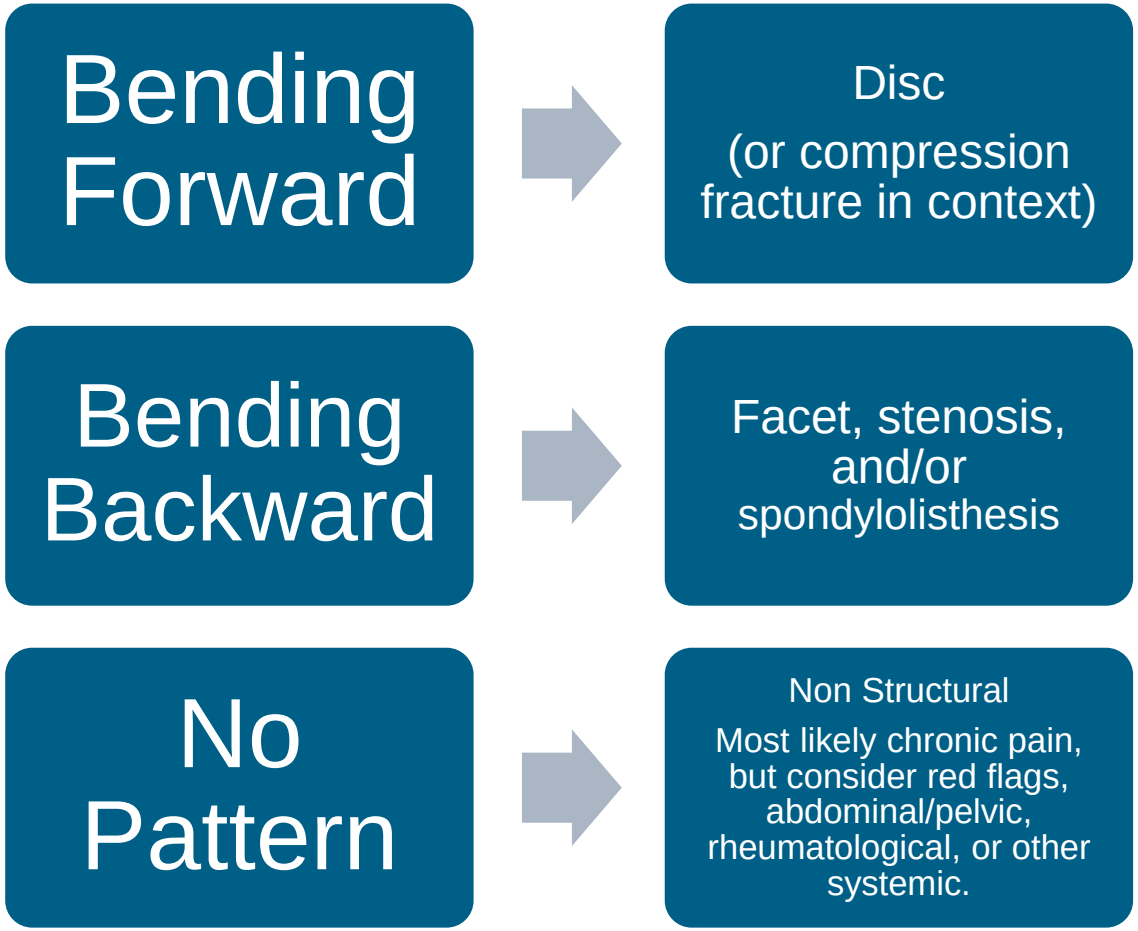
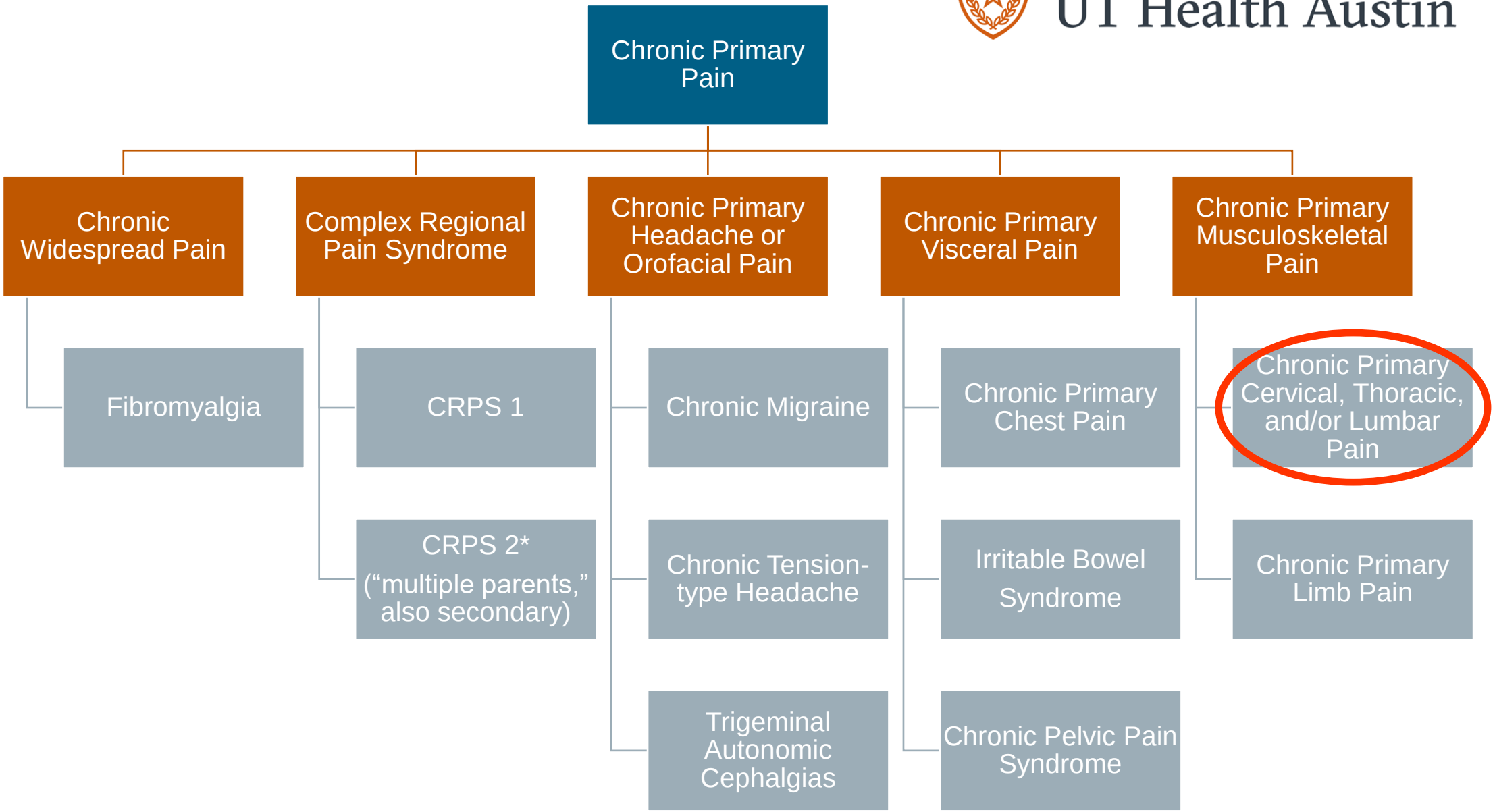
Classification by Aggravating Activity




Chronic Primary Pain
Chronic Widespread Pain
Complex Regional Pain Syndrome
Chronic Primary Headache or Orofacial Pain
Chronic Primary Visceral Pain
Chronic Primary Musculoskeletal Pain
Fibromyalgia
CRPS 1
CRPS 2* ("multiple parents," also secondary)
Chronic Migraine
Chronic Tension-type Headache
Trigeminal Autonomic Cephalgias
Chronic Primary Chest Pain
Irritable Bowel Syndrome
Chronic Pelvic Pain Syndrome
Chronic Primary Cervical, Thoracic, and/or Lumbar Pain
Chronic Primary Limb Pain

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Chronic Pain – Management

- Pain Neuroscience Education (PNE)
- Physical Exercise
- Cognitive behavioral training (CBT and related interventions)
- Medications

When to refer to Physical therapy

Physical therapy should be considered in those with a flexion or extension presentation, that are unresponsive or incompletely responsive to their home exercise program, and/or medications.

When referring to physical therapy, specifically request three things:

- To evaluate for directional preference – which is the physical therapy language for the flexion or extension bias we've been talking about.
- To prioritize active over passive care.
- To limit initial program to 6 visits, then re-assess.

For those whose presentation is non-mechanical or if pain is chronic/recurrent, consider multidisciplinary referral before physical therapy.

When to Refer to a Specialist

- Red Flags – urgent
- Severe or progressive neurological deficit – urgent/semi-urgent
- > 6 weeks of symptoms, unresponsive to conservative care.

Key Summary Points

- Assess for Red Flags.
- Stratify according to movement preference
  - Flexion aggravation (disc pattern)
  - Extension aggravation (stenotic pattern)
  - No pattern (80-90%!)
- Initiate trial of conservative management
  - Home exercise program
  - Medications as needed
- In the absence of red flags, defer imaging pending response.

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Questions?

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