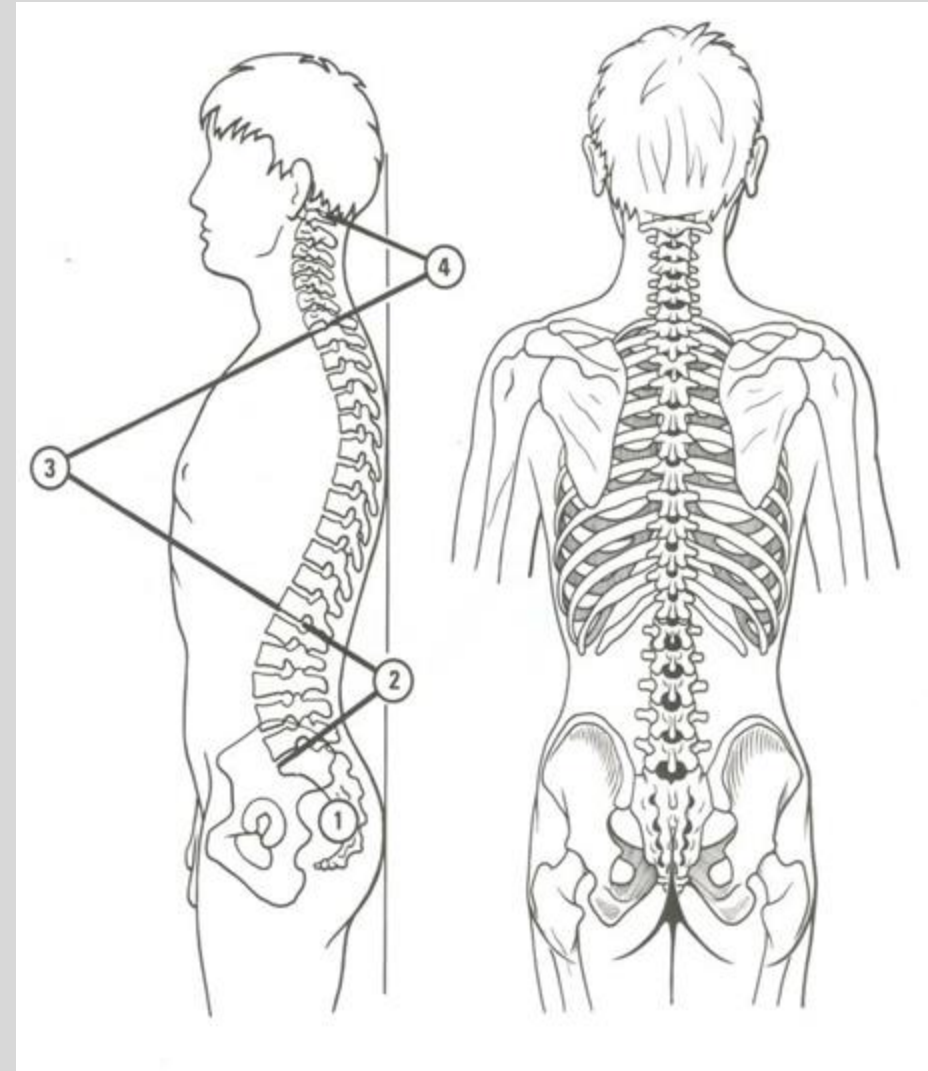


# Session Objectives

1. Identify spinal landmarks in order to localize & differentiate vertebral segments T12 through S1.
2. Evaluate neuromusculoskeletal-connective tissue TART changes & diagnose Type 1 & 2 dysfunctions of the lumbar spine.
3. Practice documentation of the biomechanical diagnoses of Type 1 & 2 lumbar spinal dysfunctions in the physical exam ("O" in SOAP note format) for professional communication.
4. Identify, evaluate, and understand the physiology of the muscles & tendons of the back, abdomen & buttocks, & hip flexors & extensors.
5. Understand the importance of an osteopathic examination of dysfunctions, muscle tone & function in the clinical assessment of back pain
6. Assess for contraindications to soft tissue techniques and demonstrate the traction, prone pressure with counter-leverage, and supine extension soft tissue techniques for the lumbar region.

# Physical Examination (PE): Look at the Lumbar Spine Region

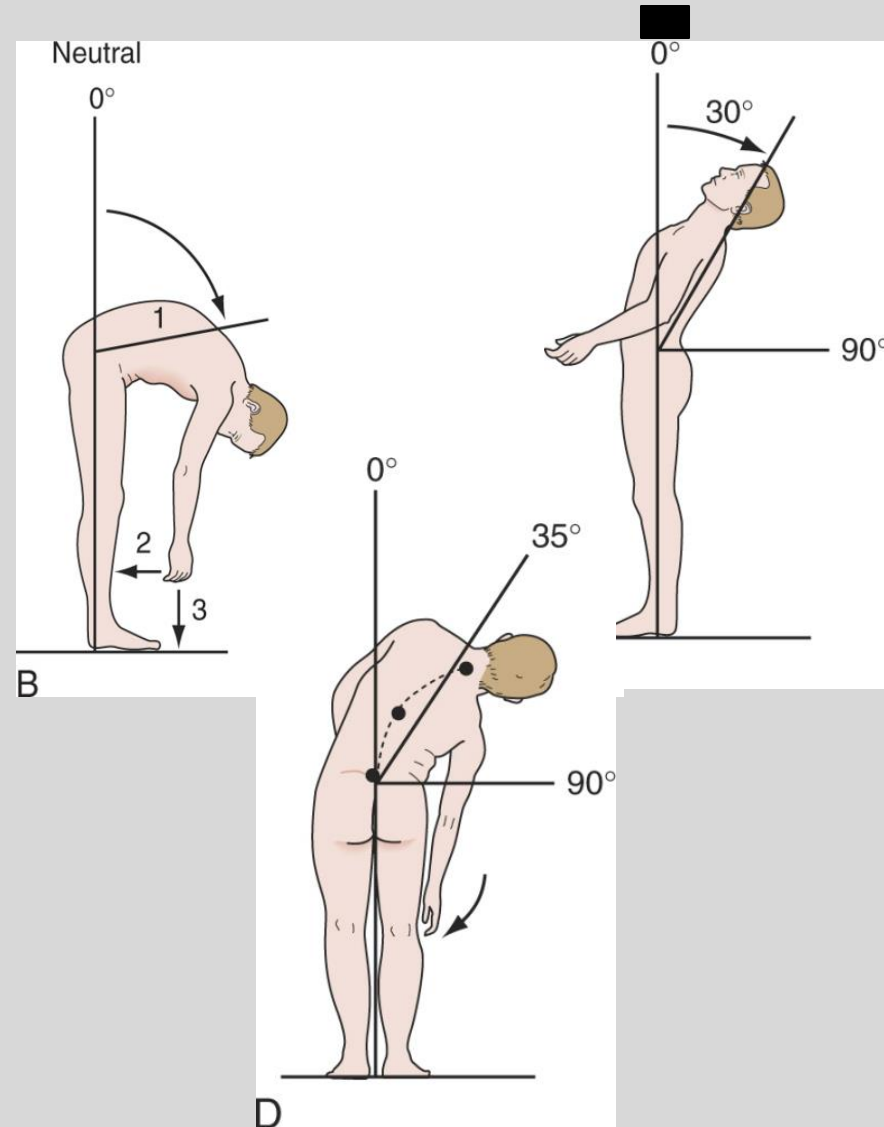
- Lumbar Spine Primary **lordotic** Curve  
Backward Bending
- Thoraco-Lumbar Junction: T10-T12 Lordotic



# PE: Move - Gross Thoraco-Lumbar Range of Motion (ROM) evaluation

- **Approximate healthy Range of Movement:**
- **Thoracolumbar Spine**  
(approximate degrees of motion)
- Flexion 0-80 degrees
- Extension 0-30 degrees
- Lateral bend 0-35 degrees
- Rotation 0-45 degrees

*From Carr AJ, Harnden A: Orthopedics in Primary Care. Oxford, Butterworth-Heinemann, 1997, p 72.*



# Characteristics of Vertebral Segmental Dysfunction and Adaptation

## Osteopathic Lumbar Diagnosis of Somatic Dysfunctions

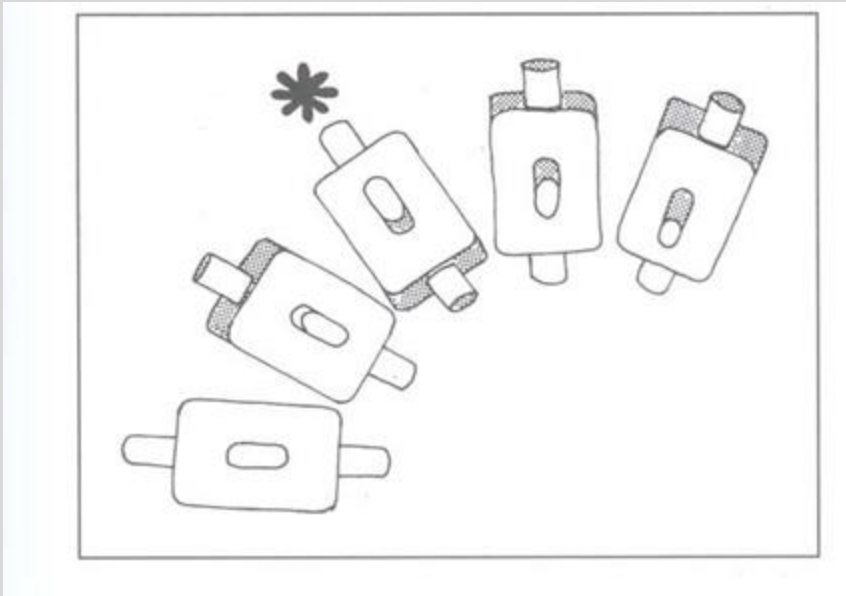
	Non-Neutral Segmental Dysfunctions	
	<i>Flexed Position</i>	<i>Extended Position</i>
Positional names ("-ed" endings)	<b>FRS Left</b> <b>Flexed, Rotated, Sidebent Left</b>	<b>ERS Left</b> <b>Extended, Rotated, Sidebent Left</b>
Restricted motions ("-ing" endings)	<b>SRE Right</b> <b>Sidebending, Rotation, Extension</b>	<b>SRF Right</b> <b>Sidebending, Rotation, Flexion</b>
Lesion type	Type II (non-neutral)	Type II (non-neutral)
Number	Single	Single
Cause (etiology)	Trauma	Trauma
Facet motion impairment	Right extension	Left flexion
Effect of hyperextension	Worse	Re-establishes symmetry
Effect of hyperflexion	Re-establishes symmetry	Worse
Coupled rotation – sidebending	Same side (e.g., Lt, Lt)	Same side (e.g., Lt, Lt)
Observed posterior transverse process(es)	Left	Left

Mitchell, Jr., FL and Mitchell, PKG, The Muscle Energy Manual: Evaluation and Treatment of the Thoracic Spine, Lumbar Spine, & Rib Cage, Volume Two, Second Edition, MET Press, East Lansing, Michigan, 2002, *Chapter 3*,  
*Biomechanics of Segmental Motion Restriction*.

# Osteopathic Lumbar Diagnosis: Fryette's 2<sup>nd</sup> Principle

When side bending is introduced into a **non-neutral spine**, the bodies of the vertebrae will rotate **toward** the side of concavity

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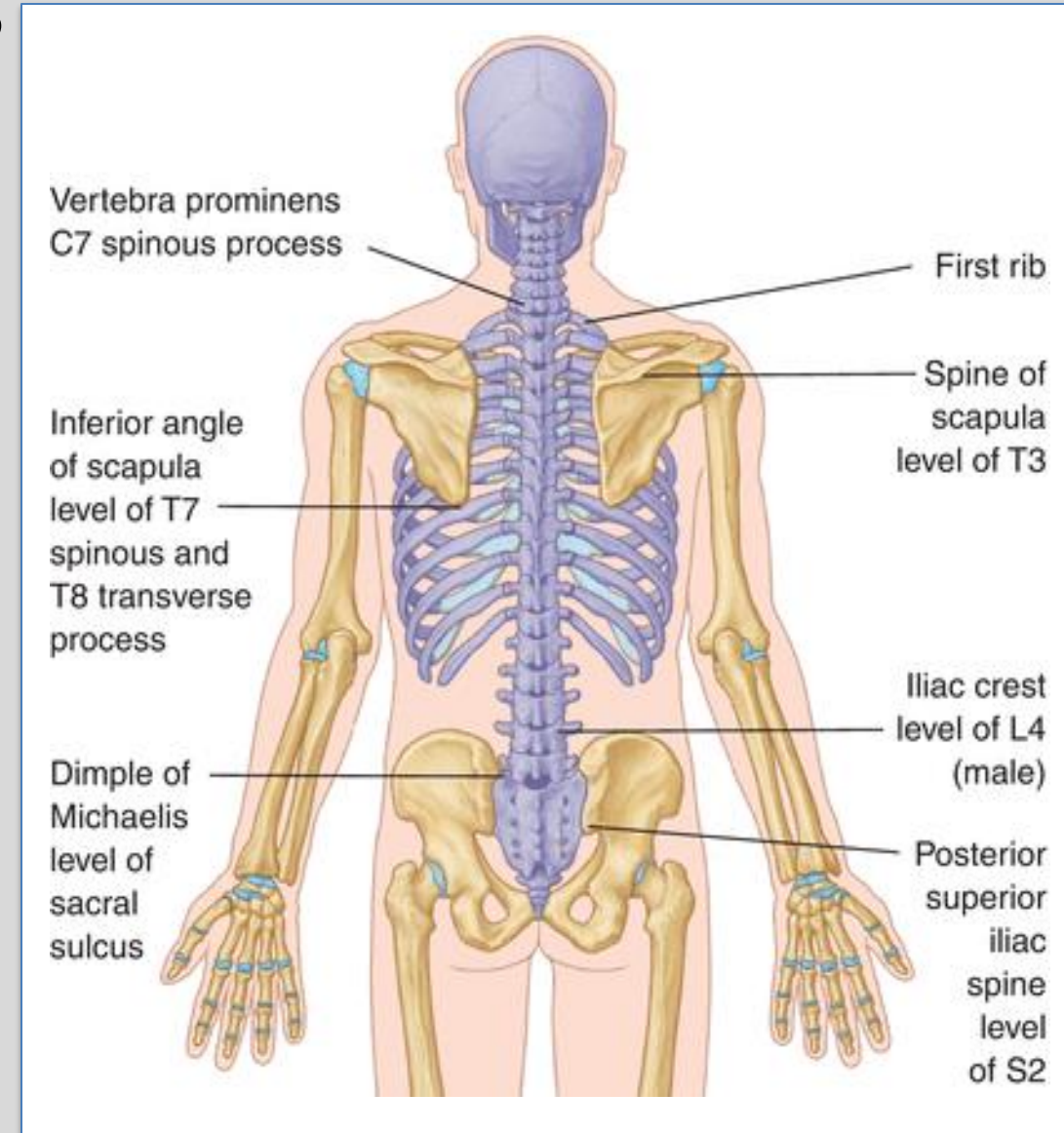
## Type II dysfunction

- Occur as a result of trauma/abrupt twisting
- Maintained by short restrictors – (rotatores brevis and intertransversari muscles)
- Found at apex or extremes of Type I curves

**Should be treated before Type I lesions**

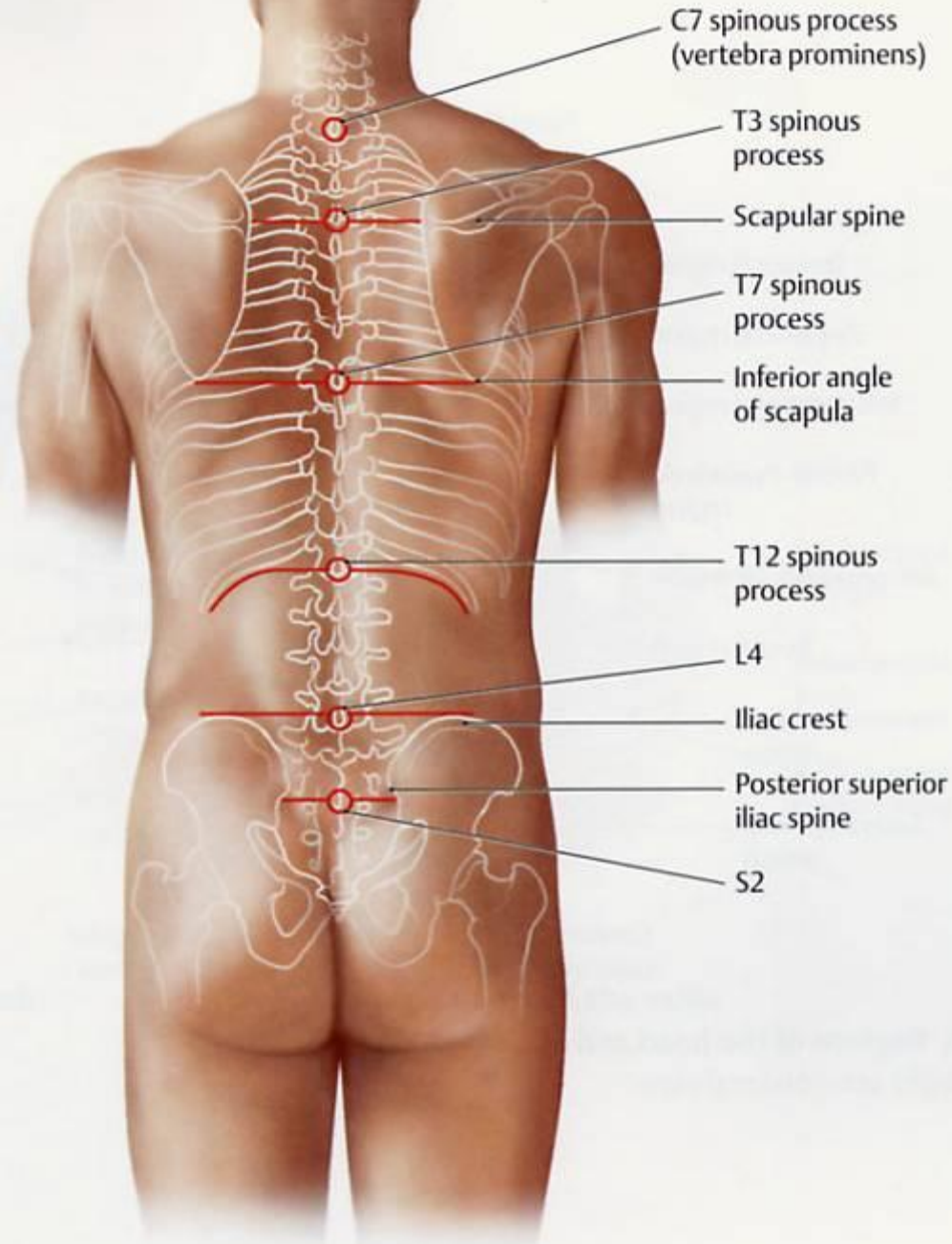
# Lumbar Dysfunction Diagnosis

- Use anatomical landmarks to identify lumbar spine region.
- Use a screening approach to identify which segment you want to focus on diagnosing.
- Use landmarks figure out at which level (L1, L2, L3, L4, or L5) you palpate a somatic dysfunction
- Find the most posterior transverse process in the area.





# Boney Landmarks



- 12<sup>th</sup> rib attaches to T12
- Find the T12 spinous process
- L1 spinous process is just inferior
- Count spinous processes going inferiorly
- Iliac crest heights at L4 or **between** L4-L5
- PSIS at the level of S2

# PE: Palpate Lumbar spine transverse processes (TP)

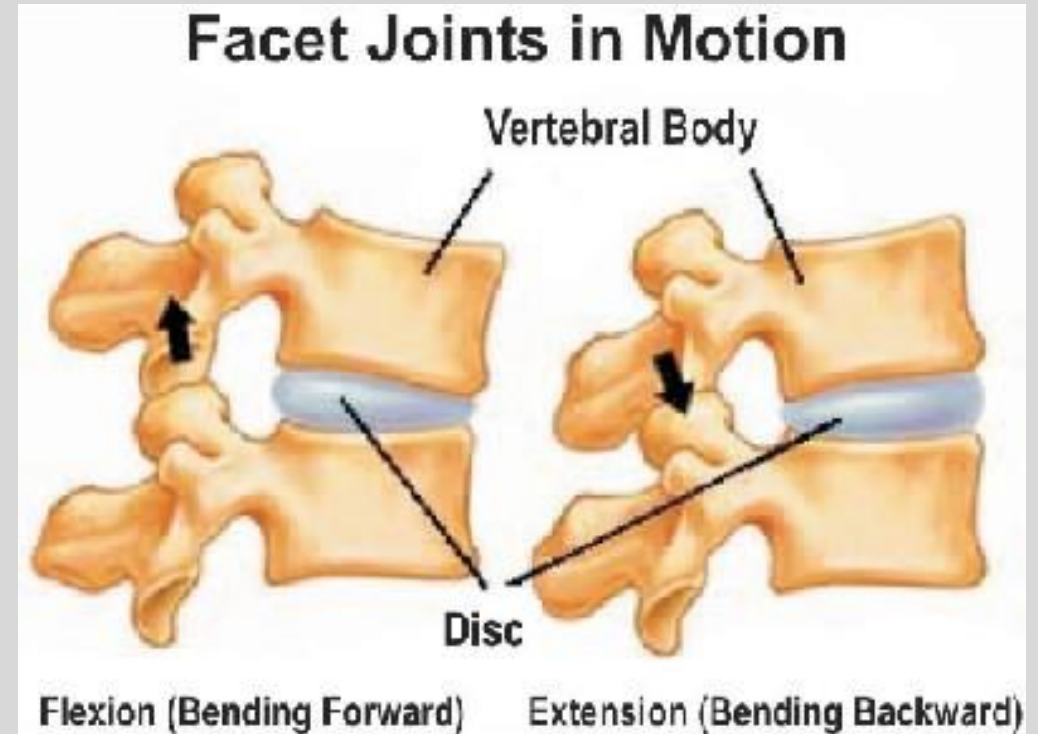
- Lumbar spine Transverse processes are about 1.5 inches lateral from midline (spinous processes).
- Rotational segmental motion examination
- With Patient prone, physician places thumbs or fingers on TPs of segment to be tested.
- Apply a firm pressure **towards anterior of Patient's body**, (toward the table) one side at a time; Which TP does not move into rotation easily?
- (The side that resists your downward/ anterior pressure = the side of the posterior TP = the direction of that vertebra's rotation dysfunction. Named/ documented for which direction the anterior vertebral body is rotated)



# Vertebral Unit

Facet joints have 2 surfaces that are Motion Guiding Structures, among Anterior & Posterior Elements

- Planes of coupled motions
  - Flexion & Extension = Sagittal Plane
  - Rotation = Horizontal Plane
  - Side bending = Coronal Plane



<https://nyit.idm.oclc.org/login?url=https://meded.lwwhealthlibrary.com/content.aspx?sectionid=209545625&bookid=2582>

# Vertebral Unit

## Anterior Portion

**Weight Bearing (Vertebral bodies and Discs)**

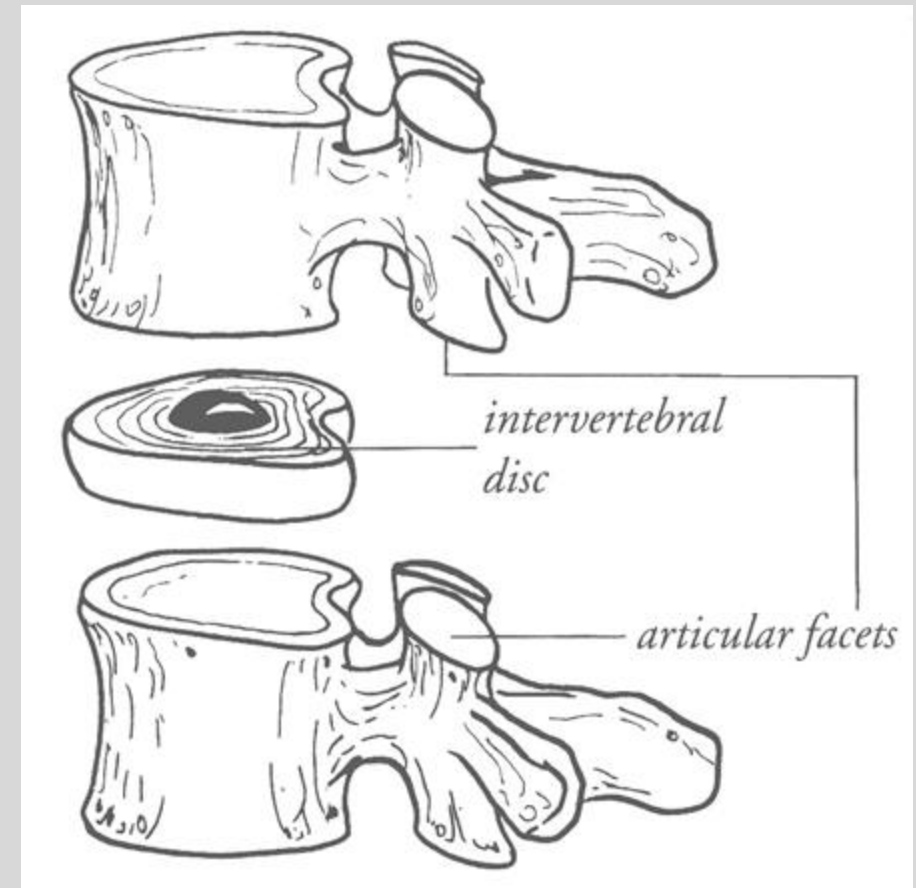
## Posterior Portion

Neural Structures (Cord & nerve roots)

Points of Articulation (Facets & Transverse Processes)

**Motion Guiding Structures (Facets): allow for motion in only specific directions.**

**Ligaments, tendons, and other connective tissues limit the range of the motion**



# Testing segment for Extension

- Have pt prop themselves up on their elbows (“SPHINX” or “TV WATCHING”) to create extension to the segment being tested.
- Motion test segment ONE SIDE AT A TIME to see if *asymmetry improved*.



# Testing segment for Flexion

- Have patient bend forward on knees to flex lumbar vertebra (“CHILD’S POSE”).
- Again, motion test segment ONE SIDE AT A TIME as previously described to see if asymmetry improved.





# Lumbosacral Spring Test



- Patient lies prone on examination table.
- Physician stands to the side with the
  - dominant eye over the midline.
- Physician places the palm of 1 hand over the
  - midline of the lumbar region, with the thenar eminence of the hand over the lumbosacral junction (L5 & base of sacrum). The fingers extend superiorly over the spinous processes & paravertebral tissue.
- Physician provides a short quick push in an anterior direction with the heel of the hand and evaluates for compliance (“springiness”) or resistance of the lumbar spine.
  1. Compliance of the lumbar spine with no resistance is described as a **negative test**.
  2. Resistance (stiffness) to this springing motion is described as a **positive test**.

Seated Motion Examination(examine patient in 2 positions. Seated involves examination with spinal weight-bearing.)

1. While standing beside/behind patient, physician contacts the segment with the most posterior TP by placing the thumb & index finger on the lateral aspects of the patient's TP's
2. The other hand on the shoulder to induce motion of spine.
3. If the TPs are most symmetrical with the patient in extension, then the vertebra is described as extended, sidebent, and rotated to the same side, for example, L1  $ER_R S_R$ .
4. If the TPs are most symmetrical with the patient in flexion, then the vertebra is described as flexed and will be sidebent and rotated to the same side, for example, L1  $FR_R S_R$ .
5. If the TPs are most symmetrical with the patient in the neutral position, then the vertebra is described as neutral and will be sidebent and rotated to opposite sides, for example, L1-L3  $NR_R S_L$ . This result also indicates that there is a group dysfunction present, and all vertebrae in this region where TART changes were found would be described in the same fashion. This may include the thoracic spine, for example, T11-L2  $NR_R S_L$ . L2 would be the apex of a L1-L3  $NR_R S_L$ . Whereas, L1 would be the apex of a T11-L2 group curve, since it demonstrated the most posterior transverse process or the greatest amount of restricted motion within this group of vertebrae.



27: Osteopathic Segmental Examination

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# Goals of Soft Tissue Techniques

- Relax muscles and fascia
- Improve circulation to muscles:
  - Arterial: O<sub>2</sub> and nutrition to areas of ischemia. D.O. stands for Deliver Oxygen.
  - Venous
  - Lymph drainage
  - “We suffer from two things: the want of supply and a burden of dead deposits” -Andrew Taylor Still.
- Improve mobility
- Decrease pain
- Interfere with progression to chronicity
- To relax the ***stretch reflex***  
Which is based on ***mu. spindle mechanism***

Nicholas & Nicholas:

<https://nyit.idm.oclc.org/login?url=https://meded.lwwhealthlibrary.com/content.aspx?sectionid=123844137&bookid=1629#123844867>

# Soft Tissue (ST) Prone Traction

07.23: Prone Traction; Two-Handed, Lumbosacral Method

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nicholas\_3e\_ch07\_pronetraction.mp4



1. Identify lumbar paraspinal muscles and palpate for soft tissue tone.



# Key Points Summary Slide

- Visually & manually identify anatomical landmarks to localize & differentiate vertebral segments T12 to S1.
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- Practice documentation of the biomechanical diagnoses of Type 1 & 2 lumbar spinal dysfunctions in the physical exam ("O" in SOAP note format) for professional communication.
- Identify, evaluate, and understand the physiology of the muscles & tendons of the back, abdomen & buttocks, & hip flexors & extensors.
- Understand the importance of an osteopathic examination of dysfunctions, muscle tone & function in the clinical assessment of back pain
- Assess for contraindications to soft tissue techniques, and demonstrate the soft tissue techniques for the lumbar region:
  - prone traction,
  - prone pressure with counter-leverage, and
  - supine extension