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**MORE STUFF ABOUT ME**

- Personal trainer 10 years, specializing in injury rehabilitation (spinal recovery)
- Worked with a LOT of LBP, knee/shoulder, cancer, distance runners, diabetics, paraplegics, even an Olympic gold medalist
- Special consultant with Edmonton Oilers
- Meathead who lifts heavy things

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#### WHAT WE'LL COVER TODAY

- Basics of mobility – centration, plane of action, anatomical considerations, Joint-by-Joint Approach
- Use of specific modalities – static stretching, SMR, traction, active mobilization
- Therapeutic modalities – referrals

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#### UNIVERSAL TENETS

- THE BODY WILL BECOME GOOD AT WHAT IT'S REQUIRED TO BECOME GOOD AT
- REGARDLESS OF THE SITUATION, THE BODY WILL **ALWAYS** FIND A WAY
- THE RABBIT HOLE ALWAYS HAS NEW LEVELS TO IT
- MANY FACTORS AFFECT MOBILITY, THE LEAST OF WHICH IS MUSCLE LENGTH

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#### 3 FACTORS TO CHOOSING AN EXERCISE

1. Does it conceivably get them closer to their goals and have proof of benefit?
  2. Can they do the movement to get the right benefit from it?
  3. Can they do it Pain-free?
- If you answer YES to all of the above, it's a good exercise, period.

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*"As to methods there may be a million and then some, but principles are few. The man who grasps principles can successfully select his own methods. The man who tries methods, ignoring principles, is sure to have trouble."*

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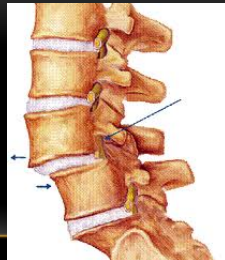
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#### FOUNDATION

- Joints operate best when in a state of **centration** in both form & orientation
- Muscular forces acting on joint balanced, guarding minimized, anticipatory reflexive contraction limited  
→ low threat of injury




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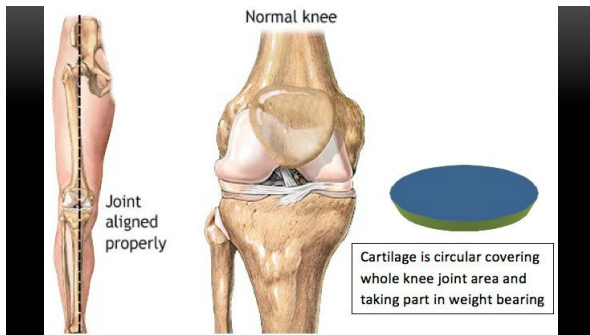
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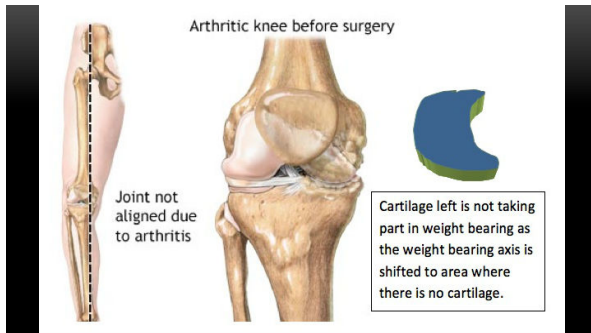
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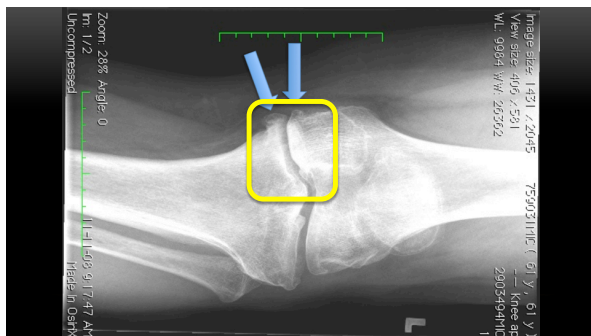
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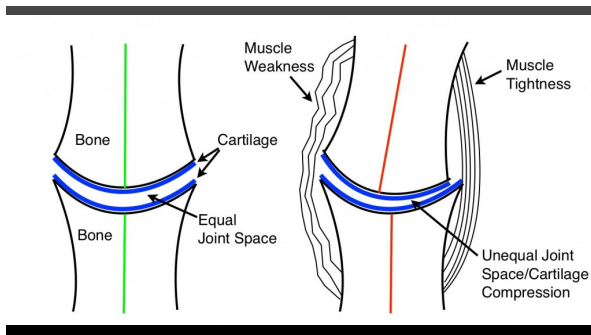
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### CENTRATION

- AKA, geometric dimensioning and tolerancing in engineering
- Outlines tolerable variations from optimal alignment, shape, and size of manufactured components and how they interact with others.
- If one piece is found outside the tolerable variation, it will not work with its counterparts

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### FOUNDATION

"Centration is the position of the joint where there is maximal bony congruency around the joint as well as equal co-contraction of agonists and antagonists. This anatomical visual is the basis of stereotypical postures in developmental kinesiology and is believed to yield full-body neurological strength and stability. When 1 joint is 'in place,' the rest of the body will ultimately follow."

— Weingroff, DPT, 800 lb squatter, WWE superfan

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### STARTED FROM THE BOTTOM, NOW WE'RE HERE

- Alignment begins at the foot.
- "fallen arches" or "flat feet" typically trainable to create an arch
- Flat foot causes tibial IR, which alters alignment through the chain
- Janda Short Foot Posture




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#### FACTORS THAT AFFECT ALIGNMENT/CENTRATION

- Bony architecture
- Repetitive strain, tissue remodeling
- Posture
- Gout, diabetes, disease, previous injury/scar tissue
- Faulty motor patterns
- Fear, guarding, apprehension
- Fatigue

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#### FACTORS THAT AFFECT ALIGNMENT/CENTRATION

- Stretching into misalignment = joint instability
- Strengthening into misalignment = muscle imbalances

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Type 1: Flat 17%    Type 2: Curved 43%    Type 3: Hooked 40%

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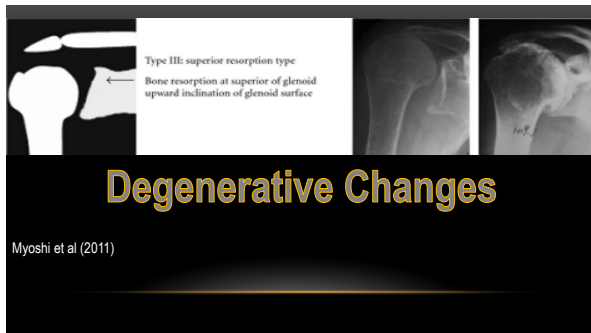
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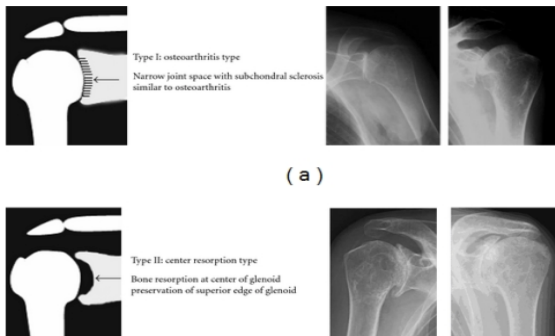
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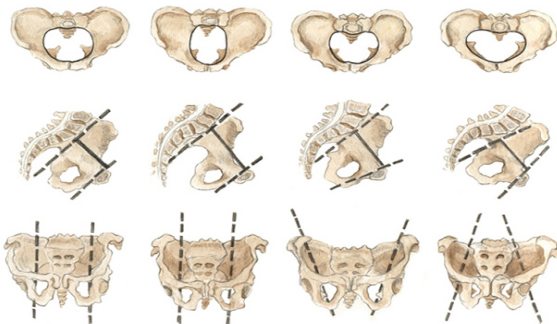
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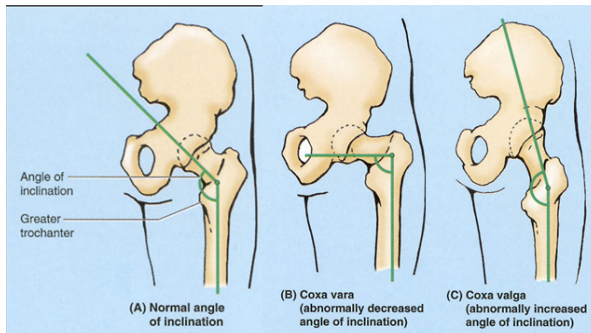
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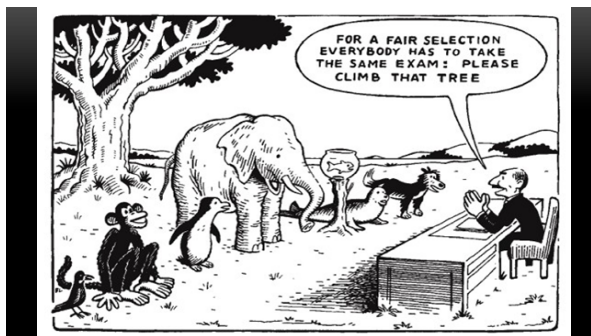
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### FOUNDATION

- Poor alignment stays with you
- If someone **stands** with APT, when they **lay down** are their hip flexors still tight? → YES!!
- Standing → sitting, typically (+) lumbar flexion, which (-) hip mobility

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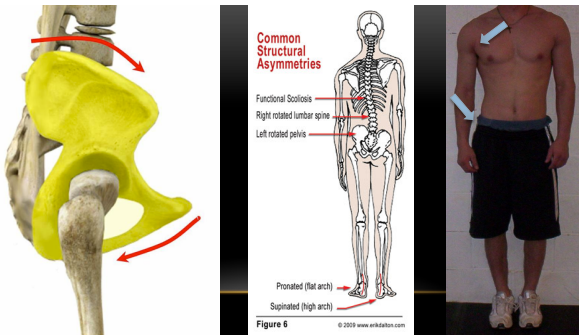
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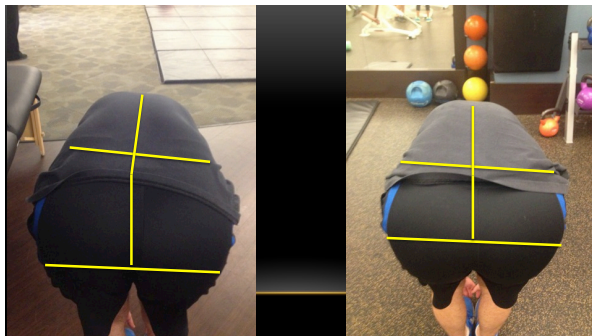
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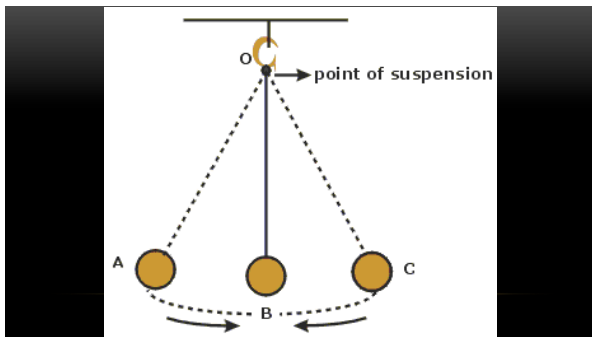
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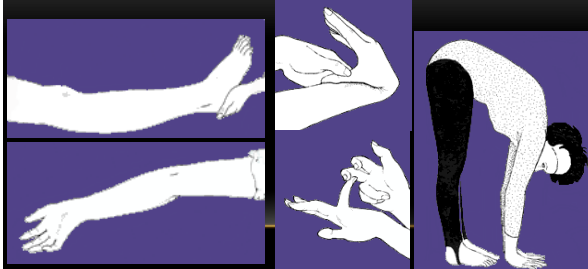
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## Beighton Score of Hypermobility




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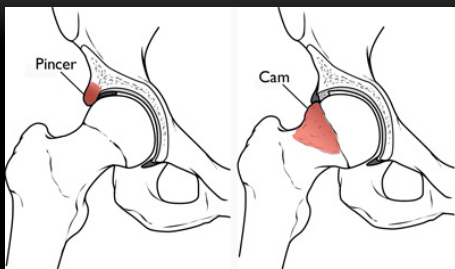
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## BONE BLOCKS - FAI




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## FOUNDATION

- Passive insufficiency – influenced by joint architecture, alignment, bone blocks at end ROM, restricted tissue, dehydration
- Active insufficiency – influenced by strength, muscle balance, nerve transmission, posture, anticipatory guarding, proximal stability

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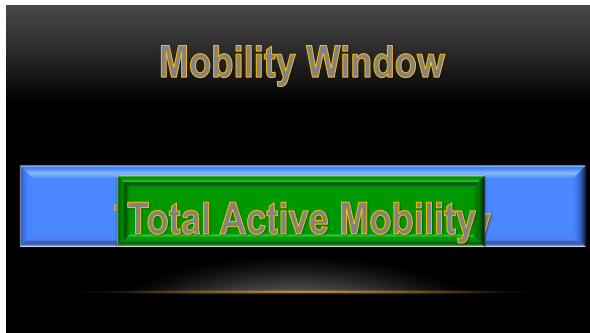
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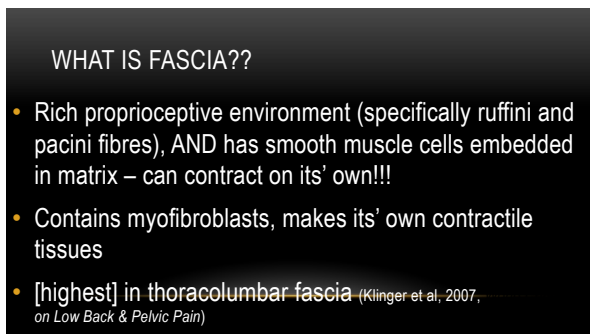
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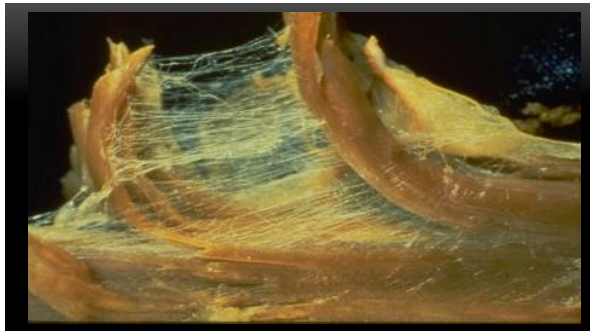
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### WHAT IS FASCIA??

- Ruffini endings – slow adapting, low threshold mechanoreceptors
- **Decrease tone** of tissues when stretched. Like direct pressure (SMR, massage), inhibit sympathetic activity
- Pacini Fibres – provide proprioceptive feedback.
- **Tense** tissues when vibration & rapid pressure changes occur

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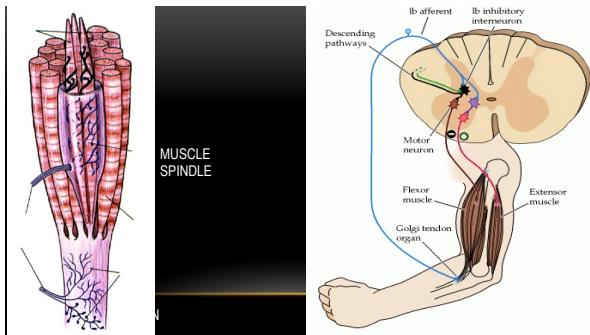
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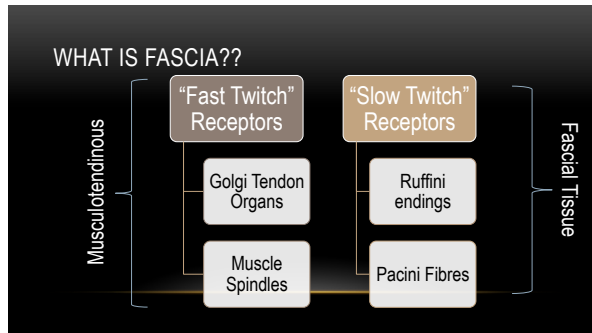
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- WHAT DOES IT DO??
- Rapid force application causes GTO to respond by contracting (tensed & guarded)
  - Slow causes ruffini fibers in fascia to decrease fascial contraction, reduce pressure in associated joints, encourages breathing
  - Moral: GO SLOWLY!!

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WHAT IS FASCIA??



- Has contractile properties, carries electric charge
- activity → High  
↑
- Slow Contracter, can last for hours
- Contractions can influence joint stability & structure

• Schleip et al, 2006.  
Biomechanics

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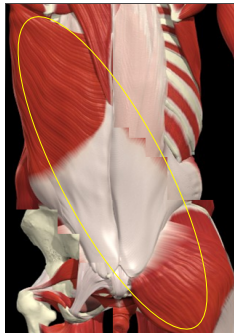
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#### WHAT ACTUALLY HAPPENS...

- Muscles interconnect through fascial networks, form more powerful connections than muscles alone
- Tensile strength of 2000 psi compared to 4700 psi in the ACL – strong, and lots of it!!
- Sum of parts < unit as a whole

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#### WHAT ACTUALLY HAPPENS...

- Senses tension & relays info back through spinal reflex loops
- Most sensory nerves come from myofascial tissue, mechanoreceptors that can also be nociceptors
- **Fascial dysfunction creates pain!!!!**

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#### FOAM ROLLING

- Mechanical compression of soft tissue, with the goal of altering contractile threshold and reduce tissue density
- Prolonged tensed fascia can produce enough force to misalign joints, create dysfunction
- “An ounce of prevention is worth a pound of cure.”

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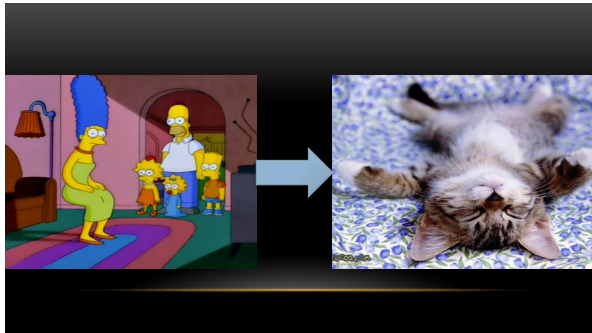
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#### FOAM ROLLING

- A muscle cannot function properly if in a constant state of excitation.
- Muscles have to be able to contract fully and relax entirely on command in order to operate optimally

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#### FOAM ROLLING

- Miller et al (2006), SMR didn't increased hamstring flexibility (8 week intervention)
- MacDonald et al (2012), SMR increased joint ROM without reducing muscle force activation

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#### WHAT DOES IT DO?

- Fredrickson et al (2005), SMR reduced IT band symptoms in runners
- Healey et al (2011), showed no change in squat jump & depth jump performance, negative effect in counter-current jump

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#### WHAT DOES IT DO??

- Decreases neural tone, resistance to movement.
- Allows muscles to move without back-pressure of fascial resistance.
- "Short-circuits" the fascial receptors
- DOES NOT STRETCH!!! No length change.

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#### TAKE-HOME POINTS

- It adapts to physical stress like muscle.
- Lays down more dense collagen in areas with more stress, breaks down when stressed w/o recovery
- Deteriorates faster when dehydrated
- Takes a long time to remodel effectively (1-2 years), which explains slow healing times in certain injuries

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#### FASCIAL RESPONSE TO STRESS

- Wang et al (2007): leg lengthening at a rate of 1mm/d and 2mm/d in rabbits (external fixation), deep fascia changes after ++ length by 10%
- Normal wavy collagen fibres became necrotic when stretched at 2mm/d, active recovery @ 1mm/d
- Chronic strain (>1mm/d) caused breakdown of *fascial* tissue, → mechanical dysfunction

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#### FASCIAL RESPONSE TO STRESS

- Fascial adhesions (fixatrophic changes) can result from chronic stress and inflammatory protein buildup - super glue to tissues
- Leads to reduced movement capacity, pain with stretching, and reduced muscle function
- Decreased function leads to compensation which leads to injuries

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### KEY POINTS

- Roll slow to get a release
- Roll to open movement capacity, not to increase flexibility
- Helps reduce movement limitations, muscle recruitment restrictions, neural hyper-excitations
- Test → roll → re-test to see any changes

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### TISSUE QUALITY

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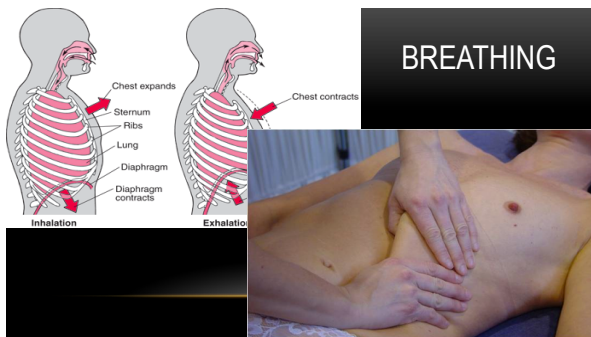
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### BREATHING

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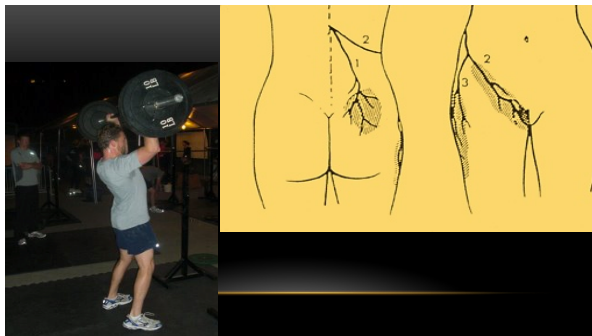
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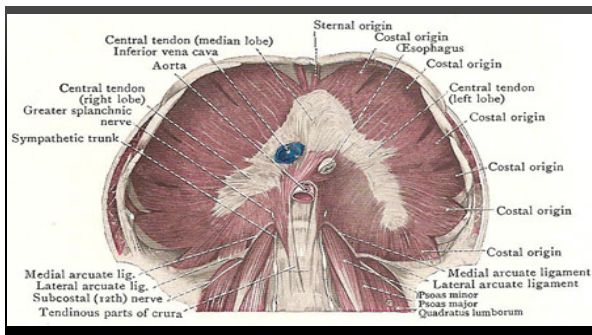
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## DIAPHRAGM

- Costal segment has digitations into TvA
- Medial lumbar segment attaches to T11-L4
- Medial & lateral acurate ligaments attach to QL and psoas, repsectively
- Connectivity to thoracolumbar & transversalis fascia

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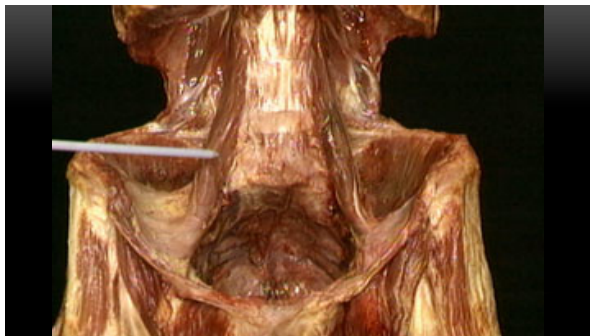
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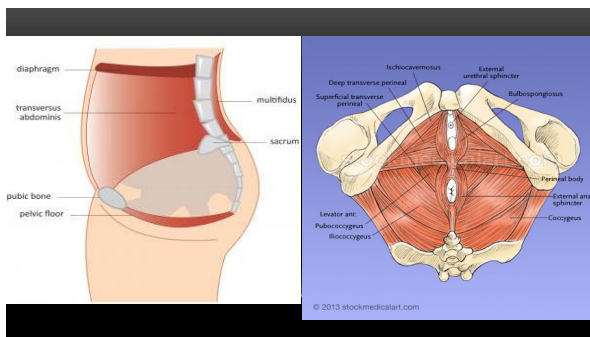
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***“Weak pelvic floor muscles typically result in overactive piriformis, obturator externus, and quadratus femoris. This results in “butt gripping,” which pushes the femur anteriorly in the labrum.”***

Osar,  
Corrective Exercise Solutions to Common Hip and Shoulder  
Dysfunctions

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#### **“STRETCH THE TIGHT”**

- Muscle are incredibly dumb
- Muscle only contract on their own due to 3 reasons:
- “guarding” tension
- Contractures/scarring
- Cerebral distortions (cerebral palsy, seizure, etc)

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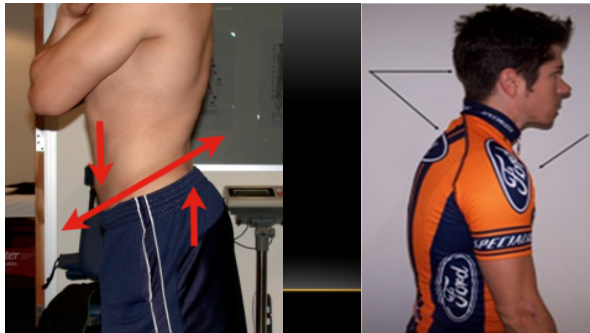
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**“STRETCH THE TIGHT”**

- “Functionally, muscles work together in **slings, chains and loops.**”
- “Muscle Imbalances are a systematic and predictable response to pain and pathology at peripheral joints.”
- “Muscles held in contracted states will fatigue, which will compromise force production capacity.”

*- Dr. Vladomir Janda, The Janda Approach*

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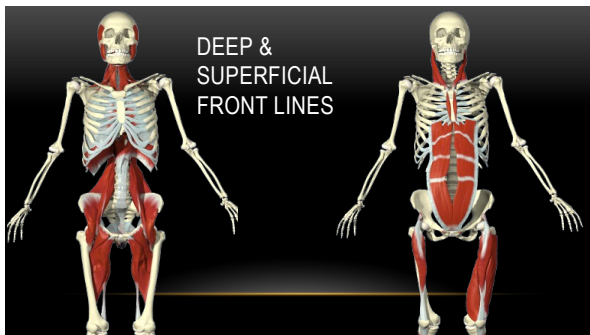
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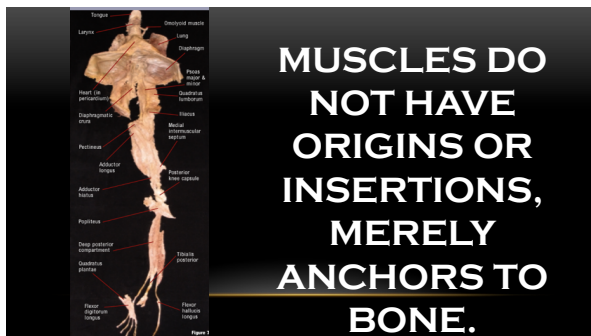
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"STRETCH THE TIGHT"

- *Muscle will hold tension in the presence of implied instability of associated joints.*
- *Muscles will relax when the implied stability of the associated joint is improved.*
- Stretching a tight muscle without improving stability → muscle remains tight + INSTABILITY

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#### "STRETCH THE TIGHT"

- Anterior core instability – translates into reduced hip ER, tight hip flexors, valgus collapse, adductor trigger points, side stitches with hard cardio
- Lateral core instability – translates into reduced hip IR, tight low back, IT band trigger points, "butt gripping"

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#### "STRETCH THE TIGHT"

- For tight hip flexors, hamstrings, <ER:
  - Front planks, dead bugs, anti-extension
- For tight glutes, lower ribs, IT band, LBP:
  - Side planks, suitcase carries, chops and lifts

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#### "STRETCH THE TIGHT"

- Stabilizing unstable segments will reflexively relax associated tense muscles
- Muscles no longer under constant tension will respond to strength training and conditioning without producing compensation patterns

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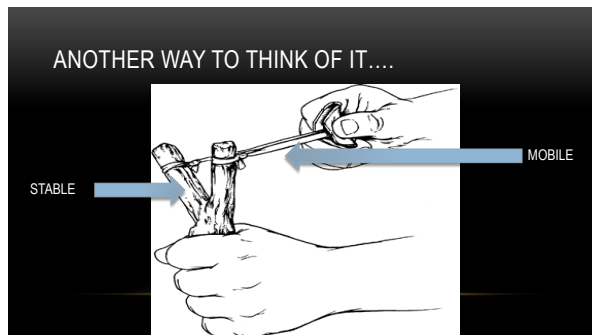
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### "STRETCH THE TIGHT"

*"Many postural changes are associated with increased muscle length. Because the lengthened muscle is associated with joint misalignment evident in postural changes such as forward shoulders or postural limb length discrepancies, correction is indicated. Even more importantly, the change in length of the muscle also changes the movement of the joint controlled by the muscle."*

- Dr. Shirley Sahrmann

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*"A reasonable hypothesis is that increased stiffness in one muscle group can cause compensatory movement at an adjoining joint that is controlled by muscles or joints with less stiffness."*

- Dr. Shirley Sahrmann

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#### TRACTION

- Manipulating the joint stabilizers and decreasing compressive forces working on the joint
- Synergistic assistance for stretching
- Encourages re-alignment of main joints (hips, shoulders) as well as non-gravitational loading vector to assist strengthening through ROM
- Looks hella cool

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#### TRACTION

- Commonly used in passive setting for spinal issues
- Can have huge benefits to active use in hips/shoulders




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## STATIC/DYNAMIC STRETCHING

- Simply being active
- Spend time on joints/muscle that holds greater tension, but don't forget about reciprocal stabilization
- Breathe. For the love of God, BREATHE!!!!!!

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## MOBILITY BASICS

- Alignment, length-tension relationship, centration
- Breathing, co-stabilization, synergistic activity
- Soft tissue modality (foam rolling, massage, etc)
- ROM activities
- Get after it.

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## ADDRESSING KEY CENTRES

- Reactive core: crook lying, prone, half kneeling, tall kneeling, split stance, square stance, 1-foot
- Neutral spine: APT/PPT, T-L hinge, braced
- Neutral neck: forward head, packed neck, shoulder shrug
- Lumbopelvic disassociation

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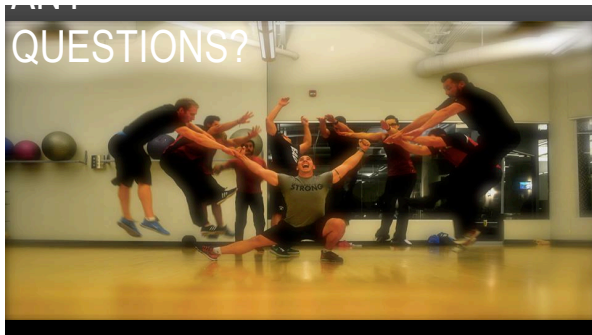
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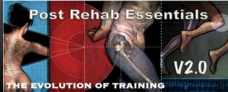
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