ATSU | National Center for Osteopathic Principles and Practice Education

Introduction to OMM for MDs and DOs

- May 20, 2024 – May 23, 2024 Kirksville, MO
- NCOPPE & KCOM

ATSU | A.T. Still University

FIRST IN WHOLE PERSON HEALTHCARE

SEGMENTAL DIAGNOSIS OF THE THORACIC AND LUMBAR SPINE

Billy W. Strait, D.O.

Copyright © 2024, A.T. Still University/Kirksville College of Osteopathic Medicine.
This presentation is intended for ATSU/KCOM use only. No part of this presentation may be distributed, reproduced or uploaded/posted on any Internet web sites without the expressed written consent from the author or ATSU/KCOM OMM Department Chairperson.

Billy Strait, DO

Billy Strait, DO, is an associate professor at A.T. Still University's Kirksville College of Osteopathic Medicine (ATSU-KCOM) and also serves as the OMM fellows director. Dr. Strait is board certified in Neuromusculoskeletal Medicine & Osteopathic Manipulative Medicine. He earned his doctor of osteopathic medicine from ATSU-KCOM, and he completed residency at Northeast Regional Medical Center.

Speaker Disclosure Statements

The speaker(s) disclose that s/he has no relevant financial relationships with any organization producing, marketing, reselling, or distributing healthcare goods or services consumed by, or used on, patients relative to the content of this presentation.

Planning Committee Disclosure Statement

- The Continuing Education Steering Committee (CESC), Osteopathic Principles and Practice (OPP) Committee members, and planners/reviewers of this activity disclose that they have no relevant financial relationships with any organization producing, marking, reselling, or distributing health care goods or services consumed by, or used on, patients relative to the content of this presentation.
- The copyrighted materials available in this PowerPoint are for educational use only. Redistribution of copyrighted materials is not permitted.
- No discussion of off-label use and/or investigation used in this presentation.

TOPICS:

- Discuss the Osteopathic Examination
- Review Functional Anatomy & Spinal Landmarks of the T&L Spine
- Introduce the “Rule of Three’s” for the T&L Spine
- Practice Screening for Normal Motion and Somatic Dysfunction of the T&L Spine

TOPICS (cont.):

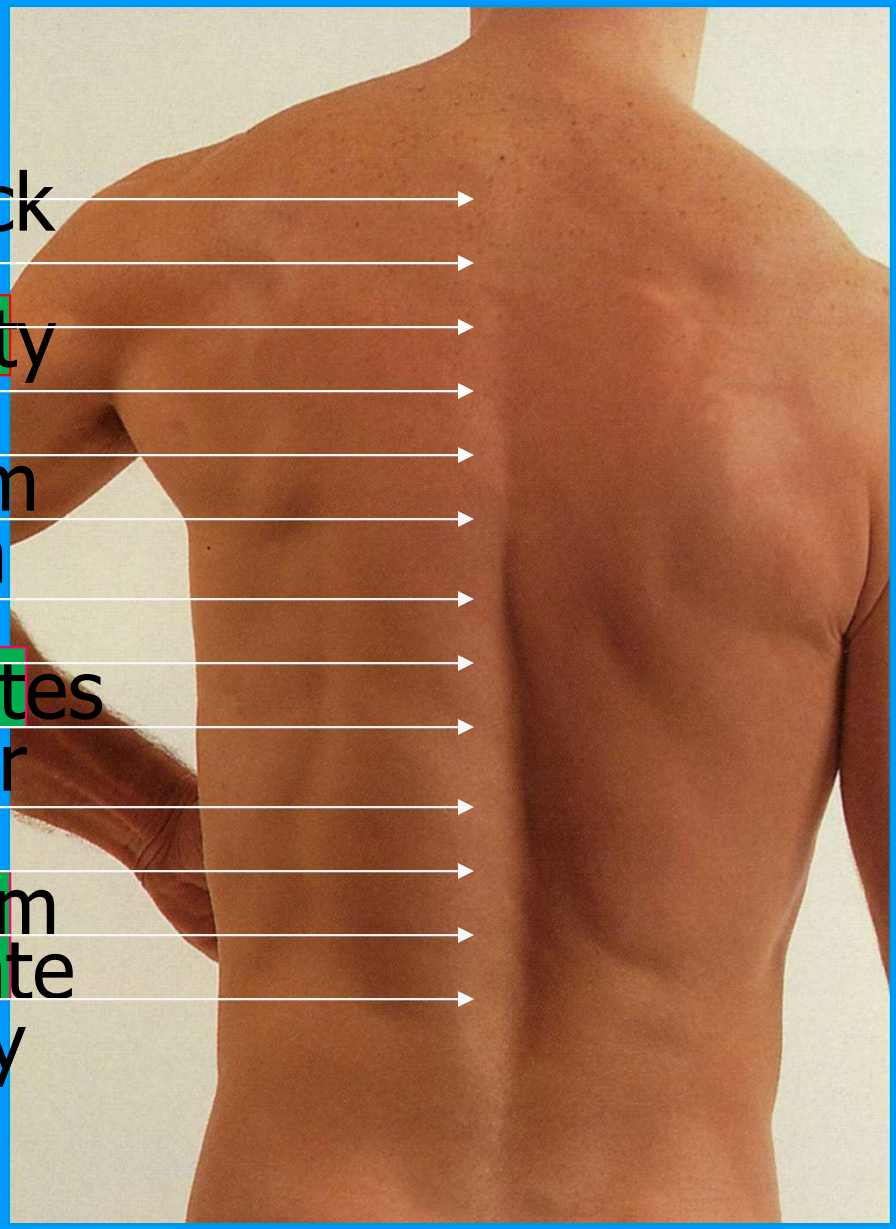
- Discuss Motion Testing of the T&L Spine
- Describe How to Name Vertebral Motion & Somatic Dysfunction
- Review Steps for Segmental Motion Testing
- Demonstrate how to Perform Passive (Neutral) Testing for Rotation, Sidebending, & Flexion/Extension

Integrated Osteopathic Neuromusculoskeletal Examination

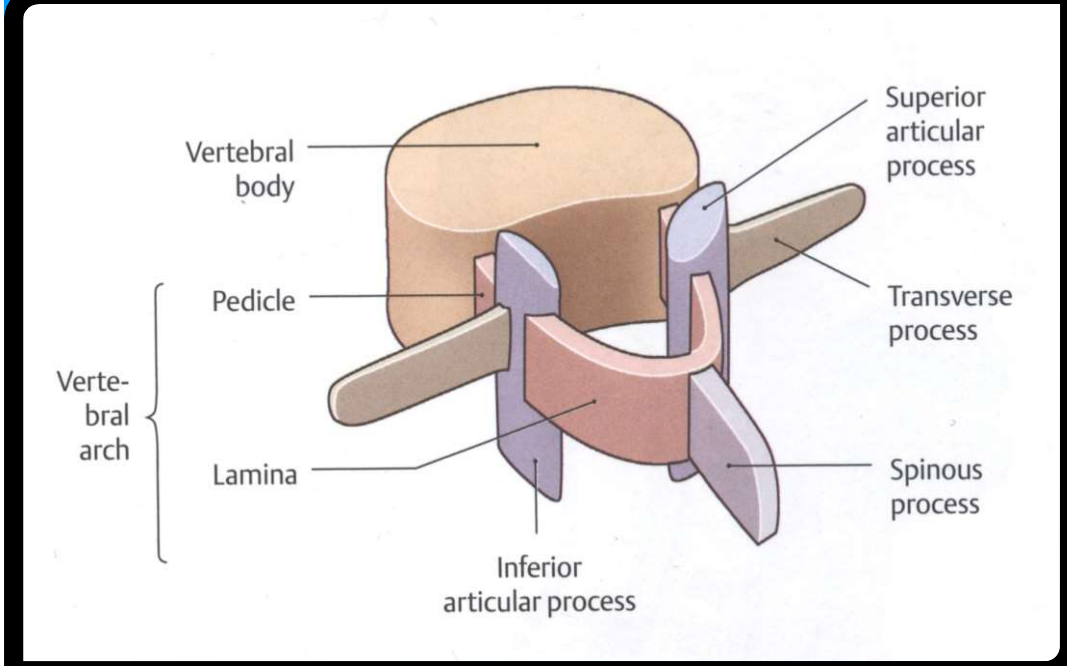
- Links structure and function
- Provides information for primary musculoskeletal dysfunction
- Provides info for systemic disease
- Expanded data base for Dx and Tx
- Allows for host support (Homeostasis)

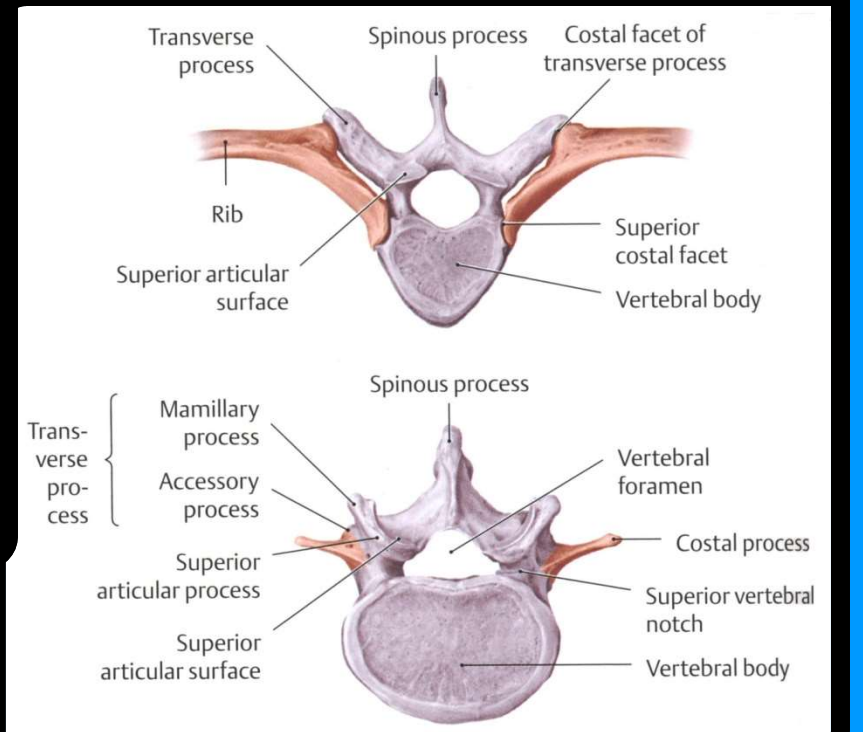
Somatotopic Relationships to Sympathetic Function

- T1-4 Head and Neck
- T1-6 Heart, Lungs
- T2-8 Upper Extremity
- T2-8 Esophagus
- T5-9 Upper GI System
- T10-11 Mid GI System
- T10-Kidney
- T 10-11-Ovaries, Testes
- T11-L1 Upper Ureter
- T12-L2 Bladder
- T12-L2 Lower GI System
- T12-L2 Uterus, Prostate
- T11-L2 Lower Extremity



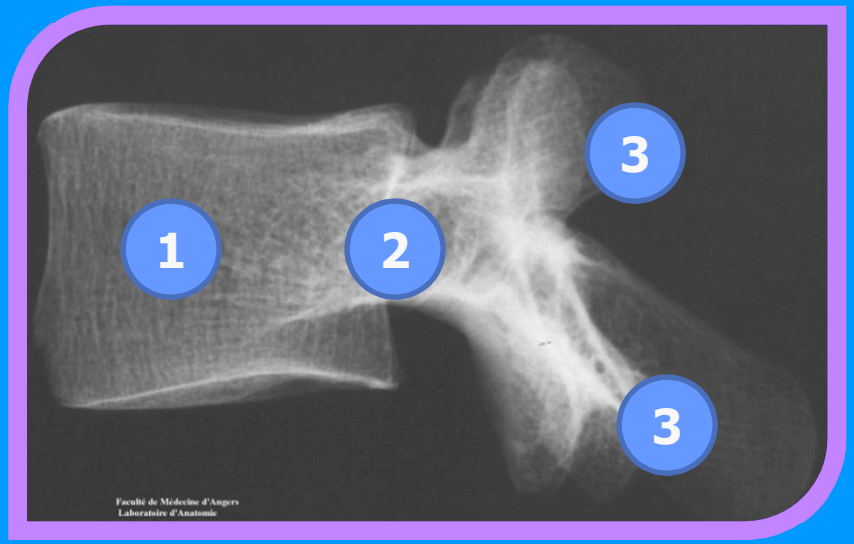
The Structure and Components of the Thoracic and Lumbar Vertebra





Functional Components of a Typical Vertebra

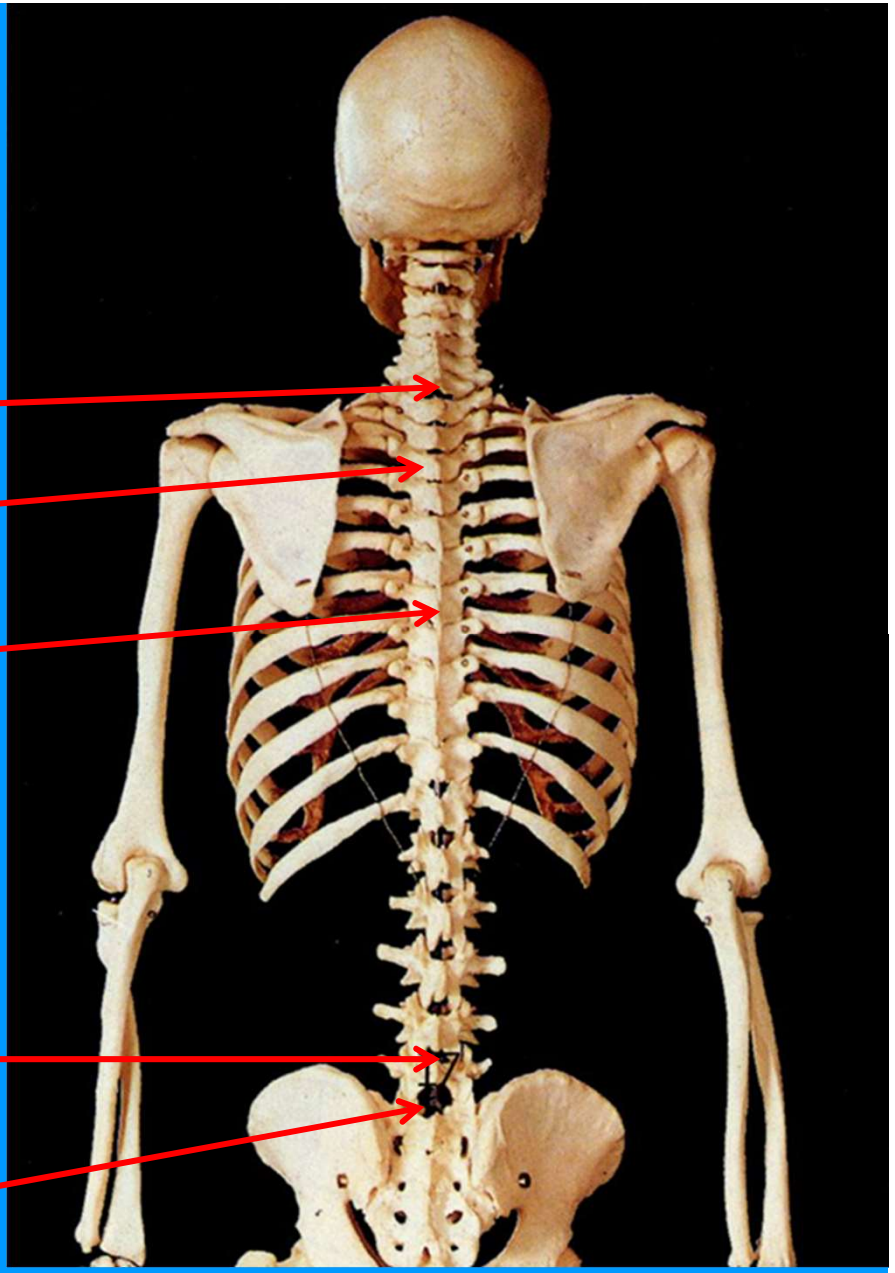
1. Vertebral body - load-bearing.
2. Pedicles – transmit forces from the posterior elements to the vertebral bodies and encase the spinal cord
3. Posterior elements – inferior facets lock into superior facets below to resist forward sliding and rotation.



Spinal Anatomy Landmarks and Surface Anatomy Relationships

- Vertebra Prominens: C7
- Scapular Spine: T3
- Inferior Angle of the Scapula: T7

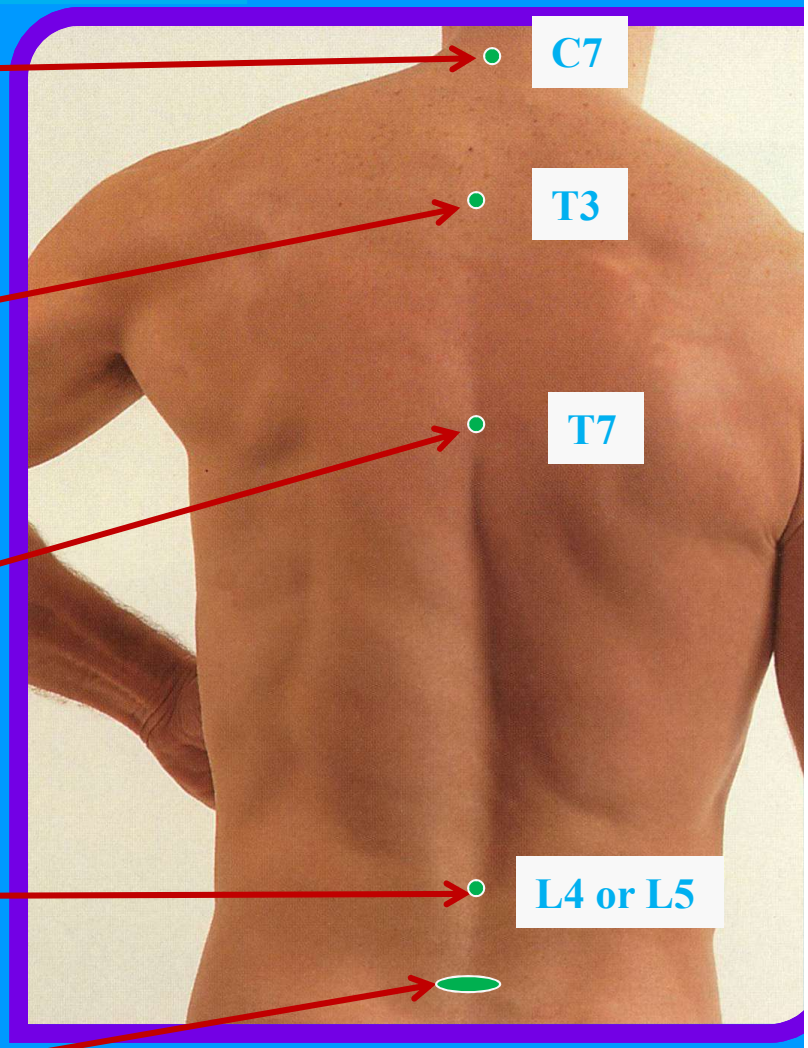
- Iliac Crests: L4-Male L5-Female*
- Sacral Dimples: L5/Base interspace



*See "Reliabilty of Tuffier's Line as an Anatomic Landmark", Snider et al

Demo/Practice: Identify Landmarks

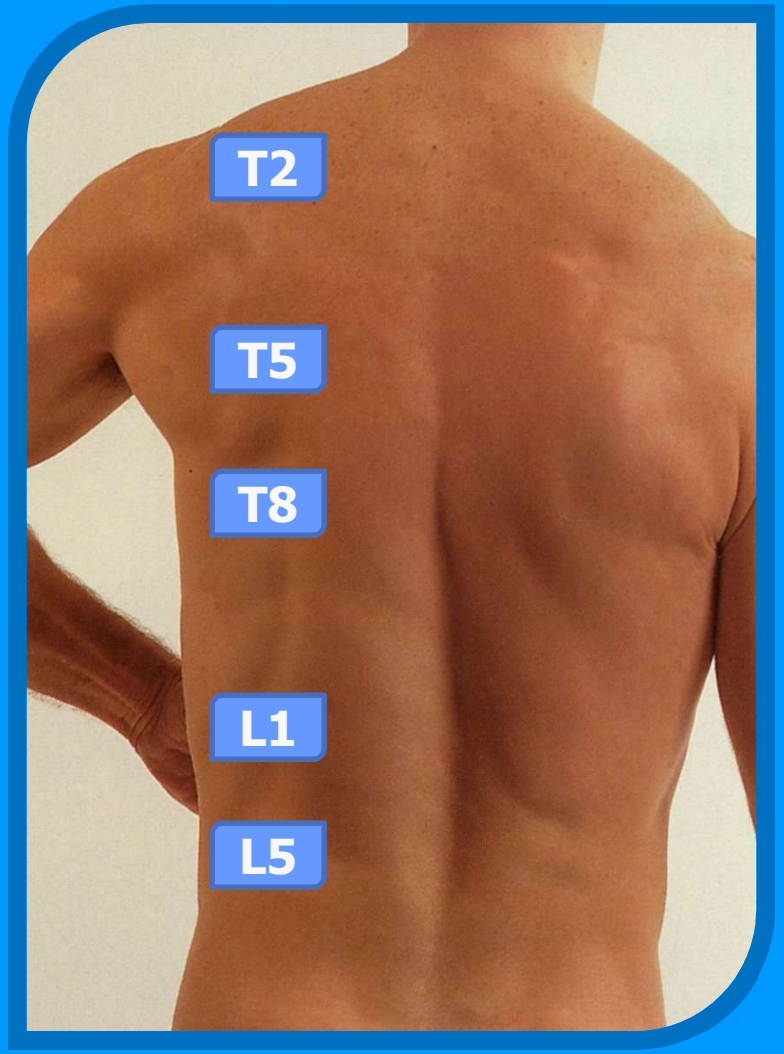
1. Vertebra Prominens: C7 (pt. seated; rotate head L. & R. to find motion, T1 no motion)
2. Scapular Spine: level w/ T3 (pt. prone)
3. Inferior Angle of the Scapula: level w/ T7 (T8) (pt. prone)
4. Iliac Crests: level w/ L4-Male, L5-Female (pt. prone)
5. Sacral Dimples: level w/ L5/sacral base interspace (prone)



Relationships of the Spinous Processes (SP) to the Transverse Processes (TP)

1. Rule of Three's for Thoracic Vertebrae

2. Lumbar Vertebra-- TP & SP in the same plane



Rule of Threes for the Thoracic Vertebrae

-T1-3: transverse process at same level of spinous process

-T4-6: TP ½ level superior to SP

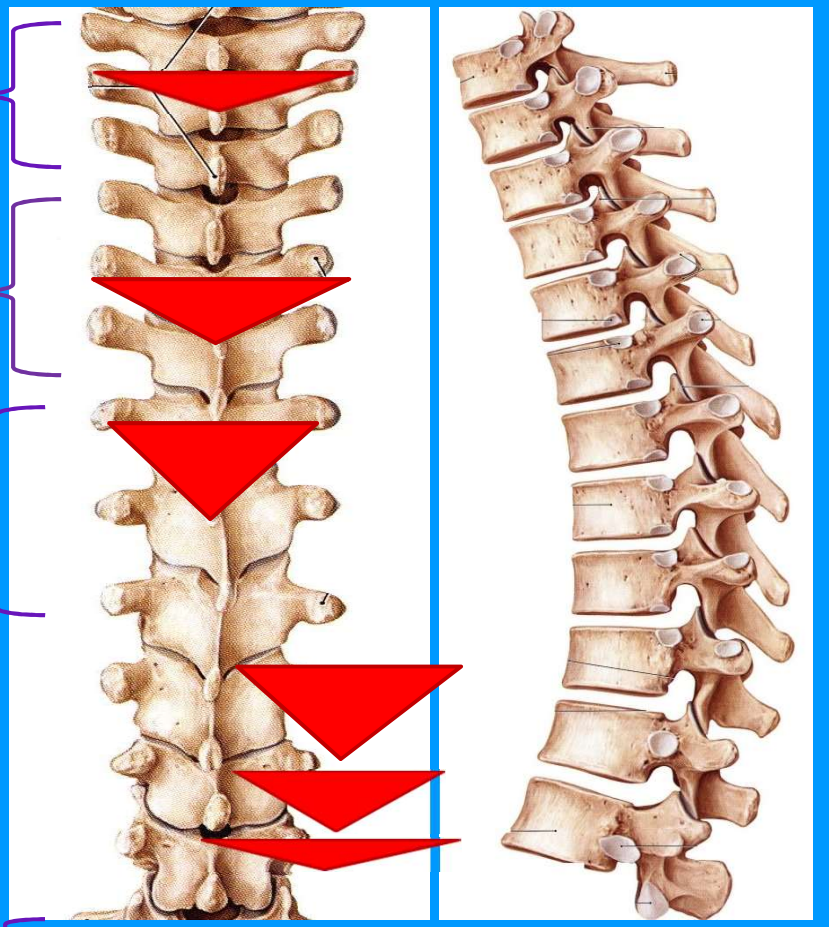
-T7-9: TP 1 level superior to SP

-T10: TP 1 level superior

-T11: TP ½ level superior

-T12: TP at same level of SP

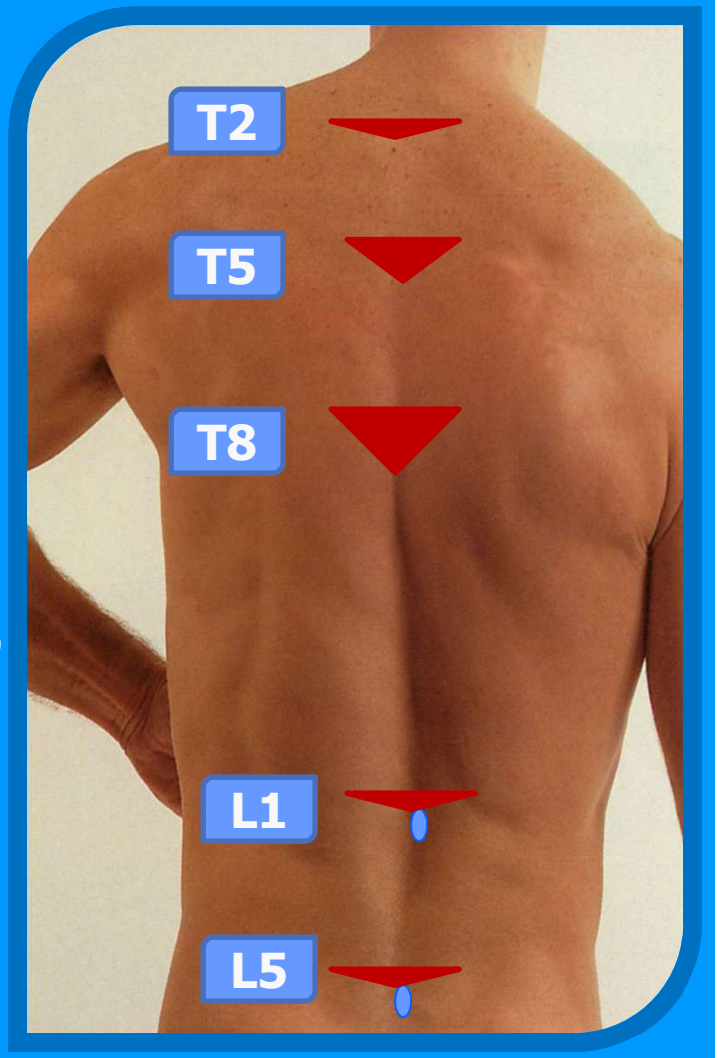
-Lumbar transverse processes at superior aspect of same spinous processes



See Magee pp 472, 73

Demo/Practice: Rule of 3's

- T1-3: transverse process at same level as spinous process
- T4-6: transverse process ½ level superior to spinous process
- T7-9: transverse process 1 level superior to spinous process
- T10: transverse process 1 level sup
- T11: transverse process ½ level sup
- T12: transverse process same level
- Lumbar: transverse processes at superior aspect of same spinous processes (& more lateral)



SCREENING TOOLS FOR SOMATIC DYSFUNCTION

-Tissue Texture Abnormalities

-Prone Springing

-Seated Rotation

-Seated Sidebending

--Other…

Screening for Simple Motion or Sagittal Plane Motion: Spinal Spring Test

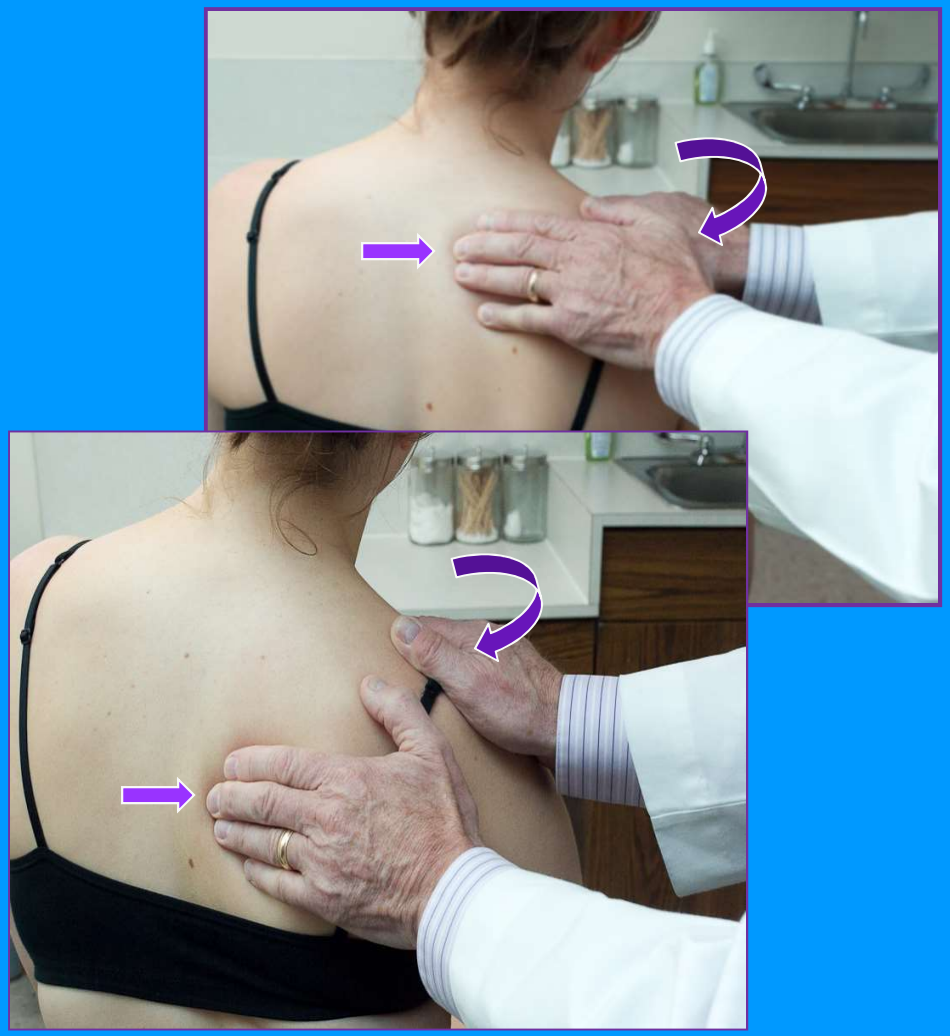
- Patient prone
- Spring perpendicular to spinal segments
- Identify areas of resistance or enhanced motion

Demo/Practice: Spinal Spring Test
(spring at 90 deg. to curve & look for areas of resistance & name levels)

Screening for Compound Motion: Palpation Screen for Rotation

- Patient is seated in a natural posture
- Contact shoulder with superior hand other hand palpating for rotation of the spine
- Direct rotation to segments being evaluated
- Identify areas of freedom or resistance to motion

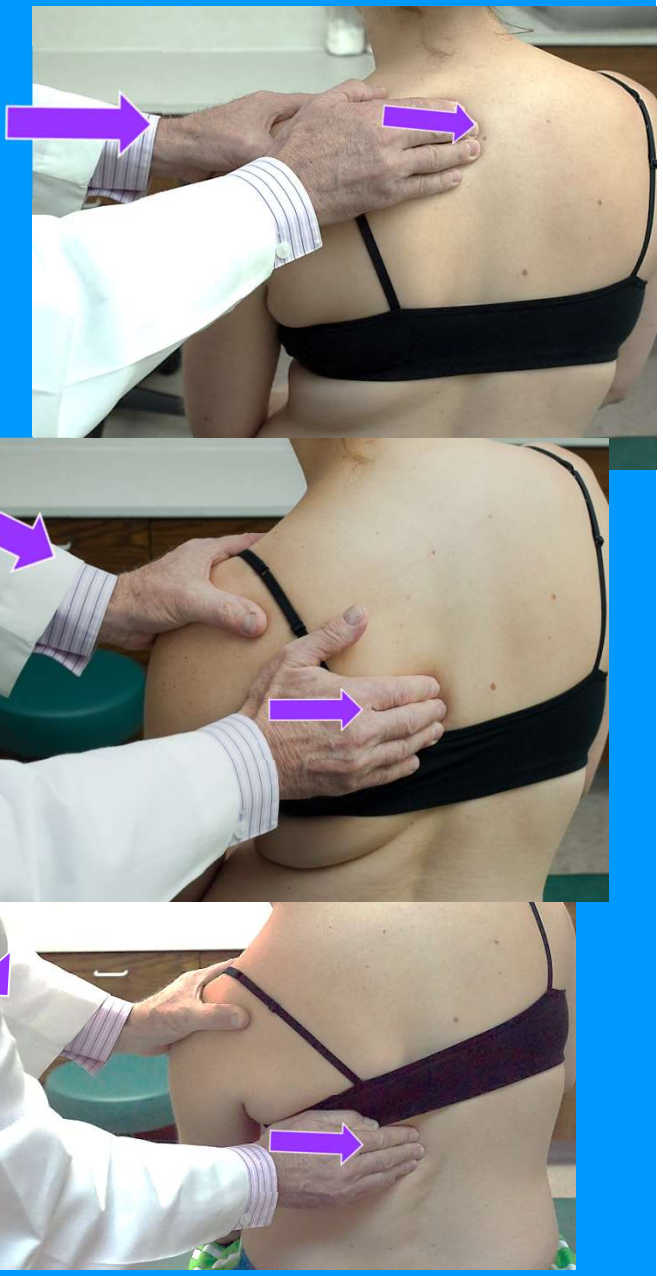
Demo/Practice: Rotation Screen



1. Superior hand directs rotation to segments being evaluated
2. other hand palpates for rotation along the ipsilateral spine at the SP or TP—is there resistance to motion?
3. Check both sides

Demo/Practice:
Seated Sidebending Screen

1. Superior hand directs sidebending vectors progressively inferior
2. The other hand palpates for sidebending along the ipsilateral spinous process area
3. Vertebral segments approximate on the concave side and separate on the convex side
4. Identify areas of resistance to motion; repeat on other side

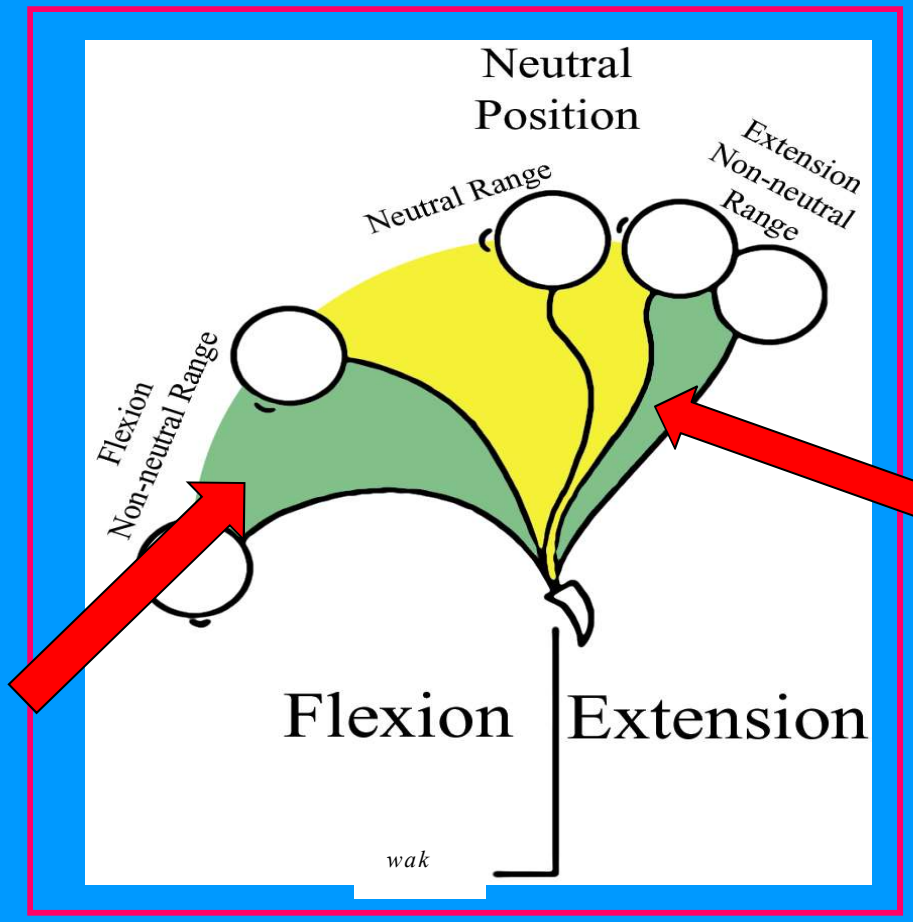


MOTION TESTING - OVERVIEW

- **Passive Testing - evaluates sagittal, coronal, and horizontal plane motion with the spine in neutral position; (Pt. prone & doesn't move, you move the pt.)**

NEUTRAL & NON-NEUTRAL RANGES OF BODY POSITIONS:

FLEXION, NEUTRAL, EXTENSION

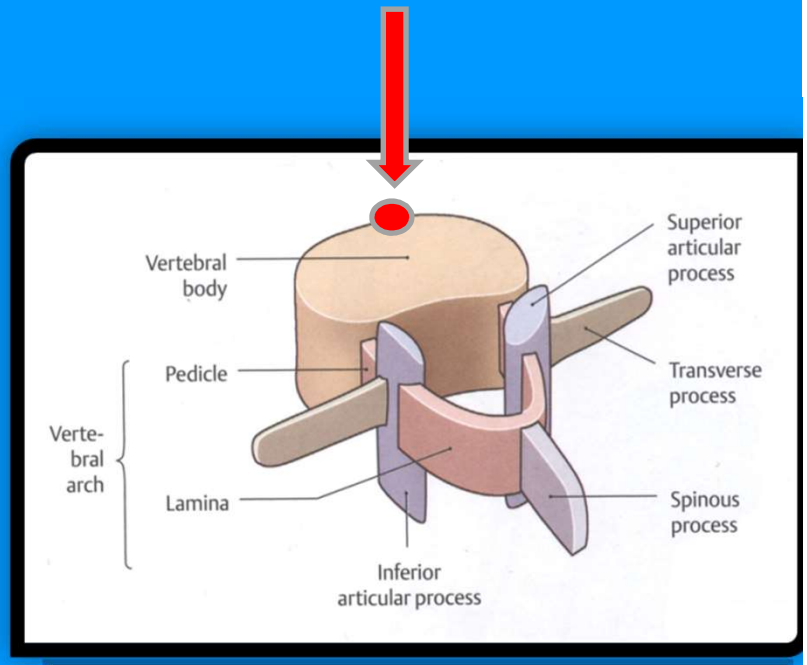


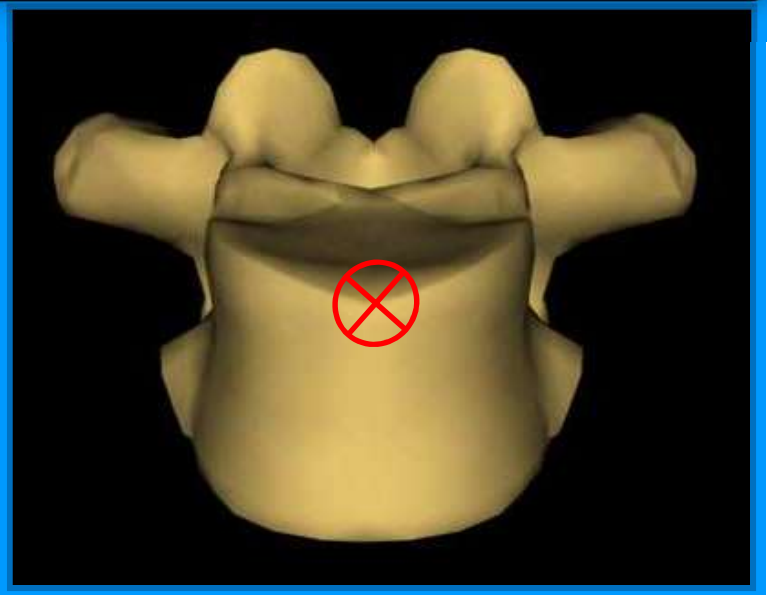
Non-neutral Flexion

Non-neutral Extension

NOMENCLATURE

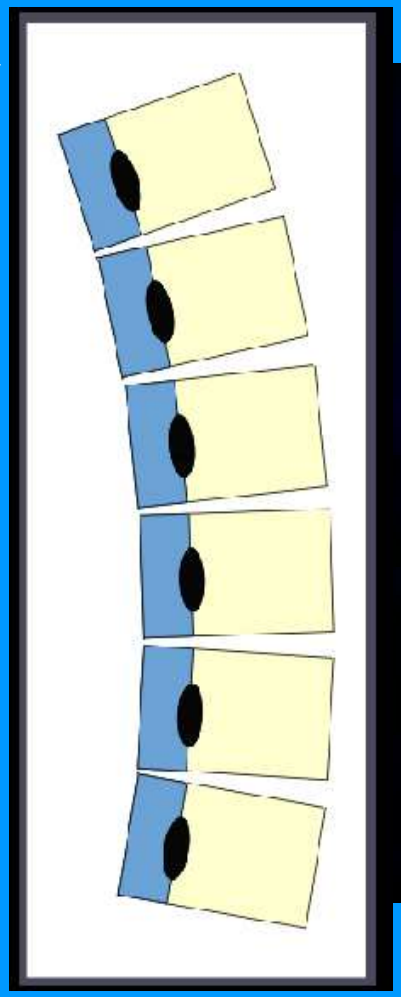
- In Osteopathic terminology and record keeping, motion of a bone is described from Anatomic Position
- Vertebral motion is named for a point on the most **SUPERIOR AND ANTERIOR** portion of the vertebral body
- Important for naming motion & somatic dysfunction





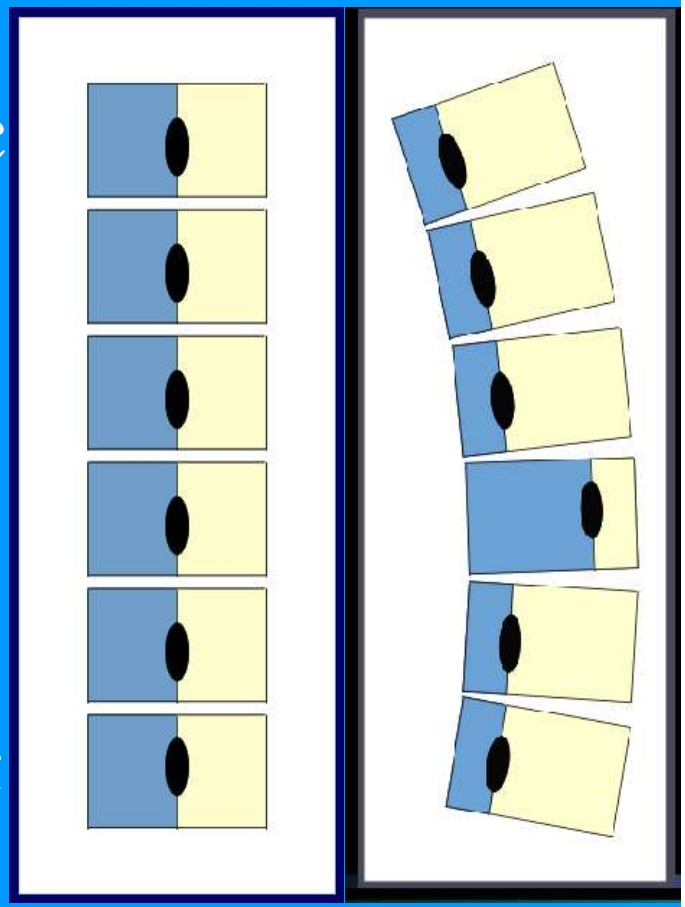
Normal Spinal Motion: Principle 1- Neutral Motion, Type I

- The figure depicts articulated spinal vertebrae displaying Neutral, Type I physiologic motion
- Sidebending and rotation occur in opposite directions-$S_L R_R$



Normal Spinal Motion: Principle 2- Non-Neutral Motion, Type II

- The figure depicts articulated spinal vertebrae displaying Nonneutral, Type II physiologic motion
- When sagittal plane enters nonneutral range, rotation and sidebending occur in the same directions & commonly occur with a single segment located at the apex of the curve--FR_LS_L



STEPS FOR SEGMENTAL MOTION TESTING

- Observe thoracic and lumbar spine
- Evaluate tissue texture changes, asymmetry, and temperature
- Screen with prone springing
- Passive testing (pt. prone)

- Record results

MEDICAL RECORD KEEPING FORMAT (REVIEW)

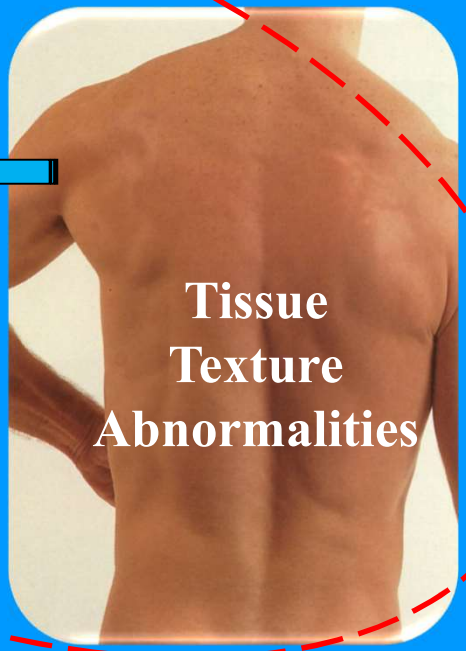
Describe:

- ✓ **Tissue texture changes**
- ✓ **Tenderness**
- ✓ **Vertebral level(s) involved**
- ✓ **Asymmetries of position**
- ✓ **Preference for Rotation, Sidebending and Sagittal plane**
- ✓ **Always include N for neutral preference**

PALPATORY SCREENING FOR THORACIC AND LUMBAR SPINE–PASSIVE METHOD

Spinal Spring Test

Sidebending: Thoracic and Lumbar



Tissue Texture Abnormalities

Rotation: Thoracic and Lumbar

PASSIVE MOTION TESTING FOR SOMATIC DYSFUNCTION

- Simple Motion – Flexion/Extension
- Compound or Coupled Motion – Biaxial or Triaxial

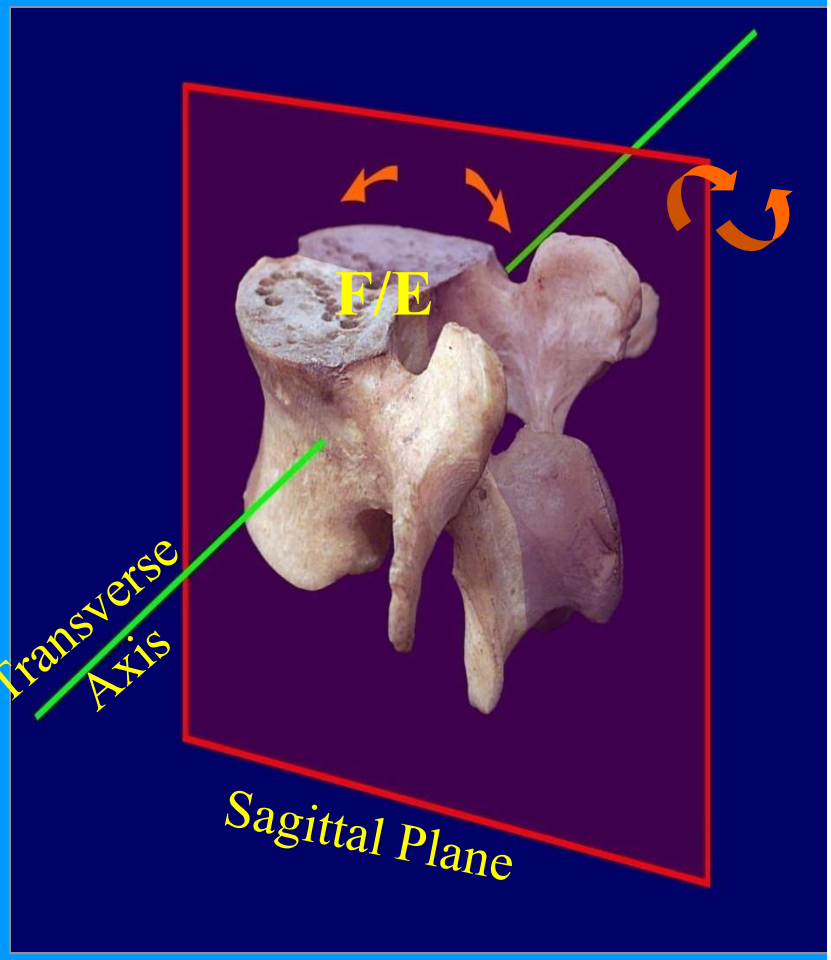
Perform **Passive Motion Testing** (prone pt. doesn't move, you move the pt.):

- Evaluate Flexion/extension (sagittal plane)
- Evaluate Rotation (horizontal plane)
- Evaluate Sidebending (coronal plane)

PASSIVE TESTING: FLEXION/EXTENSION

Evaluate sagittal plane motions (flexion/extension):

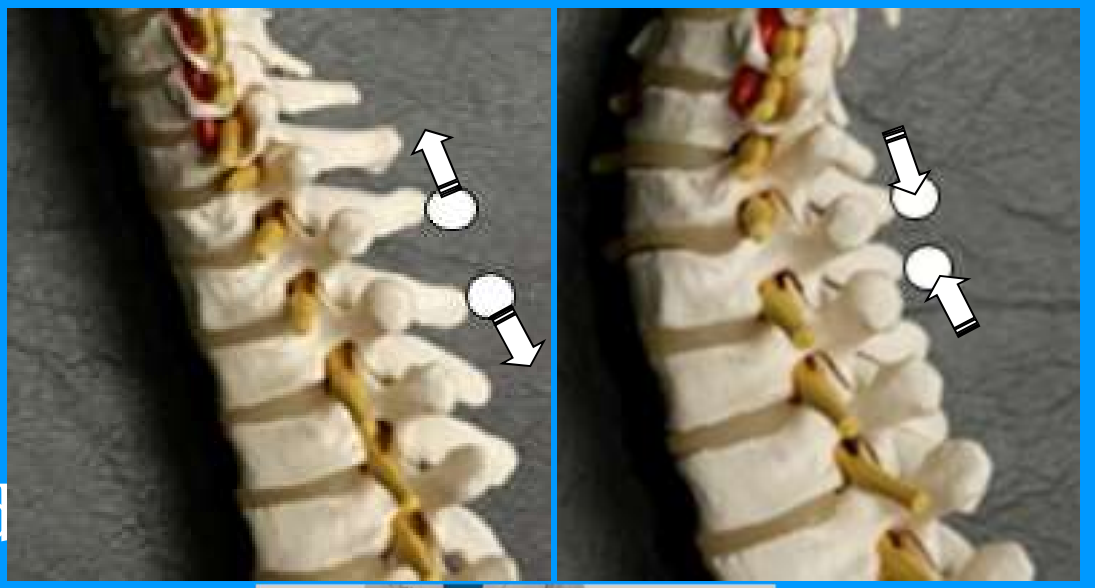
- **Operators finger pads on the tips of spinous processes (or interspaces)**
- **Forward/backward bending is induced and evaluated (sphinx for Thor. & lat. recumbant for Lumb.)**
- **Asymmetric motion recorded for the way it likes to go: F or E (N for no preference)**



Demo/Practice:

Passive Motion Testing for Flexion/Extension

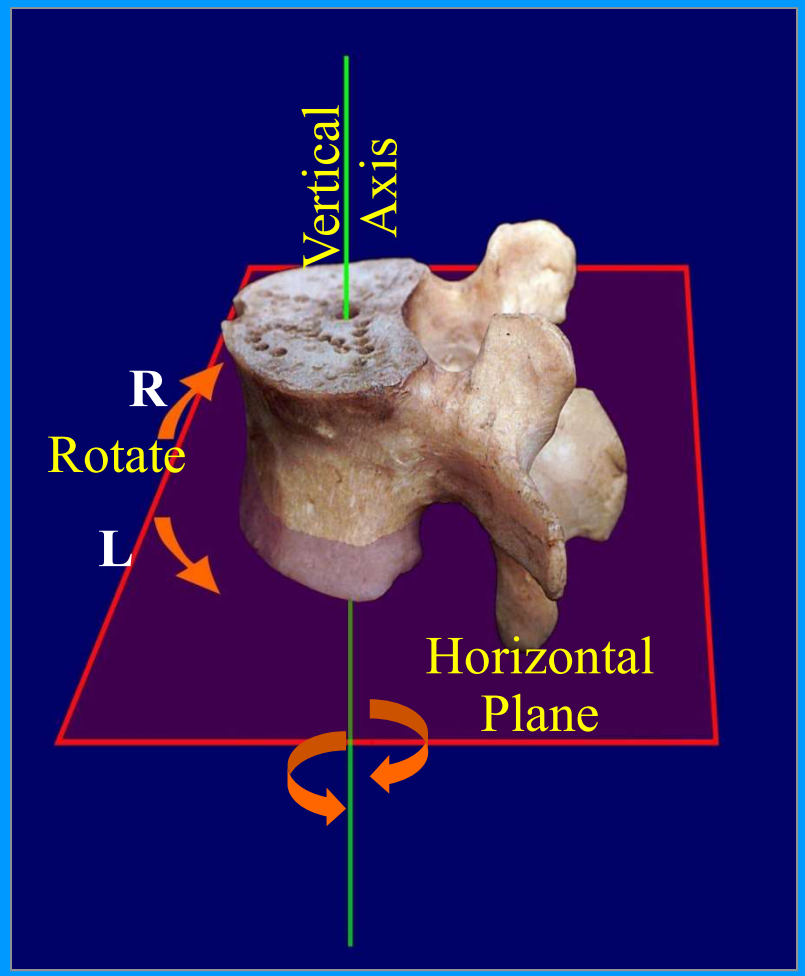
1. Operator's finger pads on the tips of spinous processes (or interspaces)
2. Forward/backward bending is induced and evaluated (sphinx for Thor. & lat. recumbant for Lumb.)
3. Asymmetric motion recorded for the way it likes to go: F, E (N for no preference)



PASSIVE TESTING: ROTATION

To evaluate horizontal plane motions (rotation):

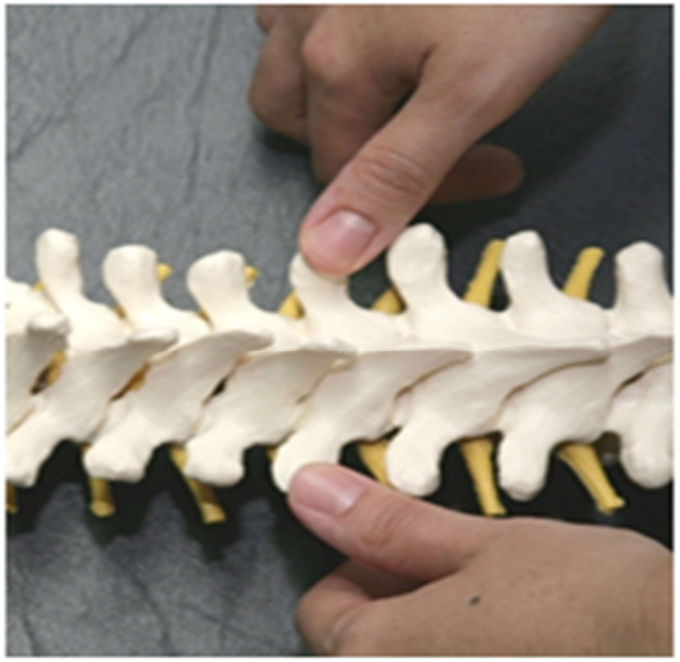
- Operator's thumbs contact transverse processes
- Alternately press anteriorly to induce left and right rotation
- Asymmetric motion is recorded for the way it likes to go: R_R or R_L

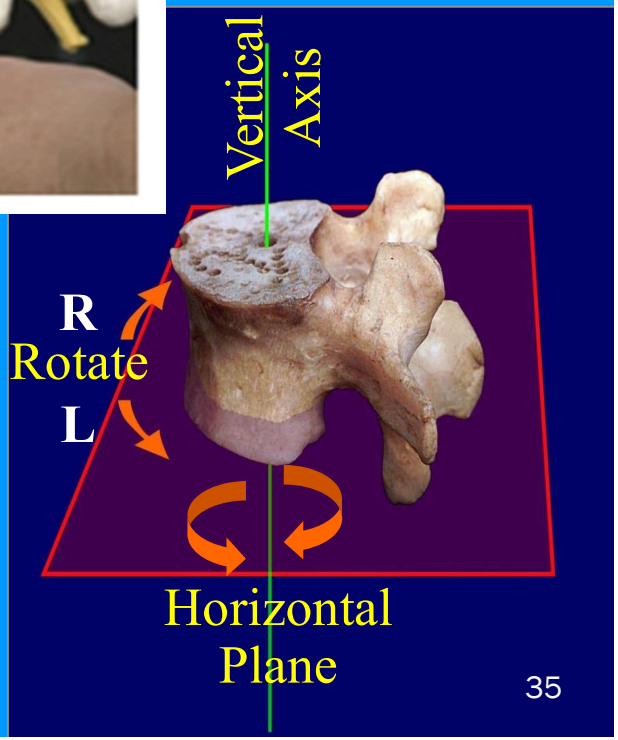


Demo/Practice:

Passive (Prone) Testing for Rotation: R_R or R_L

1. Operator's thumbs contact transverse processes found in screening
2. Alternately press anteriorly to induce left and right rotation
3. Asymmetric motion is recorded for the way it likes to go: R_R or R_L

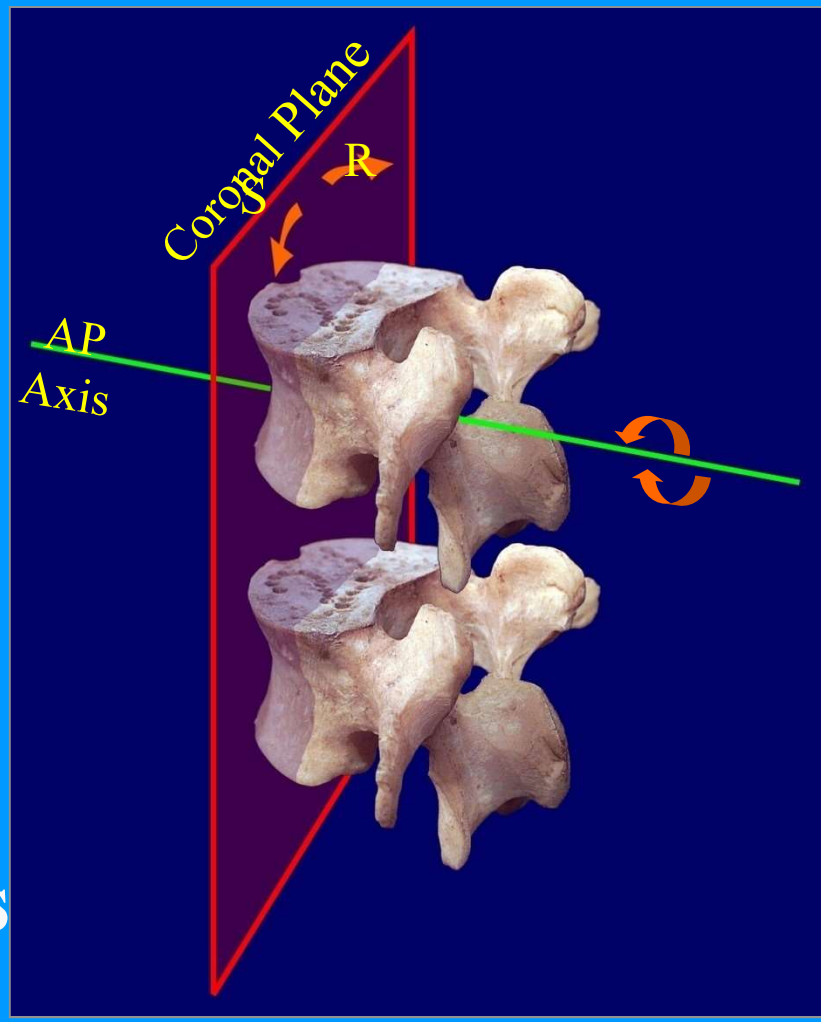




PASSIVE TESTING: SIDEBENDING

Evaluate coronal plane motions (sidebending):

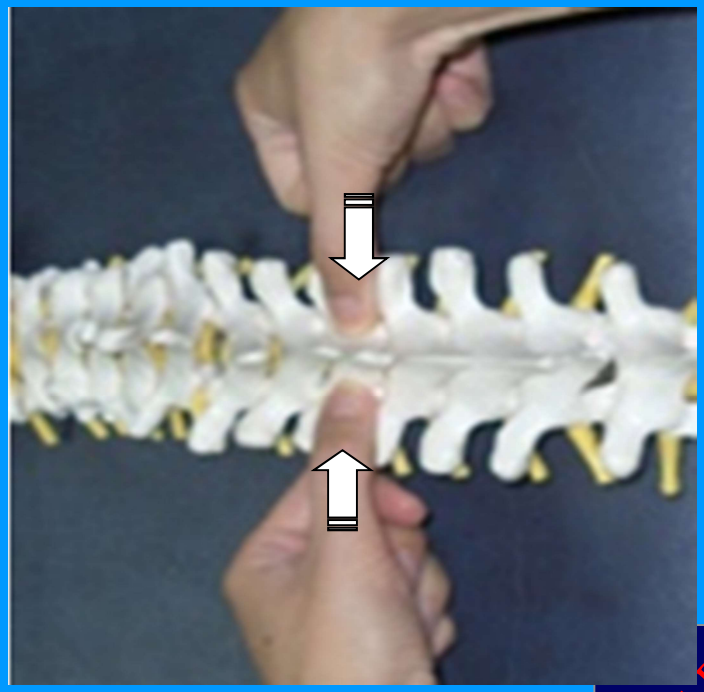
- **The operator's thumbs contact the facet junction (sl. inf. & med. to TP-base of the TP)**
- **Alternately press medially to induce left and right sidebending**
- **Asymmetric motion recorded for the way it likes to go: S_R or S_L**

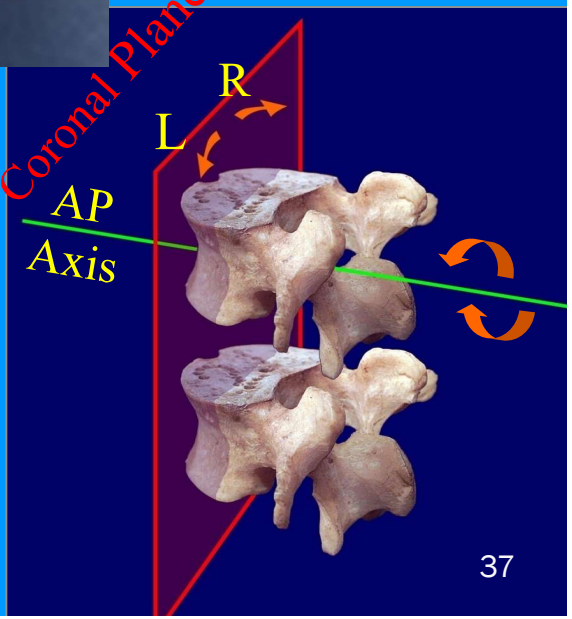


Demo/Practice:

Passive Motion Testing for Sidebending: S_R or S_L

1. The operator's thumbs contact the facet junction (sl. inf. & med. to tip of TP-base of the TP)
2. Alternately press medially to induce left and right sidebending
3. Asymmetric motion recorded for the way it likes to go: S_R or S_L





TYPICAL NOMENCLATURE FOR SOMATIC DYSFUNCTION: PASSIVE TESTING METHOD

- **Type I dysfunction:** ***NSxRy =neutral, sidebent and rotated in opposite directions;***
  eg. NS_RR_L= Neutral, Sidebent Right, Rotated Left; (usually found in groups of 3 or more)
- **Type II dysfunction :** ***(F or E)RxSx=flexed or extended, rotated and sidebent in the same directions;***
  eg. $FR_R\ S_R$ = Flexed, Rotated Right, Sidebent Right; (usually one segment, maybe 2)
- **Sagittal plane dysfunction:** ***F or E=Flexed or extended;*** **eg. T4 Flexed; (one or groups)**

WHAT IS WRONG WITH THESE DIAGNOSES?

- T7 N $R_L S_L$
- F $R_L S_L$
- L2 E $R_R S_L$
- T9 F $R_L S_R$
- T4-7 N $R_L S_R$

PARTING SHOT

Passive Testing Method:

- *Asymmetry and restriction of motion*, along with tissue texture changes and tenderness indicate dysfunction
- The conclusions of triaxial motion testing are recorded using standard nomenclature
- Both Type I and II dysfunction can be determined
- Type I dysfunction is commonly found, however, Type II dysfunction may be more painful or clinically significant
- All diagnoses named for the way they like to go!!

REFERENCES:

- Chila, A.G. (ed.): Foundations for Osteopathic Medicine 3rd Edition, Lippincott Williams & Wilkins, Baltimore, MD, 2011.
- Kimberly, P.; Outline of Osteopathic Manipulative Procedures: Kimberly Manual, 2006 Edition (updated 2008)
- Netter, Frank H.: Atlas of Human Anatomy 7th edition, Hoechstetter Printing Company Inc., New York, New York, 2018