OMM

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Useful resources

Dirty Medicine OMM: https://youtu.be/Q1_ZkS_u1_Q

OMM slides: https://docs.google.com/presentation/d/13xNcxVUaXbBsZgCDoeZPMiRgjIdJmp7y/edit#slide=id.p1

OPP/ COMAT review: https://jeopardylabs.com/play/opp-comat-review

Quizlet: https://quizlet.com/583351984/omm-related-combank-topics-flash-cards/

https://quizlet.com/583351984/omm-related-combank-topics-flash-cards/

Qbanks: Comquest, Combank, Uworld

Online MedEd: https://onlinemeded.org/spa/omm

COMAT breakdown:

1. MET diagnosis and treatment: ~ 20-30 questions**
2. Sacral and innominate diagnosis and treatment: ~10 questions
3. Cranial diagnosis and treatment: ~10 questions
4. Counterstrain treatment (neck, ribs, abdomen, leg, arm/ hand): ~15 questions
5. Viscerosomatics: ~10 questions
6. Lymphatics: ~ 5 questions
7. Stills technique vs FPR: ~5 questions
8. Radial head and fibular head dysfunction: ~5 questions

Diagnose somatic dysfunction **

If given the set up for treatment, delineate and reverse. Name it for what it likes

- Better in extension= its extended
- Better in flexion= its flexed
- Moved into restrictive barrier
    - Sidebend left → doesn't like left, so its sidebent right
    - Sidebend right → doesn't like right, so its sidebent left

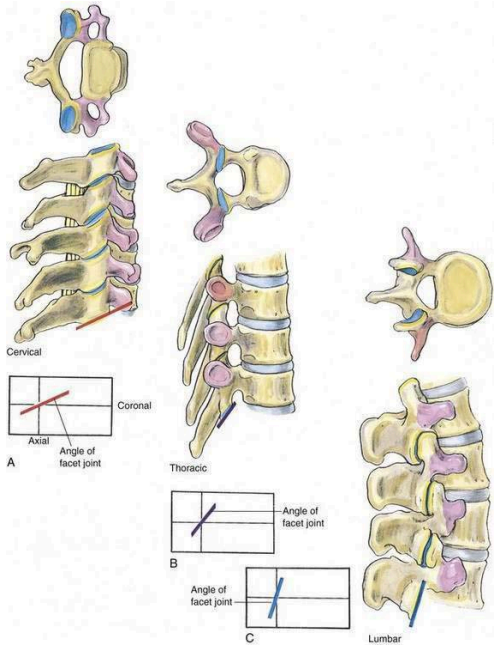
Rule of 3's

The angulation of the spinous processes (SPs) of the thoracic spine varies in relation to its transverse processes (TPs) as one moves down the spinal column. The **thoracic rule of threes** is a tool utilized to locate the SPs and TPs in relation to one another, as follows:

- T1, T2, T3—the tip of the SP is in the same plane as the TP of that same vertebrae.
- T4, T5, T6—the tip of the SP lies in a plane halfway between that vertebrae's TP and the TP of the vertebrae below (eg, the T4 SP is midway between the TPs of T4 and T5).
- T7, T8, T9—the tip of the SP is in a plane with the TP of the vertebrae below it (eg, the T8 SP lies at the level of the T9 TP).
- T10, T11, T12—each progressing vertebrae follows the above rules in regressing order.
    - The SP of T10 lies at the level of the TP of T11 (following rule #3).
    - The SP of T11 lies midway between the TPs of T11 and T12 (following rule #2).
    - The SP of T12 lies at the level of the TP of T12 (following rule #1).

Spinous process and transverse process

- BUM, cervical = BUM = superior facet surface faces back up and medial.
- BUL, thoracic = BUL = superior facet surface faces back up and lateral.
    - T1-3= SP= TP
    - T4-6= SP half-way below respective TP
    - T7-9= SP in TP below it
    - T10-12= rule 3, 2, 1
- BM, lumbar = BUM = superior facet surface faces back up and medial.



Tender point vs trigger point vs chapman point

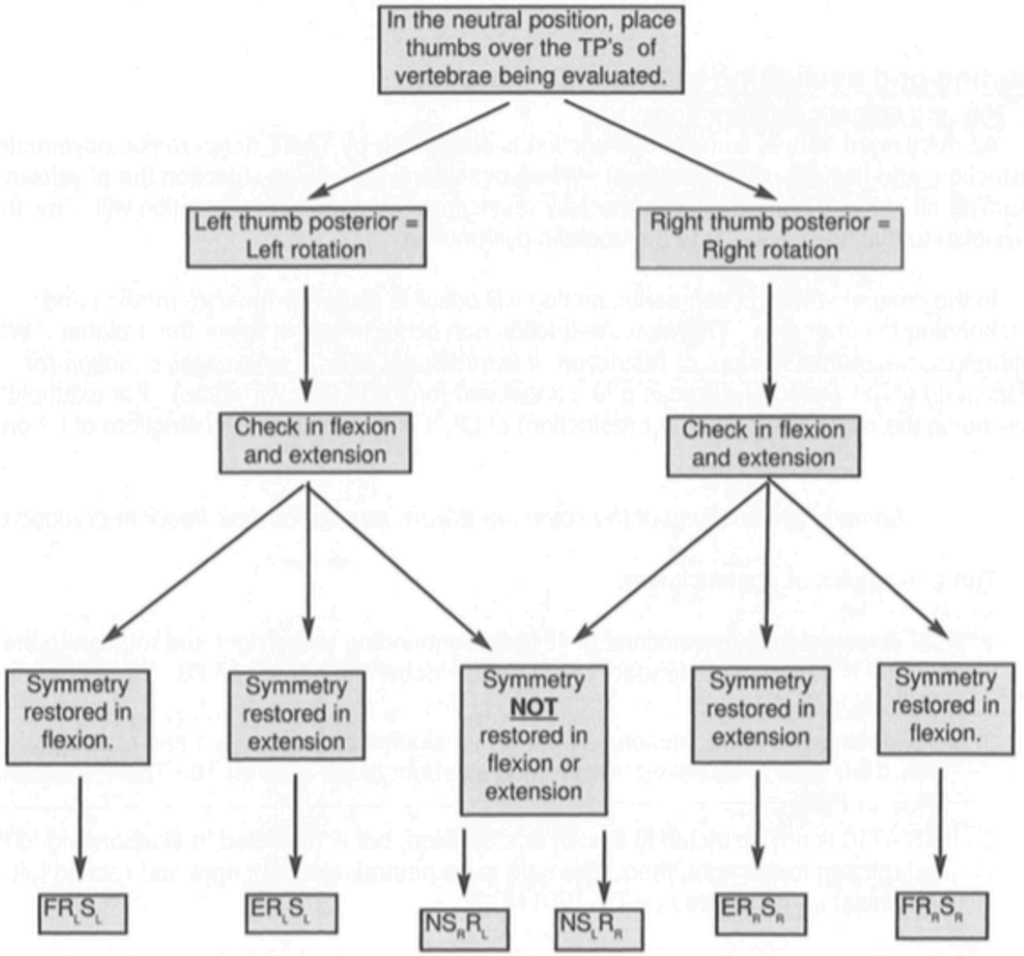
	Pathophysiology	Characteristics
Tender point	Somatic dysfunction	• Fingertip-sized areas of exquisite tenderness in tendon/muscle/ligament • No referred pain
Trigger point	Somatosomatic reflex	• Tender area within taut band of skeletal muscle • Pain referred to nearby structures
Chapman point	Viscerosomatic reflex	• 2-3 mm, discretely tender nodules in deep fascia, with predictable anterior/posterior distribution • Can aid in diagnosis of visceral disease

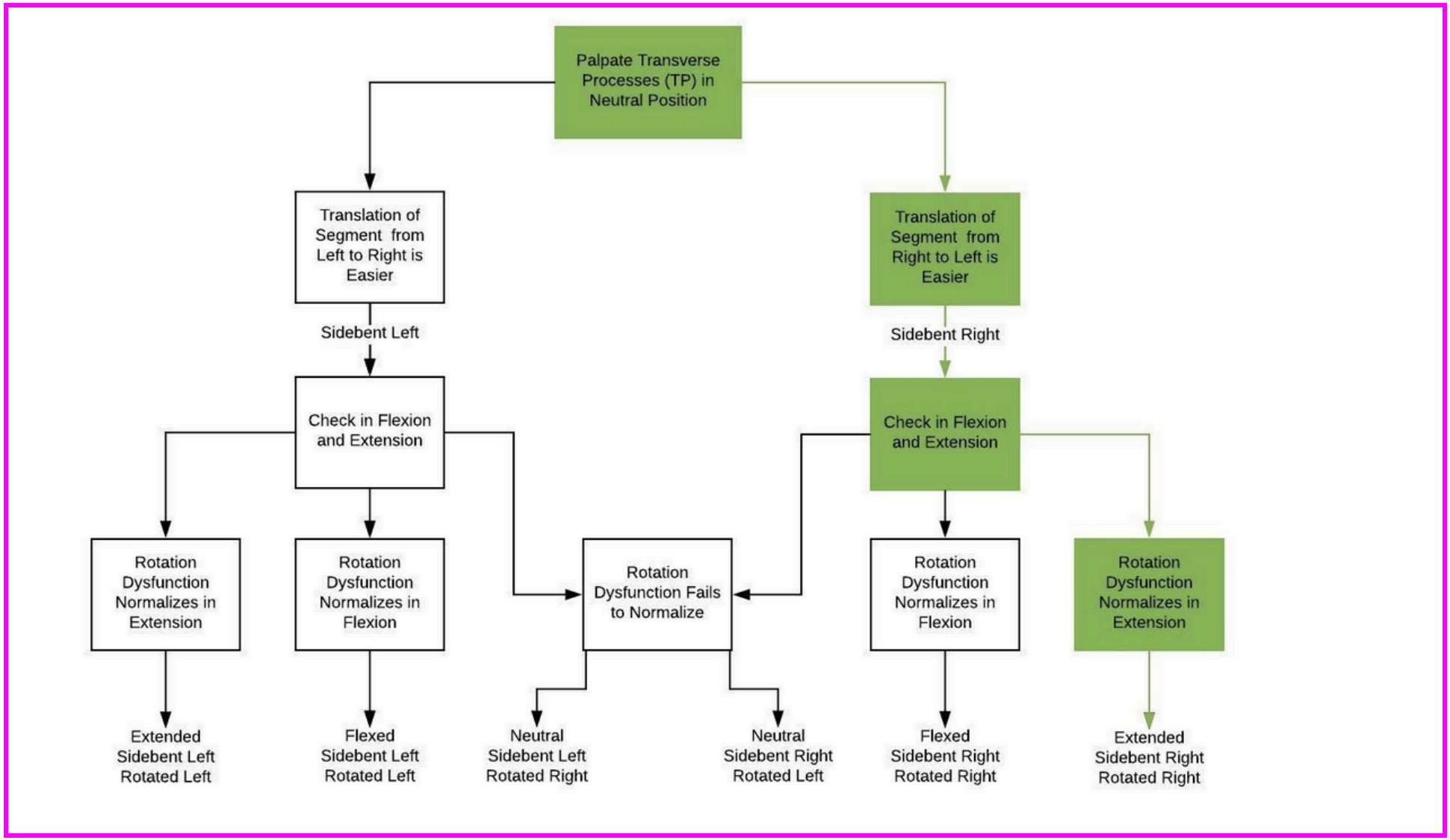
Tender points → tx with counterstrain
- Ribs held for 120 seconds

Trigger points → tx with myofascial release. Cause sharp and radiating pain

Chapman points: smooth, discrete nodules. Anterior chapman points are used to dx posterior points. Posterior points used for treatment

Algorithm for evaluating somatic dysfunction





Osteopathic Principles

The 5 Osteopathic Models
On the comat

Biomechanic	Posture, motion, optimal structure and function of MSK to affect body's homeostatic mechanism
Respiratory/ circulatory	Fluid movement, circulation and lymphatics for homeostatic responses
Metabolic/ energetic/ immune	Cell and organ function, nutrition, waste and metabolic processes; optimize body's biochemical processes, energy use
Neurologic	CNS and PNS, viscerosomatics
Behavioral	Sleep, exercise, social support, diet. Manage stress

Findings	Acute	Chronic
Tenderness	Severe, sharp	Dull, achy, burning
Asymmetry	Present (e.g., paravertebral fullness)	Present with compensation in other areas of the body Obvious rotoscoliosis or increased/decreased spinal curvature (regional lordosis or kyphosis)
Restriction	Present, painful with movement	Present, decreased or no pain
Tissue texture changes	Edematous, erythematous, boggy with increased moisture Muscles hypertonic	Decreased or no edema, no erythema, cool dry skin, with slight tension Contractions or decreased muscle tone, flaccid, fibrotic, ropiness, firmness/hardness of tissue

Direct	Indirect
MET HVLA MFR (both) Stills technique Articulatory Soft tissue	FPR MFR Counterstrain BLT
Direct Techniques	
Direct myofascial release	1. Put tissue into **<u>restrictive</u>** (single/ stacked) 2. Hold until release, reassess
Soft tissue	1. Apply stretch to tissue, **<u>rhythmically</u>** apply stretch 2. Improves blood circulation
Articulatory	1. Position to **restrictive barrier** (~MET) and push into barrier 1-2 seconds 2. Patient is passive
Muscle energy / Golgi technique	1. Position to **restrictive barrier** 2. Patient pushes against force 3. Position into another barrier, anatomic barrier 4. Post-isometric relaxation
Still technique • FPR is only a portion of stills • **INDIRECT → DIRECT** • **EASE → THEN COMPRESS**	1. Place in position of ease 2. Add localizing force, move through restrictive barrier 3. Return to neutral EASE- COMPRESS-BARRIER
HVLA	1. Ask for permission 2. Put into restrictive barrier Contraindications: never perform in extension Mets, fracture, AA joint (RA, Downs) OA, osteoporosis, disc herniation, RA

<table>
<tr><td></td><td>
<table>
<tr><th colspan="2">Contraindications to high velocity low amplitude (HVLA)</th></tr>
<tr><th>Underlying condition</th><th>Potential complication</th></tr>
<tr><td>Osteoporosis</td><td rowspan="4">Fracture</td></tr>
<tr><td>Osteomyelitis</td></tr>
<tr><td>Local bone malignancy</td></tr>
<tr><td>Joint replacement or ankylosis/spondylosis with fusion</td></tr>
<tr><td>Disc herniation with radiculopathy</td><td rowspan="2">Neurologic complications (ie, cauda equina syndrome, atlantoaxial instability)</td></tr>
<tr><td>Ligamentous instability (eg, severe rheumatoid arthritis or Down syndrome)</td></tr>
<tr><td>Vertebrobasilar insufficiency</td><td>Ischemic stroke</td></tr>
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</td></tr>
<tr><th colspan="2">Indirect techniques</th></tr>
<tr><td>Indirect MFR</td><td>1. Put tissue into position of ease (single/ stacked)</td></tr>
<tr><td>BLT (balanced ligamentous tension)
LAS</td><td>1. Exaggerate injury pattern and move to position of ease
2. Position in shifted neutral in all planes
3. Use activating force (respiration)
4. Wait for air hunger, return to neutral
Use in patients who cannot tolerate other techniques
*Disengage segment, exaggerate freedom, fine tune with respiration, palpate for release, reassess</td></tr>
<tr><td>FPR
- INDIRECT
- COMPRESS → THEN EASE</td><td>1. Flatten
2. Compression while in neutral
3. Take into ease/ what it likes
Treatment position is the same as the position of dysfunction
*place into neutral, apply compressive or torsional force, place back into ease, reassess</td></tr>
<tr><td>Counterstrain</td><td>1. Tender Point 10/10 rating scale</td></tr>
</table>

Gamma motor neuron	2. Place in position of ease 70% 3. Hold 90 seconds 4. Return to neutral 5. Reassess Treat most tender point first, treat proximal, 3+ TP → treat the middle point
Functional technique	Small motions with minimal force, elicit compliance
Other	
Fascial distortion model (direct & indirect)	**Trigger bands** (pull/ burn) **Herniated points** (fascial gap, little spot/ knot) **Continuum distortion** (from tendon to bone, spot painful at transition zone) **Folding distortion** (joint pain, need to refold) **Cylinder distortion** (bizarre symptoms) **Tectonic distortion** (joint symptoms)
Dynamic strain	Inherent tissue motion

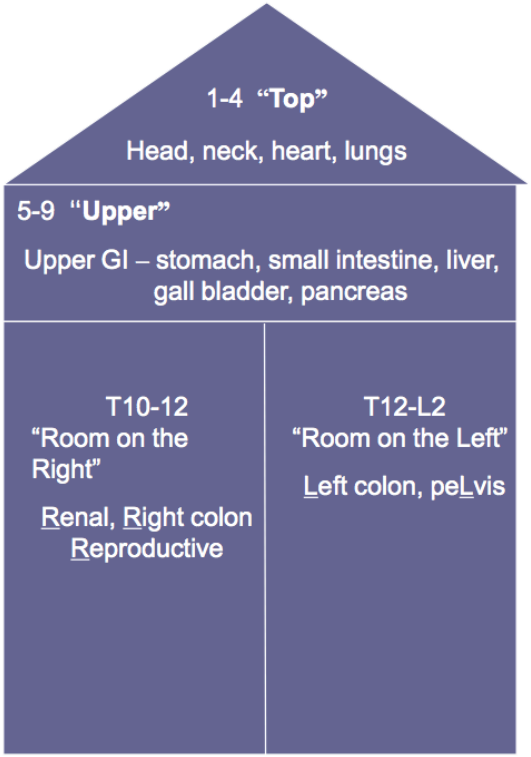
This patient has back pain and a L3 somatic dysfunction that is being treated with **facilitated positional release** (FPR). FPR is an **indirect** (ie, movement away from the restrictive barrier), passive technique used to treat hypertonic muscles associated with somatic dysfunction. The technique involves moving the affected joint into a neutral position and applying a facilitative force (ie, axial compression) that relaxes the surrounding tissues and allows for easier manipulation; the joint is then **moved into a position of ease** (ie, in the direction that it is "stuck") for several seconds to shorten and further relax the affected hypertonic muscles.

The soft-tissue technique is a direct technique that utilizes stretching of the skin and underlying muscle in multiple vectors. The forces that this technique utilize include:

- Effleurage – light stroking
- Petrissage – muscle kneading
- Skin rolling – lifting and rolling of skin
- Tapotement – skin striking with the side of the hand

This differs from myofascial release in that it is classically done as a prelude to other more definitive articular techniques, as it prepares the soft tissues for other techniques. This technique serves to improve local and regional blood flow to reduce any somatic dysfunctions present.

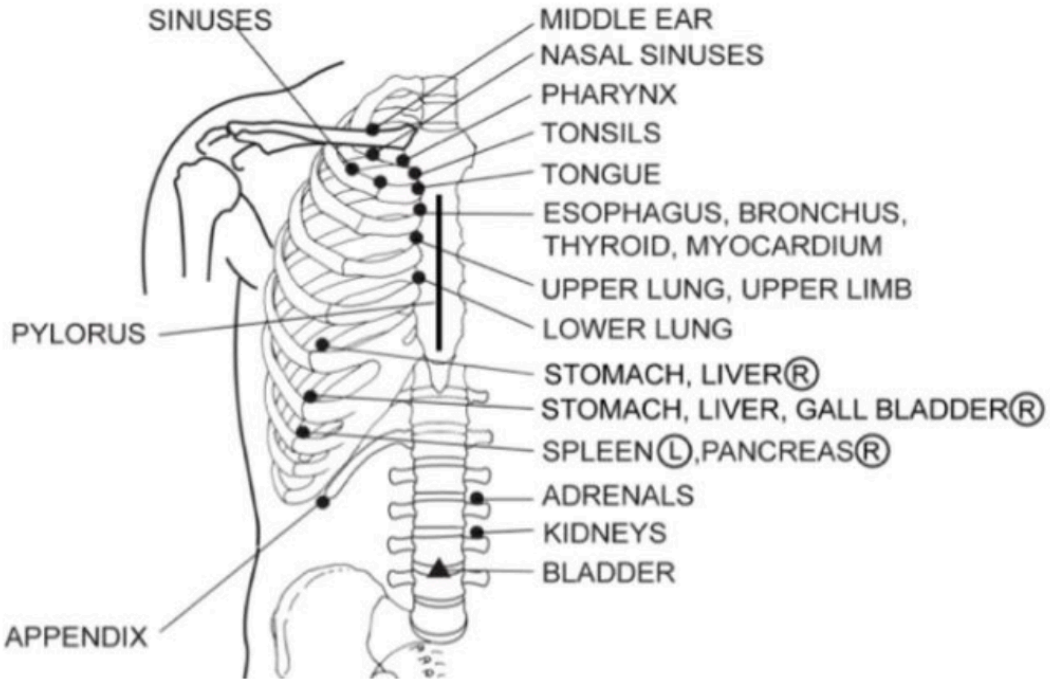
House of Golden



Heart	**T1-5** **- Decompensated heart failure → volume overload**
Upper ureter **• *Above ureteropelvic junction***	**T10-11**
Lower ureter **- Below ureteropelvic junction**	**T12-L1**
Upper GI (stomach -prox duodenum)	**T5-9 (sympathetic)** **- Greater splanchnic → celiac**

	Vagus (parasympathetic), OA-C2
Middle GI (distal duodenum-⅔ transverse colon)	**T10-11 (sympathetic)** **- Less splanchnic → SMA** **Vagus (parasympathetic), OA-C2**
Lower GI (distal transverse - rectum) **Uterus, cervix, prostate, lower ureters, bladder**	**T11-L2** **- LEAST splanchnic nerve → IMA** **Pelvic splanchnic (S2-4)**

Chapman points



Structure	Anterior Chapman Point	Posterior Chapman Point
Eyes	Surgical neck of the humerus	Squamous portion of the occiput below nuchal line
Middle Ear	Superior portion of the clavicle	C1 articular process
Sinuses	1st rib	C2 between SP/TP
Tongue	2nd rib	———————
Tonsils	1st ICS	C1 between SP/TP
Pharynx	Sternoclavicular joint (inferior aspect)	C2 between SP/TP
Larynx	Lateral to sternocostal junction @ 2nd rib	C2 between SP/TP

pharynx	3-4 cm medial to 1st rib emerges from beneath the clavicle=
larynx	5-7 cm lateral to sternocostal junction on 2nd rib=

Structure	Anterior Chapman Point	Posterior Chapman Point
Heart	2nd ICS	B/w T2 and T3 (intertransverse space)
Upper Lung	3rd ICS	B/w T3 and T4 (intertransverse space)
Lower Lung	4th ICS	B/w T4 and T5 (intertransverse space)

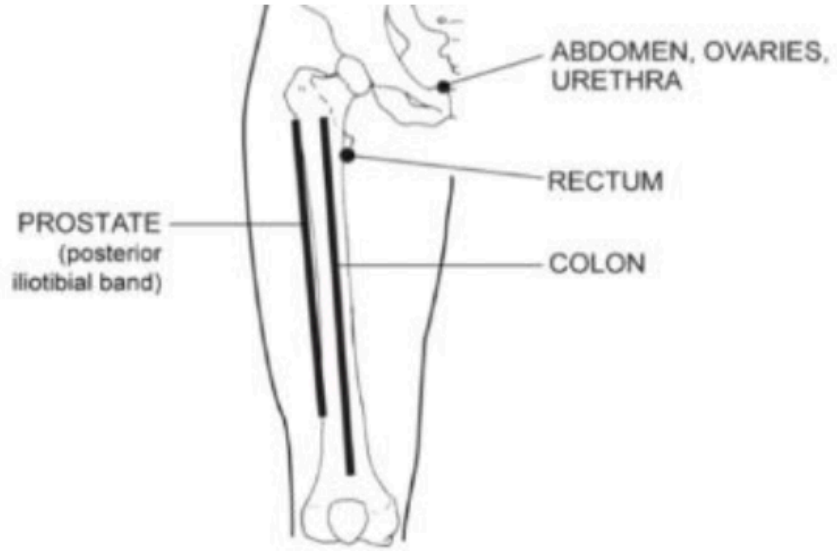
right middle lobe:	T4-T5
esophagus:	2nd ICS at sternocostal junction; midway bw SP and top of TP on 2
Thyroid	2nd ICS at sternocostal junction

Gastrointestinal Chapman Points		
Organ	**Anterior**	**Posterior**
Stomach (acidity)	5th ICS on the left	Left T5 lamina of TP
Stomach (peristalsis)	6th ICS on the left	Left T6 lamina of TP
Liver	5th- 6th ICS on the right	Right T5-T6 lamina of TP
Gallbladder	6th ICS on the right	Right T6 lamina of TP
Pancreas	7th ICS on the right	Right T7 lamina of TP
Spleen	7th ICS on the left	Left T7 lamina of TP
Small bowel (duodenum, jejunum, ileum)	8th, 9th, 10th ICS bilaterally	Right and left T8-T10 lamina of TP
Appendix	Tip of the 12th rib on the right	Right T11-T12 lamina of TP
Cecum	Upper 1/5 of the right anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Ascending colon	Middle 3/5 of the right anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Right half of the transverse colon	Lower 1/5 of the right anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Left half of transverse colon	Lower 1/5 of the left anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Descending colon	Middle 3/5 of the left anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest

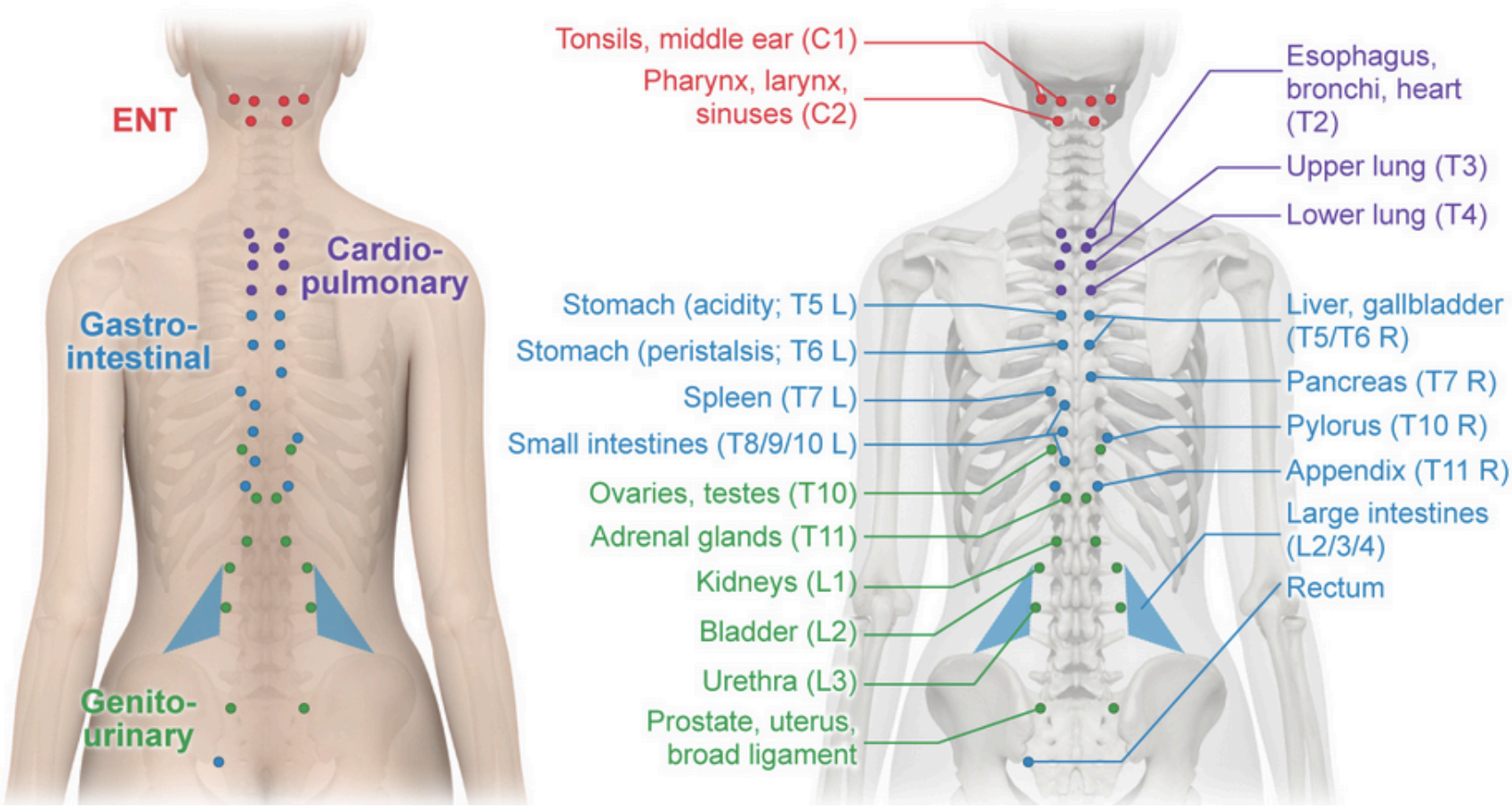
Organ	Anterior point	Posterior point
Head and neck		
Sinuses	Inferior to medial clavicle	Midway between the spinous process and tip of transverse process of C_2
Pharynx	3-4 cm medial to where first rib emerges from beneath the clavicle	Midway between the spinous process and tip of transverse process of C_2
Larynx	On the second rib 5-7 cm lateral to the sternocostal junction	Midway between the spinous process and tip of transverse process of C_2
Tonsils	First intercostal space adjacent to the sternum	Midway between the spinous process and tip of transverse process of C_1
Middle Ear	Superior anterior aspect of the clavicle lateral to the intersection of the clavicle and first rib	Tip of the posterior aspect of the C_1 transverse process
Eye	Anterior aspect of the surgical neck of the humerus	Squamous portion of the occipital bone below the superior nuchal line
Cardiac/Respiratory		
Heart	Second intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{2-3}
Bronchi	Second intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process of T_2
Upper lung	Third intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{3-4}
Lower lung	Fourth intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{4-5}
Gastrointestinal		
Esophagus	Second intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process of T_2
Stomach acidity	Left fifth intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{5-6}
Stomach peristalsis	Left sixth intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{6-7}
Pylorus	No spot exists	Right tenth rib – costotransverse junction
Liver/Gallbladder	Liver – right fifth/sixth intercostal space at the intercostal junction Gallbladder – right sixth intercostal space at the sternocostal junction	Intertransverse space between T_{5-7} Midway between the spinous process and tip of the transverse process on the right
Pancreas	Right seventh intercostal space	Intertransverse space between T_{7-8} Midway between the spinous process and tip of the transverse process on the right
Spleen	Left seventh intercostal space	Left transverse process of T_7
Small intestine	Near the costochondral junction: Duodenum – Eighth intercostal space Jejunum – Ninth intercostal space Ileum – Tenth intercostal space	Midway between the spinous process and tip of the transverse process: Duodenum – T_{8-9} Jejunum – T_{9-10} Ileum – T_{10-11} (Right side)

Appendix	Tip of the twelfth rib	Intertransverse space between $T_{11\text{-}12}$ Midway between the spinous process and tip of the transverse process on the right
Cecum	Right lateral thigh – upper 1/5	Between the L_2 and L_4 transverse processes as well as the iliac crest in the area of a "triangle"
Large intestine	Lateral thigh: Ascending colon – middle 3/5 (right) Hepatic flexure – lower 1/5 (right) Sigmoid colon – upper 1/5 (left) Descending colon – middle 3/5 (left) Splenic flexure – lower 1/5 (left)	
Rectum	Lesser trochanter – proximal inner thigh	On the sacrum near the sacroiliac articulation at the level of S_2
Endocrine		
Thyroid	Second intercostal space near the sternum	No point exists
Adrenal glands	1-inch lateral and 2-inches superior to the umbilicus	Intertransverse space between $T_{11\text{-}12}$ Midway between the spinous process and tip of the transverse process
Genitourinary		
Kidneys	1-inches lateral and superior to the umbilicus	Intertransverse space between T_{12}-L_1 Midway between the spinous process and tip of the transverse process
Bladder	Periumbilical region	Transverse process of L_2
Urethra	Pubic symphysis – most superior aspect	Transverse process of L_3
Ovaries/testes	Superior to the pubic tubercle *Some sources say superior to the pubic ramus or pubic symphysis*	Transverse process of T_{10}
Male reproductive organs	Prostate - Lateral aspect of the thigh Seminal vesicles – No spot exists	Between the posterior superior iliac spine and L_5 transverse process.

Structure	Anterior Chapman Point	Posterior Chapman Point
Kidney	1 inch superior + 1 inch lateral to umbilicus	B/w T12 and L1 (intertransverse space)
Bladder	Periumbilical area	L2 transverse process
Gonads	Pubic Symphysis (superior aspect)	T10 transverse process


ABDOMEN, OVARIES,
URETHRA
RECTUM
PROSTATE
(posterior
iliotibial band)
COLON

Posterior Chapman points



Sympathetic viscerosomatic reflexes

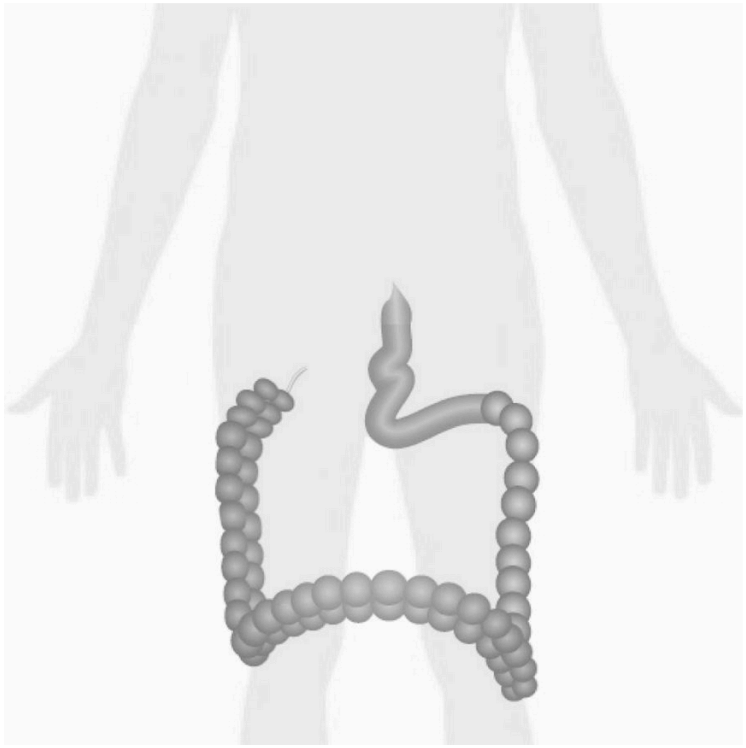
Sympathetic Viscerosomatic Reflexes			
Visceral Organ	**Spinal Cord Level**	**Visceral Organ**	**Spinal Cord Level**
Head and Neck	T1-T4	Kidneys	T10-T11
Heart	T1-T5 (left)	Upper Ureters	T10-T11
Respiratory System	T2-T7	Lower Ureters	T12-L1
Esophagus	T2-T8	Bladder	T11-L2
Upper GI Tract	T5-T9	Gonads	T10-T11
Middle GI Tract	T10-T11	Uterus/Cervix	T10-L2
Lower GI Tract	T12-L2	Erectile Tissue	T11-L2
Appendix/Cecum	T10-T12	Prostate	T12-L2
Arms	T2-T8	Legs	T11-L2

T11-L2	BLADDER

TO-T11	gonads/ testicles/ ovaries
T2-T8	Arms

Gastrointestinal		
Esophagus	Second intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process of T_2
Stomach acidity	Left fifth intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{5-6}
Stomach peristalsis	Left sixth intercostal space at the sternocostal junction	Midway between the spinous process and tip of the transverse process between T_{6-7}
Pylorus	No spot exists	Right tenth rib – costotransverse junction
Liver/Gallbladder	Liver – right fifth/sixth intercostal space at the intercostal junction Gallbladder – right sixth intercostal space at the sternocostal junction	Intertransverse space between T_{5-7} Midway between the spinous process and tip of the transverse process on the right
Pancreas	Right seventh intercostal space	Intertransverse space between T_{7-8} Midway between the spinous process and tip of the transverse process on the right
Spleen	Left seventh intercostal space	Left transverse process of T_7
Small intestine	Near the costochondral junction: Duodenum – Eighth intercostal space Jejunum – Ninth intercostal space Ileum – Tenth intercostal space	Midway between the spinous process and tip of the transverse process: Duodenum – T_{8-9} Jejunum – T_{9-10} Ileum – T_{10-11} (Right side)

Cecum	Right lateral thigh – upper 1/5	Between the L_2 and L_4 transverse processes as well as the iliac crest in the area of a "triangle"
Large intestine	Lateral thigh: Ascending colon – middle 3/5 (right) Hepatic flexure – lower 1/5 (right) Sigmoid colon – upper 1/5 (left) Descending colon – middle 3/5 (left) Splenic flexure – lower 1/5 (left)	
Rectum	Lesser trochanter – proximal inner thigh	On the sacrum near the sacroiliac articulation at the level of S_2

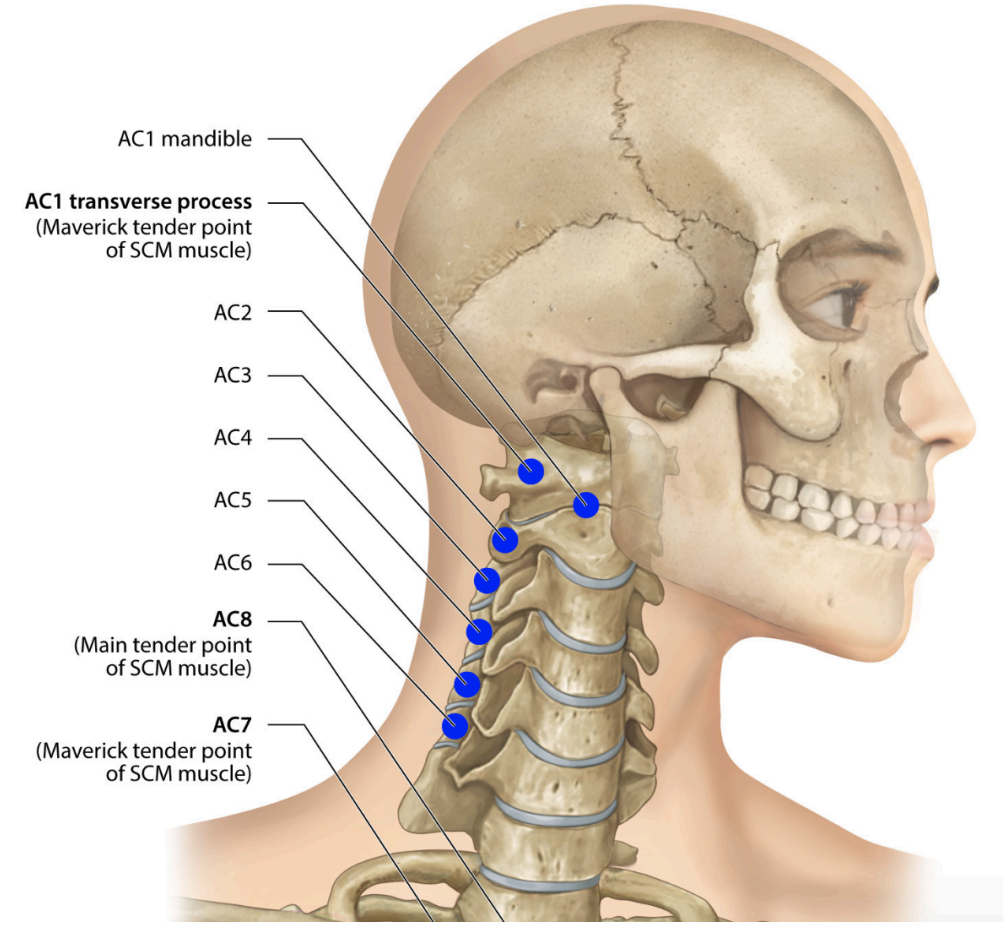
Colon	Lateral thigh, from greater trochanter to just above knee. Location of Chapman points depends on which area of the colon has the visceral dysfunction. The relationship between the two is best described as picturing the colon to be flipped down onto the thighs. 	Triangular area between the transverse process of L_2, iliac crest, and transverse process of L_4

Organ	Anterior Chapman Point	Posterior Chapman Point	Associated Abnormal Lab Tests
Liver/Gallbladder	Right Side Intercostal spaces of Ribs 5-7	Right Side, Between Transverse processes of T5-T7	ALT (choice A) AST (choice C)
Pancreas	Right Side, between costal cartilages of Rib 7-8	Right side, between transverse processes of T7-T8	Amylase (choice B)
Kidney	One inch superior and lateral to umbilicus	Between spinous and transverse processes of T11-T12	Creatinine (choice D)
Heart	Intercostal space between ribs 2 and 3, at the Sternocostal Junction	Between Transverse Processes of T2 and T3	Troponin (choice E)

Genitourinary		
Kidneys	1-inches lateral and superior to the umbilicus	Intertransverse space between T_{12}-L_1 Midway between the spinous process and tip of the transverse process
Bladder	Periumbilical region	Transverse process of L_2
Urethra	Pubic symphysis – most superior aspect	Transverse process of L_3
Ovaries/testes	Inferior to the pubic tubercle	Transverse process of T_{10}
Male reproductive organs	Prostate - Lateral aspect of the thigh Seminal vesicles – No spot exists	Between the posterior superior iliac spine and L_5 transverse process.
Female reproductive organs	Broad ligament – No spot exists Uterus – Obturator foramen – medial edge Fallopian tubes – No spot exists Vagina/clitoris – Inner thigh near its proximal posterior aspect	

Posterior cervical counterstrain points

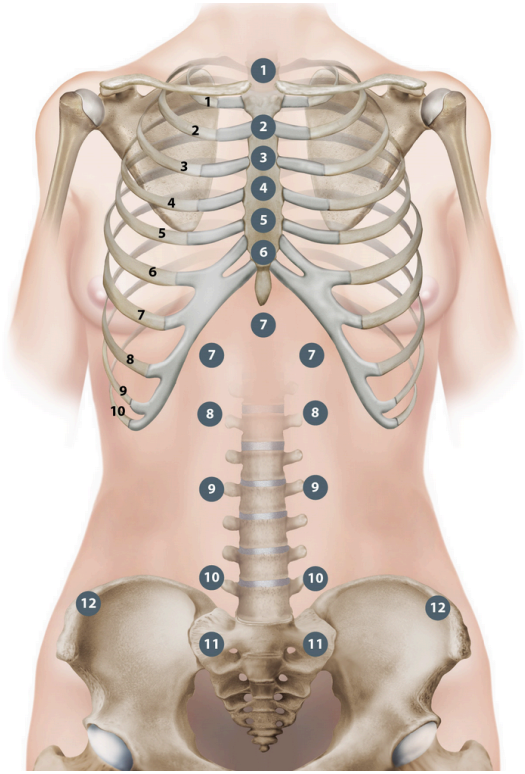
Anterior Cervical Tender Points in Relation to the Sternocleidomastoid Muscle

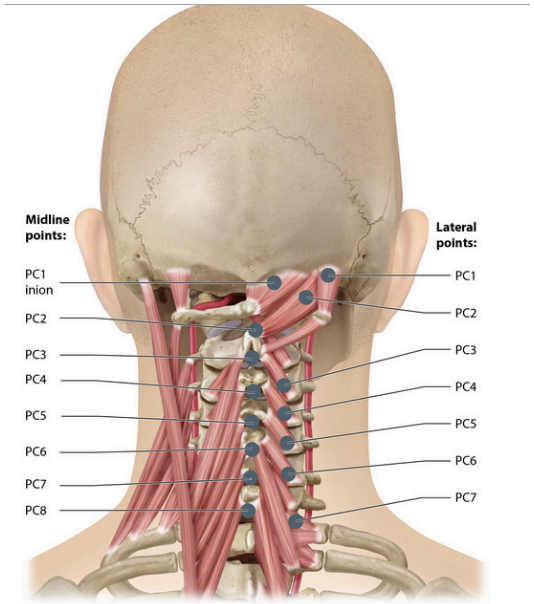


Anterior Cervical Tender Points		
Tender Point	**Location**	**Treatment Position**
AC1 mandible (maverick point)	Posterior aspect of ascending ramus of the mandible at earlobe level	Rotation away; fine-tuning with slight side bending away/flexion
AC1 transverse process	Lateral aspect of the C1 transverse process halfway between the mastoid process and ramus of the mandible	Rotation away; fine-tuning with slight side bending away/flexion
AC2-AC6	Anterior lateral aspect of anterior/posterior tubercles of corresponding vertebrae transverse process	Flex to the level of the segment; side bend and rotate away
AC7 (maverick point)	The superior surface of the clavicle at the clavicular attachment of the sternocleidomastoid muscle	**Flex to the level of C7; side bend toward, rotate away**
AC8	The superior medial end of the clavicle at the sternal attachment of the sternocleidomastoid muscle	Flex (but less than C7); side bend and rotate away

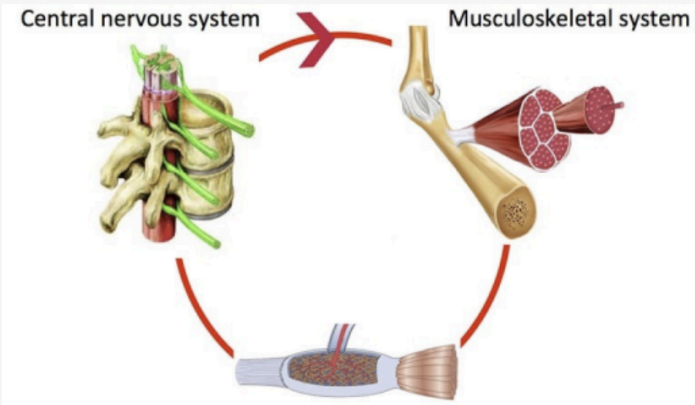
Tender Point	Location	Treatment Position
PC1 inion	Inferior nuchal line lateral to inion	Flexion of occipitoatlantal (OA), minor side bending toward, rotation away
PC1 occiput	Inferior nuchal line midway between inion and mastoid on splenius capitis	Extension of OA, mild compression of head, slight side bending, and rotation away
PC2 occiput	Inferior nuchal line within semispinalis capitis muscle	Extension of OA, mild compression of head, slight side bending, and rotation away
PC2 midline spinous process	Superior or superior lateral tip of C2 spinous process	Extension of OA, mild compression of head, slight side bending, and rotation away
PC3 midline spinous process	Inferior or inferolateral tip of C2 spinous process	Flexion, side bending away, rotation away
PC4-PC8 midline spinous process	Inferior or inferolateral tip of spinous process above segment	Extension, slight side bending, and rotation away
PC3-PC7 lateral	Posterolateral tip of articular process on dysfunctional segment	Extension, slight side bending, and rotation away

PC1- inion	Flexion OA
PC1- occiput	Extension OA *SARA*
PC2 occiput	Extension OA *SARA*
PC2 SP	Extension OA *SARA*
PC3 SP - Inferolateral tip of C2 SP	Flexion SARA
PC4-8 SP midline PC3-7 lateral	Extension SARA



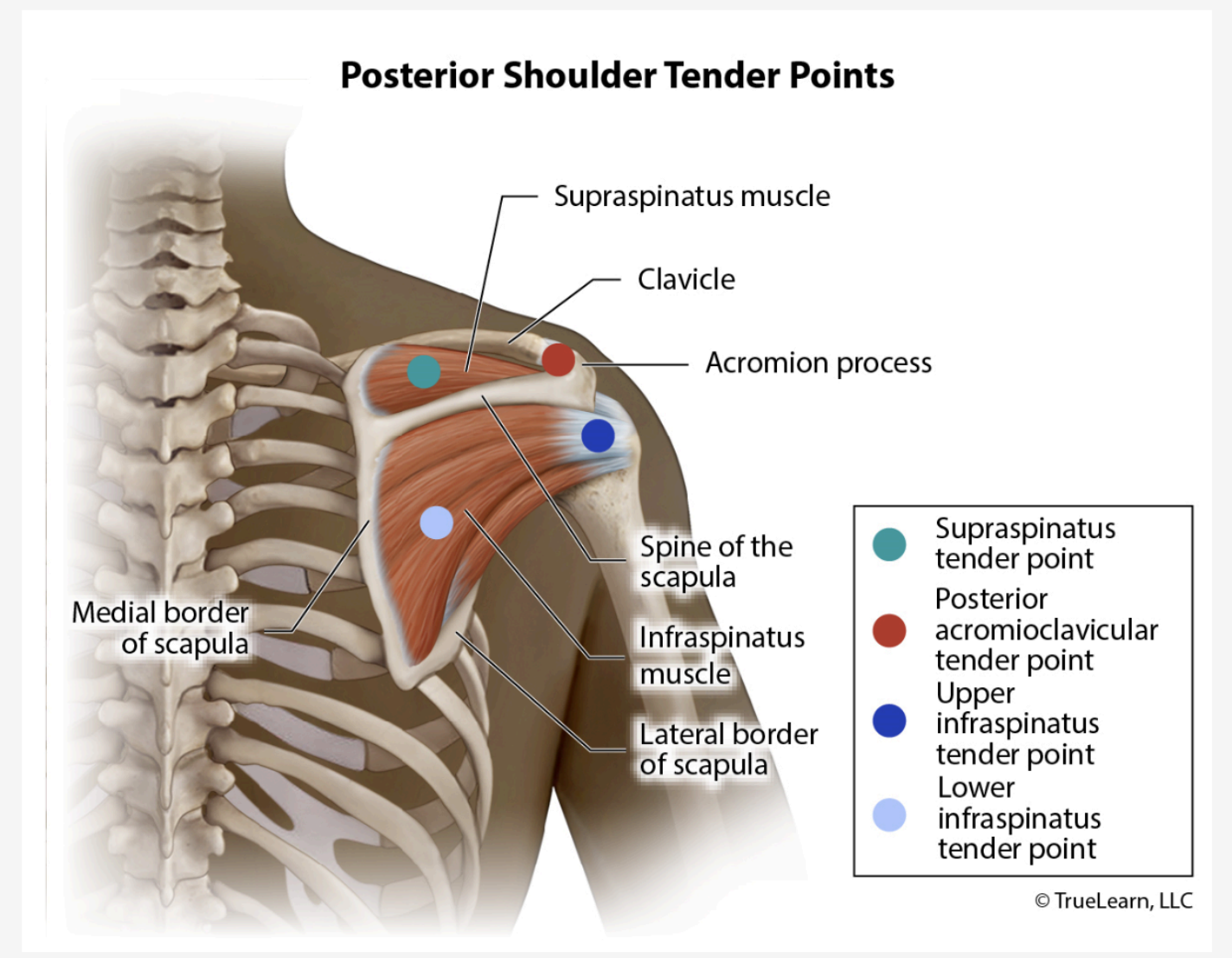


Posterior cervical tender points.



Proprioceptive sensoric afferents: spindle- and Golgi tendon organs

Muscle Spindles	Golgi Tendon Organs
• Located in muscle bellies and composed of intrafusal muscle fibers • Innervated by group Ia and II afferent fibers • Respond to muscle stretch by causing reflexive muscle contraction • Primary physiologic basis for counterstrain and facilitated positional release • Osteopathic manipulative therapy goal is to reduce firing of muscle proprioceptors to decrease hypertonicity	• Located in tendons • Innervated by group Ib afferents • Respond to increased tension by causing reflexive muscle relaxation • Primary physiologic mechanism for **muscle energy technique** • Osteopathic manipulative therapy goal is to activate Golgi tendon organs to produce muscle relaxation



Supraspinatus	
Posterior AC joint	Lay prone, adduct arm across back with traction
Subscapularis	Supine, hold arm posteriorly over the table, internally rotate without traction (anterior point)

Upper infraspinatus	
Infraspinatus	
Latissimus dorsi	Supine, hold arm posteriorly over side of the table, internally rotation arm with traction
Long head of biceps	supine , supinate arm, flex the arm at 90 degrees at shoulder and elbow

Cervical tender points

Cervical tenderpoints		
Tenderpoint	**Location**	**Treatment position**
Anterior cervical		
AC2-AC6	Anterolateral aspect of corresponding transverse process	F, SA, RA
AC8	On clavicle, near sternal attachment of SCM	
AC1*	Near the angle of the mandible & transverse process of C1	RA
AC7*	On clavicle, near clavicular attachment of SCM	F, *ST*, RA
Posterior cervical		
PC1 (lateral)	Between inion & mastoid process	E, SA, RA
PC2 (midline)	Superior aspect of C2 spinous process	
PC2 (lateral)	On inferior nuchal line	
PC3-PC7 (lateral)	Posterolateral aspect of the corresponding articular process	
PC4-PC8 (midline)	Inferior aspect of the spinous process of the *above* vertebrae (C3-C7)	
PC1* (midline)	Just lateral to the inion	*F*
PC3* (midline)	Inferior aspect of C2 spinous process	*F*, SA, RA

Counterstrain point	Location	Treatment position
Anterior cervical region		
AC1	Between the earlobe and the angle of the mandible near the transverse process of C_1	Patient is supine. Head is rotated and side bent away from the tender point.
AC2	Anterior or lateral to the most lateral aspect of the lateral masses OR Anterolateral to the anterior tubercle of the transverse process.	Patient is supine. Head is rotated and side bent away from the tender point.
AC3		
AC4		
AC5		
AC6		
AC7	At the lateral attachment of the sternocleidomastoid muscle 2-3 cm lateral to the medial end of the clavicle.	Patient is supine. Head is flexed as well as side bent toward and rotated away from the tender point.
AC8	At the medial clavicular head where the sternocleidomastoid muscle attaches.	Patient is supine. Head is rotated and side bent away from the tender point.

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ANTERIOR cervical tender points

Tenderpoint	Location	Treatment
AC1	Posterior edge of the ramus of the mandible	RA
AC2	Anteriorlateral tip of the transverse process	FSARA
AC3		
AC4		
AC5		
AC6		
AC7	Superior surface of the clavicle at clavicular attachment of the SCM	FSTRA
AC8	Medial edge of the clavicle at the sternal attachment of the SCM	FSARA

Maverick tender points

- Not resolved when muscle is shortened
- Must be positioned in opposite direction

"Flex STRAw into 7 up"

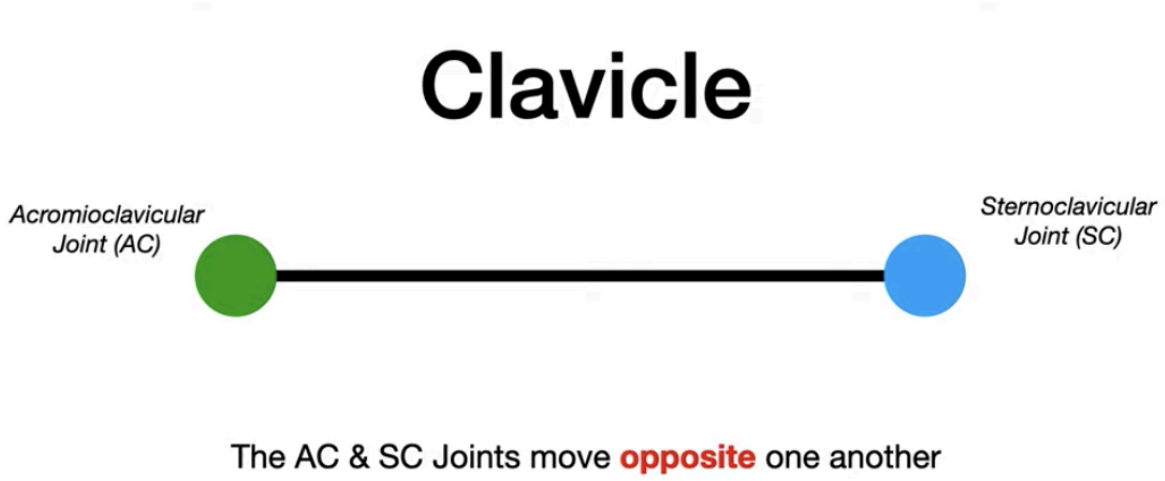
"AC1 rotates away, son"

Posterior cervical tender points

Tenderpoint	Location	Treatment
PC1 (midline/inion)	Inferior nuchal line, just lateral of the inion	F
PC1 (lateral/occiput)	Halfway b/w inion & mastoid process	ESARA
PC2 (midline)	Superior surface of the C2 spinous process	ESARA
PC2 (lateral/occiput)	Inf. nuchal line @ attachment of semispinalis capitis	ESARA
PC3 (midline)	Inferolateral aspect of the C2 spinous process	FSARA
PC3-PC7 (lateral)	Posterolateral aspect of the corresponding articular process	ESARA
PC4-PC7 (midline)	Inf. surface of the ABOVE verebral spinous process	ESARA
PC8 (midline)	Inf. surface of the C7 spinous process	ESARA

3 isnt E
F PC1

Clavicle



Ribs

Counterstain: Anterior axillary line
Exhalation restriction = inhalation dysfunction
Inhalation restriction= exhalation dysfunction

Rib motion

Ribs 1-5



"Pump handle" motion

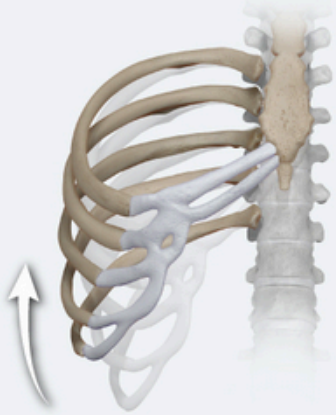


- Superior/anterior (inhalation)
- Inferior/posterior (exhalation)

Ribs 6-10



"Bucket handle" motion



- Lateral/superior (inhalation)
- Medial/inferior (exhalation)

Ribs 11-12



"Caliper" motion



- Lateral (inhalation)
- Medial (exhalation)

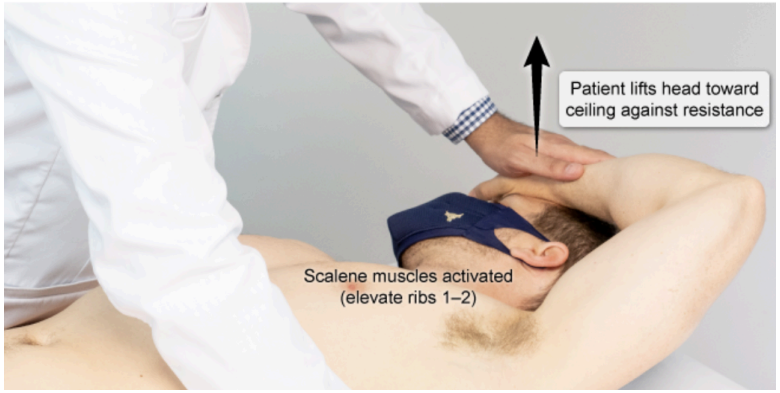
	Inhalation dysfunction (exhalation restriction)	Exhalation dysfunction (inhalation restriction)
Preferred movement	Cephalad	Caudad
Restricted movement	Caudad	Cephalad
Appears as	“holding up other ribs”	“holding down other ribs
Key rib	Bottom-most rib	Top-most rib
Outcome (Can also be named this way)	exhalation restriction	inhalation restriction

	Inhalation dysfunction (exhalation restriction)	Exhalation dysfunction (inhalation restriction)
Preferred movement	Cephalad	Caudad
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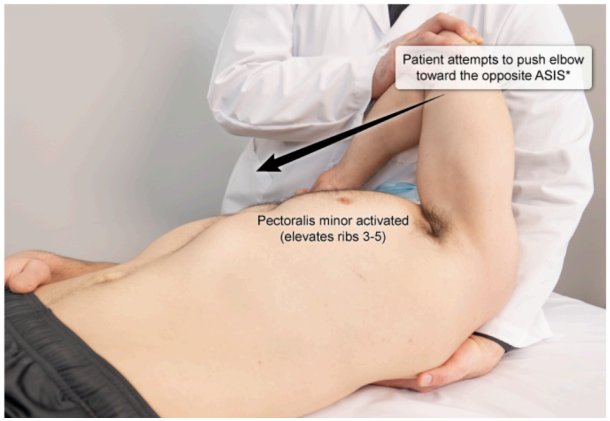
	Inhalation dysfunction	Exhalation dysfunction
Pump-Handle Ribs (Ribs 1-5)	Anterior narrowing of intercostal space **above** dysfunctional rib **Superior aspect of posterior rib angle** prominent	Anterior narrowing of intercostal space **below** dysfunctional rib **Inferior aspect of posterior rib angle** prominent
Bucket-handle Ribs (Ribs 6-10)	Lateral narrowing of intercostal space **above** dysfunctional rib **Lower edge of rib shaft** prominent	Lateral narrowing of intercostal space **below** dysfunctional rib

EXHALATION RIB SOMATIC DYSFUNCTION		
Ribs	**Muscle involved**	**Patient response when supine. (Arm is resting above the head)**
1	Anterior and middle scalenes	Elevate head to ceiling
2	Posterior scalene	Rotate head 30^{o} away from the affected side. Elevate head to ceiling.
3-5	Pectoralis minor	Pushes elbow of affected side to opposite ASIS
6-9	Serratus anterior	Push arm anteriorly (“scapula protraction”)
10-11	Latissimus dorsi	Adduct arm
12	Quadratus lumborum	Adduct arm OR Iliac crest lifting.

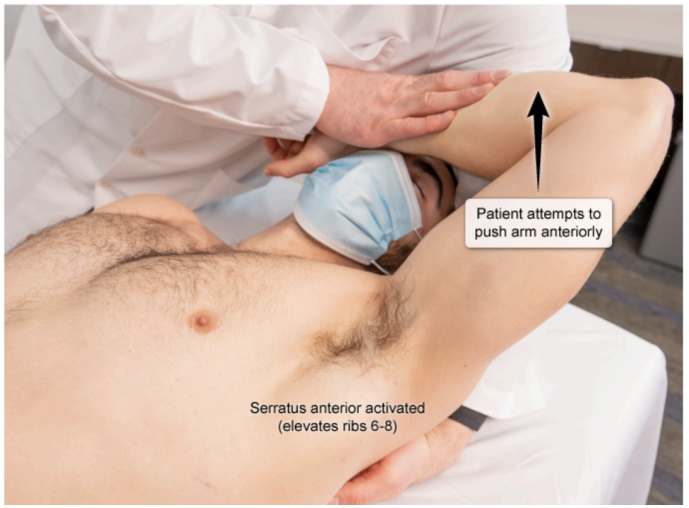
Muscle energy for rib 1 and 2 exhalation dysfunction



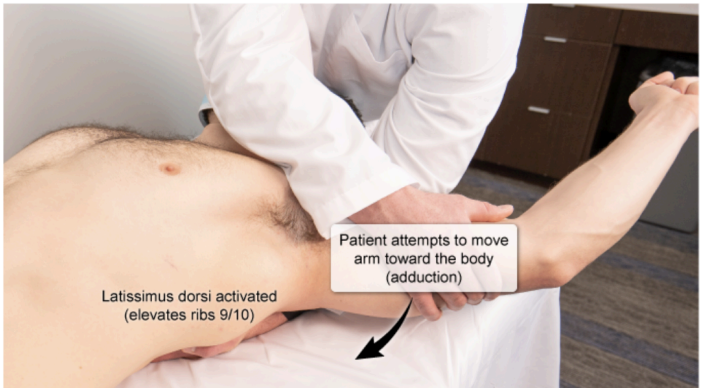
Muscle energy for ribs 3-5 exhalation dysfunction



Muscle energy for ribs 6-8 exhalation dysfunction



Muscle energy for ribs 9/10 exhalation dysfunction



Rib tenderpoints		
Tenderpoint	**Location**	**Treatment position**
Anterior ribs		
AR1	Sternocostal junction of rib 1	F, ST, RT
AR2-AR10	Over the corresponding rib/ICS along the midclavicular line (AR2) or anterior axillary line (AR3-10)	
Posterior ribs		
PR1	1 inch lateral to the articulation of rib 1 & T1 transverse process	E, SA, RT
PR2-PR10	Angle of the corresponding rib	SA, RA*

Location	Treatment Position	Notes
AT1 mid-line	• Episternal notch mid-line or slightly lateral	Flexion
AT2-6 mid-line	• Level of corresponding rib on sternum	Flexion, minimal sidebending and rotation
AT7-9 bilateral	• AT7: 1/4 distance from xiphoid tip to umbilicus, AT • AT8: 1/2 distance between xiphoid tip and umbilicus, AT • AT9: 3/4 distance xiphoid tip and umbilicus	Flexion, sidebend toward, rotate away
AT10-12 bilateral	• AT10: 1/4 distance umbilicus to pubic symphysis • AT11: 1/2 between umbilicus and pubic symphysis • AT12: Apex of iliac crest at mid-axillary line	Flexion, sidebend ankles toward, rotate torso away

Ribs	Muscles
Rib 1	Anterior and middle scalenes
Rib 2	Posterior scalene
Ribs 3-5	Pectoralis minor
Ribs 6-9	Serratus anterior
Ribs 10-11	Latissimus dorsi
Rib 12	Quadratus lumborum

[Sacral torsions and tender points]

Diagnosis	Seated Flexion Test	Sacral Sulcus	ILA	Spring Test
Left on left	Positive on right	Deep on right	Shallow on left	Negative
Right on right	Positive on left	Deep on left	Shallow on right	Negative
Left on right	Positive on left	Shallow on left	Deep on right	Positive
Right on left	Positive on right	Shallow on right	Deep on left	Positive
Left unilateral extension	Positive on left	Shallow on left	Deep on left	Positive
Right unilateral extension	Positive on right	Shallow on right	Deep on right	Positive
Bilateral extension	Positive bilateral	Shallow bilateral	Deep bilateral	Positive
Left unilateral flexion	Positive on left	Deep on left	Shallow on left	Negative
Right unilateral flexion	Positive on right	Deep on right	Shallow on right	Negative
Bilateral flexion	Positive bilateral	Deep bilateral	Shallow bilateral	Negative

Sacral torsion	L_5 diagnosis
Forward sacral torsions	
Left on left	NS_LR_R
Right on Right	NS_RR_L
Backward sacral torsions	
Right on left	F or E R_LS_L
Left on right	F or E R_RS_R

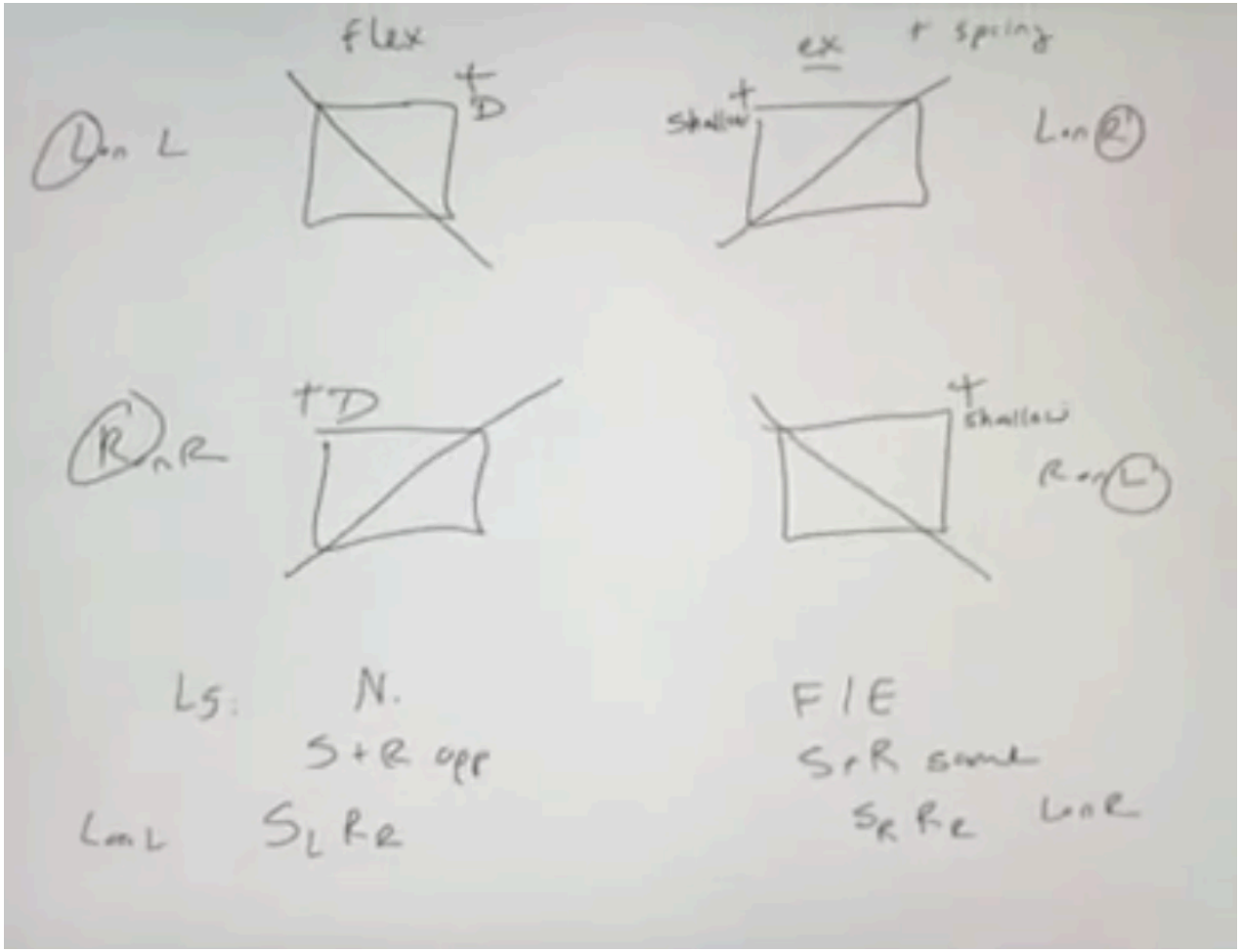
Characteristics of the Sacral Axes		
Axis	**Motion at the Axis**	**Description of Motion and Axis Location**
Superior transverse axis	• Respiratory and craniosacral	• The sacrum moves posteriorly during inhalation or cranial flexion • The sacrum moves anteriorly during exhalation or cranial extension • The axis is located at the level of the second sacral segment
Middle transverse axis	• Postural	• The sacral base moves anteriorly in bending forward • At the end range of motion in flexion/bending, the sacral base moves posteriorly because of tension in the sacrotuberous ligaments • The axis is located at the anterior convexity of the upper and lower limbs of the sacroiliac joint
Inferior transverse axis	• Innominate rotation	• Motion involves rotation of the innominates during ambulation or with anterior/posterior innominate rotation somatic dysfunction • The axis is located at the posterior-inferior portion of the inferior limb of the sacroiliac joint
Oblique axes (left and right)	• Dynamic motion during ambulation	• With transfer of weight between legs during ambulation, a left or right oblique axis is engaged • The side of engagement of the oblique axis always aligns with the weight-bearing leg

The motions occurring around each sacral axis are as follows:

- **Superior transverse axis** (S2 level): responsible for respiratory and craniosacral motions
- **Middle transverse axis** (S3 level): responsible for postural motion
- **Inferior transverse axis** (S4 level): responsible for innominate motion
- **Oblique axis** (left or right): responsible for dynamic motion

The mnemonic DRIP (**D**ynamic, **R**espiratory, **I**nnominate, **P**ostural) is useful to help remember the different types of motions around the sacral axes.

Superior = CRS (flexion = counternutation)
middle= postural (bending forward= base moves anterior)
inferior= innominate
oblique= dynamic→ sacral torsions



Bilateral flexion	Resist nutation, augment counternutation
Forward sacral torsion **Left on Left Sacral torsion** **Right on right sacral torsion**	Lay on axis side **DOWN** **Left/Right LATERAL RECUMBENT** **Torso rotated towards the table, FACE the table** Hips & knees flexed until lumbosacral motion appreciated Legs suspended off table, legs pushed to floor Patient raises feet to sky against resistance of movement
Backward sacral torsion	Lay axis side down, back rotated posteriorly. **Torso rotated away** from the table FACE UP (rotated posteriorly),

Left on right sacral torsion **Right on left sacral torsion**	**Back on table** Posterior rotation until lumbosacral motion is appreciated. Top of leg is adducted and flexed Top foot is hooked to bottom knee Patient pushes knee up to ceiling against resistance
Sacral Shear	Patient Prone Ask patient to hold breath/ breathe in - Inhale: unilateral sacral extension - Exhale: unilateral sacral flexion Physician places hand on - Inferolateral angle: unilateral sacral flexion → push anterior - Sacral base: unilateral sacral extension → push anterior Hold for 3-5 seconds, repeat and assess sacral motion.
Treatment	Acetaminophen

Sacral dysfunction	Treatment position
Forward sacral torsion (L-on-L or R-on-R)	Sims position with the oblique axis side down with the torso rotated towards the table.
Backward sacral torsion (L-on-R or R-on-L)	Lateral recumbent position with the oblique axis side down with the torso rotated away from the table
Unilateral sacral flexion/extension	Sphinx position (extension) or Prone (flexion) with the affected extremity abducted and internally rotated
Bilateral sacral flexion/extension	Sphinx position (extension) or Prone (flexion) with both extremities abducted and internally rotated

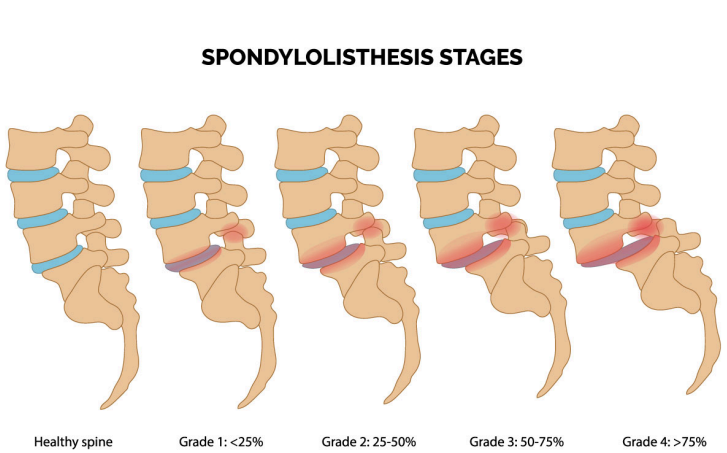
Sacral dysfunction	Patient response
Forward sacral torsion (L-on-L or R-on-R)	Patent's ankles pushed down to engage the restrictive barrier. Patient is asked to push up to the ceiling.
Backward sacral torsion (L-on-R or R-on-L)	Patent's top leg pushed down to engage the restrictive barrier. Patient is asked to push up to the ceiling.
Unilateral sacral flexion/extension	Pressure is applied to either the sacral base or inferolateral angle. Patient asked to inhale or exhale to exaggerate sacral movement.
Bilateral sacral flexion/extension	Pressure is applied to either both sacral bases or inferolateral angles. Patient asked to inhale or exhale to exaggerate sacral movement.

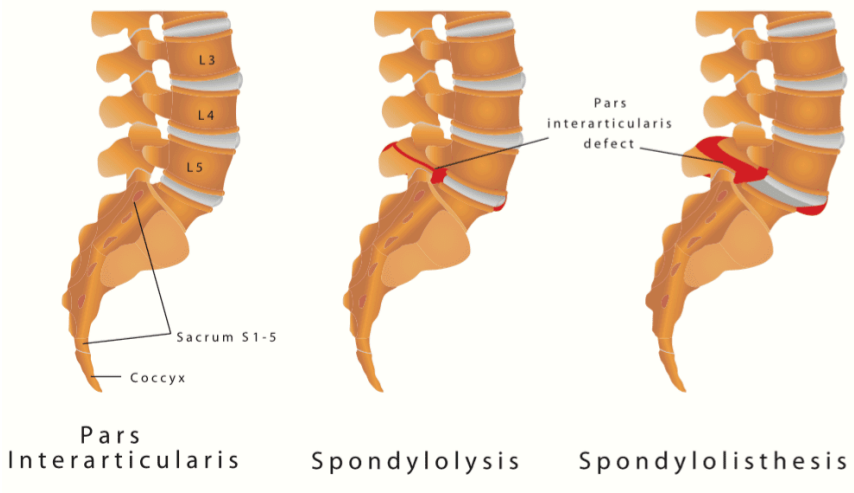
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- **Oblique axis** (left or right): responsible for dynamic motion

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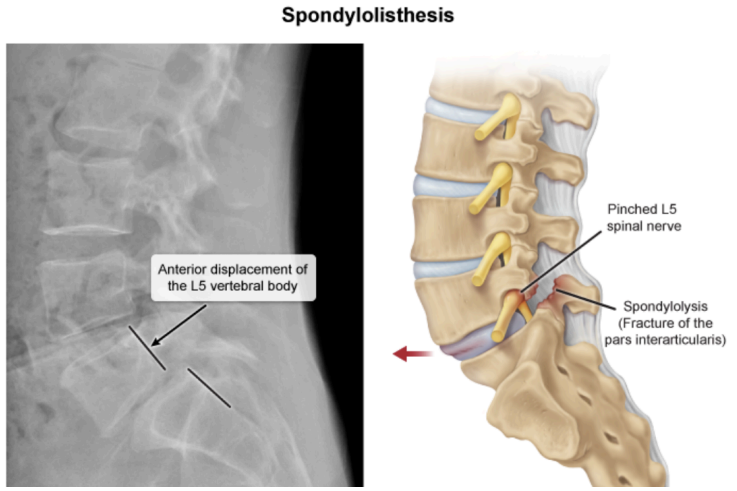
L5/S1- spondylosis, spondylolysis, spondylolisthesis

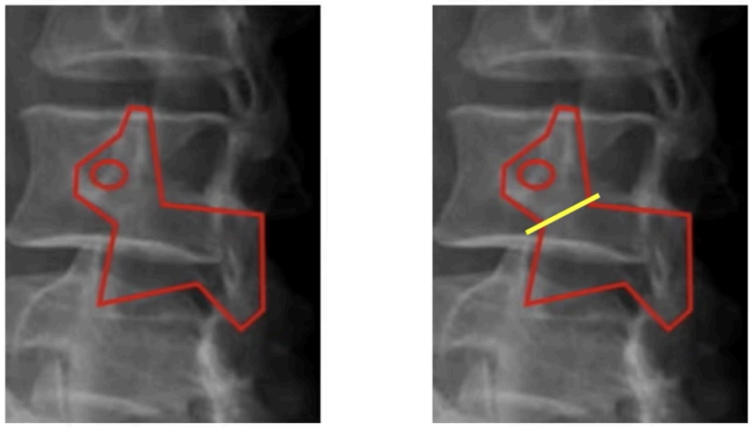
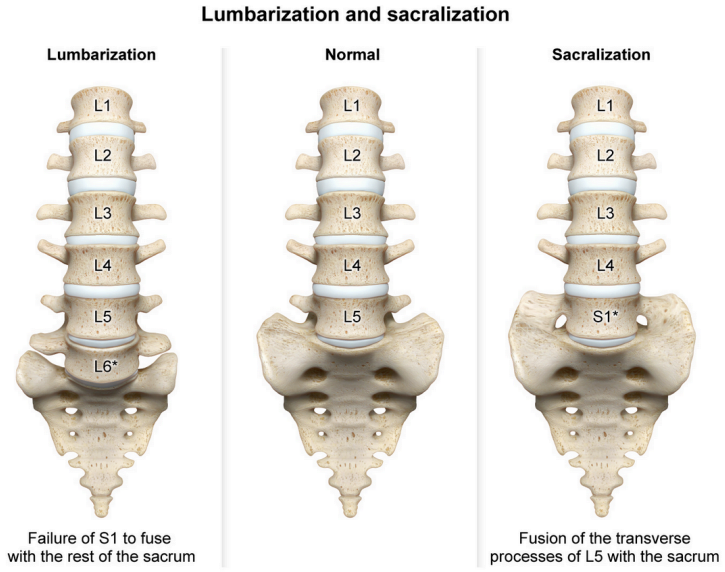




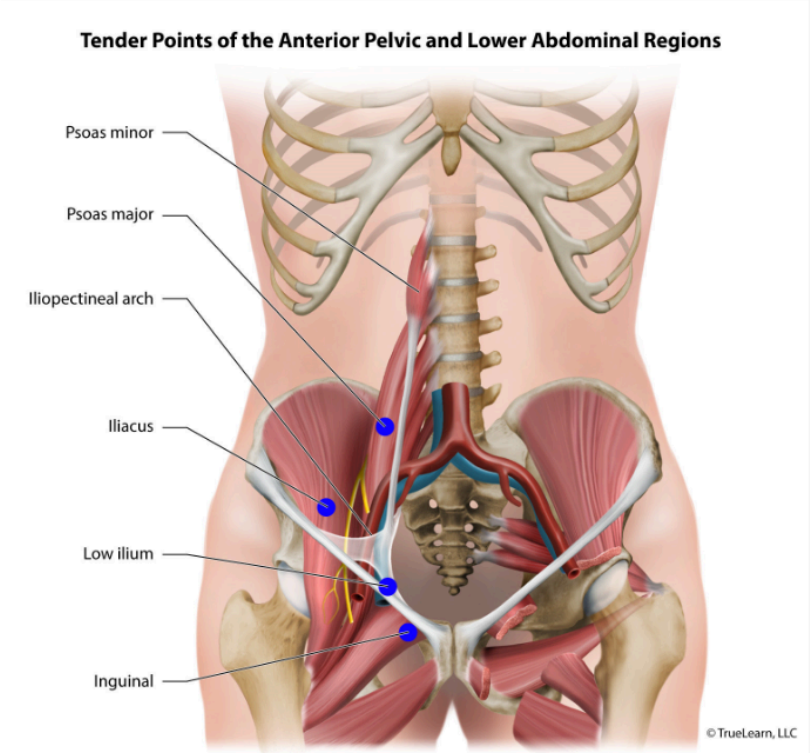
Spondylolisthesis

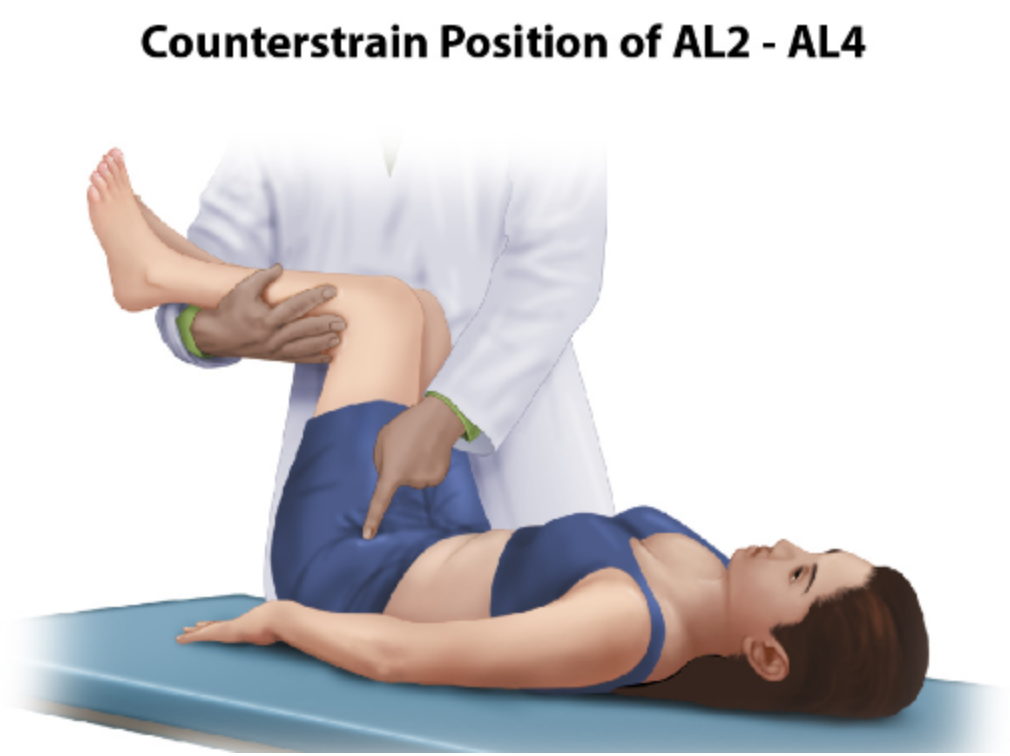
- Anterior displacement
- NO Pars interarticularis fracture
- Worse with extension of spine
- Positive vertebral step-off sign
- Lateral x-rays
- STEP OFF



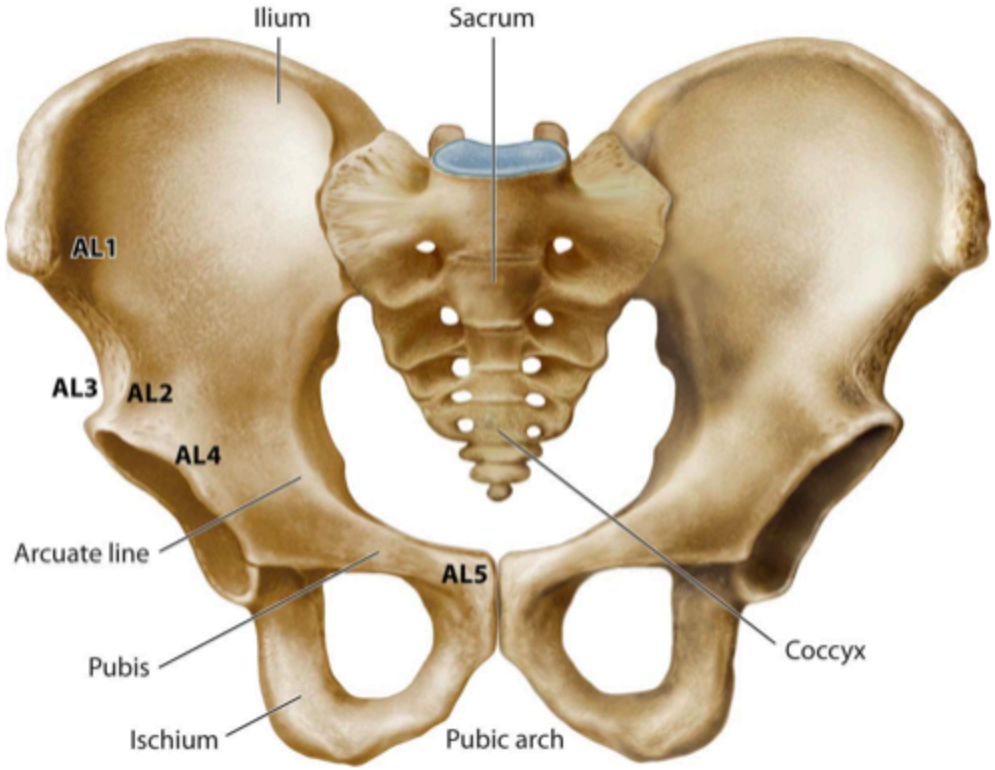
Spondylolysis - Pars interarticularis fracture	
Spondylosis	Degenerative spine, age-related Osteophytes, narrowing disc space
Sacralization - 6 Lumbar like vertebra - Congenital - Leads to lower back pain	

Pelvic tender points





Pelvic Tender Points		
Tender Point	**Location**	**Treatment Position**
Psoas (psoas major)	2/3 of the distance from the ASIS toward the midline	Bilateral flexion and external rotation at the hips, with sidebending of the lumbar spine toward the affected side
Iliacus	1/3 of the distance from the ASIS toward the midline	Bilateral flexion and external rotation at the hips and flexion at the knees
Low ilium (psoas minor)	Superior surface of the iliopubic eminence at the attachment of the psoas minor	Hyperflexion at the ipsilateral hip
Inguinal (pectineus)	Lateral aspect of the pubic tubercle at the attachment of the pectineus muscle or inguinal ligament	Bilateral flexion at the hips, with adduction and internal rotation at the ipsilateral hip (by crossing the contralateral thigh over the ipsilateral thigh and pulling the ipsilateral lower leg laterally)



Location of anterior L1-L5 tender points.

Pelvic tender point short cut
Anterior = Supine + flexion

- A1+5: SB & Rotate TOWARDS
- A2-4: SB & rotate AWAY
- Psoas major: F, Ex rotate, lumbar SB
- Psoas minor: Flex
- Iliacus: F, Ex rotate, cross contralateral leg (“Criss cross ILiacus”)
- Low ilium: FABER

Counterstrain point	Location	Treatment position
Anterior lumbar spine		
AL1 (internal oblique muscle)	Medial to the anterior superior iliac spine	Patient is supine. Flex the hips. Fine-tune tender point by rotating and side bending towards it.
AL2 (external oblique muscle)	Medial to the anterior inferior iliac spine	Patient is supine. Flex the hips. Fine-tune tender point by rotating and side bending away from it.
AL3 (Iliopsoas muscle)	Lateral to the anterior inferior iliac spine	Patient is supine. Flex the hips. Fine-tune tender point by rotating and side bending away from it.
AL4 (Iliopsoas muscle)	Inferior to the anterior inferior iliac spine	
AL5 (Rectus abdominis muscle)	Pubis anterior surface	Patient is supine. Flex the hips. Fine-tune tender point by side bending and rotating towards it.

Anterior pelvis		
Psoas major muscle	2/3 of the distance between the midline and anterior superior iliac spine	Patient is supine. Flex the hip and externally rotate it. Fine-tune tender point with lumbar side bending
Psoas minor muscle	On the pubic ramus 2 in lateral to the pubic symphysis.	Patient is supine. Flex the hip. No tender-point fine tuning needed.
Iliacus muscle	1/3 of the distance between the midline and anterior superior iliac spine	Patient is supine. Flex the hips. Fine-tune tender point by externally rotating the hips and crossing the contralateral leg.
Low ilium (flare-out)	Along the pubic bone near the inferomedial surface and descending ramus	Patient is supine. Flex the hip. Fine-tune tender point with hip abduction and external rotation.

Posterior Pelvis/Lumbar spine		
Piriformis muscle	Between the greater trochanter and lateral edge of the sacrum (7 cm and cephalad)	Patient is prone. Flex the hip and knee off the table. Fine-tune tender point with abduction and external rotation.
Upper pole of L5	Superomedially along the posterior superior iliac spine	Patient is prone. Extend the hip. Fine-tune tender point with adduction and external/internal rotation.
Sacral midpole	Along the attachment of the piriformis muscle to the sacrum.	Patient is prone. Extend the hip. Fine-tune tender point with abduction and external rotation.
Lower pole of L5	Inferior to the posterior superior iliac spine	Patient is prone. Flex the hip and knee off the table. Fine-tune tender point with adduction and internal rotation.
Gluteus medius muscle	Along the posterior margin of the tensor fascia latae muscle and 2/3 of the distance between the posterior superior iliac spine and the tensor fascia latae muscle	Patient is prone. Extend the hip. Fine-tune tender point with abduction and external rotation.
L_{1-5}	Spinous process	Patient is prone. Extend the hip. Fine-tune tender point with external rotation and adduction.
L_{1-5}	Transverse process	Patient is prone. Extend the hip. Fine-tune tender point with adduction.

Pelvic tenderpoints		
Tenderpoint	**Location**	**Treatment position**
Anterior pelvic tenderpoints		
Psoas major	⅔ between the ASIS & midline	Flex the hip on affected side
Psoas minor (low ilium)	Just lateral to the pubic symphysis	
Iliacus	⅓ between the ASIS & midline	Flex the hip & knees, cross legs in a frog leg position
Pectineus (inguinal)	On the superior pubis	Flex the hip & knees, cross opposite leg over affected leg & internally rotate
Posterior pelvic tenderpoints		
Piriformis	7 cm medial to (& slightly above) the greater trochanter	Prone, flex hip & knee, abduct & externally rotate thigh
Upper pole L5 (UPL5)	Just above the PSIS	Prone, extend hip, adduct & rotate thigh*
Lower pole L5 (LPL5)	Just below the PSIS	Prone, flex hip, adduct, internally rotate thigh

Anterior Pelvic/Sacral Tenderpoints

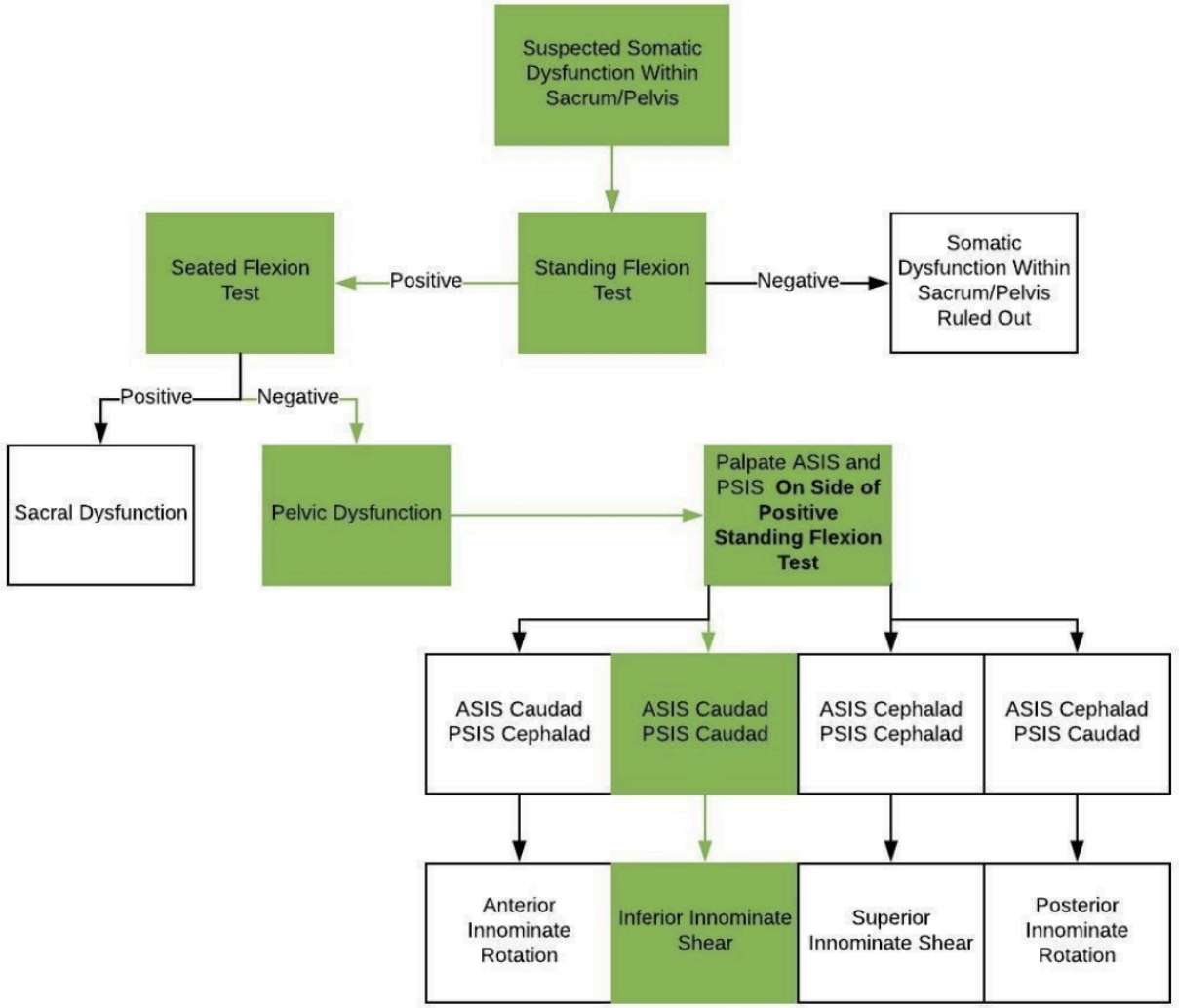
Tenderpoint	**Location**	**Treatment**
Psoas	2/3 from ASIS to midline	FST (Hips)
Iliacus	1/3 from ASIS to midline	F-AB-ER ("Frog position")
Low Ilium	~2 inches superolateral to Pubic Symphysis	Flexion
Pectineus ("*Inguinal*")	Medial aspect of inguinal ligament, near Pubic Tubercle	F-AD-IR
Low Ilium Flareout	Descending ramus of pubic bone	F-AB-ER

Posterior Pelvic/Sacral Tenderpoints

Tenderpoint	Location	Treatment
Piriformis	Halfway between the ILA and greater trochanter	F-AB-ER ("Peeing Dog")
Upper Pole L5 (UPL5)	Superomedial aspect of PSIS	Extension
Lower Pole L5 (LPL5)	Inferior aspect of PSIS	F-AD-IR
PL3 Gluteus	2/3 PSIS to Tensor Fasciae Latae	E-AB-ER
PL4 Gluteus	Posterior aspect of Tensor Fasciae Latae	E-AB-ER

Gluteus Medius	Along the posterior margin of the tensor fascia latae muscle and 2/3 of the distance between the posterior superior iliac spine and the tensor fascia latae muscle	Patient is prone. Extend the hip. Fine-tune tender point with abduction and external rotation.
L_{1-5}	Spinous process	Patient is prone. Extend the hip. Fine-tune tender point with external rotation and adduction.
L_{1-5}	Transverse process	Patient is prone. Extend the hip. Fine-tune tender point with adduction.

-



Knee OMM

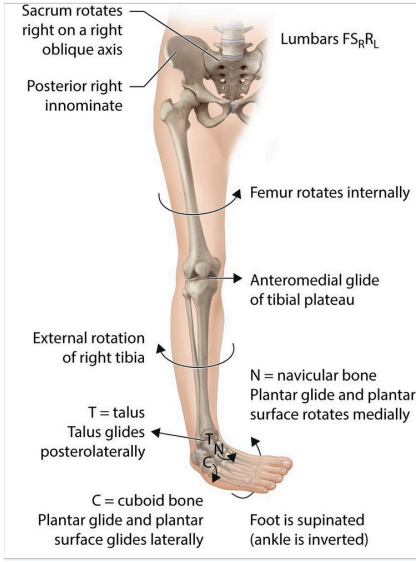
Posterior fibular head Get PAID	Lateral knee pain Fibular head reciprocal motion with proximal fibula (anterior-posterior) Ankle prefers supination (plantarflexion, inversion, adduction) Talus is anterior, internally rotated and inverted

	dorsiflexion= fibular head moves anterior plantarflexion= fibular head moves posterior MET: anterior force on fibular head, pronate ankle → go back to ease
Anterior fibular head	Prefers anterior glide, resists posterior glide Ankle prefers pronation (eversion, abduction, dorsiflexion) Talus is Posterior, externally rotated and everted MET: posterior force on fibular head, supinate ankle → go back to ease
ACL	Stabilizes anterior motion of tibia Hyperextension of valgus deformity of the knee POPPING sound Dx: anterior drawer sign (90 degrees), Lachman test (30 degrees, MORE sensitive)
PCL	Stabilizes posterior motion of tibia High impact trauma Dx: posterior drawer test (90 degrees)
MCL	Medial motion of knee, resists valgus Most commonly injured Inferiorly bordered by pes anserinus
LCL	Lateral motion of knee, stabilizes varus stress
meniscus	Shock absorbers Popping, locking, giving away Twisting or sudden direction of change medial= mcmurray, EXternal rotation lateral= mcmurray, Internal rotation

ANKLE OMM

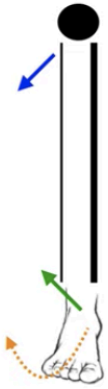
Structure	**Function**	**Diagnosis**
Anterior Cruciate Ligament (ACL)	Stabilizes anterior motion of tibia	Anterior Drawer & Lachman Tests
Posterior Cruciate Ligament (PCL)	Stabilizes posterior motion of tibia	Posterior Drawer Test
Medial Collateral Ligament (MCL)	Resists valgus stress	Valgus Stress Test
Lateral Collateral Ligament (LCL)	Resists varus stress	Varus Stress Test
Menisci	Shock absorbers	McMurray Test

Fibular Mechanics & Dysfunction



Anterior Fibular Head

Fibular head prefers anterior glide
Ankle prefers pronation
Talus is posterior



Motion of the Fibular Head is ALWAYS OPPOSITE motion of the Talus

Posterior Fibular Head

Fibular head prefers posterior glide
Ankle prefers supination
Talus is anterior

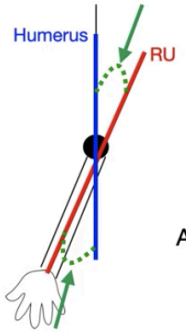


HVLA talotibial joint	Dorsiflexion with traction, thrust is long axis Tightness of gastrocnemius
Pronation (stable)	Dorsiflexion, eversion, ABDUCTION
Supination (unstable)	Plantarflexion, inversion, adduction

ARM OMM

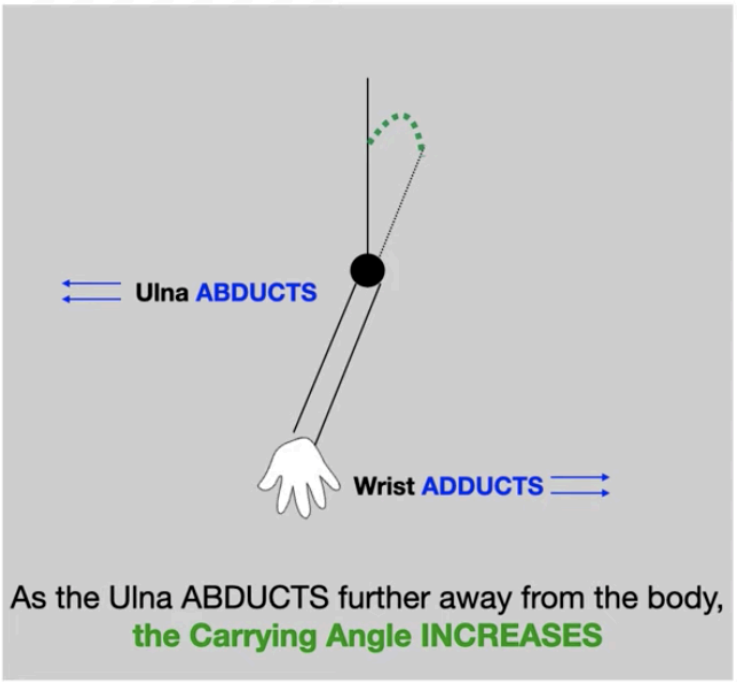
Carrying Angle

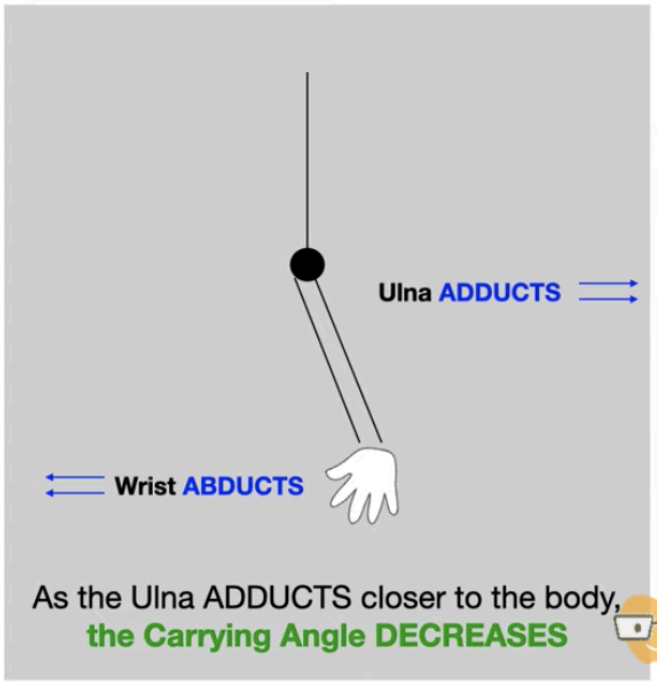
An angle that helps diagnose the relationship/dysfunction between the elbow, forearm, and wrist



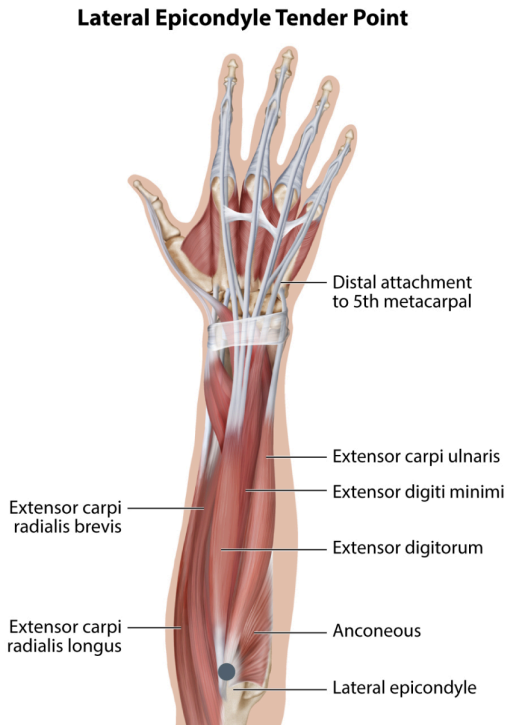
As the Ulna ABDUCTS further away from the body,
the Carrying Angle INCREASES

As the Ulna ADDUCTS closer to the body,
the Carrying Angle DECREASES





Elbow OMM

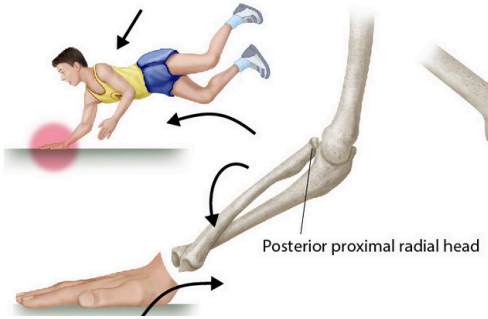


Lateral epicondylitis	Extend, supinate abduct
Medial epicondylitis	Flex, pronate, abduct

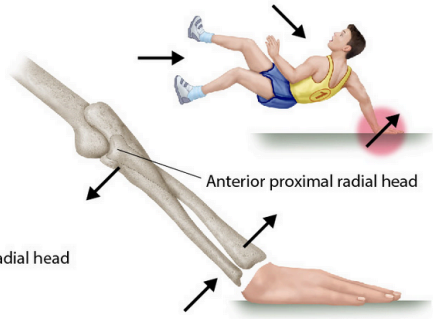
Wrist OMM

Radial head dysfunction

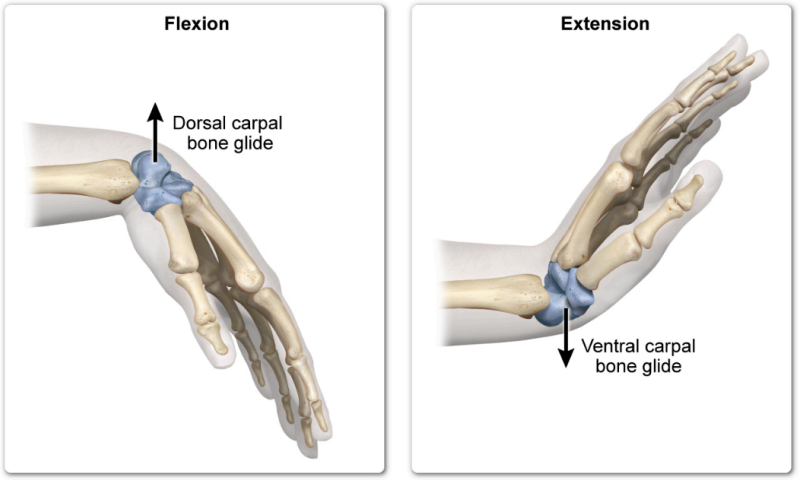
Mechanism for posterior radial head somatic dysfunction



Mechanism for anterior radial head somatic dysfunction



Wrist flexion and extension

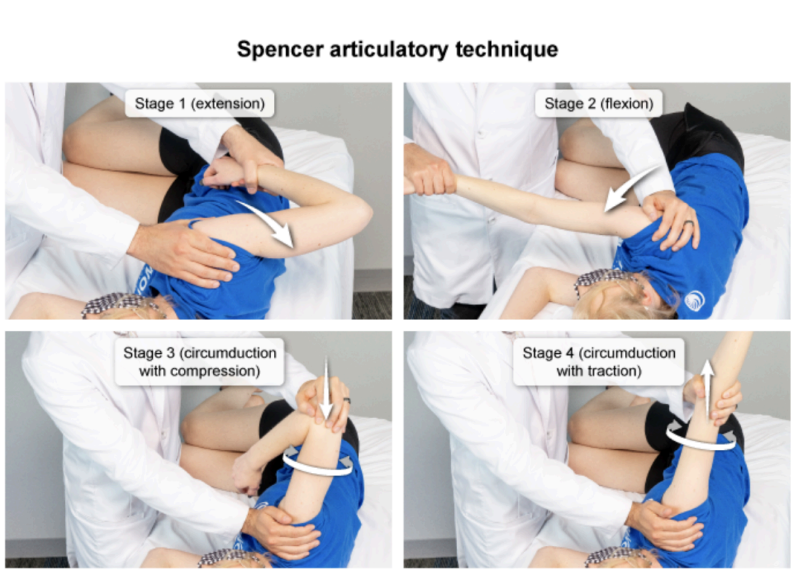


	Wrist flexion dysfunction	Wrist extension dysfunction
Wrist	Stuck in flexion = restriction in extension	Stuck in extension = restricted in flexion
Carpal bones*	Stuck dorsally† = restricted in ventral‡ glide	Stuck ventrally‡ = restricted in dorsal† glide

Ulnar nerve compression	Wrist: cubital tunnel - Gunyon canal: bw palmar carpal ligament and flexor retinaculum (sensory loss over 4-5th digits Elbow: medial epicondyle and olecranon
Median nerve compression	Flexor retinaculum and carpal bones= carpal tunnel syndrome (first 3 digits and weakness of thumb and first 2 digits)
Radial nerve compression	Two heads of supinator muscle → weakness in extension of thumb and fingers
Anterior radial head **Anterior = pronation restriction** Flex and thrust posterior	Supination of hand- supination somatic dysfunction → HVLA=pronate arm and flex → thrust down and flex Fall on back stretched hand
Posterior radial head posterior= supination Extend and thrust anterior	Pronation of hand -pronation somatic dysfunction → HVLA supinated and flexed → anterior and extended thrust Fall on outstretched hand

FOOSH= posterior radial head, pronation, glides posterior
Restrictions: does not go anterior, supination
Fall back= anterior radial head, supination, glides anterior
Restriction: does not go posterior, does not pronate

Spencer techniques





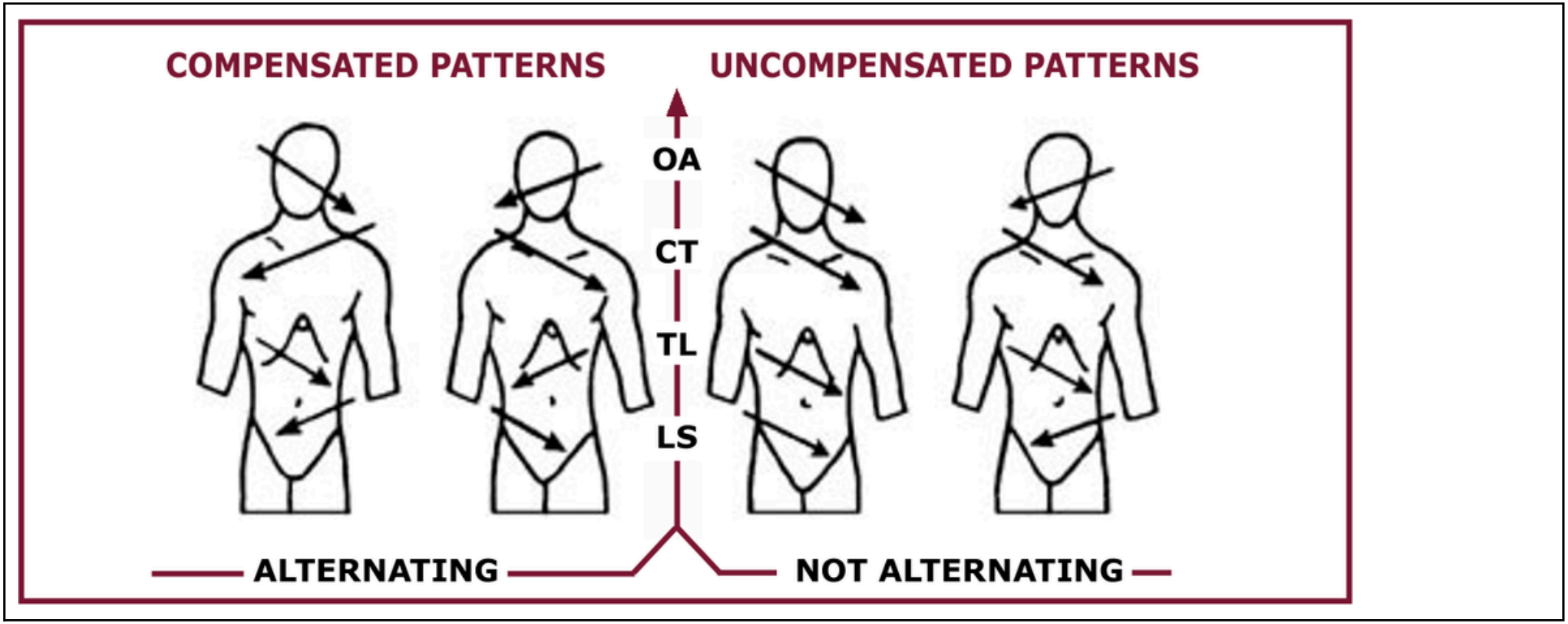
Muscle movements of lower extremities

Muscles of the Leg			
Muscle	**Compartment**	**Nerve**	**Function**
Extensor hallucis longus	Anterior	Deep peroneal	Great toe dorsiflexion
Extensor digitorum longus	Anterior	Deep peroneal	Lesser toe dorsiflexion
Tibialis anterior	Anterior	Deep peroneal	Ankle dorsiflexion
Peroneus longus	Lateral	Superficial peroneal	Ankle plantarflexion and foot eversion
Peroneus brevis	Lateral	Superficial peroneal	Foot eversion
Flexor hallucis longus	Deep posterior	Tibial	Great toe plantarflexion
Flexor digitorum longus	Deep posterior	Tibial	Lesser toe plantarflexion
Tibialis posterior	Deep posterior	Tibial	Ankle plantarflexion and foot inversion
Gastrocnemius	Superficial posterior	Tibial	Ankle plantarflexion
Soleus	Superficial posterior	Tibial	Ankle plantarflexion
Plantaris	Superficial posterior	Tibial	Ankle plantarflexion

Zink Fascial patterns

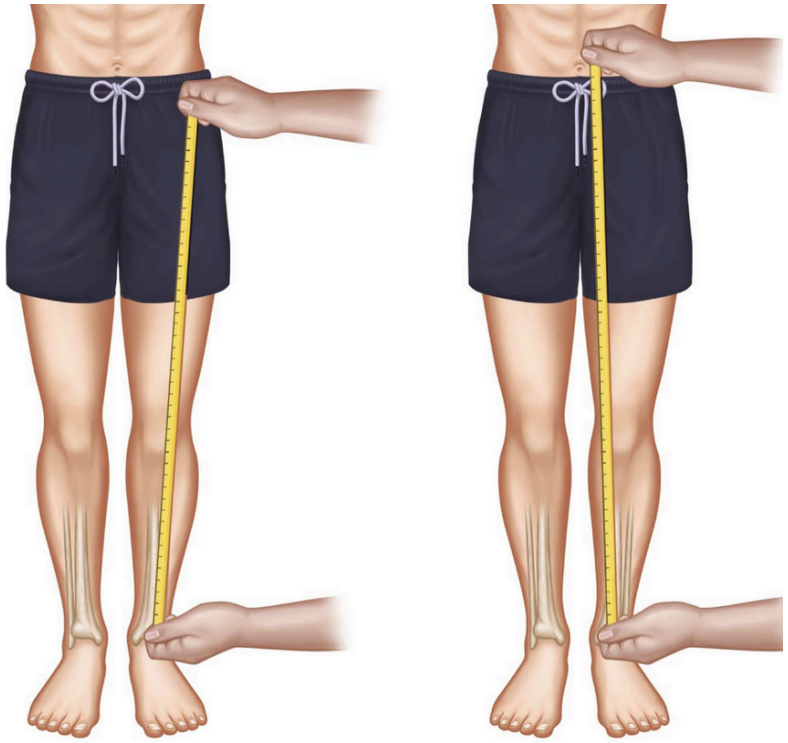
- Low yield

Facial patterns are “compensated somatic dysfunctions”	Left- right- left- right in 80% of people Right- left-right-left in 20% of people
Uncompensated facial patterns	Left, left, right, right



Short Leg Syndrome

Short leg syndrome
True measurement= ASIS + medial malleolus



A B

A=True leg length; **B=Apparent** leg length

Short leg syndrome arises when there is an anatomical or functional leg length discrepancy. Anatomical leg discrepancies arise from hip replacements and physical trauma, whereas functional leg discrepancies arise from a dropped foot arch and poor running biomechanics. These factors will result in somatic dysfunctions of the innominates, lumbar spine, and sacrum. Ankle pain, foot pain, low back pain, and poor ambulation are common symptoms. A physical examination will reveal the following findings:

- A positive standing flexion test (side of the short leg)
- Inferior sacral base (side of the short leg)
- Anterior innominate rotation (side of the short leg)
- Posterior innominate rotation (side of the long leg)
- Type I biomechanics of the lumbar spine (side bent away and rotated towards the short leg)
- Tight iliolumbar ligaments (side of the short leg)

Cranial OMM

Treatment

- Compression of 4th ventricle: reduced CRI
- Decompression of occipital condyles: normalize function of hypoglossal nerve
- Life technique: cranial bone dysfunction of frontal or parietal bones
- Venous sinus drainage: enhance CRI amplitude
- V-spread technique: release restricted cranial sutures

Vault Hold

1. Index finger: Place on the greater wing of the sphenoid over the pterion
2. Middle finger: Place in front of the ear on the temporal bone
3. Ring finger: Place on the mastoid region on the temporal bone
4. Little finger: Place on the occiput

Primary Respiratory Mechanism (PRM)

Fluctuation of the CSF

Inherent motion of the brain & spinal cord

Articular mobility of the cranial bones

Tension of the dura (Reciprocal Tension Membrane)

Motion of the sacrum between the illia

Dysfunction	**Axis/Axes**	**Coupling**	**Naming Convention**
Torsion	1 AP	Rotate OPPOSITE	Greater wing of the sphenoid
Sidebending/Rotation	2 Vertical 1 AP	Rotate SAME (AP) Rotate OPPOSITE (Vertical)	Convexity in sidebending
Vertical Strain	2 Transverse	Rotate SAME	Base of the sphenoid
Lateral Strain	2 Vertical	Rotate SAME Translate OPPOSITE	Sphenoid translation
Compression	————————	Sphenoid & Occiput move toward one another	————————

Attachments to dura

C2, C3, foramen magnum, sacrum

Strain pattern	Axis	Bone and movement	Finger movement with the vault hold
Physiological strain patterns			
Flexion	2 parallel transverse axes (one each through sphenoid and occiput)	Anterior rotation – sphenoid Posterior rotation - occiput	Second and fifth digits spread out and move caudally
Extension	2 parallel transverse axes (one each through sphenoid and occiput)	Anterior rotation – occiput Posterior rotation - sphenoid	Second and fifth digits approximate and move cephalad
Left torsion	1 anterior-posterior axis (nasion to opisthion)	Left greater wing of the sphenoid is higher Sphenoid and Occiput rotate in opposite directions	Left second digit – anterior and superior rotation Right second digit – posterior and inferior rotation
Right torsion	1 anterior-posterior axis (nasion to opisthion)	Right greater wing of the sphenoid is higher Sphenoid and Occiput rotate in opposite directions	Left second digit – posterior and inferior rotation Right second digit – anterior and superior rotation

Left side bending and rotation	2 vertical axes and 1 anterior-posterior axis	Sphenoid and Occiput side bend about vertical axis to approximate on the right side. Left side is far apart.	Left digits – spread and move caudad Right digits – narrow and move cephalad
Right side bending and rotation	2 vertical axes and 1 anterior-posterior axis	Sphenoid and Occiput side bend about vertical axis to approximate on the left side. Right side is far apart.	Left digits – narrow and move cephalad Right digits – spread and move caudad
Non-physiological strain patterns			
Superior vertical shear	2 parallel transverse axes (one each through sphenoid and occiput)	Anterior rotation of sphenoid and occiput. Sphenoid is higher than occiput	Second digits move caudad
Inferior vertical shear	2 parallel transverse axes (one each through sphenoid and occiput)	Posterior rotation of sphenoid and occiput. Sphenoid is lower than occiput	Second digits move cephalad
Left lateral strain	2 vertical axes	Sphenoid shifts to the left	Right hand – Second digit moves laterally, fifth digit moves medially Left hand – Second digit move medially, fifth digit moves laterally

Left lateral strain	2 vertical axes	Sphenoid shifts to the left	Right hand – Second digit moves laterally, fifth digit moves medially Left hand – Second digit move medially, fifth digit moves laterally
Right lateral strain	2 vertical axes	Sphenoid shifts to the right	Right hand – Second digit move medially, fifth digit moves laterally Left hand – Second digit move laterally, fifth digit moves medially
Compression	None	Compression at the SBS body. Little movement produced	"Fullness" No deviations noticed.

Cranial Strains: Naming and Axes of Motion			
Strain	**Physiologic/Pathologic**	**Named For**	**Axis of Motion**
Flexion/expansion	Physiologic	Superior SBS	2 parallel transverse
Extension/contraction	Physiologic	Inferior SBS	2 parallel transverse
Torsion	Physiologic	Superior/cephalad greater wing of the sphenoid	AP
Sidebending rotation	Physiologic	Convexity/wide finger side (left or right)	3 total: AP (sidebend), 2 parallel vertical (rotation)
Superior vertical strain	Pathologic	Superior sphenoid base	2 parallel transverse
Inferior vertical strain	Pathologic	Inferior sphenoid base	2 parallel transverse
Lateral strain	Pathologic	Direction sphenoid base points (left or right)	2 parallel vertical
AP = anterior-posterior; SBS = sphenobasilar symphysis/synchondrosis (ie, joint at which the sphenoid and occiput bases meet).			

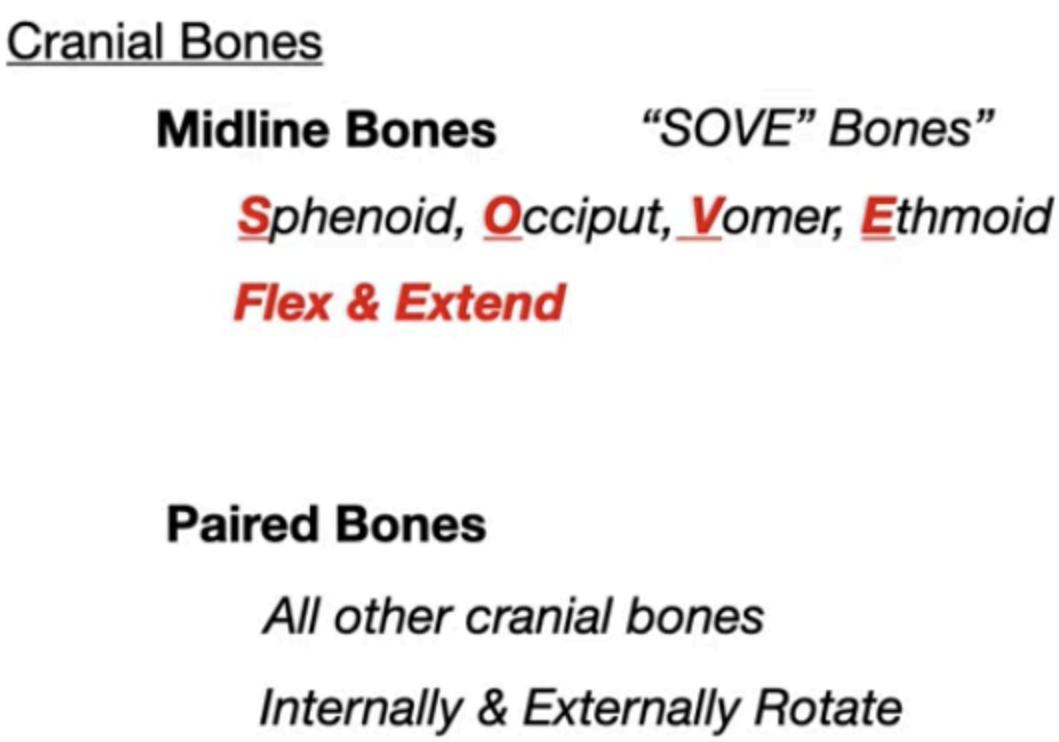
Cranial Strain patterns

PRM (primary respiratory mechanism)

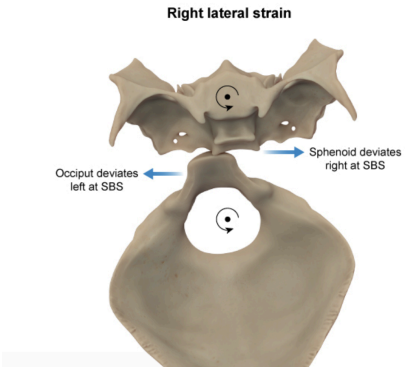
- inherent mobility of brain and spinal cord (inhale shrink/ thicken), exhalation lengthens)
- CSF fluctuation: glial cell pulsation, CRI normal= 10-14 cycles
- intracranial and intraspinal membrane movement= dura mater attaches at C2-3 and S2
- cranial bone articular mobility: limited movement
- involuntary mobility of the sacrum bw the ilia= transverse axis, inelastic rope

Paired bones
SOVE

- Sphenoid
- Occiput
- Vomer
- ethmoid

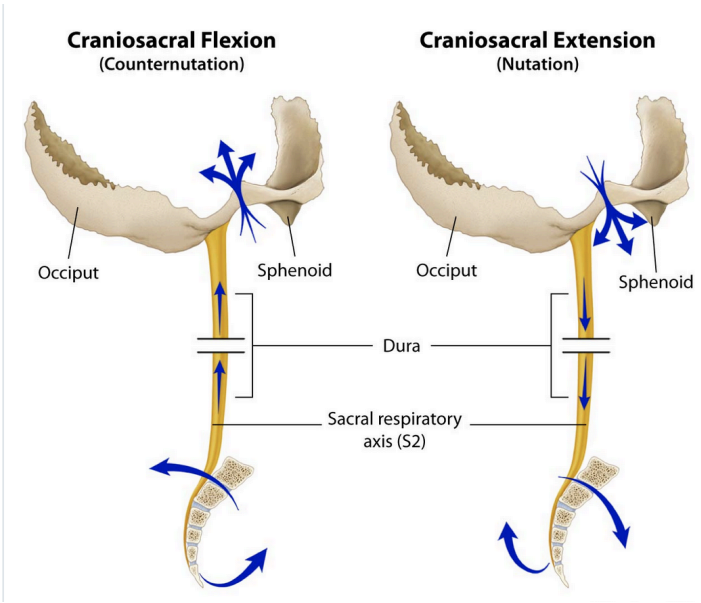


PATHOLOGIC

Lateral strain	**2 vertical axes** Sphenoid deviates to side of dysfunction - Right lateral strain, sphenoid is right - Occiput deviates left, but moves right - PARALLELOGRAM Axis: (2) Vertical Axes Naming Convention: Sphenoid translation Coupling: Sphenoid & Occiput rotate SAME direction Sphenoid & Occiput translate OPPOSITE direction Head may appear "parallelogram"	 2 Vertical
vertical strain	Axis: (2) Transverse Axes Naming Convention: Base of the sphenoid Coupling: Sphenoid & Occiput rotate SAME direction	2 Transverse
Compressions	Axis: N/A Naming Convention: N/A Coupling: Sphenoid & Occiput move TOWARD each other Due to trauma	Poor suckling Severely reduced CRI
PHYSIOLOGIC		

<table>
<tr>
<td>Flexion

Physiologic
2 horizontal</td>
<td>flexion of midline bones, external rotation of paired bones
head widens, decrease AP diameter
flexion of SBS causes dura to pull cephalad, moves sacral base posterior through superior transverse axis of sacrum= COUNTERNUTATION on transverse axis

<table>
<tr><td>Sphenobasilar Synchondrosis</td><td>Cephalad</td></tr>
<tr><td>Sacrum</td><td>Posterior & Counternutates</td></tr>
<tr><td>Respiration</td><td>Inhalation</td></tr>
<tr><td>Paired Bones of the Cranium</td><td>Externally Rotate</td></tr>
<tr><td>AP Diameter of the Cranium</td><td>Shortens</td></tr>
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<td>
</td>
</tr>
<tr>
<td>Extension

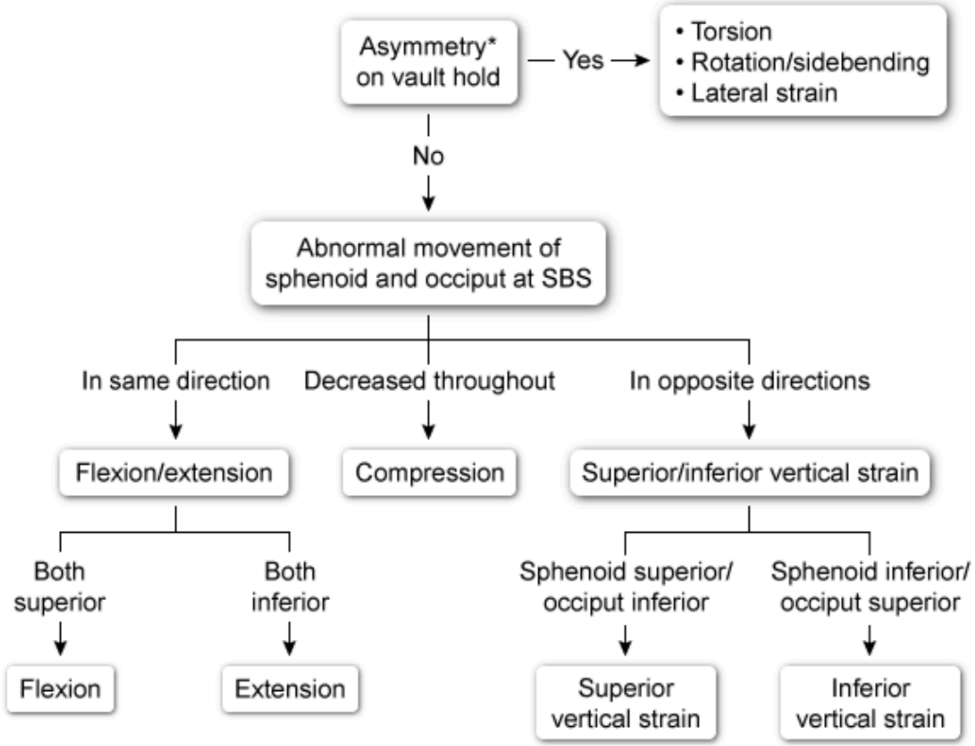
Physiologic
2 horizontal</td>
<td>extension of midline bones (sphenoid, occiput, ethmoid, vomer), internal rotation of paired bones
extension of SBS causes dura to fall caudad, moves sacral base anterior through transverse= NUTATION</td>
<td>Extension
<table>
<tr><td>Sphenobasilar Synchondrosis</td><td>Caudad</td></tr>
<tr><td>Sacrum</td><td>Anterior & Nutates</td></tr>
<tr><td>Respiration</td><td>Exhalation</td></tr>
<tr><td>Paired Bones of the Cranium</td><td>Internally Rotate</td></tr>
<tr><td>AP Diameter of the Cranium</td><td>Lengthens</td></tr>
</table>
</td>
</tr>
<tr>
<td>Side bending
2 vertical and 1 AP</td>
<td>Side of sidebending/ rotation is side with the greatest opening</td>
<td>Axis: (2) Vertical Axis & (1) AP Axis

Naming Convention: Convexity in sidebending

Coupling: Sphenoid & Occiput rotate SAME direction on AP axis
Sphenoid & Occiput rotate OPPOSITE direction on Vertical axes</td>
</tr>
</table>

Torsion 1 AP axis	Left torsion: left greater sign sphenoid is superior, left occiput interior Named for greater wing of sphenoid	Axis: **(1) AP Axis** Naming Convention: **Greater wing of the sphenoid** Coupling: **Sphenoid & Occiput rotate OPPOSITE directions**

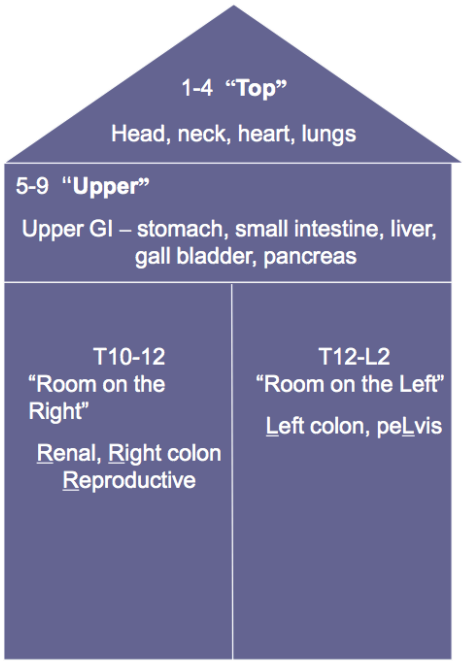
Symmetric SBS dysfunctions



JAW OMM

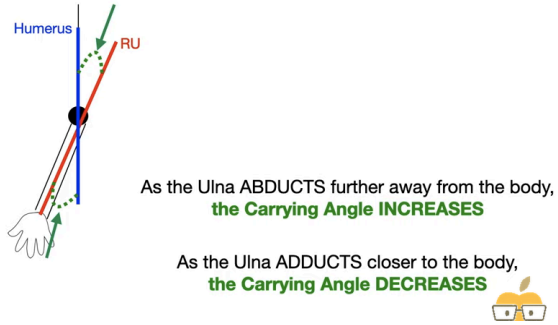
MET	Position patient into barrier → isometric muscle contraction against resistance → reciprocal inhibition ⇒ contract toward their barrier NO APPROXIMATION of joint

KNEE Jerks

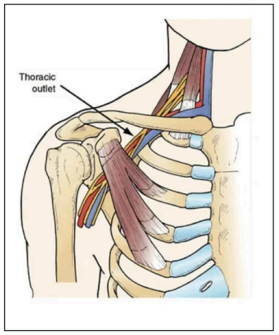
<table>
<tr>
<td>AUTONOMIC LEVELS</td>
<td>
<table>
<tr><th>Structure</th><th>Level</th></tr>
<tr><td>Head & Neck</td><td>T1-T4</td></tr>
<tr><td>Heart & Lung</td><td>T1-T4</td></tr>
<tr><td>Foregut</td><td>T5-T9</td></tr>
<tr><td>Midgut</td><td>T10-T11</td></tr>
<tr><td>Hindgut</td><td>T12-L2</td></tr>
<tr><td>Kidney</td><td>T10-T11</td></tr>
<tr><td>Appendix</td><td>T12</td></tr>
<tr><td>Upper Extremity</td><td>T2-T8</td></tr>
<tr><td>Lower Extremity</td><td>T11-L2</td></tr>
<tr><td>Upper Ureter & Gonads</td><td>T10-T11</td></tr>
<tr><td>Lower Ureter & All Else GU</td><td>T12-L2</td></tr>
</table>
</td>
<td>


</td>
</tr>
<tr>
<td>Sympathetic viscerosomatics</td>
<td>Greater splanchnic nerve: T5-9
Lesser splanchnic nerve: T10-11</td>
<td></td>
</tr>
<tr>
<td>Bony landmarks</td>
<td>C7= vertebra prominens</td>
<td>BUM</td>
</tr>
</table>

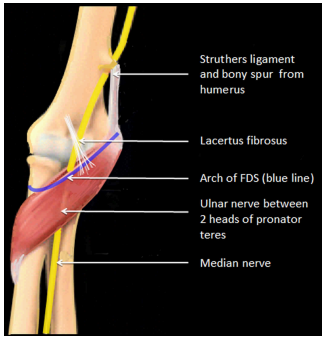
	T3= spine of scapula T7 SP= inferior angle of scapula, TP of T8 T2= sternal notch T4, 2nd ribs= sternal angle, carina Iliac crest= level of L4 males, L5 females Dimple of venus: PSIS, S2	**BUL** **BM**
Articulatory technique	Stabilize vertebrae and spinous process below dysfunctional segment→ oscillate - Spencer technique for shoulder	**Low velocity, high amplitude** Direct technique
Spencer techniques		
Reciprocal inhibition	Muscle energy that lengthens a short muscle (**torticollis**) - **Gentle** contraction in agonist muscle, reflexive relaxation of antagonist muscle. (capitis muscles → SCM) - LENGTHENS a muscle with gentle contraction	Vs isolytic lengthening: similar, however, patient contracts muscle against a greater force where operators force is greater Post Isometric relaxation: direct MET involving contraction of painful muscle group
Balanced ligamentous tension (**BLT**)	Used in **acute dysfunction, indirect techni**que **MYOFASCIAL**, **counterstrain** and **FPR** are also indicated. Treats somatic dysfunction by moving the segment into direction of ease, restore ligamentous tension, uses patients breathing or muscular cooperation to overcome resistance	Avoid HVLA, Stills, and muscle energy in acute dysfunction - Less aggressive and direct techniques - Do not directly engage the barrier
Rib 1	Anterior and middle scalene	
Rib 2	**Posterior scalene**	
Riib 4-6	Pectoralis	
Rib 7-10	Latissimus dorsi	
Nursemaid elbow	**Radial head subluxation** thru annular ligament Displacement of **radiocapitellar line** Slight flexion and pronation arm position	Colles fracture is fracture of distal radial head and ulna

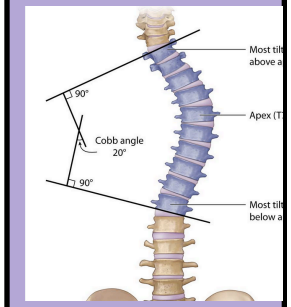
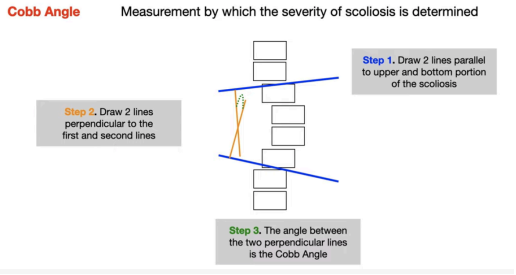
Shoulder subluxation	**Anterior→ posterior: still technique is underhand pitch** **Posterior → anterior: overhand pitch**	
Carrying angle	> 15 degrees= abduction of ulna + adduction of wrist= **VALGUS** < 15 degrees, ulna adduction, abduction of wrist. = **VARUS** **ULNA and WRIST act opposite of each other**	
Fat pad sign	Radial head fracture, FOOSH	
Acute TTA findings	**Boggy** Normal range of motion with sluggish quality, vasodilation and edema of surrounding tissue, warm and moist	
Chronic TTA findings	**Ropy**, stringy, doughy, flaccidity, fibrotic Dry and scaly skin, cool **Chronic Somatic Dysfunction** • Tissue texture: no edema, no erythema, cool dry skin, decreased muscle tone • Asymmetry is present with compensation in other areas of the body • Restriction of motion is present, but there is no pain/decreased pain with movement into the barrier and the quality of movement is normal • When palpated, the tissues subjectively feel dull and achy	
Viscerosomatic reflex	**Chapman's points are myofascial nodules of sympathetic tone**	
Sympathetics to head	T1-4	

Dysmenorrhea	**Tx sacral inhibition / sacral rock** Chapman points for uterus are sacral bases and between L4/5 transverse processes bilaterally **Sympathetics: T10-L2= uterus → rib raising decreases sympathetic tone, enhance blood flow and relax uterus, decrease pain** Parasympathetics: s2-s4= cervix	Pubic tubercle chapman point = ovary
Appendix	Anterior: tip of 12th rib. Posterior: transverse process of T11	Adrenals chapman: T8-10
Diverticulitis	Left sigmoid colon, left thigh along IT band	
Sacral rocking	**NORMALIZES parasympathetic ton**e of pelvic and lower abdominal viscera	
Post-Op ileus	Reduce hypersympathetic tone by performing **paraspinal inhibition** of thoracolumbar junction	
Prostate	Chapman's point= lateral thigh	
Iliotibial band syndrome	Knee pain in athletes, runners, lateral thigh pain Positive OBER'S test, originates from tensor fascia lata Pain over lateral femoral epicondyle	Muscles insert at Gerdy's tubercle at the proximal lateral tibia, lateral femoral condyle Tx: sitting on floor, flex affected leg over the other, them pull leg in medially
Forward sacral torsions	Type I dysfunction R on R, L on L L5 rotates opposite, side bends same	Negative spring = "junction **springs freely"**
Backward sacral torsions	Type II dysfunction L on R, R on L	Positive spring
Anterior radial head	Prefers **supination**, restricted in pronation Resists posterior glide, prefers anterior glide	Forearm held in pronation, while patient resists
Posterior radial head	Prefers **pronation**, restricted in supination Prefers **posterior** glide PPP AS	Tx: MET, HVLA - HVLA place into SUPINATION and extension, apply posterior to anterior force on posterior radial head

Wrist dysfunction	Flexion dysfunction: stuck in flexion, carpal bones are dorsal → restricted extension Extension dysfunction: stick in extension, carpal bones ventral → restricted flexion	
Terrible triad	Radial head fracture, coronoid process fracture of ulna, posterior elbow dislocation	
Effleurage	Soft tissue technique stroking/ skimming over to push fluid back to heart	
Galbreath technique	Otitis media, traction of jaw downward	
Anterior talofibular ligament pathology	Positive ankle anterior drawer test	Always Tears First
SCM acute spasm	LEFT SCM - Right sidebending - Left rotation of neck	Tx: muscle energy or myofascial release to lengthen spasmed muscle
Thoracic inlet syndrome	Uneven pulses due to compression of subclavian vessels and brachial plexus between anterior and middle scalene muscles **Thoracic Outlet** Neurovasculature, lymphatic, musculoskeletal space bour •First rib •Clavicle •Pectoralis minor •Anterior & Middle Scalenes 	Dx: military posture test Adson's test → loss of radial pulse with head turn extended arm. Compressed brachial plexus and subclavian vessels. Anterior and middle scalenes. Subclavius muscle under the clavicle protects the brachial plexus in clavicle fractures
Rotator Cuff muscles	**Supraspinatus: ABduction** **Infraspinatus: External rotation** **Teres Minor: External rotation** **Subscapularis: Internal rotation** Rotator cuff tear: ROM deficit	**“A, E, E, I the SITS muscles makes the arm touch the sky”**

	Tendonitis: no ROM deficit	
Shoulder tests	**AC joint:** Cross arm test, apley scratch **Bicipital tendonitis:** speeds test, **yergason's** test **Glenohumeral** joint instability: sulcus sign, inferior traction **Subacromial** bursa impingement: hawkins test, neer/ painful arc **Supraspinatus: empty can test, Drop arm test**	
Nerve impingement	**Extra cervical rib and scalene: brachial plexus** **Corachobrachialis: bench pressing, traps musculocutaneous nerve** **Teres major: quadrangular space, axillary nerve**	
Sympathetics to lower extremities	T10-L2	
Plantar fasciitis	Tight calf muscles: gastrocnemius, soleus. Achilles tendonitis	Tx: counterstrain of gastrocnemius with plantarflexion and knee flexion
Wallenbergs test	Vertebral artery insufficiency	
Postpartum sacral dysfunction	**Bilateral sacral flexion** - Labor	Deep sacral sulci and shallow ILAs
Diverticulitis (sigmoid colon)	Left anterior iliotibial band chapman point	T12-L2
Flexion	**External rotation of paired bones** Decreased AP diameter, eyes further apart Dura pulled caudad	Sacral **counternutation**
Extension	**Internal** rotation of paired bones **Increased AP diameter,** eyes closer together Dura pulled cephalad	Sacral nutation
Posterior radial head	**Repeated pronation and supination** Fall forward on outstretched hand	Pronates, but cannot supinate Tx: forearm held in pronation while patient resists
Anterior radial	Fall backward on outstretched hand	Post-isometric MET: put patient into pronation and have them

head	Radius is supinated, **barrier is pronation** Restricted wrist FLEXION Restricted DORSAL glide of carpal bones	contract into supination against counterforce
Pronator teres syndrome	Numbness and tingling	
Posterior fibular head - PIP - Inverted - Plantar Flexes - Supinated	Fibular head resists anterior glide Anterior lateral malleolus resists posterior gliding Ease of plantarflexion / restricted **dorsiflexion** Ease in inversion / restricted **eversion** Foot is **supinated** **PED restriction**	See-saw motion - Fracture of posterior fibular head can damage the common fibular nerve Tx: MET HVLA - Posterior fibular head= pronate ankle= dorsiflex, abduction, eversion (PED) - Anterior fibular head= supinate ankle= plantarflex, adduction, inversion (PIA)
Winged scapula	“Asymmetry of upper back”= **C5-7,** long thoracic nerve, serratus anterior	7 heaven
Adrenal gland sympathetics	T8-10 2x1 inch above umbilicus	
Chapman Points	I am funny→ Eye= humerus I heard you broke your clavicle→ **Ear= clavicle (superior proximal)** STLP, 11SC→ sinus, tinsel, larynx, pharynx= 1st rib ICS, Sternoclavicular appendix= comes after right 12th rib	
Chapman points	FLip rule. Open up the guts and fold it down.	Posterior of iliotibial band= prostate

for GI	Iliotibial band. Sigmoid on upper left lateral thigh Splenic flexure: lower left lateral thigh	
Chapman for adrenal	2x1 inch above umbilicus	
Scoliosis 	Idiopathic and women #1 Dextro: right, convex right Levo: left, convex left **Structural: does NOT correct with sidebending. Adams forward bending test assess spinal curvature.** Functional: Does correct with sidebending. Functional FIXES. Due to short leg syndrome Mild: 0- 20 → OMT Moderate: 21-45 → Omt + bracing **Severe: 50+--> surgery , respiratory issues** > 75 degrees= CV involvement , surgery Progression of angle > 5 degrees/ year → surgical correction	Cobb angle - Measure of scoliosis severity - Superior - top and inferior - bottom 
Short leg syndrome	**Functional** short leg= **COMPENSATORY** somatic dysfunction, hip replacement or short leg - Anterior innominate rotation - Tx: OMT HVLA **Anatomic short leg= genetic** - Posterior innominate rotation - Heel lift for younger patients Heel Lift Tx: 1/16” in elderly, ⅛” in young, ½ “ maximum every 2 weeks*** 3.2mm (⅛”) with goal of half of total height difference Heel lift GOAL: ½ to ¾ of LLD in chronic case, full correction of LLD in acute case (hip replacement)	Findings: Uneven landmarks bilaterally Lumbar spine: SART Posterior hip dislocation: short leg, internally rotated, injury to sciatic nerve
T10-T11	Middle Gi tract (lesser splanchnic, SM ganglion) **Kidney, upper ureters [lower ureters T12-L1]** Gonads (ovary, testes)	prostate= T12-L2 Uterus, cervix= T10-L2
T11-L2	Bladder, penis, clitoris, Legs	

<table>
<tr><td>Occipital condylar decompression</td><td>Poor suckling in newborn
Decompress/ myofascial occipital condyles and normalize CN XII. apply cephalad and lateral force at base of occiput
Nerve entrapment of CN IX, X, XI at the jugular foramen and CNXII at hypoglossal foramen</td><td></td></tr>
<tr><td>Fibular head</td><td>Named for movement of ease.
Lateral malleolus restriction is opposite of fibular head restriction</td><td>Teeter-totter</td></tr>
<tr><td>Piriformis syndrome</td><td>Bending, hunched over position. Pain with standing and walking.
Peripheral irritation of sciatic nerve at the piriformis muscle
- Sciatica has the same symptoms, originates at the nerve root</td><td>FABER ½ between ILA and greater trochanter
Stretch: cross leg over knee and bend forward
Summary of Provocative Lower Extremity Tests
Test | Evaluated Structures/Pathology
FADIR | Hip (femoroacetabular) impingement
FABER | Intra-articular hip or SI joint
Trendelenburg | Gluteus medius and/or minimus
Ober | TFL and/or ITB
Thomas | Iliopsoas</td></tr>
<tr><td>CRI</td><td>Decreased in stress, depression, chronic fatigue, pituitary tumors.
Increased in acute fever, exercise, hyperthyroidism
- CV4</td><td>Normal: 10- 14
Decreased with depression or hypo physiologic states.</td></tr>
<tr><td>Direct treatment</td><td>Engages restrictive barriers, away from position of ease.
Place patient into barrier that you found it in</td><td></td></tr>
<tr><td>Interossei</td><td>PAD: palmer adduct</td><td></td></tr>
</table>

	DAB: dorsal abduct	
Rotator cuff tear	Most common is supraspinatus tendon. Drop arm test and painful arc test.	Infraspinatus: promotes external rotation Teres minor: external rotation Supraspinatus: abduction (inn suprascapular n.) Subscapularis: internal rotation
Parallelogram	**Lateral strain pattern**, **2 vertical axes in same direction**	Neonate with misshapen head
Psoas syndrome	Thomas test. Pt is supine, flexes right knee to chest and extends opposite leg off table. Pain with hip extension - Abscess: fever, CT abdomen, IVDA, appendicitis Tender point between the ASIS and umbilicus Pelvic shift to opposite side Nonneutral lumbar dysfunction on affected side Tender point medial to ASIS	Muscular imbalance, strain, spasm, tendonitis, contracture of the iliopsoas muscle. - Kidney stones/ ureter cause viscerosomatic reflex to this muscle - Quadratus lumborum has overlap (inn by T12-L4)

	Psoas syndrome (ie, flexion contracture of the psoas muscle) typically causes **low back pain** and stiffness that is worsening by standing and walking. It is commonly seen in athletes and runners (as in this patient) but can also be caused by repetitive truncal flexion (eg, bending over) or visceral irritation (eg, appendicitis). Due to the attachment of the psoas to the lumbar spine, pelvis, and femur, **contracture of the right psoas muscle** (ie, right-sided psoas syndrome) is associated with the following physical examination findings: • Positive Thomas test on the right: With the patient in the supine position, flexing the hip and knee on the unaffected side (left side in this patient) causes the leg on the side of the hypertonic psoas (right side) to elevate off the table. • **Pelvic shift** to the **opposite** side: The innominate on the dysfunctional side is pulled superiorly, inducing a pelvic shift to the opposite (ie, unaffected) side. This patient's psoas syndrome is on the right side. Therefore, her pelvis will be **shifted to the left**. • This pelvic shift induces a **piriformis spasm** on the **opposite**/unaffected (left) side, which can cause *left* buttock pain that radiates down the posterior thigh and a posterior tenderpoint 7 cm medial to the *left* greater trochanter. • **Tenderpoint** between the umbilicus and the anterior superior iliac spine (ASIS) on the affected (right) side. • **Nonneutral** (eg, flexed or extended) lumbar dysfunction on the affected side: A hypertonic right psoas muscle pulls the lumbar vertebrae into right sidebending and rotation (eg, extended, rotated right, sidebent right [ER_RS_R]).	
Iliolumbar ligament sprain	Very common cause of low back pain Tender point at posterior iliac crest	

V-spread technique	Alleviate restrictions along cranial **sutures** Apply traction to cranial bones until restriction is released	
CV4 technique	Restore CRI, **resist FLEXION** until a Still point is reached.	
Parietal lift	Treat squamous suture dysfunction	
Venou sinus technique	Decrease congestion in dural venous sinuses, improve circulation thru jugular foramen	
"Fall on buttocks"	Superior shear of affected side Medial malleolus, ASIIS and PSIS are all superior	Tx: Abduction and internal rotation of SI joint → gapping. HVLA engages restrictive barrier
Fryette type 1	Neutral, sidebending and rotation are **opposite** - OA **group of segments** *	HVLA treatment is a thrust, position patient and rotate into barrier (rotate patient right→ segment is rotated left). Treat at apex (in the middle of the segment) - NRLSR → Tx is N RRSL
Abduction dysfunction of ulna	Increased carrying angle, increased abduction. Increased ease of medial glide of olecranon process. Wrist is adducted	
	RIBS are named for where they are STUCK! That is their dysfunction. BITE	
Exhalation restriction/ inhalation dysfunction	Hurt during inhalation, stuck exhaled down Exhaled SD= anterior TP	BITE: bottom= inhaled, top= exhaled
Inhalation restriction/ exhalation dysfunction	Hurt during exhalation, stuck inhaled/ up Inhaled SD= Posterior TP	Ribs stuck in inhalation (exhalation dysfunction) common in asthma and COPD

Muscles Used in Treatment of Dysfunctional Ribs (Exhalation Dysfunction)

Ribs	Muscles Used	Activation of Muscle Group
1	Anterior and middle scalenes	Look straight ahead and flex the neck
2	Posterior scalenes	Turn head sideways and flex the neck
3-5	Pectoralis minor	Push ipsilateral elbow toward contralateral anterior superior iliac spine (ASIS) against resistance
6-9	Serratus anterior	Push ipsilateral arm anteriorly
10-11	Latissimus dorsi	Adduction of the affected arm against resistance
12	Quadratus lumborum	Elevate ipsilateral innominate against resistance

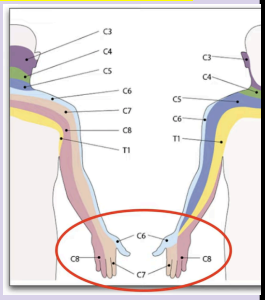
Scoliosis	• Mild (5-15°), moderate (20-45°), and severe (>50°) scoliosis are treated differently. • Moderate scoliosis 20-45° is when bracing should be utilized. • Severe scoliosis >50° may cause respiratory compromise and requires surgery. • Severe scoliosis >75° may cause cardiovascular compromise and requires surgery.	
Backward sacral torsion	Sphinx: landmarks more prominent. Posterior ILA and Deep sulcus on opposite sides. L5 rotated opposite of the axis.	Non-physiological, L on R more common.
Bilateral sacral extension	Pregnant women accommodate enlarging fetus Restrictive sacral rock, negative seated flexion	**Bilateral sacral flexion after childbirth**
Lateral strain	Sphenoid and occiput turn clockwise on 2	Direct blow to lateral head

	transverse axes (left) Or counterclockwise (right) Parallelogram head: index finger goes to right, pinky finger does to left	
Unilateral sacral flexion	Unlevel ILAs= sacral shear → ILAs are posterior Sphinx improves asymmetry → dysfunction is anterior	
Unilateral sacral extension	ILAs are inferior Sphinx worsens asymmetry	
Direct treatment to spine	Reverse all planes of potion in diagnosis FRLSL → ERRSR	Neutral dysfunctions remain in neutral position
Facilitated positional release	Indirect, passive technique : **balanced** neutral position of tissues, gentle activating force. Negative stretch reflex mechanism	**Facilitation**: highly excitable spinal segment needs - Less afferent stimuli - Higher resting membrane potential - Hyperexcitable neural state
Muscle energy	Place patient in r**estrictive barrier** → **post-isometric relaxation** → push toward ease with physician resistance → maintain contraction for 2-5 seconds → relax → slowly reposition → repeat	Isometric: physician and patient contraction forces are equal Isolytic contraction: lengthen short muscle and mobilize joint restrictions. Physician force > patients
9 physiologic principles in MET	1. *Joint mobilization with muscle force* 2. *Respiratory assistance* 3. *Oculocephalogyric reflex* 4. *Reciprocal inhibition* 5. *Crossed extensor reflex* 6. *Isokinetic strengthening* 7. *Isolytic lengthening* 8. *Postisometric relaxation* 9. *Using muscle force in one region to achieve movement o*	Torticollis: reciprocal inhibition **Crossed extensor reflex**: severely injured areas, one flexor contracted and contralateral flexor relaxes and extensor contracts. I**solytic lengthening:** operator force lengthens muscle by exceeding patient force. **Oculocephalogyric reflex** eye motion to cause reflex muscle contraction , post isometric relaxation of reciprocal inhibition **Respiratory assistance**: voluntary breathing to create muscular forces as fulcrum during muscle energy
Myofascial release	Passive direct or indirect technique Move into the barrier and into the ease	

	Steps of a typical myofascial release treatment: 1. Identify an area of somatic dysfunction through palpation. 2. Once a restriction is palpated, choose a type of myofascial release. In a direct treatment, the physician will move tissues toward the barrier. In an indirect treatment, the physician will move myofascial structures away from the barrier. 3. The physician adds other forces to "fine tune" the treatment (eg, twisting). 4. The patient is asked to use "enhancers" to assist with the release (enhancers include respiration, eye movement, muscle contraction, etc). 5. The physician awaits a release. 6. The patient is returned to neutral. 7. The physician rechecks the area.	
Muscle contractions	**Isometric**: **increase tension without movement** (**MET**)- entire biceps curl, no shortening of the muscle, pushes against resistance **Isolytic**: eccentric, muscle contraction against resistance with muscle lengthening (physician force > patient force) **Eccentric**: lengthen muscle during contraction (weight down)==> MUSCLE injuries due to too heavy equipment **Concentric**: flexing, contracting muscle with **external** force Isokinetic contraction: concentric contraction with constant Speed of contraction **Isotonic**: approximation of muscle origin with out increase in tension , CONTROLLED/ CONSTANT	
Patellofemoral pain syndrome	Runners knee, pain worsens with going up or down stairs Large Q angle, imbalance of quadriceps muscle. Knee cap deviates Laterally. J sign: patella tracking in joint with contraction of quadriceps. Weakness of vastus medialis, abnormal lateral tracking of patella.	Treatment: strengthen vastus medialis muscle.
Medial tibial stress syndrome	Shin splints, tenderness over anterior tibia, stress fracture	
Ear	Chapman's point for ear: **ABOVE** proximal third of clavicle	Below proximal third of clavicle= sinuses

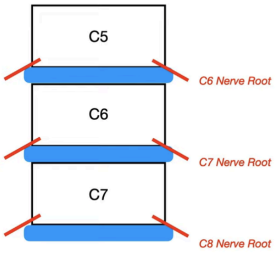
<table>
<tr><td>Skin receptors</td><td>
<table>
<tr><th>Receptor</th><th>Type</th><th>Location</th></tr>
<tr><td>Meissner Corpuscle</td><td>Large, myelinated, adapt quickly</td><td>Hairless skin</td></tr>
<tr><td>Pacinian Corpuscle</td><td>Large, myelinated, adapt quickly</td><td>Deep skin, joints, ligaments</td></tr>
<tr><td>Ruffini Corpuscle</td><td>Dendritic endings, adapt slowly</td><td>Fingertips, joints</td></tr>
<tr><td>Merkel Disc</td><td>Large, myelinated, adapt slowly</td><td>Fingertips, superficial skin</td></tr>
</table>
</td><td>Merkel Disc: Deep static touch
Ruffini: Fingertips rough, slippage
Pacinian: Pacific, deep pressure</td></tr>
<tr><td>Viscerosomatic reflex</td><td>Visceral pain → somatic pain (heart attack)</td><td></td></tr>
<tr><td>Viscerovisceral reflex</td><td>Gastric pain and GI motility</td><td></td></tr>
<tr><td>Somatovisceral reflex</td><td>Injury causes visceral response</td><td></td></tr>
<tr><td>Ganglia</td><td colspan="2">Sympathetic and parasympathetic effects on viscera
<table>
<tr><th>Structure</th><th>Levels</th><th>Sympathetic Ganglion</th><th>Parasympathetic Ganglion</th></tr>
<tr><td>Foregut</td><td>T5-T9</td><td>Celiac</td><td>Vagus</td></tr>
<tr><td>Midgut</td><td>T10-T11</td><td>Superior Mesenteric</td><td>Vagus</td></tr>
<tr><td>Hindgut</td><td>T12-L2</td><td>Inferior Mesenteric</td><td>Pelvic Splanchnic</td></tr>
</table>
</td></tr>
</table>

Cervical OMM



Nerves enter ABOVE corresponding vertebra. C8 exits below C7
"7 UP, 8 DOWN"

Nerve Root	Sensory	
C3	Neck, shoulder, and superior chest Right shoulder Phrenic Nerve (C3, C4, C5) refers Gallbladder/Diaphragm pain to the right shoulder	– –
C4		– –
C5		Biceps
C6	Thumb	Biceps
C7	Index & Middle finger (2nd and 3rd digit)	
C8	Ring & Pinky finger (4th and 5th digit)	



Radiculitis: sensory
Radiculopathy: muscle and reflex
Spurling test: extend and sidebend to side of pathology —-> Foraminal stenosis

Rheumatoid arthritis and down's syndrome have weak **transverse ligament of the atlas** → avoid upper cervical neck HVLA

Cervical motion

Primary Motions

OA	Flexion & extension
AA	Rotation
C2-C7	Sidebending

AA joint: Flexion locks out other motion, focus solely on AA rotation

"The cervical spine is the First Real Segment"
- **OA= flex/ extend**
- **AA= rotation**
- **C2-C7= sidebending**

OA is type 1 like, sidebending and rotation opposite
C2-C7 is type 2 like, sidebending and rotation same

Cervical spine mechanics			
	Occipitoatlantal	**Atlantoaxial**	**C2-C7**
Primary motion	Flexion & extension	Rotation	Rotation & sidebending
Sidebending & rotation	Opposite sides*	N/A	Same side*

Joints	Mechanics
Occipitoatlantal joint	Sidebending and rotation opposite
AA	Rotation only
C2-C7	Sidebending and rotation same
T1-L5	Follows Fryette mechanics: • Sidebending and rotation opposite for neutral dysfunctions (type 1) • Sidebending and rotation same for flexion/extension dysfunctions (type 2)

Cervical pathology

Alar and transverse ligaments are weak in Down's syndrome and RA
Avoid cervical extension in vertebral artery insufficiency
Whiplash causes loss of cervical spine lordosis

Cervical Facet orientation

Thoracic Rule of 3s	
Segment	**Rule**
T1–3	SP is at the same level as TP
T4–6	SP is 1/2 segment below TP
T7–9	SP is 1 segment below TP
T10	SP is 1 segment below TP
T11	SP is 1/2 segment below TP
T12	SP is at the same level as TP

Facet orientation

- Cervical: BUM
- Thoracic: BUL
- Lumbar: BM

Vertebrae	Facet Orientation
Cervical	**B**ackwards, **U**pwards, **M**edial ("BUM")
Thoracic	**B**ackwards, **U**pwards, **L**ateral ("BUL")
Lumbar	**B**ackwards, **M**edial ("BM")

<table>
<tr><td>Rib categories</td><td>Ribs 1-7
- Increased length and curvature as you descend inferiorly
Ribs 1-5 have pump hand motion, AP diameter
Ribs 5-10: Bucket handle
- Ribs 8-10 are false ribs
Ribs 11-12: floating, caliper motion , transverse diameter</td><td>Direct attachment to the sternum
• Ribs 1-3 have a predominantly pump-handle motion
• Ribs 4-6 have a mixture of pump-handle and bucket-handle motion
• Ribs 7-10 have a predominantly bucket-handle motion
• Ribs 11 and 12 have a predominantly caliper motion</td></tr>
<tr><td>Typical ribs</td><td>Head, neck and body. Neurovascular groove. One facet articulates with same and superior vertebrae</td><td></td></tr>
<tr><td>Atypical ribs</td><td>Rib 1: 1 facet, 2 grooves for subclavian vessels
Rib 2: rough area for serratus anterior
Rib 10: 1 facet
Ribs 11-12: no neck, 1 facet</td><td></td></tr>
<tr><td>Rib motion</td><td>Pump handle: AP diameter increases with inhalation
Bucket handle: transverse diameter increases with inhalation
Ribs 11-12: down and out motion with inhalation</td><td></td></tr>
<tr><td>Inhalation dysfunction</td><td>Rib stuck UP/ inhaled</td><td rowspan="2">Key RIB: BITE=
- inhaled= Bottom-most rib
- exhaled= top-most rib
<table><tr><th>Ribs</th><th>Muscle</th></tr><tr><td>1</td><td>Anterior & Middle Scalene</td></tr><tr><td>2</td><td>Posterior Scalene</td></tr><tr><td>3-5</td><td>Pectoralis Minor</td></tr><tr><td>6-9</td><td>Serratus Anterior</td></tr><tr><td>10-12</td><td>Latissimus Dorsi</td></tr></table></td></tr>
<tr><td>Exhalation dysfunction</td><td>Rib stuck DOWN/ exhaled</td></tr>
</table>

<table>
<tr><td>Thoracic anatomy</td><td colspan="2">T3= spine of scapula
T7= inferior angle of scapula
Diaphragm: attaches to L1-3, Ribs 6-12.

<table><tr><th>Thoracic Vertebrae</th><th>Rule of 3's</th></tr><tr><td>T1-T3</td><td>SP/TP in-line</td></tr><tr><td>T4-T6</td><td>TP 1/2 segment above SP</td></tr><tr><td>T7-T9</td><td>TP 1 full segment above SP</td></tr><tr><td>T10</td><td>TP 1 full segment above SP</td></tr><tr><td>T11</td><td>TP 1/2 segment above SP</td></tr><tr><td>T12</td><td>SP/TP in-line</td></tr></table>Rule of 3:</td></tr>
<tr><td>Diaphragm</td><td>Attaches to xiphoid, ribs 6-12, L1-3 vertebral bodies</td><td>Phrenic nerve block</td></tr>
<tr><td>Surgical neck fracture</td><td>Axillary nerve injury: flat deltoid, loss of abduction, loss sensation C5</td><td></td></tr>
<tr><td>Midshaft fracture</td><td>Radial nerve injury , wrist drop, decreased grip strength, loss of sensation over dorsal arm</td><td>Crutches, saturday night palsy</td></tr>
<tr><td>Supracondylar fracture</td><td>Median nerve. Ape hand and pope's blessing. Loss wrist flexion. Loss OPPOSITION. Loss of thenar sensation, dorsal palmar aspect and lateral 3.5 digits</td><td></td></tr>
<tr><td>Medial epicondyle injury</td><td>Hook of hamate / fall on outstretched hand.
Guyon's canal/ flexor retinaculum
Ulnar claw, radial deviation, loss AD/ ABduction of digits</td><td>GOLFERs elbow
counterstrain= flexion and pronation with minor motion of adduction</td></tr>
</table>

Upper extremity nerve injury patterns

Nerve	Injury	Dysfunction
Axillary	Surgical Neck fracture	Flattened deltoid Loss of arm abduction Loss of sensation over deltoid
Radial	Axillary "crush" injury Midshaft fracture	*Wrist drop* *Decreased grip strength* *Loss of sensation over posterior arm/dorsal arm*
Median	Supracondylar fracture	*Ape Hand & Pope's Blessing* *Loss of wrist flexion, thumb opposition* *Loss of 2nd and 3rd lumbrical* *Loss of sensation over thenar eminence, dorsal & palmar aspect of lateral 3.5 digits*
Ulnar	Hook of the hamate/Guyon Canal Median epicondyle injury	*Ulnar Claw* *Radial deviation of the wrist during flexion* *Loss of wrist flexion, AB/ADduction of digits* *Loss of sensation over medial 1.5 digits + hypothenar eminence*

Clavicle

AC and SC joints move like a teeter-totter. One goes up, the other goes down

Carpal tunnel syndrome

- **AB**ductor pollicis Brevis
- **Opponens** pollicis
- **Flexor pollicis brevis**

***BREVIS sandwich**

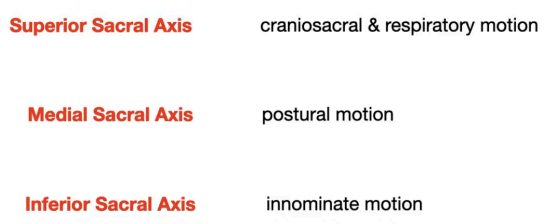
Entrapment of median nerve in flexor retinaculum. Paresthesias in first 3.5 digits, tinel and phalen test
Tx: BRace + OMM

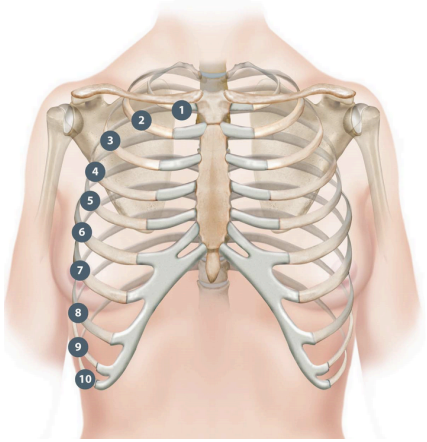
Branches of the Median Nerve

Branch	Origin	Innervation
Anterior interosseous nerve	In the proximal forearm, at the radiohumeral joint line	**Motor**: pronator quadratus, flexor pollicis longus, flexor digitorum profundus (radial 1/2)
Palmar cutaneous branch	In the middle forearm, proximal to the carpal tunnel	**Sensory**: skin over the thenar eminence
Recurrent branch	In the hand, distal to the carpal tunnel	**Motor**: abductor pollicis brevis, opponens pollicis, flexor pollicis brevis
Palmar digital branch	In the hand, distal to the carpal tunnel	**Motor**: lateral 2 lumbricals **Sensory**: palmar surface and nail beds of the lateral 3 and 1/2 digits

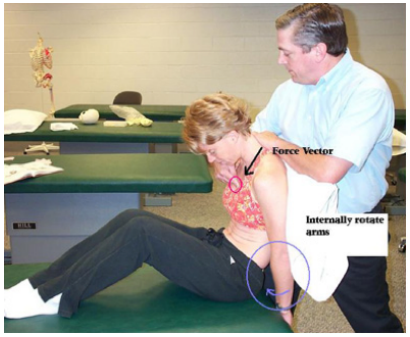
Fall on outstretched hand

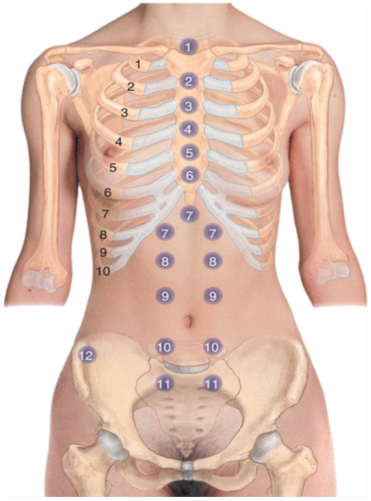
Scaphoid fracture: Proximal scaphoid risk of avascular necrosis (dorsal branch, radial artery) → serial xrays and MRI.

<table>
<tr><td>De Quervain's tenosynovitis</td><td>Inflammation of 1st dorsal compartment along thumb.
Abductor pollicis longus, extensor pollicis brevis.
Finklestein’s test</td><td></td></tr>
<tr><td>Epicondylitis</td><td>Medial= Golfers. Flexor muscle tendons
Lateral= tennis, extensor muscle tendons</td><td></td></tr>
<tr><td>Sacral motion axis</td><td>Superior sacral axis= cranioSacral motion/ S2 (nutation, counternutation)
Medial= postural motion
Inferior: innominate motion, S4</td><td>
</td></tr>
<tr><td>Anterior Lumbar counterstrain</td><td colspan="2"><table>
<tr><td>AL1 (medial)</td><td>F STRA
#1= STAR</td><td>Same side as dysfunction</td></tr>
<tr><td>AL2 (medial)</td><td>F SART</td><td>Opposite side of dysfunction</td></tr>
<tr><td>AL3 (Lateral)</td><td>F SART</td><td>Opposite side of dysfunction</td></tr>
<tr><td>AL4 (inferior)</td><td>F SART</td><td>Opposite side of dysfunction</td></tr>
<tr><td>AL5 (lateral to physis, superior pubic ramus)</td><td>F SARA
*sarah spelled with 5 letters</td><td>Same side of dysfunction
Or frog legs (FABER)</td></tr>
</table></td></tr>
<tr><td>OA</td><td>Type 1 mechanics, side bending and rotation are opposite
- Primary motion is flexion and extension
rotation restriction
- Posterior left
- Anterior right</td><td>HVLA bring the joint into the barrier</td></tr>
<tr><td>Dural</td><td>Axis, Foramen magnum, C2, C3, S2</td><td></td></tr>
</table>

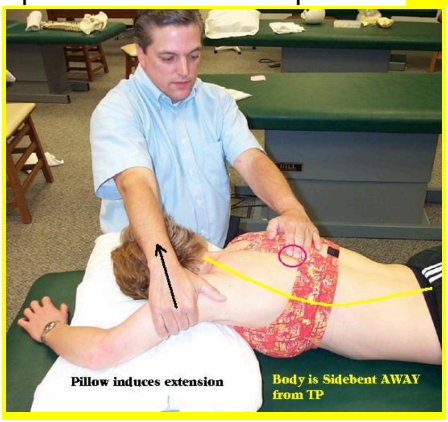
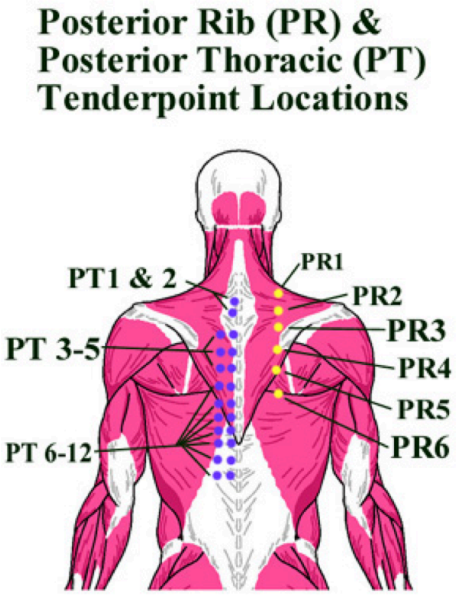
<table>
<tr><td>attachments</td><td>- Allow for craniosacral motion</td><td></td></tr>
<tr><td>Primary motion of neck segments</td><td>OA= flex/ extend → fryette 1= sidebending/ rotation are opposite
AA= rotation
C2-C4= rotation
C5-7= sidebending</td><td>
<table>
<tr><th>Cervical Level</th><th>Motion</th></tr>
<tr><td>OA</td><td>Flexed, extended or neutral; Sidebending and rotation to opposite sides</td></tr>
<tr><td>AA</td><td>Purely rotational</td></tr>
<tr><td>C2</td><td>Flexed or extended;
Sidebending and rotation to same side</td></tr>
<tr><td>C3</td><td>Flexed or extended;
Sidebending and rotation to same side</td></tr>
<tr><td>C4</td><td>Flexed or extended;
Sidebending and rotation to same side</td></tr>
<tr><td>C5</td><td>Flexed or extended;
Sidebending and rotation to same side</td></tr>
<tr><td>C6</td><td>Flexed or extended;
Sidebending and rotation to same side</td></tr>
<tr><td>C7</td><td>Flexed or extended;
Sidebending and rotation to same side</td></tr>
</table>
</td></tr>
<tr><td>Latissimus dorsi</td><td>Adducts, extends and internally rotates the humerus</td><td></td></tr>
<tr><td>Anterior rib tender points</td><td>AR1= below clavicle on 1st chondrosternal articulation
AR2= MCL, superior rib 2
AR3- 10= axillary line

Posterior tender points are on angle of rib</td><td>
<table>
<tr><th>Tender Point</th><th>Location</th><th>Treatment Position</th></tr>
<tr><td>AR1</td><td>Below the clavicle on first chondrosternal articulation</td><td>Patient supine; using the cervical-thoracic spine, flex, side-bend, and rotate towards the point</td></tr>
<tr><td>AR2</td><td>Superior aspect of second rib at midclavicular line</td><td>Same as AR1</td></tr>
<tr><td>AR3–AR10</td><td>On the rib at the anterior axillary line</td><td>In seated position, flex, side-bend, and rotate towards the point</td></tr>
</table>
</td></tr>
<tr><td>Anterior thoracic counterstrain</td><td>Anterior 1-6: flexion +/- sidebending and away rotation</td><td>Anterior 7-12 STRA
Apparently is flex,sidebent towards and rotate towards</td></tr>
</table>

Tender Point	Location
AT1 midline	Episternal notch midline or slightly lateral
AT2–6 midline	Level of corresponding rib on sternum
AT7–9 bilateral	AT7: 1/4 distance from xiphoid tip to umbilicus AT8: 1/2 distance between xiphoid tip and umbilicus AT9: 3/4 distance from xiphoid tip to umbilicus
AT10–12 bilateral	AT10: 1/4 distance from umbilicus to pubic symphysis AT11: 1/2 distance between umbilicus and pubic symphysis AT12: Apex of iliac crest at midaxillary line

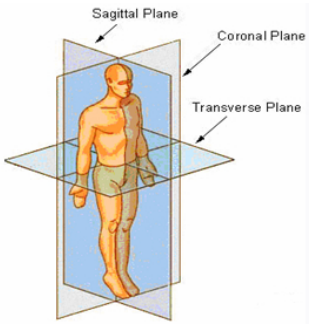
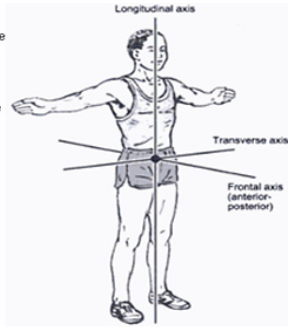
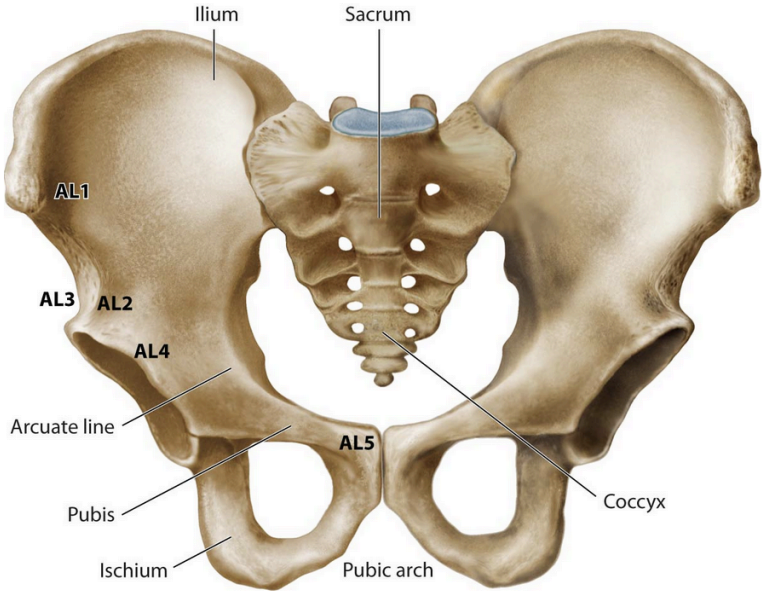






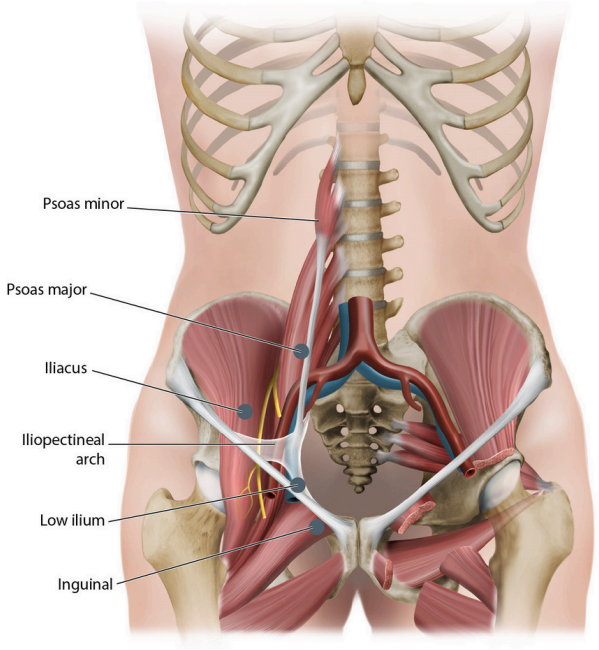
Posterior thoracic counterstrain - Midline on inferior aspect of SP - Inferolateral aspect of SP - Posterolateral aspect of TP	Spinous or transverse process **E SARA**  	
Posterior cervical counterstrain	**ESARA** - Inion (flexion only) - PC3 (FSARA)	
Cranial bones	Ethmoid: CN I Sphenoid: Superior orbital fissure CN III, IV, V1, VI - Foramen rotundum: V2 Temporal bone: CN VII, VIII, IX - Foramen spinosum: V3 Occipital: CN IX, X, XII	
Adhesive capsulitis	**Adhesive Capsulitis = Frozen shoulder**  Treat with Spencer Technique (do in this order): • Every • Fine • Cat • Takes • An • Indoor • Piss • Extension • Flexion • Compression w/circu • Traction w/circumduc • ABduction ADduction • Internal rotation • pump	

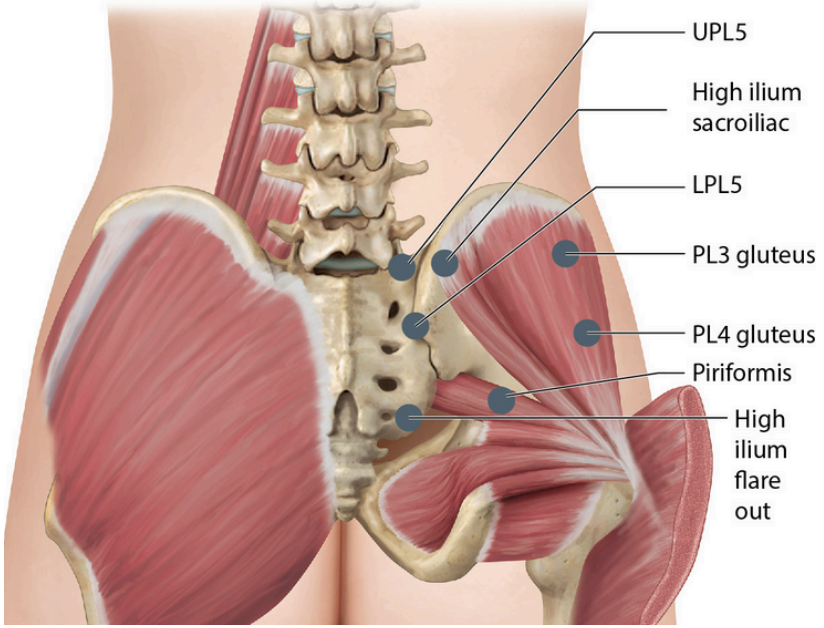
Lymphatics treatment order:	Thoracic diaphragm abdominal release → abdominal diaphragm → pedal pump and effleurage Thoracic duct: left side of body: abdomen, B/L LE, left arm, left head/ neck Right side of body: right arm/ head/ neck, LLL lung,	Zinks common compensatory pattern: - OA rotated left - Cervicothoracic (CT diaphragm) rotated right - Thoracolumbar (abdominal d): rotated left - Lumbosacral junction (pelvic): rotated right
Soft tissue techniques	Engage deep cervical muscles and use rhythmic perpendicular stretching: longitudinal, perpendicular (kneading), direct inhibition or sustained pressure - Tension headache	Direct inhibitory pressure: apply deep sustained pressure to muscles around joint Percussion device: apply oscillatory pressure to superficial muscles Myofascial release: engage cervical muscle in many planes and await release Parallel traction : reduce cervical lordosis while applying axial traction through neck
HVLA- kirksville crunch	Direct technique for neutral dysfunctions - Place into barrier (SR RL → SL RR) - Place thenar eminence on the side it is rotated/ most prominent	Somatic dysfunction is named for its ease
Acute cervical strain	Indirect techniques (with or without fracture from MVA), rest, NSAIDS	
Jones counterstrain for UE	Subscapularis muscle: anterolateral surface of scapula Biceps: long head of biceps muscle Pronator teres (medial epicondyle) Levator scapulae: inferior scapula	Tender Points are small, tender areas the size of a fingertip. Found enar bony attachments of tendons/ ligaments or muscle bellies
Barriers	Restrictive barrier: maximum distance a patient can move a joint, sometimes pathologic Physiologic barrier: maximum point a patient can actively move a joint in absence of dysfunction Anatomic barrier: maximum point a joint can move (bone, joint, muscle dependent) Elastic barrier: range between physiologic and anatomic barrier where passive ligamentous stretching occurs before tissue disruption	

Axis	Anterior/ posterior axis: coronal plane= sidebending Horizontal plane: vertical axis, rotation - **AA (C1-C2) motion** **Sagittal plane: flexion, extension** **Coronal plane: sidebending** **Transverse plane: rotation** Transverse axis: fixed position where motion occurs with in the sagittal plane Plane= direction of motion axis= fixed structure upon which the plane of motion occurs	 Figure 1 - Subject in anatomical position with planes of motion  Figure 2 – Axes of Rotation
Anterior lumbar points	A general rule of thumb for anterior lumbar tender points is: AL1: Flexion, sidebend toward and rotate away with physician on same side AL2-AL4: Flexion, sidebend away and rotate toward with physician on opposite side AL5: Flexion, sidebend away and rotate away with physician on same side 	

Anterior pelvic tender points

Tender Point	Location	Treatment Position
Psoas	2/3 of the distance from ASIS to midline	Bilateral hip flexion, side-bend lumbar spine toward
Iliacus	1/3 of the distance from ASIS to midline	Bilateral hip flexion and external rotation of hips with knees flexed
Low ilium	Superior surface of iliopubic eminence at attachment of psoas minor	Ipsilateral hip flexion
Inguinal	Lateral aspect of pubic tubercle at attachment of pectineus muscle or inguinal ligament	Flexion of hips with contralateral thigh crossed over ipsilateral thigh; causes flexion, adduction, internal rotation



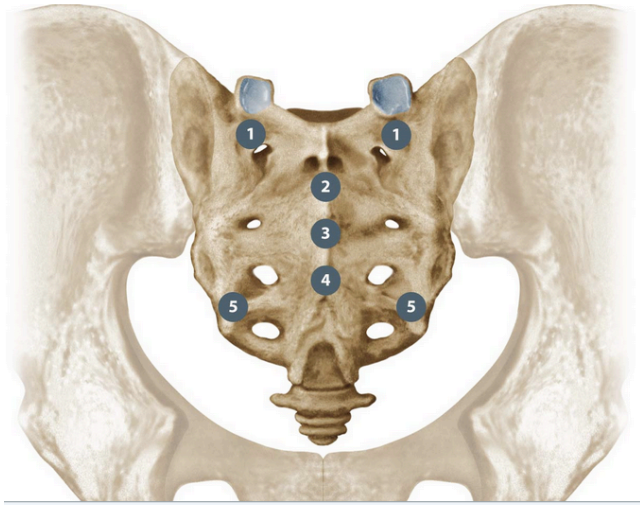


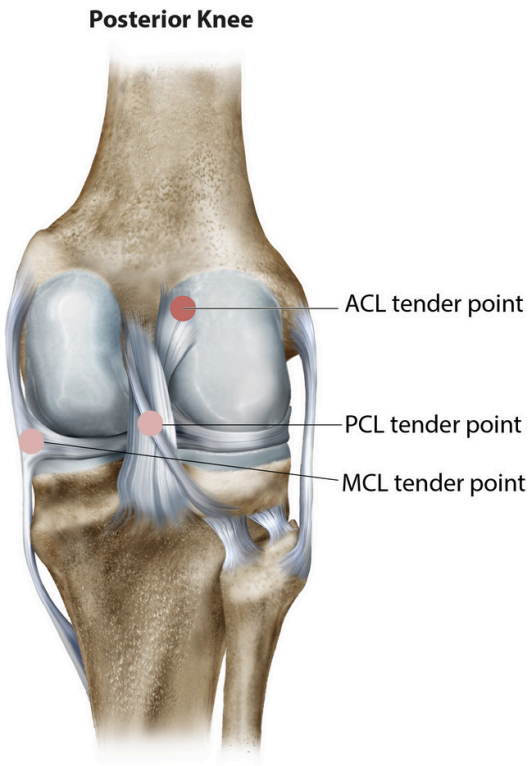
Posterior pelvic tender points

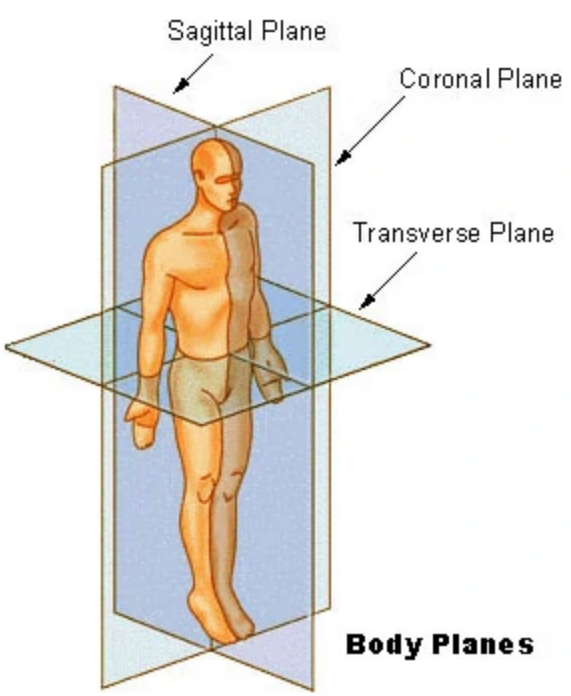
Tender Point	Location	Treatment Position
Upper pole L5	Superior medial surface of PSIS	Hip extension; fine tune with adduction, internal/external rotation
Lower pole L5	On ilium just inferior to PSIS	Hip flexion, internal rotation, adduction
High ilium sacroiliac	2-3 cm lateral to PSIS	Hip extension; fine tune with abduction, external rotation
High ilium flare out	Lateral aspect of inferior lateral angle and/or lateral aspect of coccyx	Hip extension, adduction
Posterior lumbar 3 lateral	2/3 lateral from PSIS to tensor fascia latae in gluteus medius	Hip extension; fine tune in abduction, external rotation
Posterior lumbar 4 lateral	Posterior margin of tensor fascia latae in gluteus medius	Hip extension; fine tune in abduction, external rotation
Piriformis	Midpoint between lower half of lateral sacrum and greater trochanter	Flexion and abduction of hip; fine tune with external/internal rotation

Posterior sacrum tender points

Tender point	Location	Treatment Position
PS1	Medial to PSIS at S1 level	Posterior-to-anterior pressure on opposite ILA
PS2, PS3, PS4 midline	Midline on sacrum at corresponding level	PS2: posterior-to-anterior pressure midline to the sacral apex; PS3: flexion or extension; PS4: posterior-to-anterior pressure midline on sacral base
PS5 bilateral	Medial and superior to ILA	Posterior-to-anterior pressure on opposite sacral base



Knee counterstrain		Popliteus: belly of popliteus muscle inferior to the popliteal fossa PCL: **center/ below** the center of popliteal fossa Medial meniscus/ MCL: medial aspect of the knee at the medial joint line ACL: **superior posterior fossa** medial or lateral to hamstring tendons
Fibular head	Posterior fibular head= compression of common fibular nerve (foot drop), exaggerated plantarflexion Anterior fibular head= exaggerated dorsiflexion	Deep fibular nerve: toe extensor, sensation between 1-2nd toe - Entrapment under extensor retinaculum from tight fitting shoes

Physiologic motion of spine	Flexion/ extension: FEST (sagittal plane, transverse axis) Rotation: RVT (vertical axis, Transverse plane) Sidebending: AP axis, coronal plane	
L5 and sacrum	**Bottom Line:** Know how L5 behaves with sacral somatic dysfunctions: 1. When L5 is rotated, the sacrum rotates in the opposite direction. 2. A sacral oblique axis is engaged on the same side as L5's sidebending.	
Tender points	Do not refer to pain. Painful on compression.	
Myofascial Trigger point	**Small hypersensitive points** in myofascial tissues. Somatic manifestation of a viscerosomatic, somatovisceral or somato somatic reflex **REFERS PAIN**	Trigger point= referred pain, triggers pain elsewhere
Ankle	Anterior drawer test: anterior **TALOfibular** ligament → rolled inversion, pain with supination Talar tilt= calcaneofibular ligament Squeeze calf and no plantarflexion= achilles Kleiger test (external rotation)= deltoid ligaments Squeeze test= syndesmosis of tibia and fibula	

<table>
<tr><td></td><td>Syndesmotic high ankle sprain: tibiofibular
<table>
<tr><th colspan="3">Ankle Sprains</th></tr>
<tr><th></th><th>Action</th><th>Ligaments</th></tr>
<tr><td>Lateral ankle sprain</td><td>Inversion</td><td>Anterior talofibular, calcaneofibular, posterior talofibular</td></tr>
<tr><td>Medial ankle sprain</td><td>Eversion</td><td>Deltoid (anterior tibiotalar, posterior tibiotalar, tibiocalcaneal, tibionavicular)</td></tr>
</table></td></tr>
<tr><td>Trigeminal neuralgia</td><td>CNV
- Sensory innervation to the face
- Muscles of mastication: Masseter, temporalis, lateral pterygoid
<table>
<tr><th colspan="2">Trigeminal Nerve (Cranial Nerve V)</th></tr>
<tr><td>Origin</td><td>Ventral pons</td></tr>
<tr><td>Peripheral ganglia</td><td>Trigeminal ganglion (semilunar or Gasserian ganglion)</td></tr>
<tr><td>Branches</td><td>V1: Ophthalmic nerve
V2: Maxillary nerve
V3: Mandibular nerve</td></tr>
<tr><td>General somatic sensory function (V1, V2, V3)</td><td>Sensation to the face, mouth, anterior 2/3 of the tongue, nasal sinuses, and meninges</td></tr>
<tr><td>Branchial motor function (V3)</td><td>Muscles of mastication (masseter, temporalis, medial pterygoid, and lateral pterygoid) and tensor tympani muscle</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Lower extremity innervation</td><td colspan="2">
<table>
<tr><th colspan="4">Lower Extremity Nerves</th></tr>
<tr><th>Nerve</th><th>Root</th><th>Sensory</th><th>Motor</th></tr>
<tr><td>Obturator</td><td>L2-L4</td><td>Medial thigh</td><td>Obturator externus, adductor longus, adductor brevis, gracilis, pectineus, adductor magnus</td></tr>
<tr><td>Femoral</td><td>L2-L4</td><td>Anterior thigh
Medial leg</td><td>Quadriceps, iliacus, pectineus, sartorius</td></tr>
<tr><td>Sciatic</td><td>L4-S3</td><td>NA</td><td>Semitendinosus, semimembranosus, biceps femoris, adductor magnus</td></tr>
<tr><td>Common peroneal/fibular</td><td>L4-S2</td><td>Superficial: dorsum of foot (except between second-digit web space)
Deep: web space between hallux and second digit</td><td>Superficial: peroneus longus and brevis
Deep: tibialis anterior</td></tr>
<tr><td>Tibial</td><td>L4-S3</td><td>Sole of foot</td><td>Bicep femoris (long head), triceps surae, plantaris, popliteus, flexor muscle of foot</td></tr>
</table>
</td></tr>
<tr><td>Chapman point for upper respiratory</td><td>Above proximal third of clavicle: EAR
Below proximal third of clavicle: SINUSES</td><td></td></tr>
<tr><td>Herniations</td><td>Subfalcine: medial frontal lobe and cingulate gyrus cross under anterior falx → primitive reflexes
Tonsillar: posterior fossa through foramen magnum → death
Transcalvarial: cranial trauma, skull fracture
Transtentorial: medial temporal lobe herniation through tentorium, compresses PCA, CN III and cerebral peduncle. DOwn and out eye.</td><td></td></tr>
<tr><td>Elbow</td><td>Lateral UCL: inserts on supinator crest, varus resistance.
Lateral collateral ligament: resists varus stress, stabilizes annular ligament
Quadrate ligament: anterolateral ulna and anterior radial neck under annular ligament. Tightens on supination.
Ulnar collateral ligaments: stabilize valgus stress on elbow and attach between medial epicondyle and coronoid process.</td><td>UCL injury
- Baseball player
- Increased Valgus</td></tr>
</table>

Spondylolisthesis

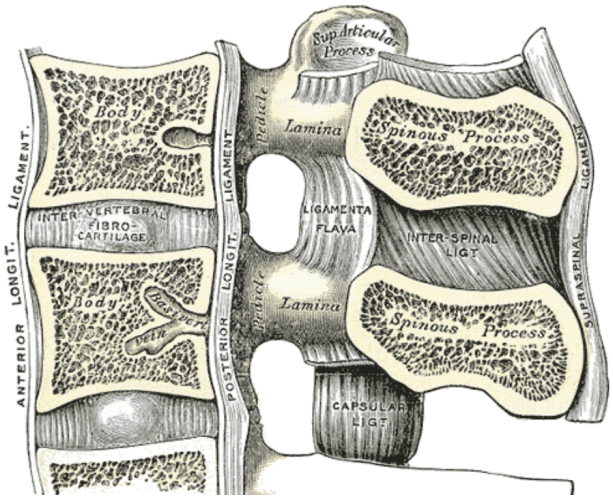
Usually L5/ S1
Type III= L4/5

Types of Spondylolisthesis

Type	Name	Description
Type I	Dysplastic	Sequela of an anatomic anomaly of S1, with rounding of the superior and ventral aspect. This allows L5 to slip forward. The risk of slippage increases with the increased degree of S1 rounding.
Type II	Isthmic	Common in young athletes. It can be further classified into types IIa and IIb (which is likely beyond the scope of COMLEX). Type IIa is seen when there is a stress fracture, with separation of the pars interarticularis. After healing, there can be repeat fracture, causing elongation of the pars, and at that point it is classified as type IIb.
Type III	Degenerative	Most commonly at the L4-L5 level, secondary to arthritic degeneration of the facet joints, allowing slippage. The typical patient is older with additional degenerative changes in the lumbar spine such as osteophytosis, intervertebral disc space narrowing, subchondral sclerosis, and subchondral cystic change.
Type IV	Traumatic	This is typically caused by high-impact trauma such as that associated with a motor vehicle accident and can occur at any level.
Type V	Pathologic	This is a pathologic spondylolisthesis that can be caused by several different etiologies. A couple of examples include generalized bone disease such as osteoporosis or osteopetrosis and lytic osseous lesions from metastatic disease.

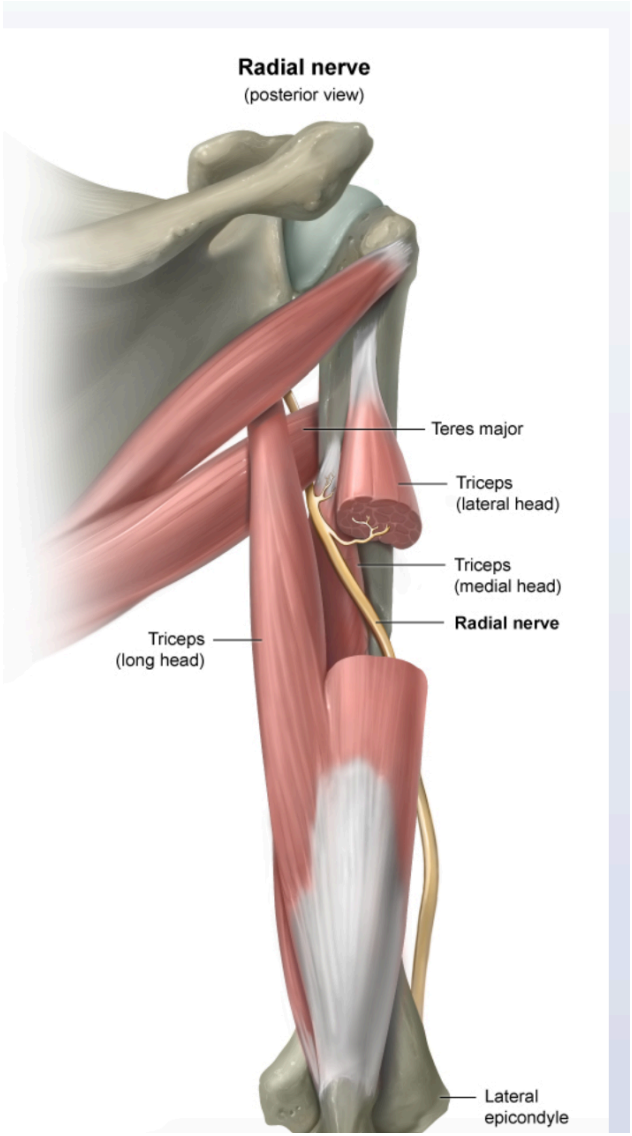
Jones counterstrain points for arm

Biceps: long head of biceps
Supinator: anterior radial head
Subscapularis: anterior and lateral surface of scapula
Pronator teres: medial epicondyle
Levator scapularis muscle: medial scapula near muscle attachment

Spinal ligaments		Ligamentum flavum: connects laminae of adjacent vertebrae PLL: posterior vertebral canal, Interspinous ligament: adjacent SP Lateral to medial: Iliocostalis, longissimus, spinalis
Precentral gyrus	UMN, motor	
Postcentral gyrus	Somatosensory	
Innominate rotations	Anterior innominate- hip extensors Posterior innominate- hip flexors	
TMJ	Jaw pain, worse with chewing, bruxism, trauma, dental procedures -lateral pterygoid **<u>opens</u>** mouth -masseter, medial pterygoid, temporalis muscle **<u>close</u>** mouth	Tx: masseter myofascial release Direct MET (post isometric relaxation) -shorten hypertonic muscle

Red flags of back pain

"Red Flag" Signs in Back Pain	
Signs	**TUNA FISH**
Trauma	**T**
Unexplained weight loss	**U**
Neurologic symptoms[1]	**N**
Age > 50 years	**A**
Fever	**F**
Intravenous drug use	**I**
Steroid use	**S**
History of cancer	**H**



Relative Contraindications	Absolute Contraindications
Mild to moderate sprain/strain	Fracture in area treated
Mild osteopenia or osteoporosis in the area to be treated	Joint instability
Osteoarthritic joints with moderate motion loss	Severe osteoporosis
Rheumatoid disease not in the spine	Osteoarthritic joint with ankylosis
Minimal disc bulge/herniation with radicular symptoms	Metastasis in the area to be treated
Atypical joint or other conditions with congenital anomalies	Severe herniated disc with radiculopathy
Some hypermobility	Osteomyelitis in the area to be treated
	Infection of the tissues to be treated
	Joint replacement in the area to be treated
	Severe discogenic spondylosis with associated ankylosis
	Congenital anomalies: Klippel-Feil syndrome, blocked vertebra, Chiari malformation
	Down syndrome
	Rheumatoid arthritis of cervical spine
	Achondroplastic dwarfism
	Vertebrobasilar insufficiency

Concentric muscle contractions occur when a muscle shortens while generating force. In relation to the elbow, the upward motion when performing a bicep curl is considered a concentric muscle contraction.

Eccentric muscle contractions occur when a muscle increases in length with contraction. The muscle elongates while under tension due to opposing forces being greater than the force generated by the muscle, such as the lowering motion of a bicep curl.

Isokinetic muscle contractions occur against resistance in which the angular change of joint motion is at the same rate (velocity). The counterforce is less than the patient's force.

Isotonic describes constant muscle tension as a muscle changes length (constant force). Eccentric and concentric muscle contractions are two examples of isotonic contractions. Operator force is less than the patient's force.

Isolytic muscle contractions are a form of eccentric contraction where the counterforce is greater than the patient force.

Isometric contraction occurs when a muscle contracts while maintaining constant length. An example of an isometric contraction would be pushing against an immovable object.

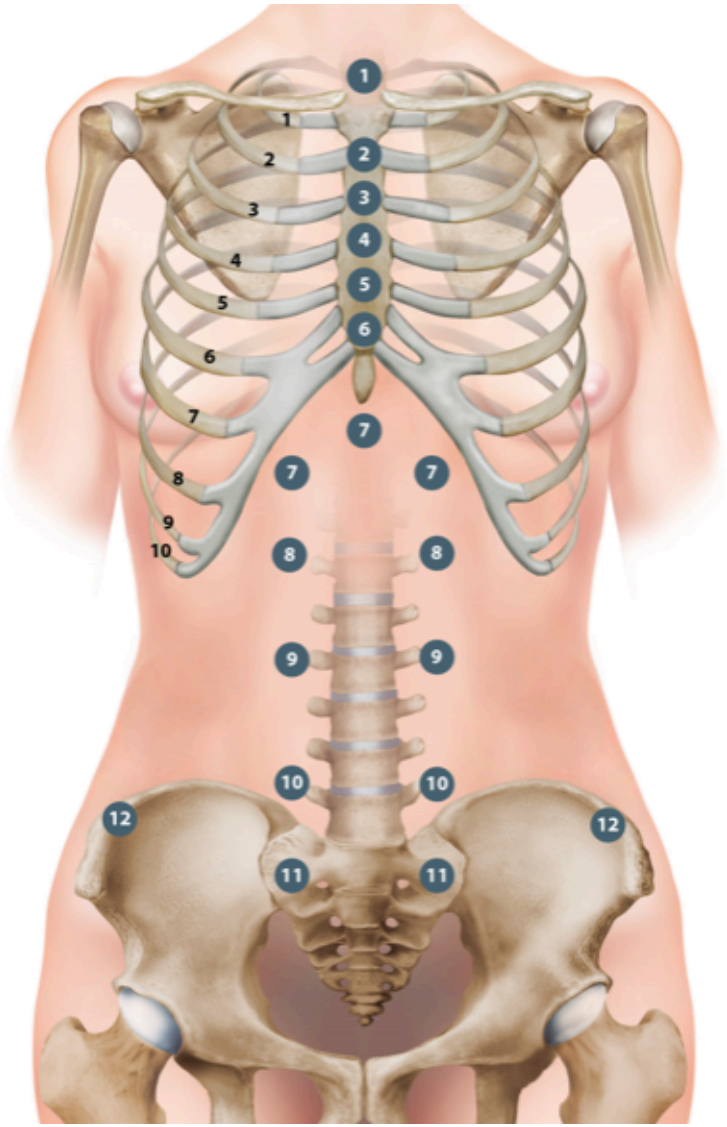
Plyometric muscle contraction refers to a muscle that is loaded and contracted in a rapid sequence. The short cycle affects the sensory response of the muscle spindles and golgi tendon organs; thus, increasing the excitatory threshold of the golgi tendon, which facilitates a greater contraction force than normal strengthening exercises.

CRANIAL

Cranial Nerve	Foramen Associated	Common Cranial Bones Involved
I: Olfactory	Cribriform plate	Ethmoid
II: Optic	Optic canal	Sphenoid
III: Oculomotor	Superior orbital fissure	Sphenoid
IV: Trochlear	Superior orbital fissure	Sphenoid
V1: Ophthalmic branch	Superior orbital fissure	Sphenoid
V2: Maxillary branch	Foramen rotundum, inferior orbital fissure	Sphenoid
V3: Mandibular branch	Foramen ovale	Sphenoid
VI: Abducens	Superior orbital fissure	Sphenoid

VII: Facial	Internal acoustic meatus, stylomastoid foramen	Temporal
VIII: Vestibulocochlear	Internal acoustic meatus	Temporal
IX: Glossopharyngeal	Jugular foramen	Temporal/Occipital
X: Vagus	Jugular foramen	Temporal/Occipital
XI: Accessory	Jugular foramen	Temporal/Occipital
XII: Hypoglossal	Foramen magnum, hypoglossal canal	Occipital

Cranial cephalad = sacral counternutation
Caudad = sacral nutation
Craniosacral motion - inherent craniosacral motion occurs at the superior transverse axis of the sacrum at S2


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Tender Point	Location	Treatment Position
AT1 midline	Episternal notch midline or slightly lateral	Flexion
AT2–6 midline	Level of corresponding rib on sternum	Flexion, minimal side-bending, and rotation
AT7–9 bilateral	AT7: 1/4 distance from xiphoid tip to umbilicus AT8: 1/2 distance between xiphoid tip and umbilicus AT9: 3/4 distance from xiphoid tip to umbilicus	Flexion, side-bend toward, rotate away
AT10–12 bilateral	AT10: 1/4 distance from umbilicus to pubic symphysis AT11: 1/2 distance between umbilicus and pubic symphysis AT12: Apex of iliac crest at midaxillary line	Flexion, side-bend ankles towards, rotate torso away

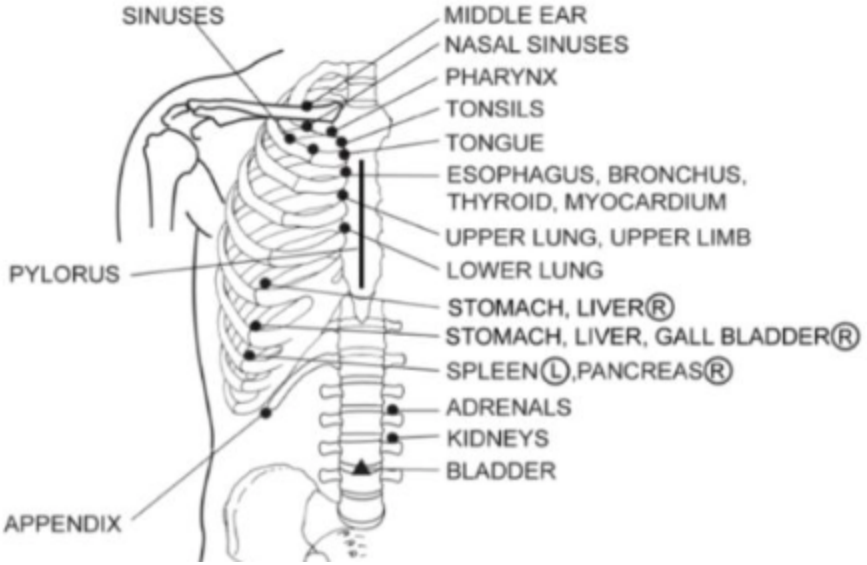
Sympathetic Viscerosomatic Reflexes			
Visceral Organ	**Spinal Cord Level**	**Visceral Organ**	**Spinal Cord Level**
Head and Neck	T1-T4	Kidneys	T10-T11
Heart	T1-T5 (left)	Upper Ureters	T10-T11
Respiratory System	T2-T7	Lower Ureters	T12-L1
Esophagus	T2-T8	Bladder	T11-L2
Upper GI Tract	T5-T9	Gonads	T10-T11
Middle GI Tract	T10-T11	Uterus/Cervix	T10-L2
Lower GI Tract	T12-L2	Erectile Tissue	T11-L2
Appendix/Cecum	T10-T12	Prostate	T12-L2
Arms	T2-T8	Legs	T11-L2

Adrenals T8-T10

Structure	Anterior Chapman Point	Posterior Chapman Point
Eyes	Surgical neck of the humerus	Squamous portion of the occiput below nuchal line
Middle Ear	Superior portion of the clavicle	C1 articular process
Sinuses	1st rib	C2 between SP/TP
Tongue	2nd rib	———————
Tonsils	1st ICS	C1 between SP/TP
Pharynx	Sternoclavicular joint (inferior aspect)	C2 between SP/TP
Larynx	Lateral to sternocostal junction @ 2nd rib	C2 between SP/TP

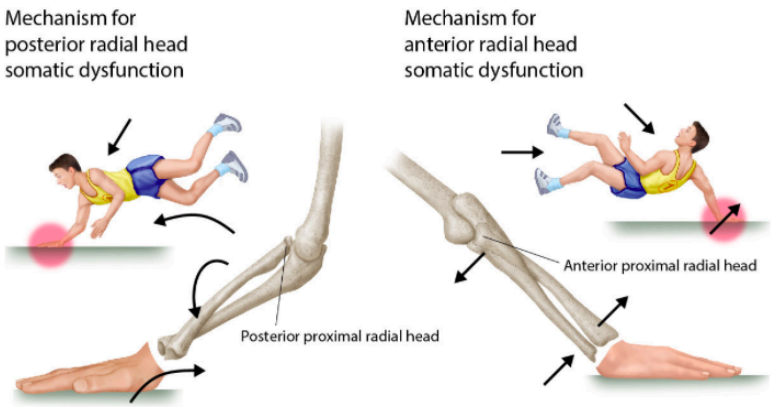
Thoracic Chapman Points		
Organ	**Anterior**	**Posterior**
Esophagus	2nd ICS	T2-T3 lamina of TP
Myocardium	2nd ICS	T2-T3 lamina of TP
Bronchi	2nd ICS	T2 lamina of TP
Upper Lung	3rd ICS	T3 lamina of TP
Lower Lung	4th ICS	T4 lamina of TP

The image shows the anterior Chapman points.



Genitourinary Chapman Points		
Organ	**Anterior**	**Posterior**
Adrenals	1 inch lateral and 2 inches superior to the umbilicus (on the respective side)	T11-T12 (on the respective side)
Kidneys	1 inch lateral and 1 inch superior to the umbilicus (on the respective side)	T12-L1 (on the respective side)
Bladder	Periumbilical area	L2 TP bilaterally
Ovaries/Urethra	Superior pubic ramus, 2 cm lateral to the symphysis	L2 TP bilaterally
Prostate	The outer femur (posterior IT band)	Lateral sacral base bilaterally
Uterus	Inferior pubic rami	L5 TP bilaterally, medial to PSIS

Gastrointestinal Chapman Points		
Organ	**Anterior**	**Posterior**
Stomach (acidity)	5th ICS on the left	Left T5 lamina of TP
Stomach (peristalsis)	6th ICS on the left	Left T6 lamina of TP
Liver	5th- 6th ICS on the right	Right T5-T6 lamina of TP
Gallbladder	6th ICS on the right	Right T6 lamina of TP
Pancreas	7th ICS on the right	Right T7 lamina of TP
Spleen	7th ICS on the left	Left T7 lamina of TP
Small bowel (duodenum, jejunum, ileum)	8th, 9th, 10th ICS bilaterally	Right and left T8-T10 lamina of TP
Appendix	Tip of the 12th rib on the right	Right T11-T12 lamina of TP
Cecum	Upper 1/5 of the right anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Ascending colon	Middle 3/5 of the right anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Right half of the transverse colon	Lower 1/5 of the right anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Left half of transverse colon	Lower 1/5 of the left anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest
Descending colon	Middle 3/5 of the left anterior thigh	Triangular area between L2 TP, L4 TP, and iliac crest



A posterior radial head somatic dysfunction (left) will have restricted forearm supination, while an anterior radial head somatic dysfunction (right) will have restricted forearm pronation.