Asymmetrical Posture and Common Related Pain Syndromes

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Special Thanks

My wife, Becki

NATA

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How do we perceive pain?[29]

- Many factors – joint, muscle, ligament, visceral, and the brain's interpretation of that pain based on previous experience and anticipation of future events

How do we perceive pain?[29]

- Nociceptors – detect signals from damaged tissue
- Free nerve endings that have transient receptor potential (TRP) channels that sense and detect the damage
- Transmit information to CNS via spinal cord

How do we perceive pain?[29]

- Tissue damage releases a variety of substances that trigger nociceptors, such as globulin and protein kinases, arachidonic acid, histamine, NGF, SP, CGRP, potassium, serotonin, ACh, ATP
- Muscle spasm and lactic acid- when muscles are hyperactive or when blood flow to a muscle is blocked, lactic acid concentration increases and pain is induced.
- Muscle hyperactivity=tone=lactic acid=pain

Joint receptors[26]

- Type I – ligaments, more in proximal joints, active at rest and movement, low threshold
- Type II – capsule, fat pads, more in distal joints, active at beginning and end of motion, low threshold, rapid adapting
- Type III – collateral ligaments, active at end of joint ROM, high threshold, slow adapting
- Type IV – ligaments, capsule, fat pads, active only to extreme mechanical or chemical irritation high threshold

Muscle tightness

- “I feel tight”
- Not due to the muscle actually being short or tight, but due to the muscle already being in a lengthened position, which activates the muscle spindle.[27]
- Stretching changes the perception of the nervous system and reduces neural activity, which makes it feel better, but doesn’t fix anything.[27]
- Length changes are so short lived that the perception of feeling better is more linked to sensation.[27]

Modern Pain Model[3]

- Pain is a multiple system output activated by the brain based on the perceived threat.
- Input is from damaged tissue, environment, and past experiences.
- Processing – the brain takes into account the input and itself to determine what to do
- Output is the result of input and processing
- Pain is the result of input and the brain's processing and interpretation of that input.

Postural Patterns and Pain

- Muscle tone due to hyperactivity due to sympathetic drive leads to increased latic acid[29]
- Patterns develop to account for the input of gravity and the body's best guess as to how to perform, given the body's position and neurologic input.
- Dysfunctional asymmetrical postural patterns reduce movement, space, and bloodflow, which increase the nervous system's level of sensitivity to everything, including gravity.

What is posture?

Defined by Ron Hruska, MPA, PT

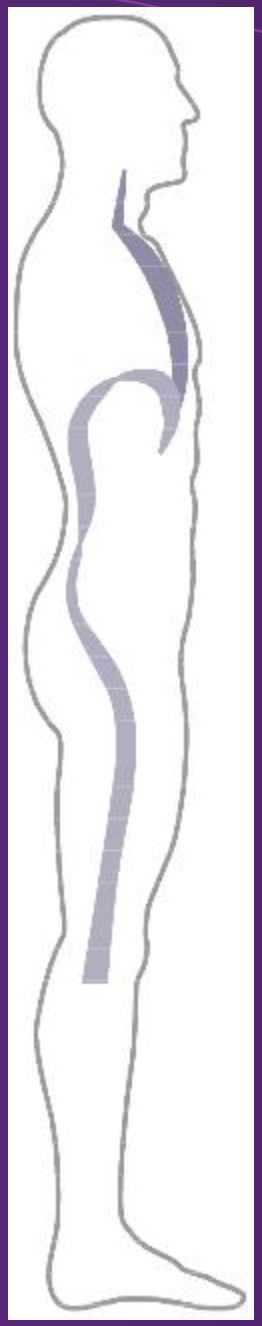
- **Posture is a reflection of the "position" of many systems that are regulated, determined and created through limited functional patterns.**

- **These patterns reflect our ability and inability to breathe, rotate, and rest, symmetrically with the left and right hemispheres of our axial structure.**

Polyarticular Muscle Chains

A muscular chain is a set of polyarticular muscles that follow each other and overlap in the same direction with no break in continuity.

- Francoise Mezieres



Anterior Interior Chain (AIC)

AIC

- There are 2 anterior interior polyarticular muscular chains that have a significant influence on respiration, rotation of the trunk, rib cage, spine and lower extremities
- Composed of muscles that attach to the costal cartilage and bone of rib 7-12 to the lateral patella, head of the fibula and lateral condyle of the tibia
- One is on the left side of the interior thoraco-abdominal-pelvic cavity and one is on the right
- Muscles include the diaphragm and the psoas
- This chain provides the support and anchor for abdominal counter force, trunk rotation and flexion movement

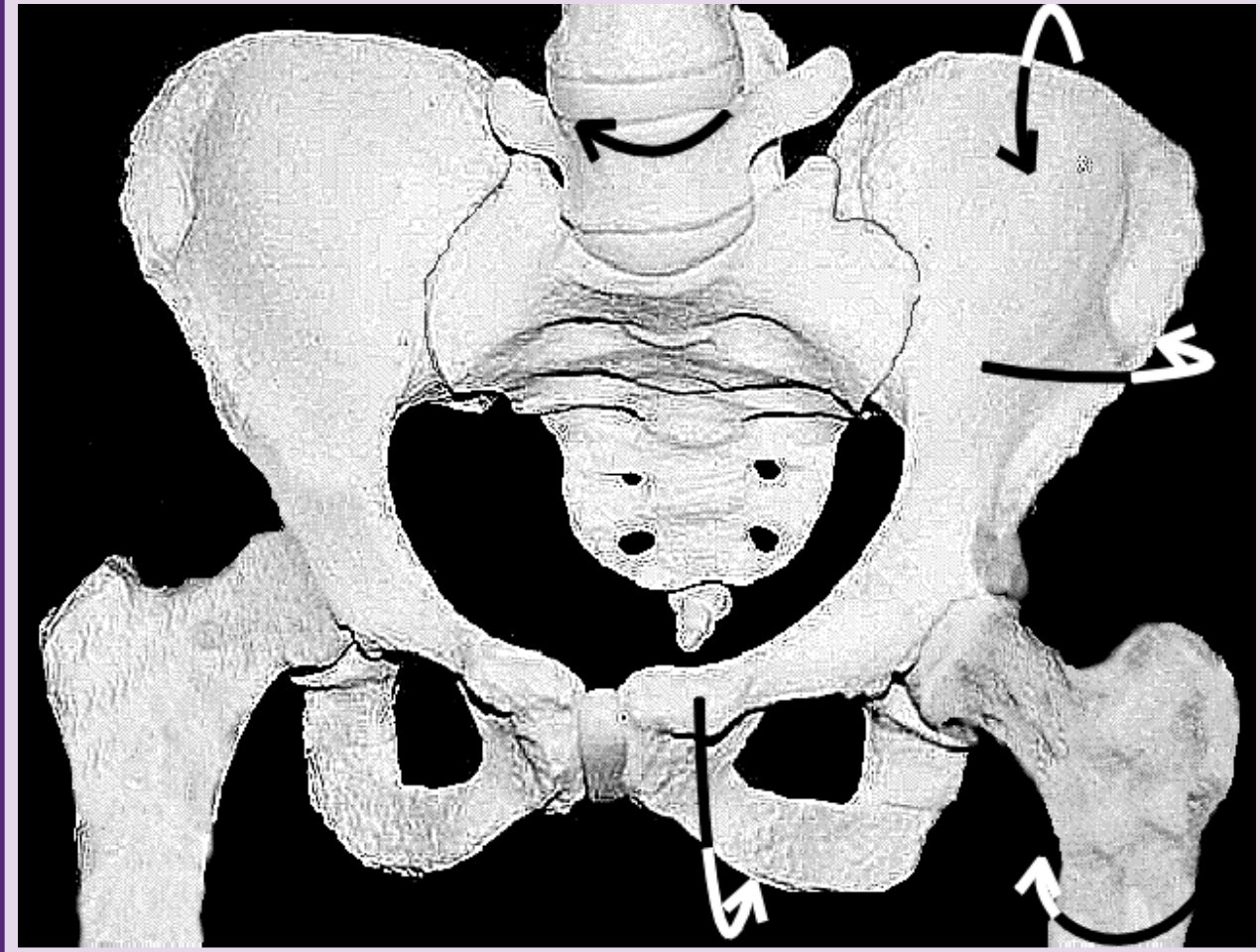
Muscles in the AIC pattern

- Diaphragm
- Obliques
- Hamstring
- Adductor group
- Gluteus Medius
- Psoas
- Vastus Lateralis
- Gluteus Maximus

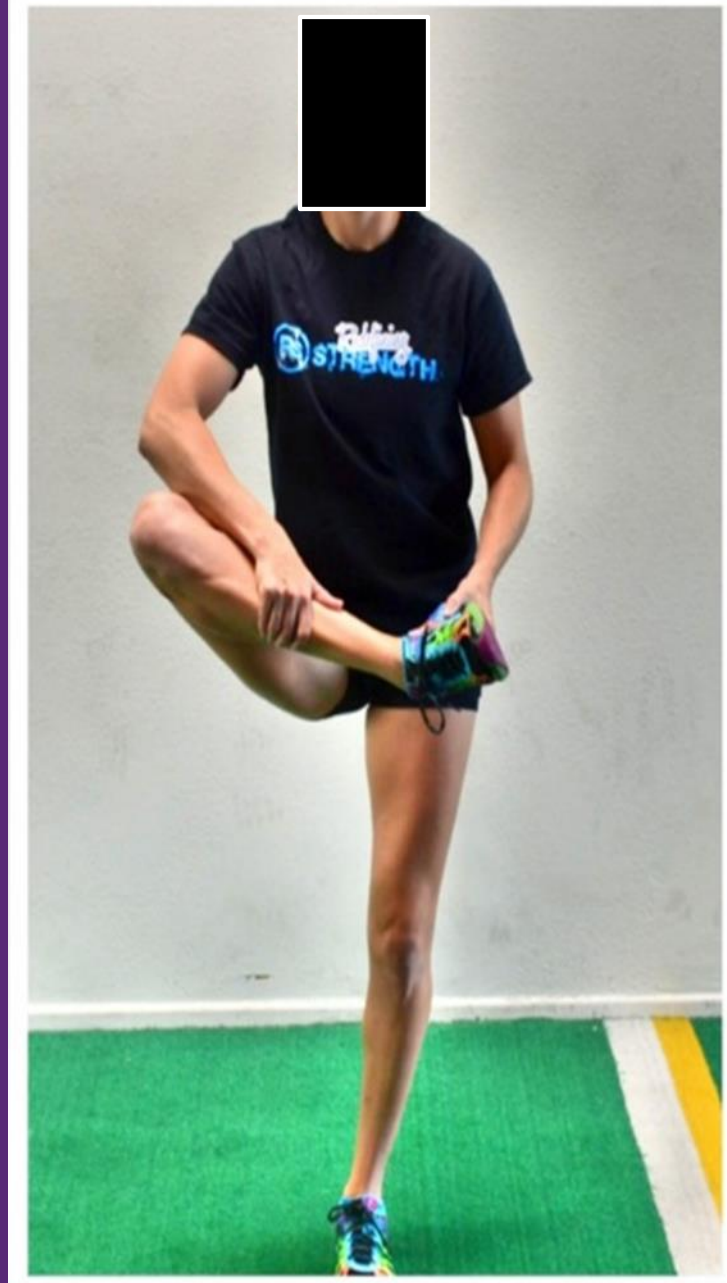
Most Common Position Due to Neuromuscular Preference of L AIC…

- Standing on Right Leg with pelvis posteriorly rotated
- Left pelvis anteriorly rotated
- Right femur in a position of internal rotation (due to position of pelvis)
- Left femur in a position of external rotation (due to position of pelvis)
- Lumbar spine placed in a position of right rotation

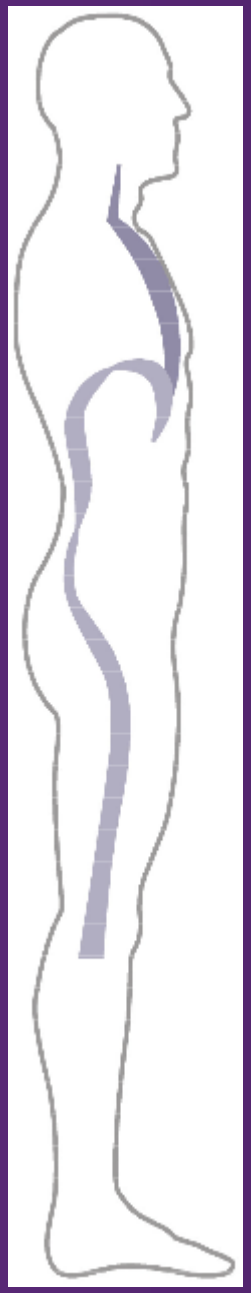
Anterior View of an Anterior & Forward Positioned Left Innominate with Accompanying Right Sacral Torsion



Posterior View of an Anterior & Forward Positioned Left Innominate with Accompanying Right Sacral Torsion


STRENGTH

STRENGTH



Brachial Chain (BC)

BC

- There are 2 brachial polyarticular muscular chains lying over the anterior pleural and cervical area
- These chains influence cervical rotation, shoulder dynamics and apical inspirational expansion
- Composed of muscle that attach to the costal cartilage and bone of ribs 4-7 and xiphoid to the posterior, inferior occipital bone, anterior, inferior mandible and coracoid process of scapula
- They provide the support and anchor for cervical-cranial orientation and rotation and rib position

Muscles in the BC pattern

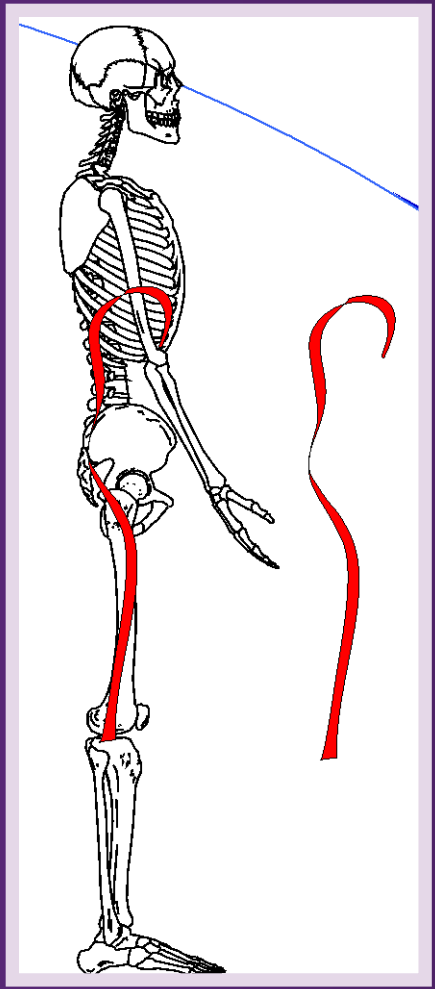
- Diaphragm
- Obliques
- Lower Trapezius
- Triceps
- Serratus Anterior
- Pec Major/Minor
- Subscapularis

Most Common Position Due to Neuromuscular Preference of R BC…

- Right ribs positioned in a state of exhale (internal rotation)
- Left ribs positioned in a state of inhale (external rotation)
- Thoracic spine orientated to the left relative to the lumbar spine and pelvis, which is positioned to the right
- Right scapulae protracted and winged
- Left scapulae retracted and tipped
- Right humerus in a state of external rotation
- Left humerus in a state of internal rotation


T-Rex hates pushups

OPTIMAL POSITION



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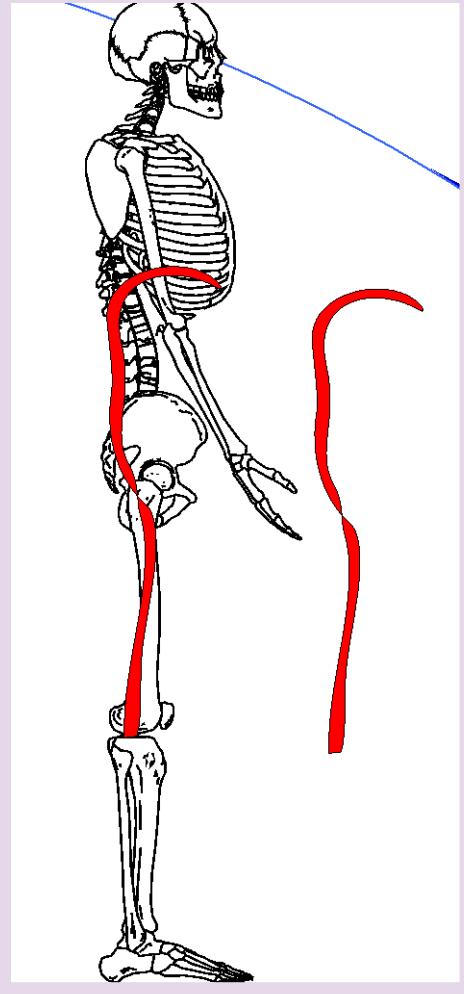

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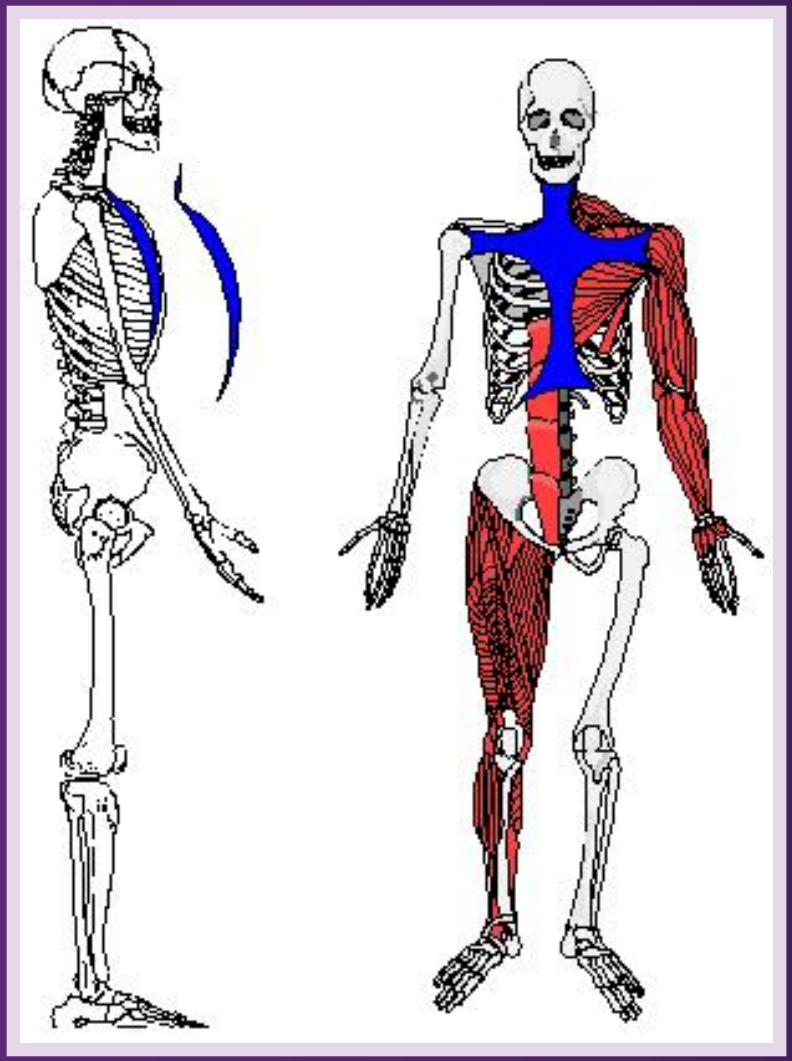

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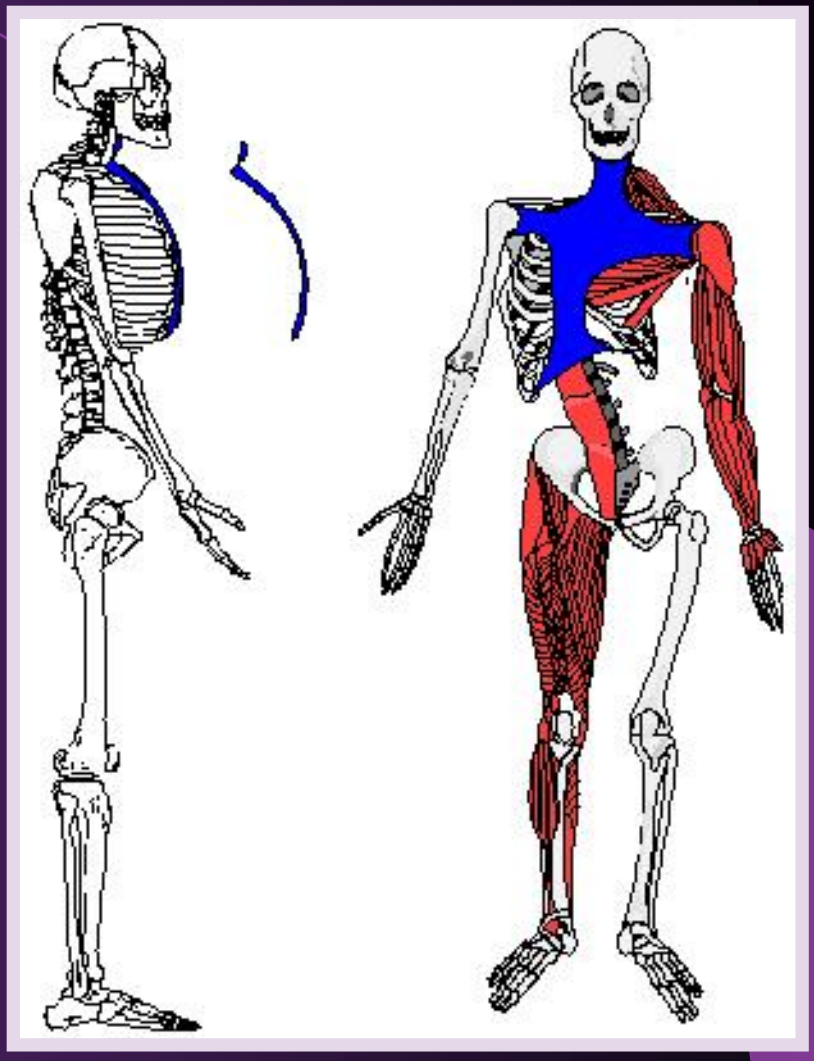

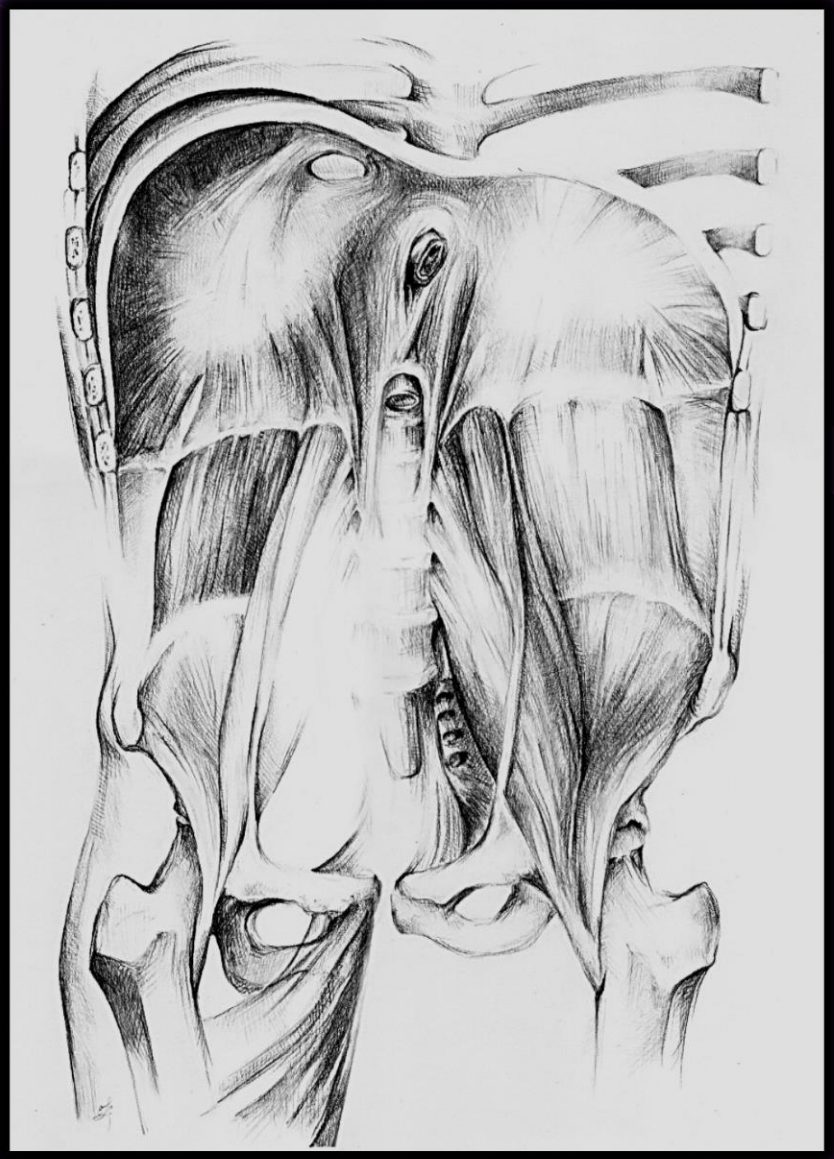

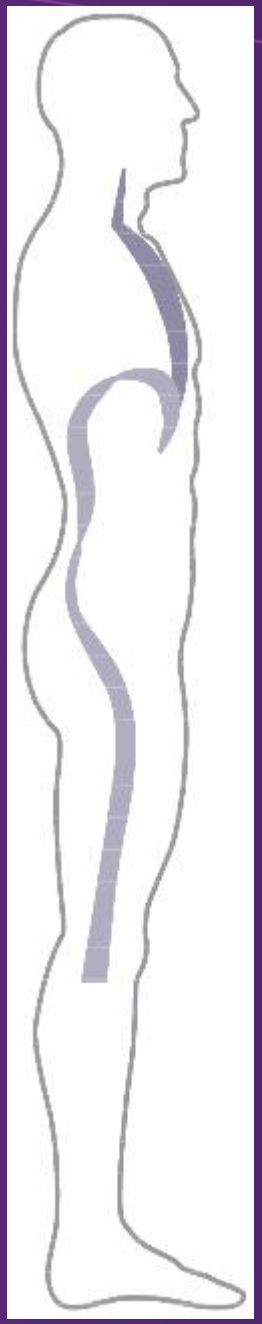

Brachial Chain (BC)

Anterior Interior Chain (AIC)

Visible Signs of Dysfunction as Related to a Left AIC/Right BC Pattern

1. One or both legs turn out when sitting, standing and lying

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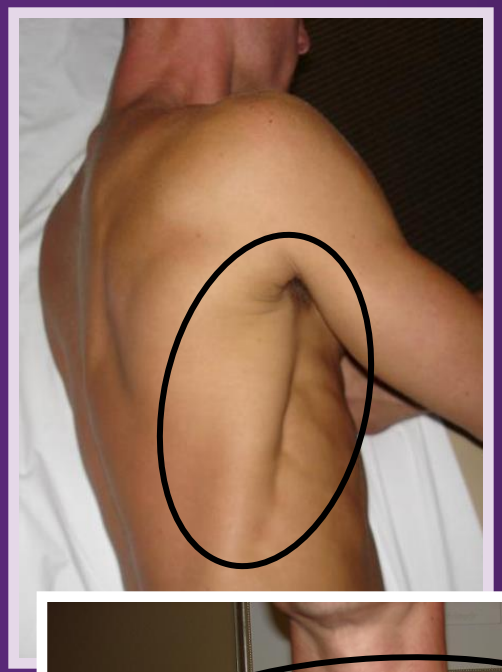
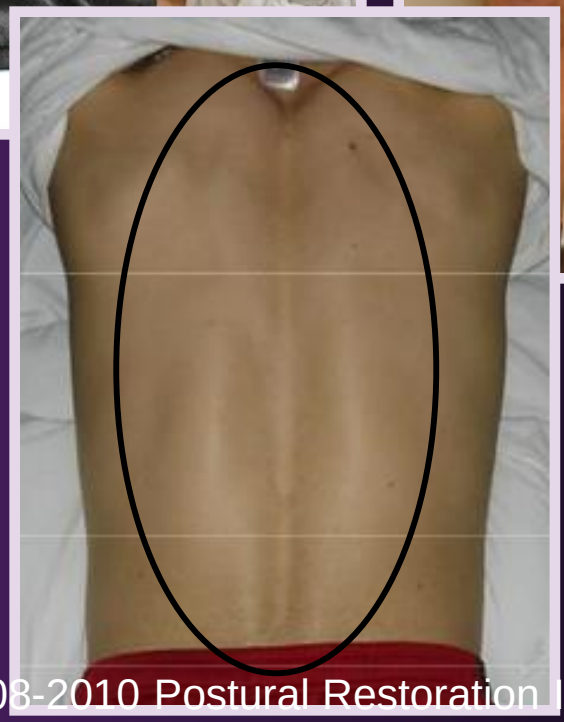
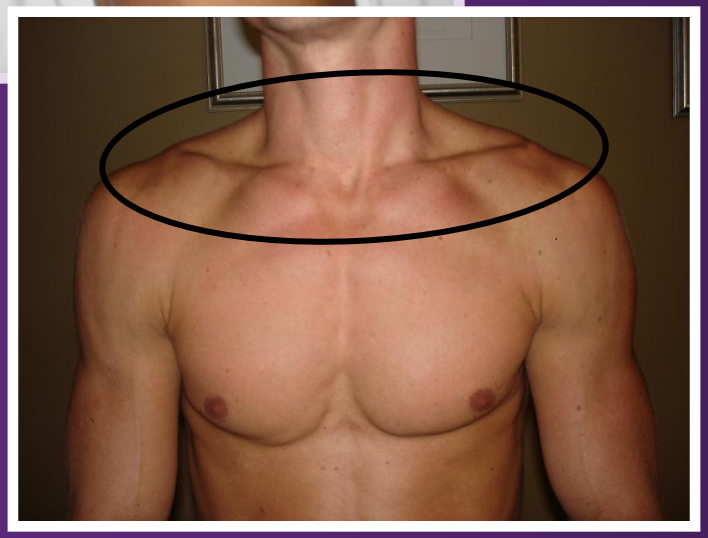
2. Overdevelopment of compensatory muscles





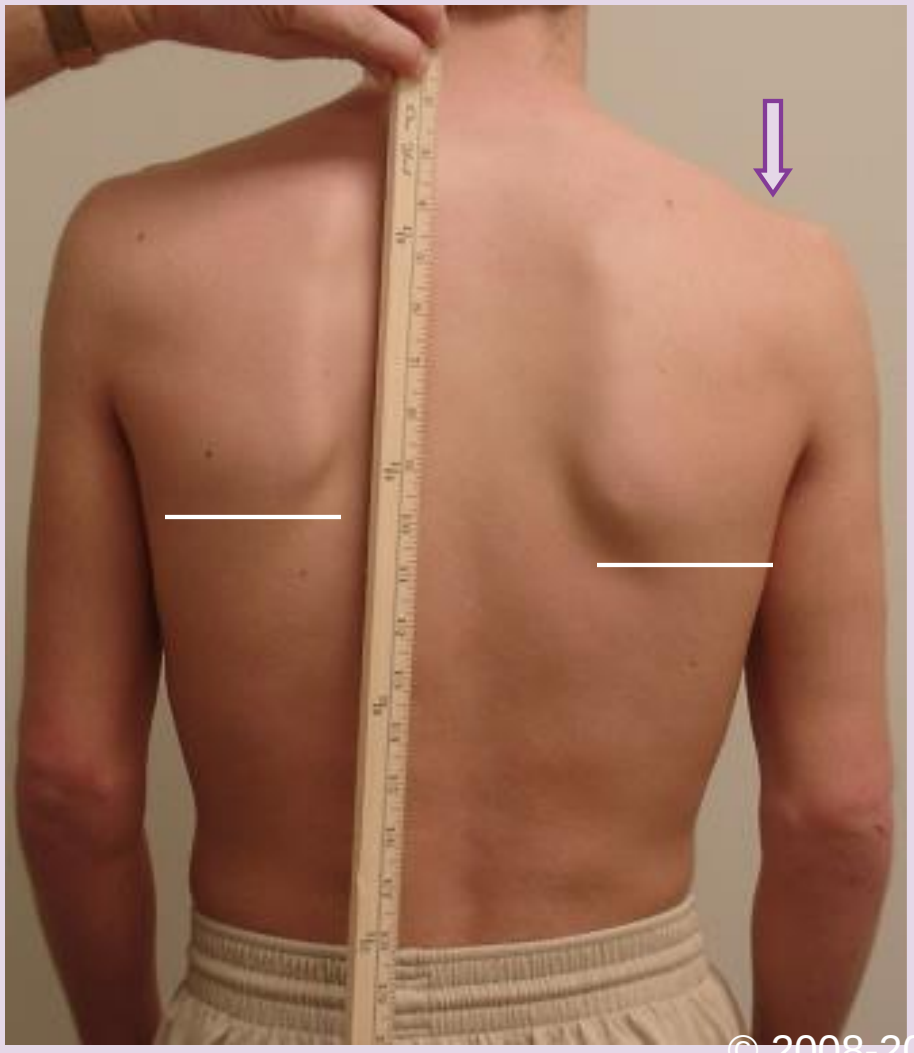


3. **Favorable standing position is on the right leg while rotating their upper body to the left**

4. **Walk with little or no arm swing on the right**

5. Elevated anterior ribs on the left

6. Lowered, depressed shoulder and chest on the right



7. Asymmetry of the head and face

8. Curvature of the spine

Objective Findings for a Left AIC/Right BC Pattern

1. Inability to adduct the left femur

2. Inability to extend the left hip

3. Limited trunk rotation to the left

4. Limited humeral-glenoid internal rotation on the right

5. Limited horizontal abduction on the left

6. Asymmetrical femoral-acetabular rotation

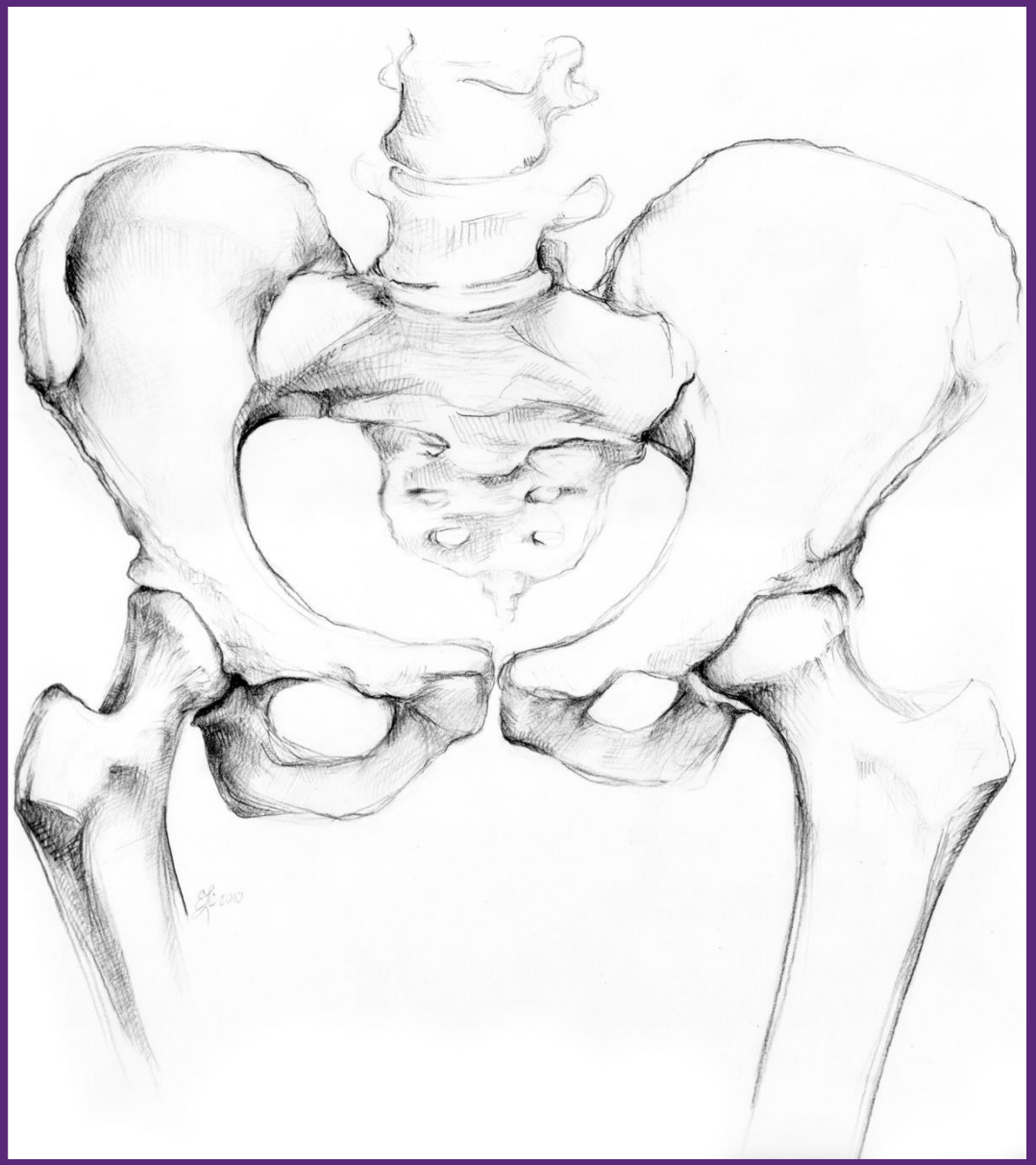
7. Excessive or limited straight leg raise

8. Inability to touch your toes

9. Inability to fully squat

Clinical Assessment

- **The left pelvis is anteriorly tipped and forwardly rotated.**
- **The forwardly rotated left innominate causes the lower spine to orient to the right with the upper spine to the left.**
- **This directional, rotational influence on the low back and spine to the right, mandates compulsive compensatory movement in one or more areas of the trunk, upper extremities and cervical-cranial-mandibular muscle.**
- **The greatest impact is on rib alignment and position, therefore influencing breathing patterns and ability.**



Postural Restoration Institute® Treatment Approach

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RESTORE Pelvic Position & Muscular Balance

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RESTORE Apical Chest Wall Expansion

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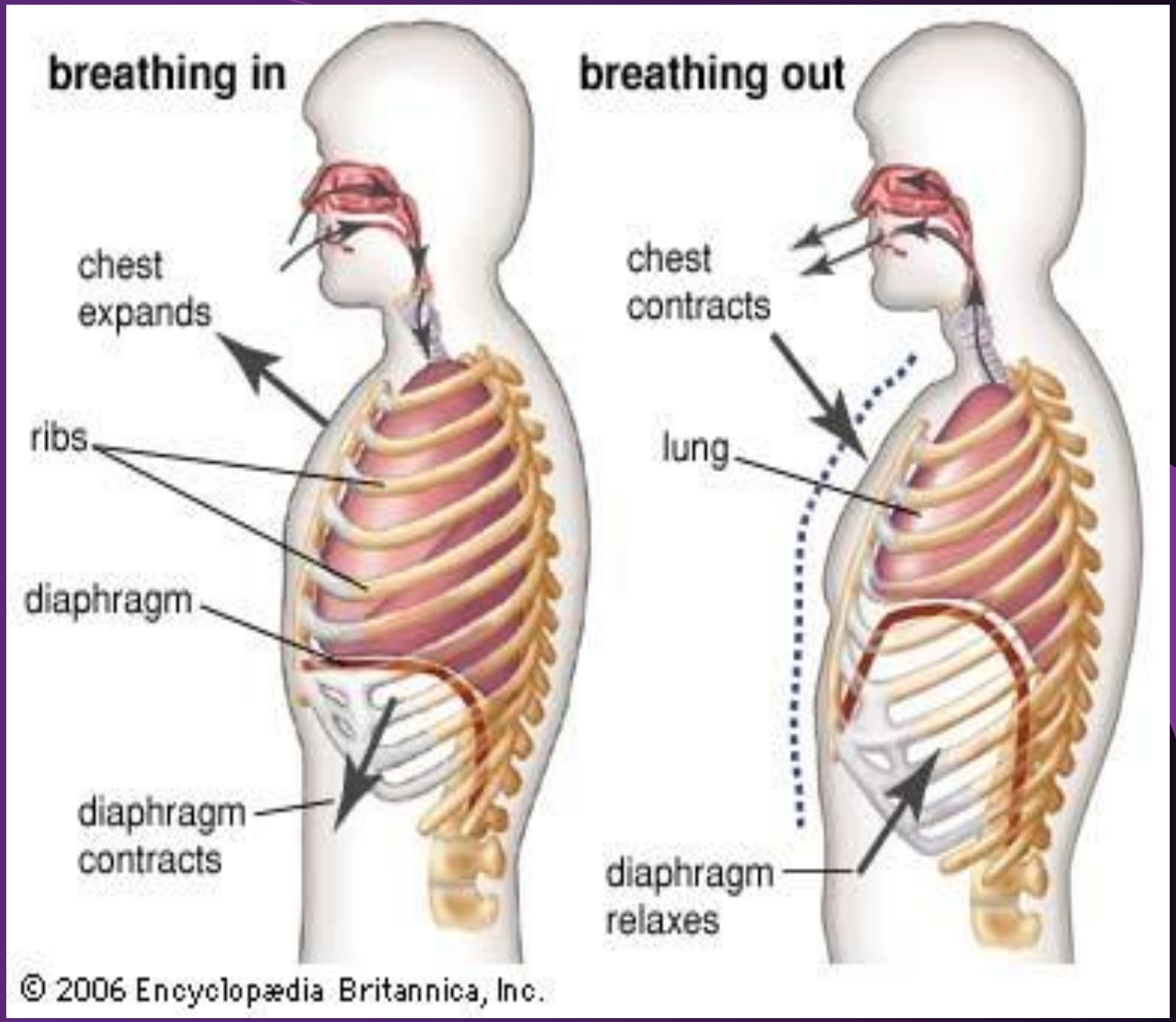
breathing in
chest expands
ribs
diaphragm
diaphragm contracts
breathing out
chest contracts
lung
diaphragm relaxes
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RESTORE Diaphragmatic Breathing

RESTORE Abdominal Opposition to Diaphragm

RESTORE Chest Wall Flexibility

Recommendations for Achieving & Maintaining Symmetry

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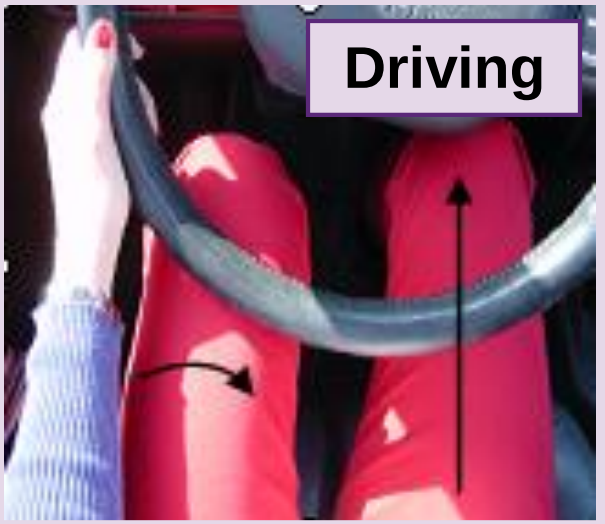
1. Positioning for daily activities

Standing

Sitting

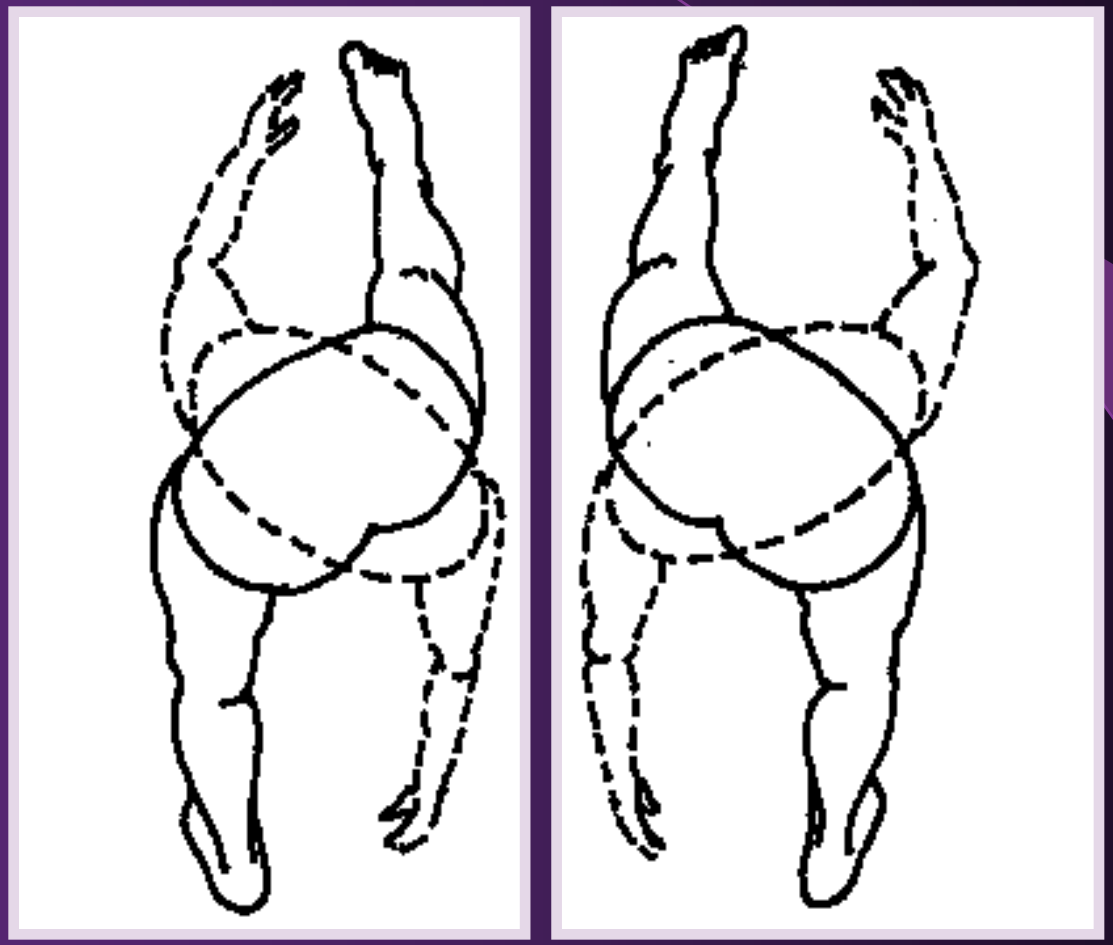


Working

Sleeping

2. Ability to shift weight over your left hip as well as your right

3. Alternating reciprocal gait always leading with your right leg and left arm



4. Ability to touch your toes

5. Ability to fully squat

- **The Postural Restoration Institute® (PRI), located in Lincoln, NE, was established in 2000 by Ron Hruska, to explore and explain the science of postural adaptations, asymmetrical patterns and the influence of polyarticular chains of muscles on the human body.**
- **PRI's mission is based on the development of an innovative treatment approach that addresses the primary contributions of postural kinematic movement dysfunction.**

- **PRI is dedicated to clinical education, research and the ongoing search for improved pathways of physical medicine.**
- **PRI is creating resources, education opportunities, research, and patient-care programs to assist those who wish to maximize their assessment and intervention skills in the areas of respiration, myokinematics, neuromuscular applications, postural imbalances, and visual function.**

Thank You!

Postural Restoration Institute®
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1. Iannetti & Mouraux. From the neuromatrix the the pain matrix (and back). *Exp Brain Res*. 2010;205(1):1-12.
2. Melzack. Pain and the neuromatrix in the brain. 2001. *J Dent Educ;* 65(12):1378-82.
3. Moseley. A pain neuromatrix approach to patients with chronic pain. 2003. *Man Ther, 8(30);130-140.*
4. Smart et al. Mechanisms-based classification of musculoskeletal pain: part 3 of 3: symptoms and signs of nociceptive pain in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):345-51
5. Smart et al. Mechanisms-based classification of musculoskeletal pain: part 2 of 3: symptoms and signs of peripheral neuropathic pain in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):345-51.
6. Smart et al. Mechanisms-based classification of musculoskeletal pain: part 1 of 3: symptoms and signs of central sensitization in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):336-44.
7. Butler. The sensitive nervous system. 2000; *NOI Group Publications.*
8. Smart et al. Mechanisms-based classification of musculoskeletal pain: part 1 of 3: symptoms and signs of central sensitization in patients with low back +/- leg pain. 2012. *Man Ther*;17(4):336-44.
9. Louw & Puentedura. Therapeutic neuroscience education: teaching patients about pain. 2013. *International Spine and Pain Institute.*
10. Visser & Davies. Expanding melzack's pain neuromatrix. The threat matrix: a super-system for managing polymodal threats

11. Legrain et al. The pain matrix reloaded: a salience detection system for the body. 2011. *Prog Neurobiol;* 93(1):111-24.
12. Meeus et al. Pain physiology education improves pain beliefs in patients with chronic fatigue sydrome compared with pacing and self-management education: A double Blind Randomized Controlled Trial. 2010. *Arch Phys Med Rehabil*. 91(8);1153-1159.
13. Moselely 2004. Evidence for a direct relationship between cognitive and physical change during an education intervention in people with chronic low back pain. 2004. *Eur J Pain, 20(5);39-45.*
14. Vlaeyen et al. Fear of movement/(re)injury in chronic low back pain and its relation to behavorial performance. 1995. *Pain,* 62(3); 363-372.
15. Engers et al. Individual patient education for low back pain. *2008.* Cochrane Database Syst Rev.
16. *Gross* et al. Patient education for mechanical neck pain. 2012. *Cochrane Database Syst Rev.*
17. *Haines et al. Patient education for neck pain with or without radiculopathy. 2008.* Cochrane Database Syst Rev(4).
18. *McDonald et al. Pre-operative education for hip or knee replacement. 2004.* Cochrane Database Syst Rev(1).
19. Low et al. 2011. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. 2011. *Arch Phys Med Rehabil*; 92(12): 2041-2056.
20. Wertli et al. Fear-avoidance beliefs-a moderator of treatment efficacy in patients with low back pain: a systematic review. 2014. *Spine J.* 14(11):2658-78

21. Barker et al. Divided by a lack of common language? – a qualitative study exploring the use of language by health professionals treating back pain. 2009. BMC Musculo Disorders; *10(123).*
22. Zusman. Belief reinforcement: one reason why costs for low back pain have not decreased. 2013. *J Multidiscip Healtc; 16(6):197-204.*
23. *Wertli etl al. Catastrophizing-a prognositc factor for outcome in patients with low back pain: a systematic review. 2014.* Spine J. *14(11):2639-57.*
24. Darlow et al. The enduring impact of what clinicians say to people with low back pain. 2013. *Ann Fam Med*;11(6):527-34.
25. Weisberg et al. The seductive allure of neuroscience explanations. 2008. *J Cogn Neurosci*; 20(3): 470-477.
26. Newton, R. Joint receptor Contributions to Reflexive and Kinesthetic Responses. 1982. *Phys Ther. 62* (1): 22-29.
27. Wepler, CH and Magnusson, SP. Increasing Muscle Extensibility: A Matter of Increasing Length or Modifying Sensation? 2010. *Phys Ther; 90: 438-449.*
28. Ng, N. Why Does Stretching Sore Muscles Feel Good? Healthy Living – azcentral.com.
29. Dafny, N. Neuroscience Online: An Electronic Textbook for the Neurosciences. The University of Texas Health Science Center at Houston. Chpt 6: Pain Principles. Neuroscience.uth.tmc.edu