Understanding Sequencing & Asymmetrical Rotational Patterns Based on Principles of Postural Restoration®

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A special thanks to. . .

- Chris Poirier and Perform Better
- Each of you here today
- My sponsors. . .
  - Every patient and client I've seen in the past 25 years….

My apologies….

….but it is not due to irresponsibility that this talk is incomplete

Think differently….

Mark Fisher Fitness

The PRI “rabbit-hole”…

www.tonygentilcore.com

Understanding sequencing & asymmetrical rotational patterns based on principles of Postural Restoration®

- Polyarticular chains
- Polyarticular chains dominance
- Positional influence and response
- Understanding sequencing
  - Establishing optimal respiratory function
  - Hierarchy of planes of activation and movement
  - Activation of specific musculature
  - Components that influence rotational capability & capacity

“To keep people engaged, you have to keep them interested and that requires anticipation and the unknown.”

- Rob Gilbert

#PBFTS2015

What is posture?

- 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.
  - Ron Hruska, MPA, PT
    - Founder, Postural Restoration Institute®
    - Owner, Hruska Clinic

Postural Restoration Institute®

HRUSKA CLINIC Restorative Physical Therapy Services

Polyarticular chains

Polyarticular Chains

- A muscular chain is a set of polyarticular ("affecting many joints") group of overlapping muscles running in the same direction with no break in continuity and that are mutually dependent in terms of their function.
  - Francoise Mezieres

- Through extensive review of literature and cadaver dissection, Ron Hruska, founder of the Postural Restoration Institute® has identified and described the most dominant paired chains (one on the Left and one on the Right) and the influence these chains have on our side dominance and patterns of movement--independent of hand or foot dominance.

Polyarticular Chains

as described by the Postural Restoration Institute®

Brachial Chain (BC)

Sternocleidomastoid, Scalenes, Sibson's Fascia, Deltoid-Pectoral, Anterior-Lateral Intercostals, Triangularis Sterni, Diaphragm

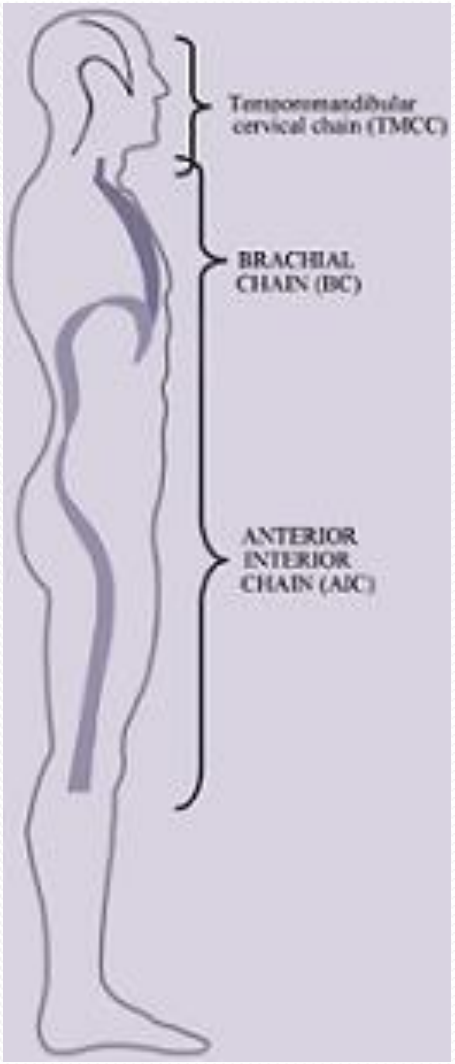
Anterior Interior Chain (AIC)

Diaphragm, Iliacus, Psoas, TFL, Vastus Lateralis, Biceps Femoris

Posterior Exterior Chain (PEC)

Posterior Intercostals, Serratus Posterior, Latissimus Dorsi, Quadratus Lumborum, Iliocostalis Lumborum

Temporo-Mandibular Cervical Chain (TMCC)



www.posturalrestoration.com

Polyarticular Chain Dominance

Polyarticular Chain Dominance

Due to the influence of a number of different aspects of our anatomical makeup and the fact that we are a living and breathing system, a certain level of predictability in the dominance of these chains exists. Osteo- and arthrokinematic presentations as well as common patterns of movement and subsequent compensations become more apparent.

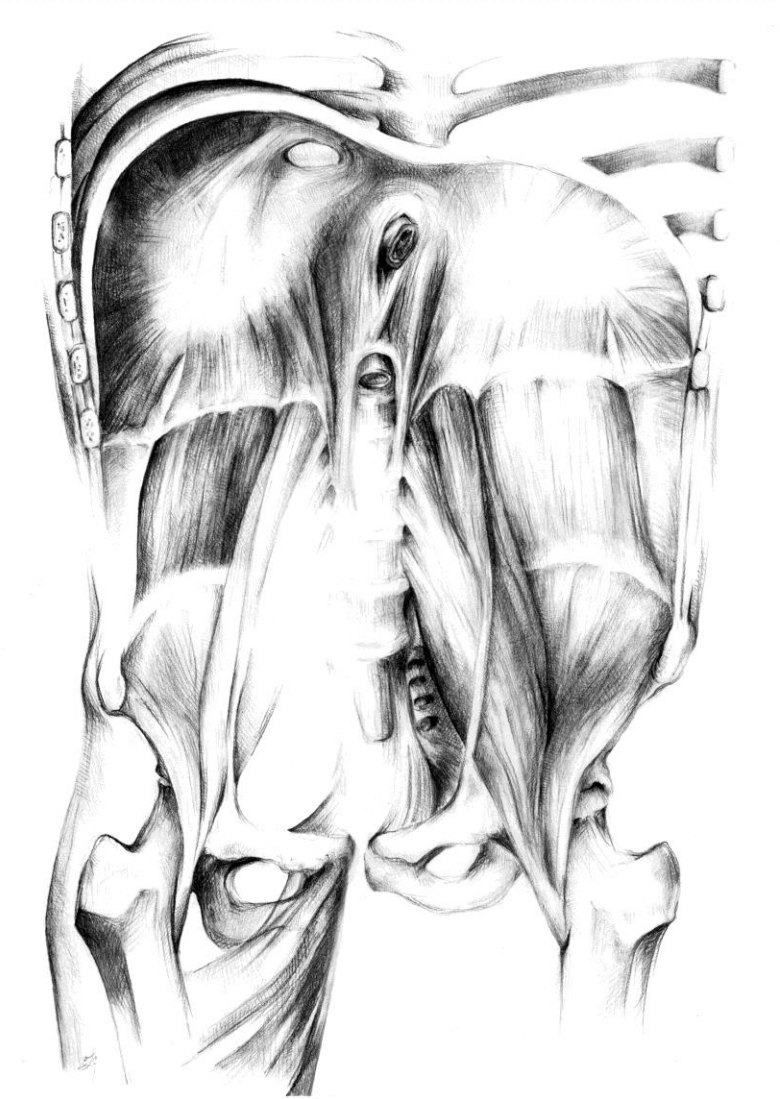
- The Left Anterior Interior Chain is the dominant lower body pattern
  - Referred to as the L AIC
    - Driven by overactive Left psoas and iliacus, Right hemidiaphragm, Left TFL and vastus lateralis, Right bicep femoris and adductors
- The Right Brachial Chain is the dominant upper body pattern
  - Referred to as the R BC
    - Driven by overactive Right hemidiaphragm, Left pectoralis, Right triangularis sterni, Right abdominal obliques
- The Posterior Exterior Chain is overactivity of the back extensors
  - Referred to as the PEC
    - Driven by compensation for the underlying dominant chains and is overactive back extensors, lats and QL's
    - Underneath this PEC is a L AIC and R BC in hiding

Polyarticular Chain Dominance

This picture represents the more common areas of muscle overactivity with the darker areas representing more facilitated and lighter regions demonstrating more inhibited.

- Overactive
  - Right hemidiaphragm
  - Left psoas and iliacus
  - Right QL
  - Left vastus lateralis and TFL
  - Right adductors and long head biceps femoris
- More inhibited
  - Left hemidiaphragm
    - May also be on, but long and/or torqued
  - Right psoas
  - Left adductors and LH biceps femoris

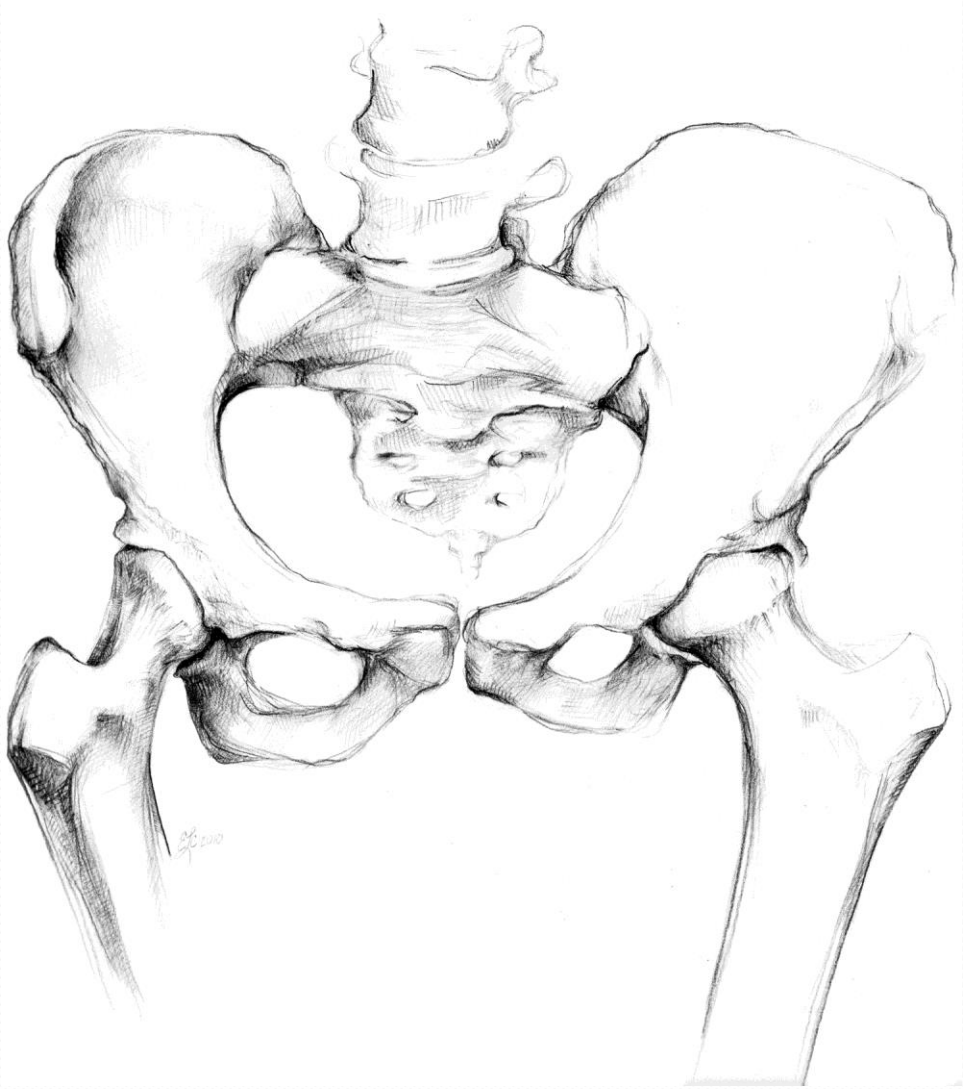
Optimally positioned….



Polyarticular Chain Dominance

This picture represents the more common osteo- and arthrokinematic position and orientation of the spine, pelvis and hips due to the influence of the pull of the muscles.

- Left anteriorly tipped and forwardly rotated pelvis.
- Right lumbosacral rotation
- Left femoral head externally rotated ***orientation*** due to compensation for the change in acetabular position.
- Right femoral head internally ***positioned*** due to acetabular position.

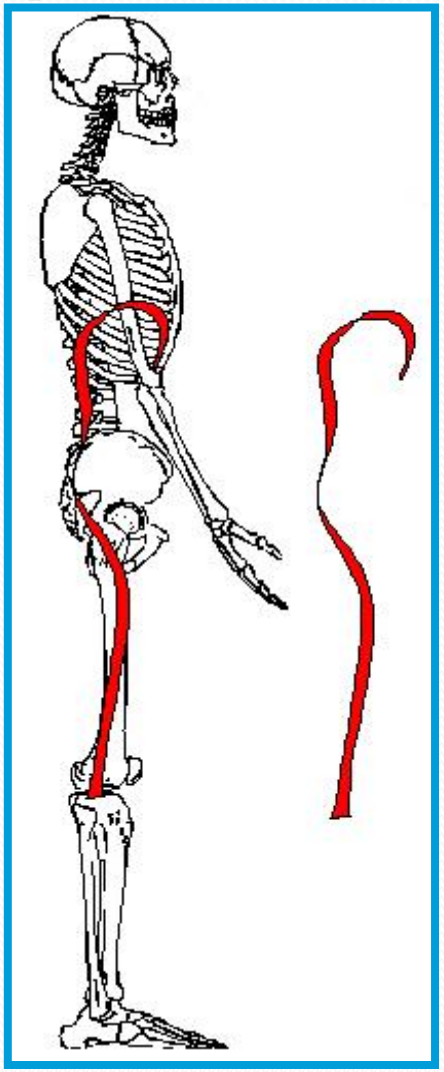


Polyarticular Chain Dominance

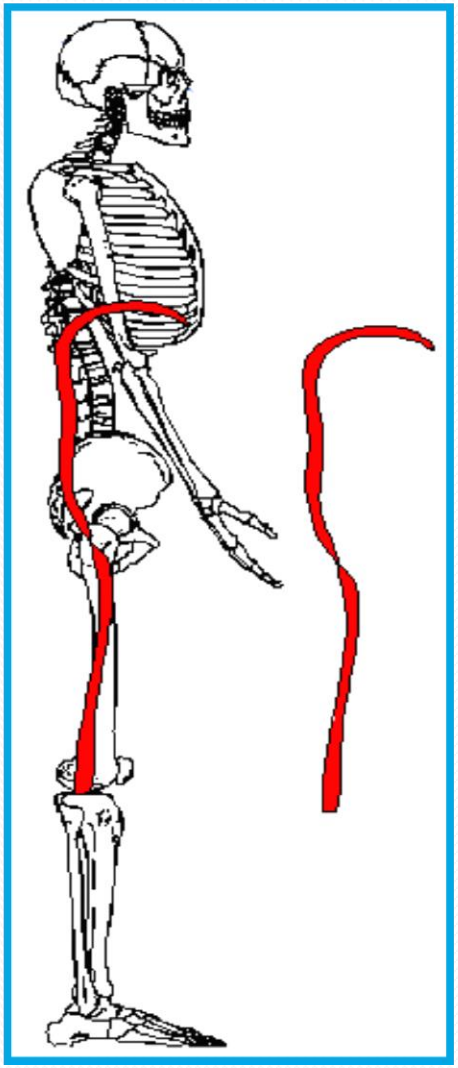
It is important to recognize the significant ways the body can and does compensate for these muscle chains. If the system has to adjust for internal and/or external inputs, then changes can occur to the soft tissue and bony structures.

This is called pathology….

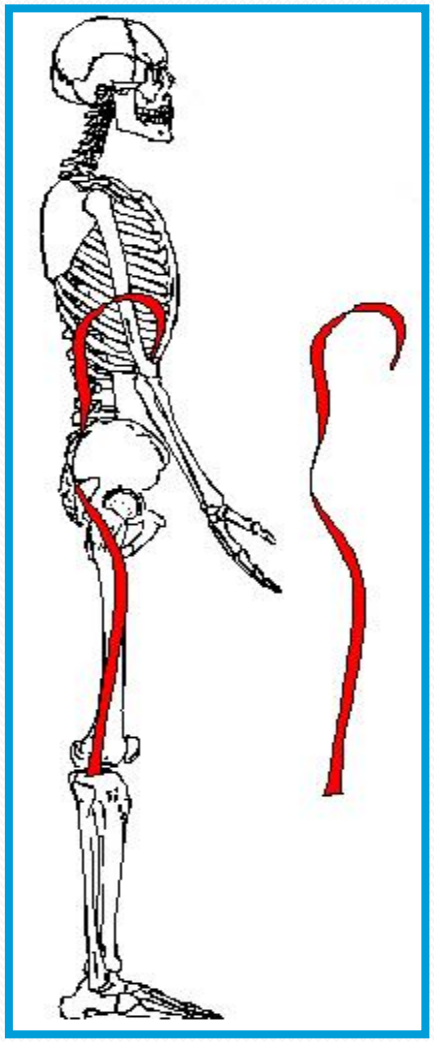
Optimal AIC



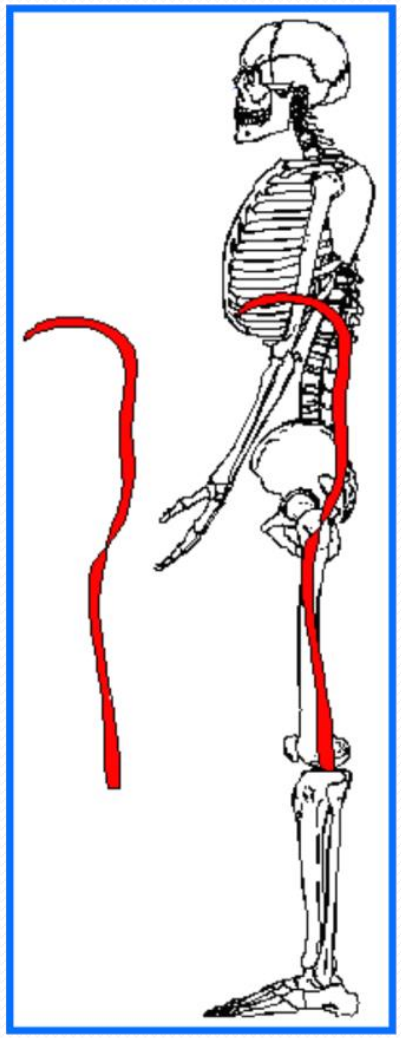
Sub Optimal AIC



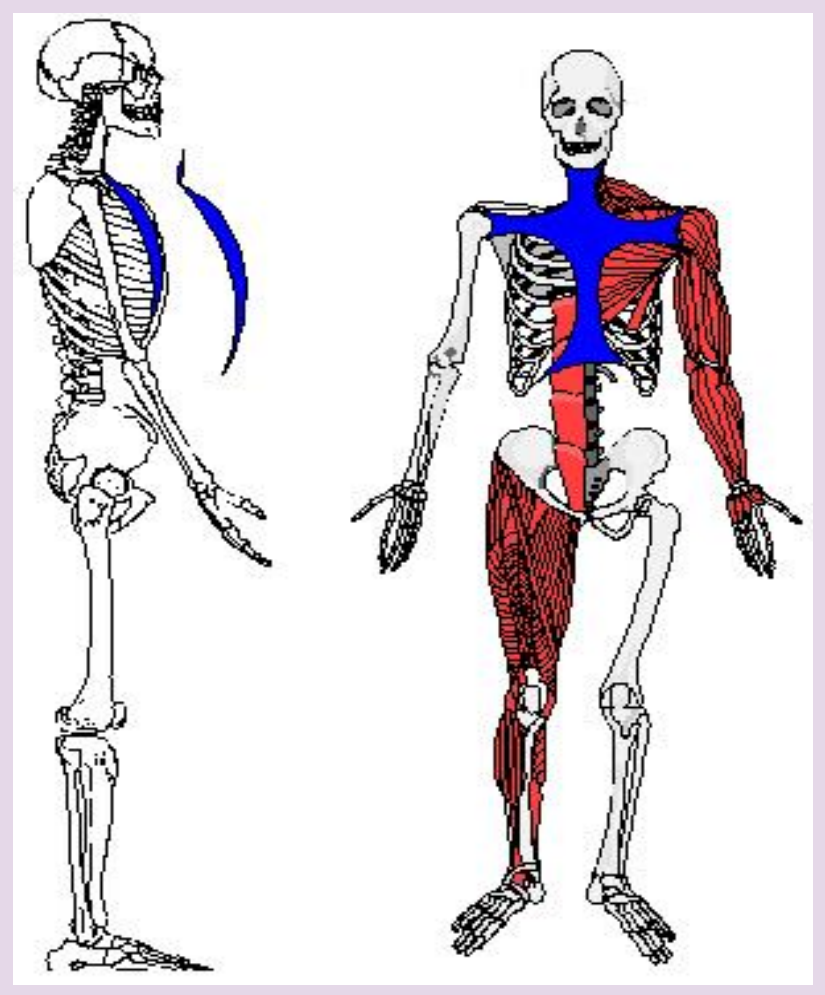
Optimal AIC--Right



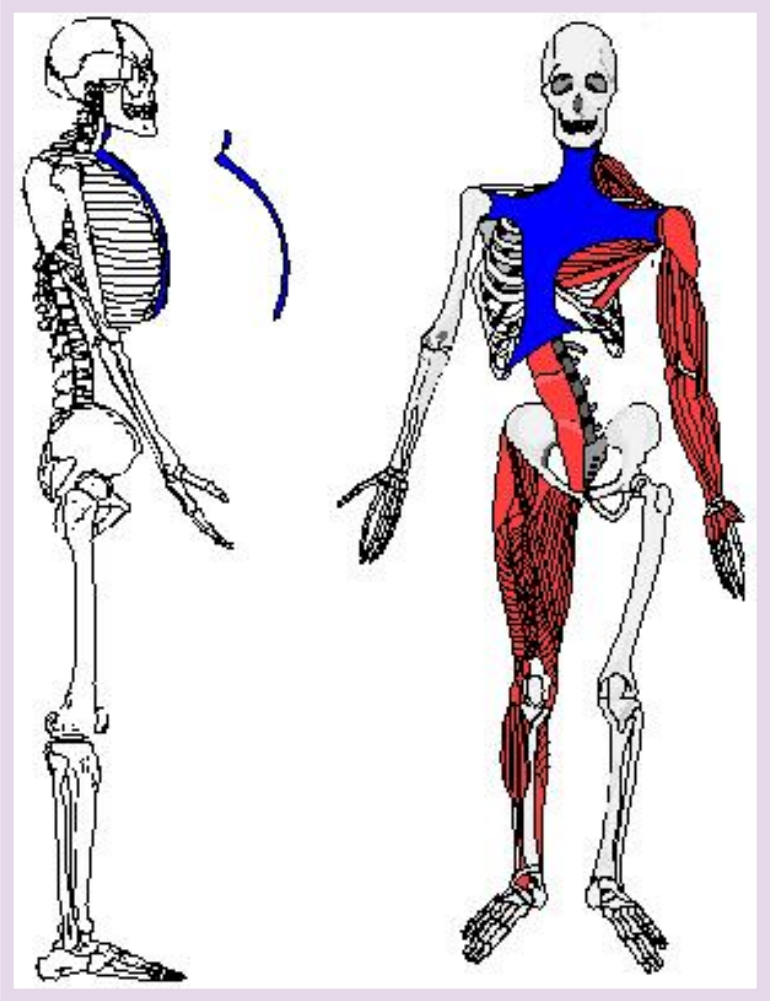
Sub Optimal AIC--Left

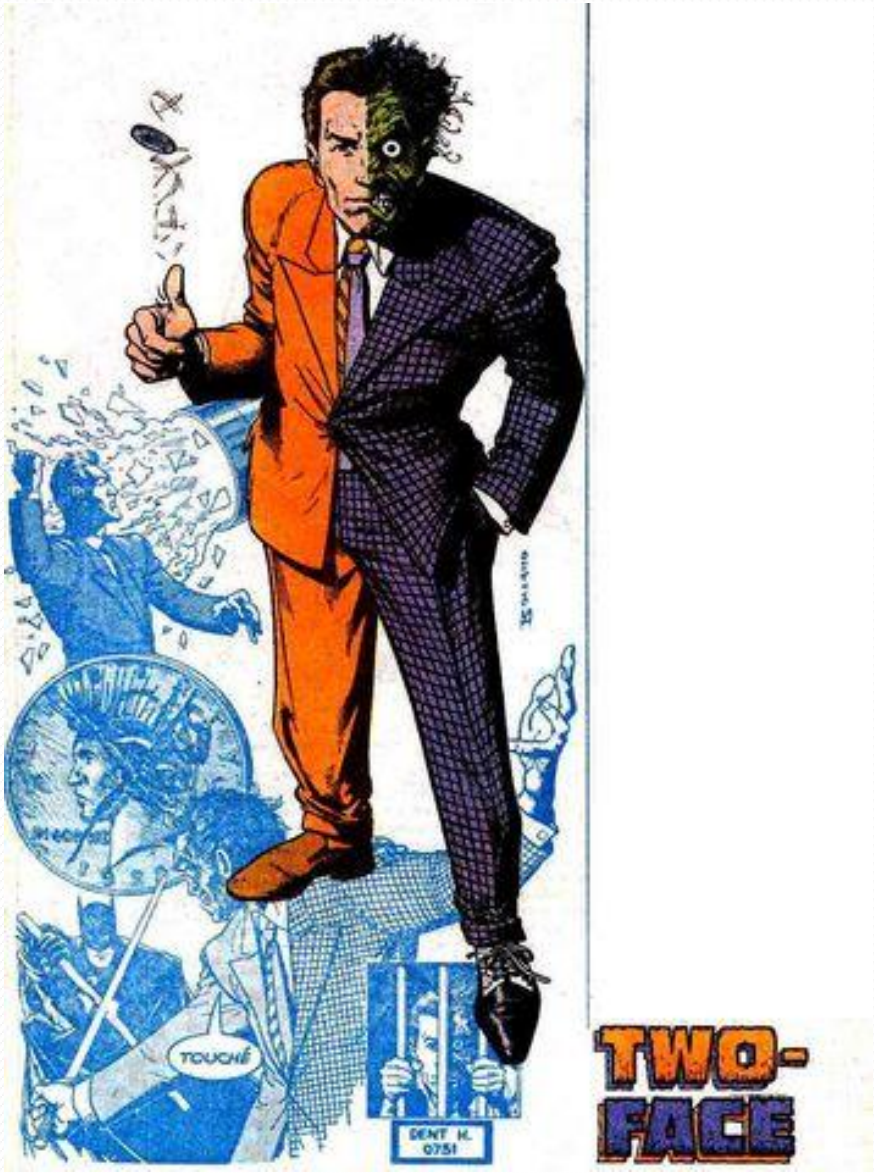


Optimal BC



Sub-Optimal BC





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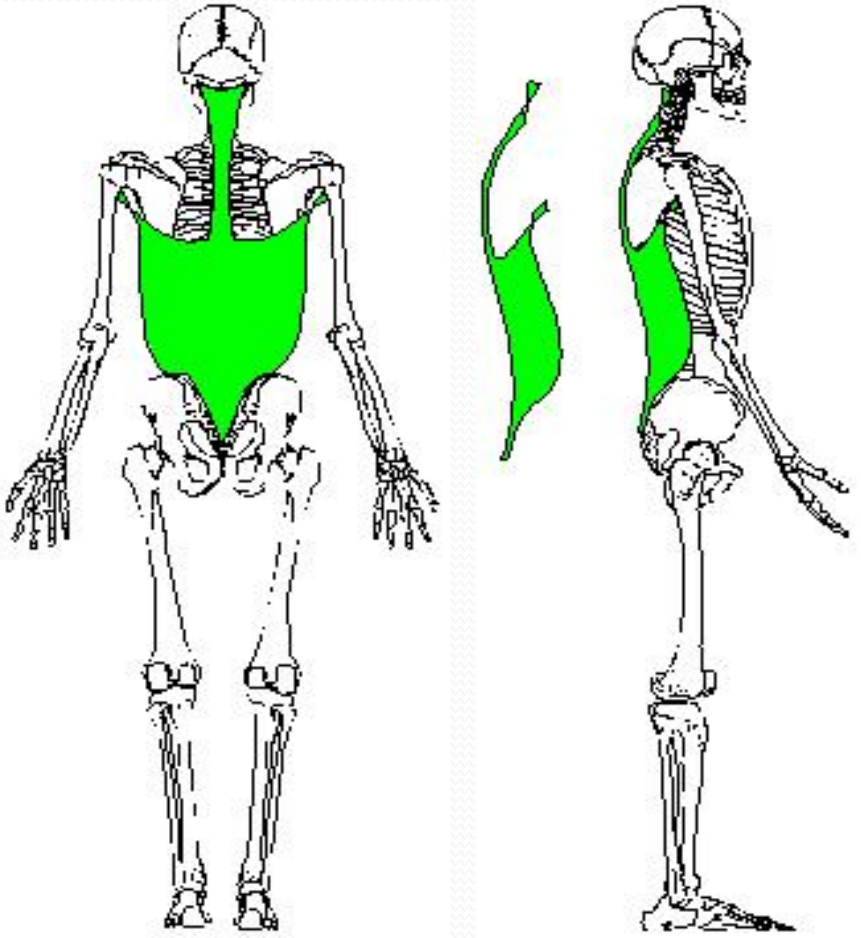
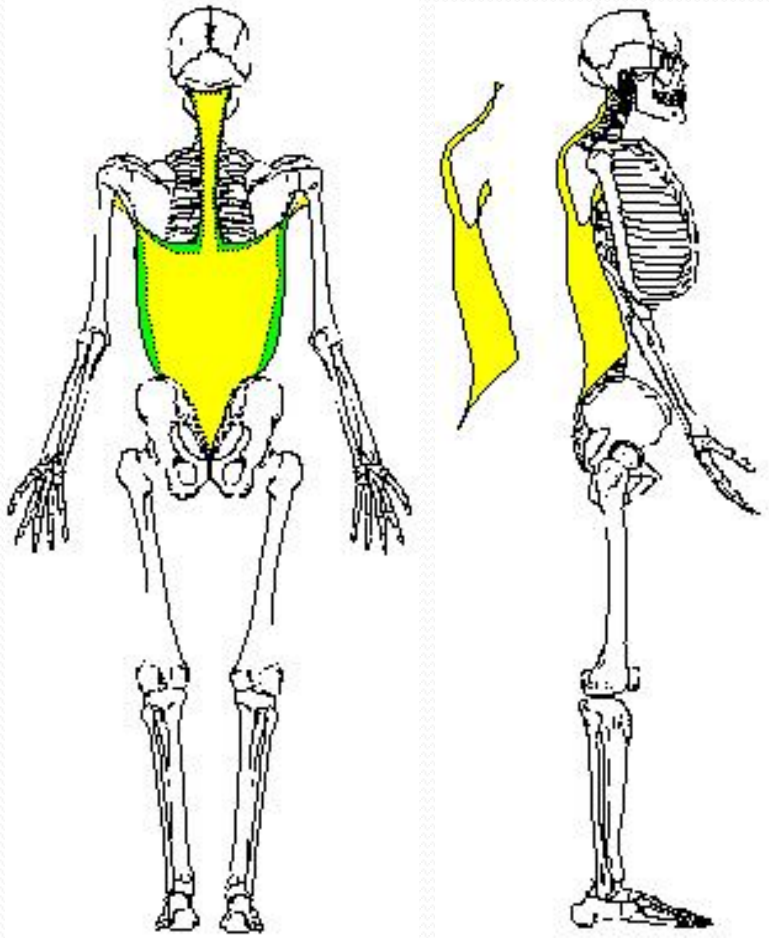
Optimal PEC



Sub-Optimal PEC



Positional Influences & Response

Patterned Influences & Response

- Right-***sided*** dominance regardless of hand and foot "dominance"
  - Driven by our brains, nervous system, respiratory system, visual system, circulatory and lymphatic systems, etc.
  - The system will orient, align, load and ***respond more consistently*** to the right side.
- Right "stance" with Left trunk counter-rotation most common
  - Trunk counter-rotation to the Left at the level of the diaphragm to balance out the system.
  - The body is over-rotated to the right at the pelvis and lumbar spine and in many cases not even rotated back to midline at the thorax and thoracic spine.

Patterned influences and responses

- Right hemipelvis posteriorly rotated with compensatory upper thoracic rotation to the left, regardless of the leg they are standing on.

Where is the compensation coming from?

- At some point between the 3rd and 4th picture, there is a sequence of rotation which may come from great pelvic to thoracic left rotation. If it comes more from left trunk rotation—in particular if it is sequenced before pelvic rotation—then that is what can create problems……

……then into right stance.

Patterned Influences & Response

- The underlying directional pull of these dominant polyarticular chains creates an imbalance in the rotational capability of the human body. This can be easily understood when looking at things strictly from a handedness and footedness aspect. However, it is much more complex and is influenced by a host of other factors and requires a multi-faceted sequenced approach in order to be best able to address these asymmetrical tendencies and reduce their affect on human function.

Patterned Influences & Response Autonomics, KITT and The Hoff

PRI is. . .

. . . .gaining access to the autonomic nervous system by creating and maximizing variability which allows the system to have better control for a multitude of situations

-Doug Kechijian, DPT, PRC

www.famous-cars.net_category_knight-rider_KITT

Patterned Influences & Response

“There is power in the pattern.”

- Bill Hartman, PT (iFAST)

Understanding Sequencing

Understanding Sequencing

- Sequence #1
  - Establishing optimal respiratory function
- Sequence #2
  - Following hierarchy of planes of activation and movement
- Sequence #3
  - Activation of specific musculature for optimizing movement
- Sequence #4
  - Addressing the components that influence rotational capabilities and capacity

Sequence #1

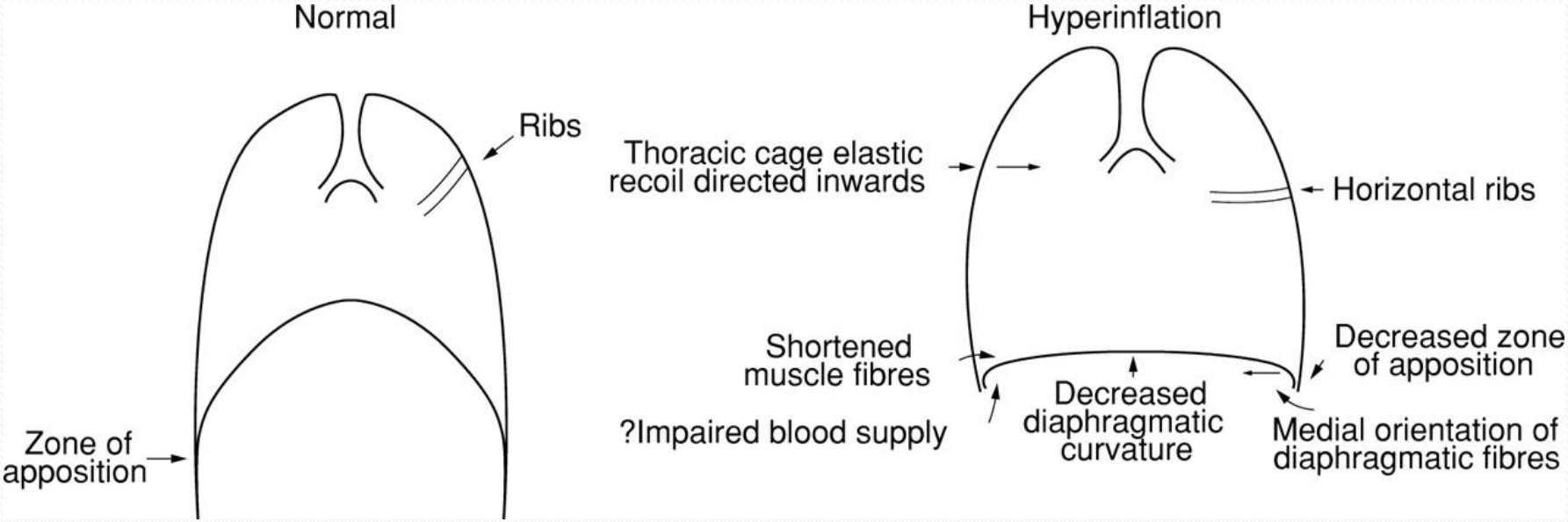
Establishing optimal respiratory function

Establishing optimal respiratory function

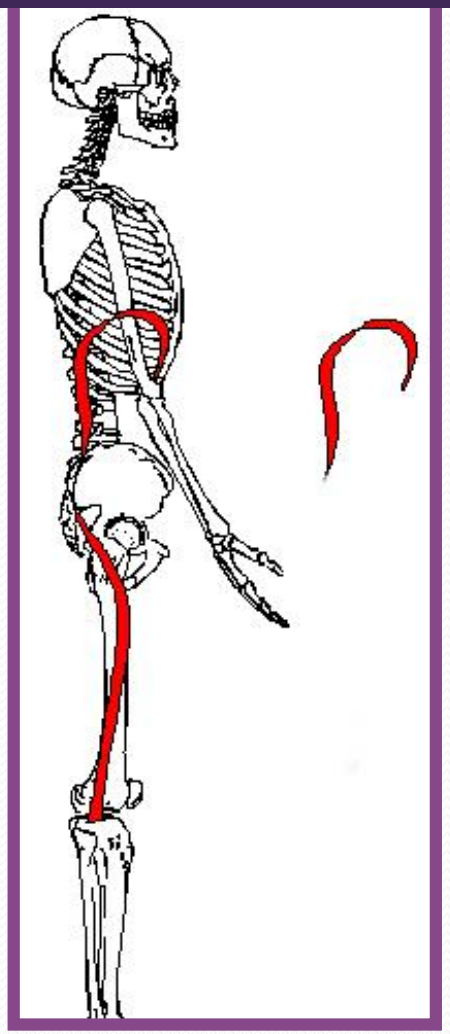
- **Zone of Apposition**—That aspect of the diaphragm that apposes the chest wall during the respiratory cycle in which the diaphragm returns to its domed shape.
- Zone of Apposition could be considered the amount of excursion the diaphragm should go through during breathing (mechanical) which optimizes respiration (chemical).
- Since the three main ways we create stability in our system is position, muscle, and pressure—this ZOA allows the *position* of the structures to influence *muscle* activity for optimal gaseous *pressure* exchange.

Establishing optimal respiratory function

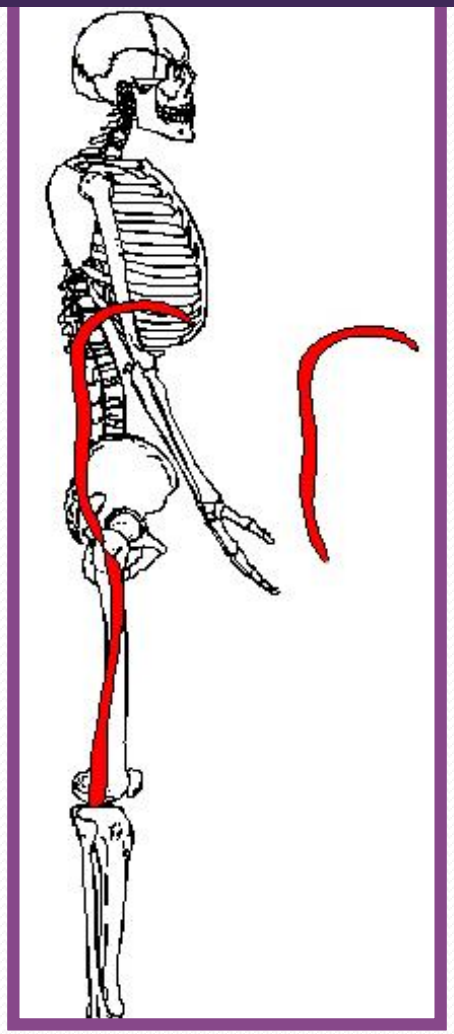
The Breath is Boss



Optimal ZOA

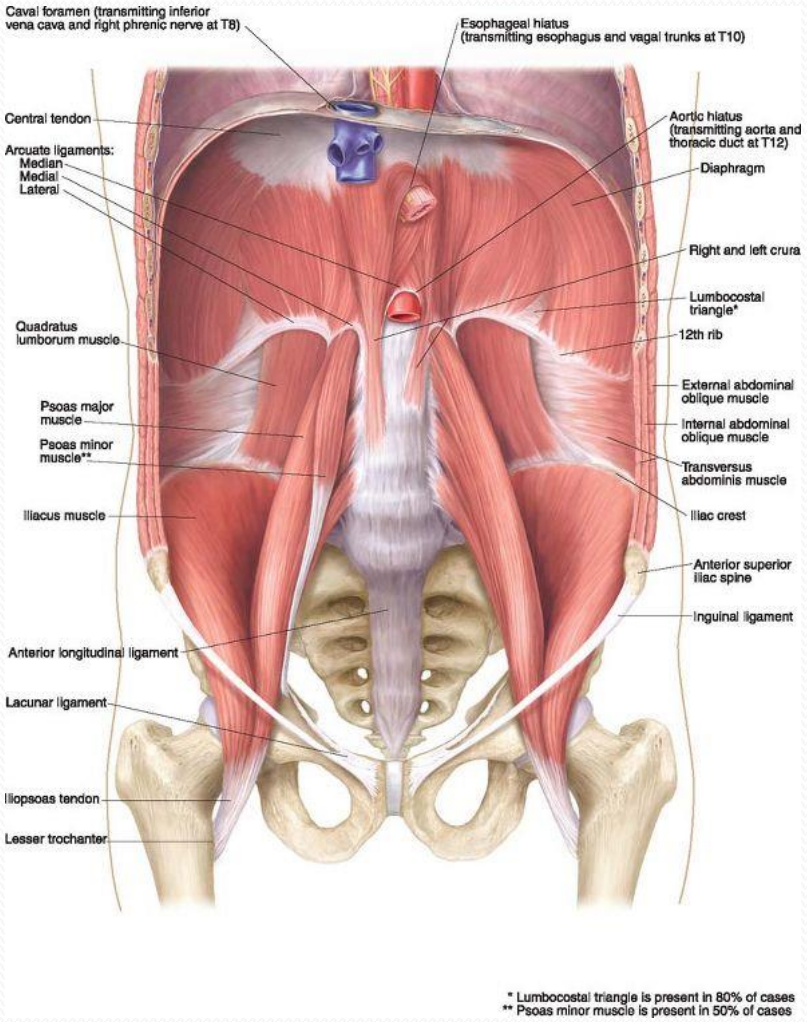


Sub-Optimal ZOA



Establishing optimal respiratory function

- The diaphragm is the central-most muscle in our body and it should be able to move freely and effectively through its normal excursion during inhalation and exhalation. This is critical for optimizing *pressure* of the system, *position* of the thorax and *push/pull* of the musculotendinous units. It also maintains proper form of the thorax and subsequently rotational capabilities of the pelvis and thorax.



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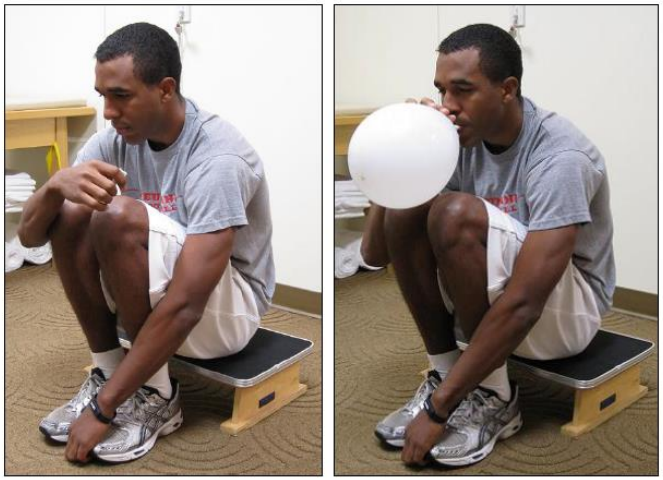
Establishing optimal respiratory function

- If optimal respiratory exchange is not established prior to initiating a training program, then asymmetric rotational forces will be exerted on the system, creating compensation and subsequent susceptibility to poor performance or injury.
  - **Ability to rotate evenly on both right and left sides can easily become compromised.**
- Forces exerted through an asymmetrical system produces deleterious loads and torsional properties onto the soft tissue and articulating structures. It is further exacerbated by the inability of the muscles to be able to produce balanced forces.
  - This creates a back and forth affect of one influencing the other and vice versa.

Establishing optimal respiratory function

Stair Short Seated Balloon

Stair Short Seated Balloon



1. Sit on a 6-inch step with your feet together, knees bent and knees together.
2. Round out your back and roll your pelvis back, feeling your "sit bones."
3. Inhale through your nose and slowly blow out into the balloon.
4. Pause three seconds with your tongue on the roof of your mouth to prevent airflow out of the balloon.
5. Without pinching the neck of the balloon and keeping your tongue on the roof of your mouth, take another breath in through your nose.
6. Slowly blow out again as you stabilize the balloon with your hand.
7. Do not strain your neck or cheeks as you blow.
8. After the fourth breath in, pinch the balloon neck and remove it from your mouth. Let the air out of the balloon.
9. Relax and repeat the sequence 4 more times.

Wall Supported Passive FA IR with Balloon

Wall Supported Passive FA IR with Balloon

1. Stand against a wall with a ball between your knees and your feet 7-10 inches from the wall. Spread your feet apart so they are wider than your hips.
2. Round out your back as you perform a pelvic tilt, so that your lower back is flat on the wall. Your upper back will be off the wall.
3. Inhale through your nose and slowly blow out into the balloon.
4. Pause three seconds with your tongue on the roof of your mouth to prevent airflow out of the balloon.
5. Without pinching the neck of the balloon and keeping your tongue on the roof of your mouth, take another breath in through your nose. You should feel your upper back expand as you inhale.
6. Slowly blow out again as you stabilize the balloon with your hand.
7. Do not strain your neck or cheeks as you blow.
8. After the fourth breath in, pinch the balloon neck and remove it from your mouth. Let the air out of the balloon.
9. On the final exhale, slowly stand up by pushing through your heels, keeping your lower back flat on the wall.
10. Relax and repeat 4 more times.

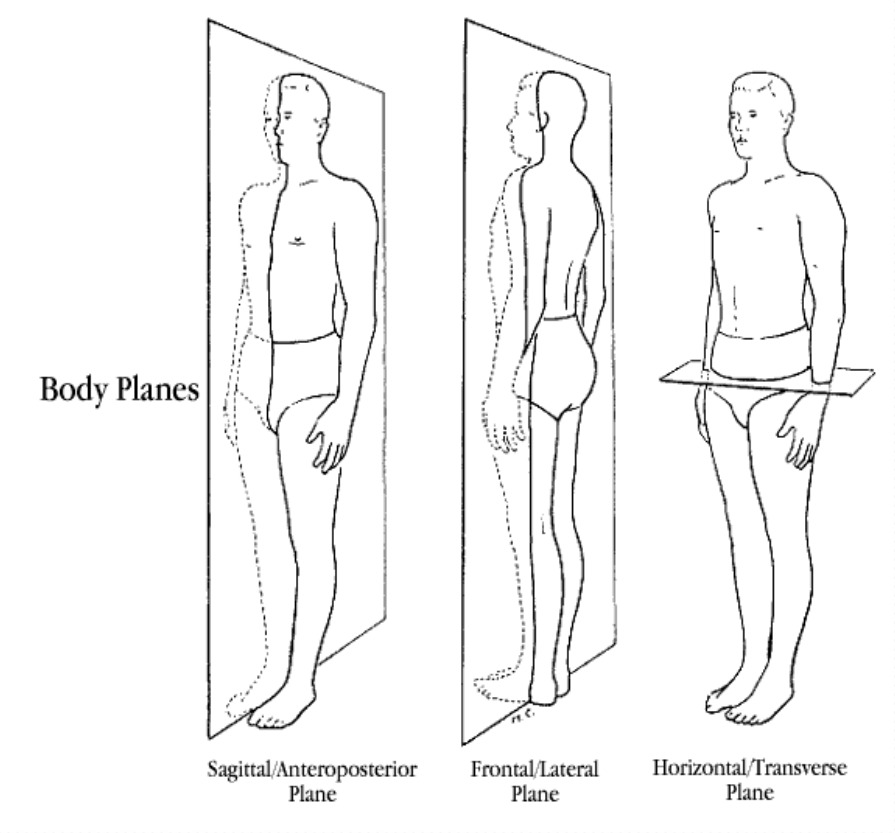
Reference Center(s): Left abdominals, Left heel, Right arch

Sequence #2

Following hierarchy of planes of activation and movement

Hierarchy of planes of activation and movement

- It is essential that the sequence of facilitation of muscle activity follows a fairly consistent pattern:
  - Sagittal
  - Frontal (Coronal)
  - Transverse

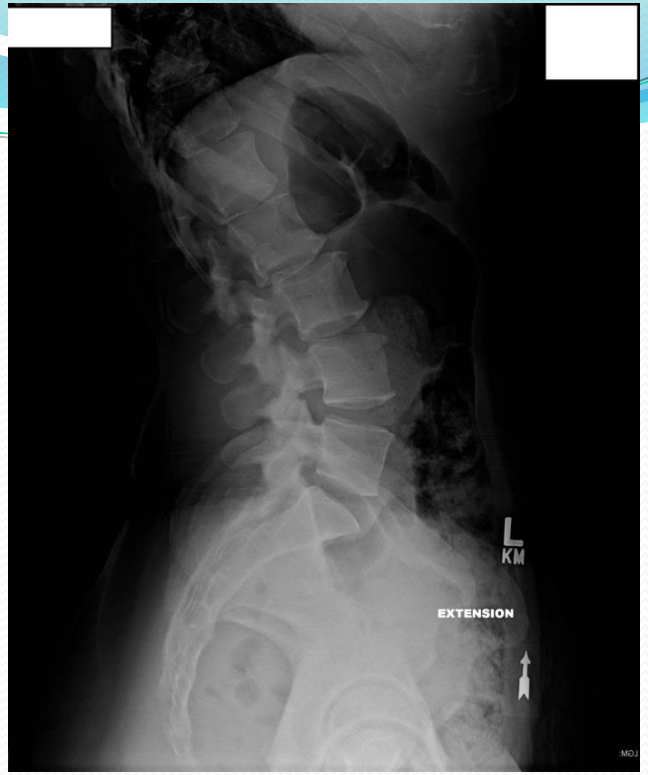


http://fog.ccsf.cc.ca.us/~tkobayas/physiokines/o8cSkel.shtml

Hierarchy of planes of activation and movement

- Sagittal (moment)
  - To help with (re)positioning the pelvis and thorax
  - To be able to get into a more balanced ratio of flexion to extension
- Frontal (moment)
  - To allow for optimal joint centration and abduction/adduction control
  - Retraining for stability and ability to transition
- Transverse (moment)
  - To allow for rotation through tri-planar movements building on the established base
  - Integrating in order to be reciprocal and alternating


L
KM


L
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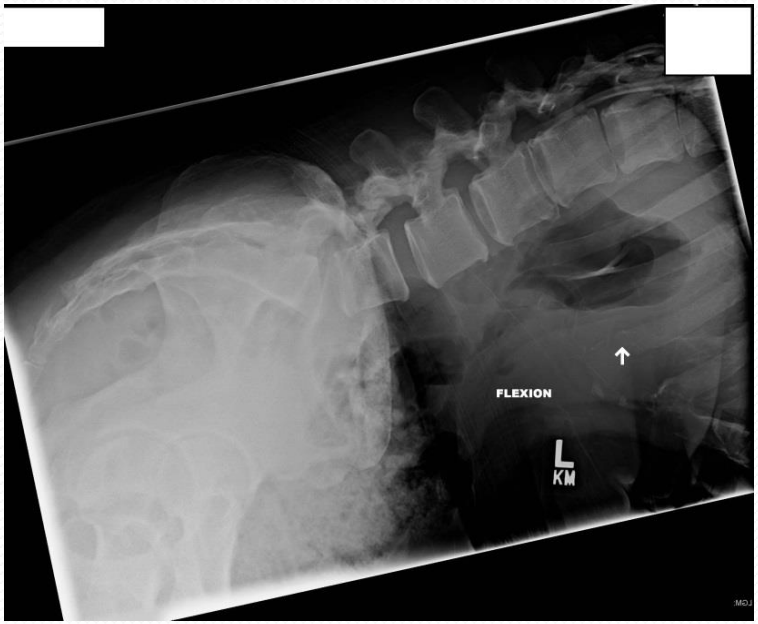
EXTENSION


FLEXION
L
KM

Hierarchy of planes of activation and movement

Movement patterns should also follow the sagittal/frontal/transverse plane sequence as well. This allows for the body and the brain to firmly establish control in safer ranges before moving on to more complex activities.

Sequence #3

Activation of specific musculature for optimizing movement

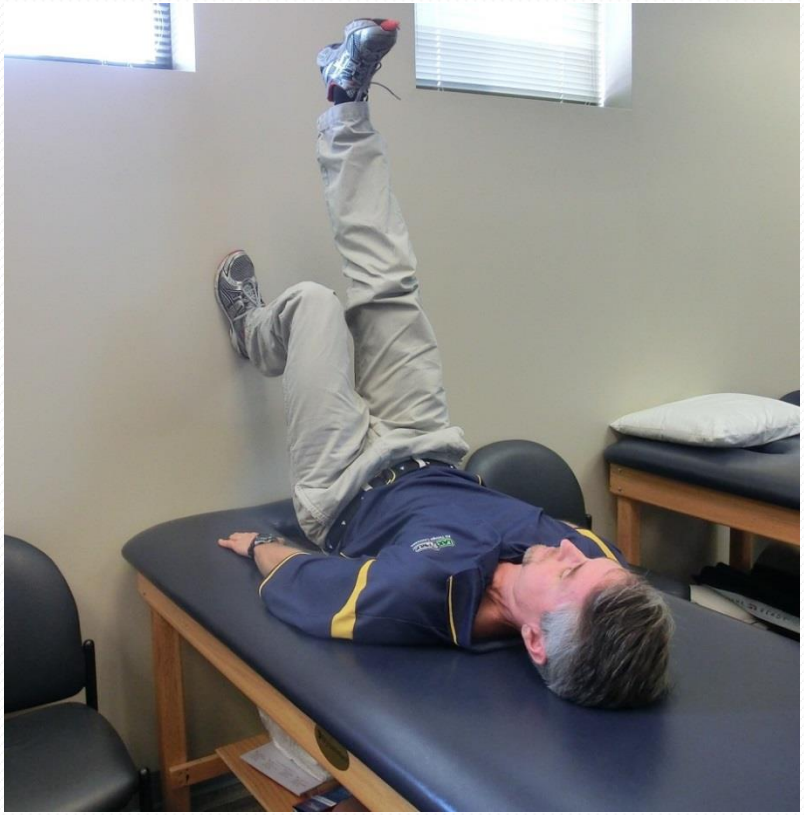
Activation of specific musculature for optimizing movement

Sagittal

LH biceps femoris

Sagittal

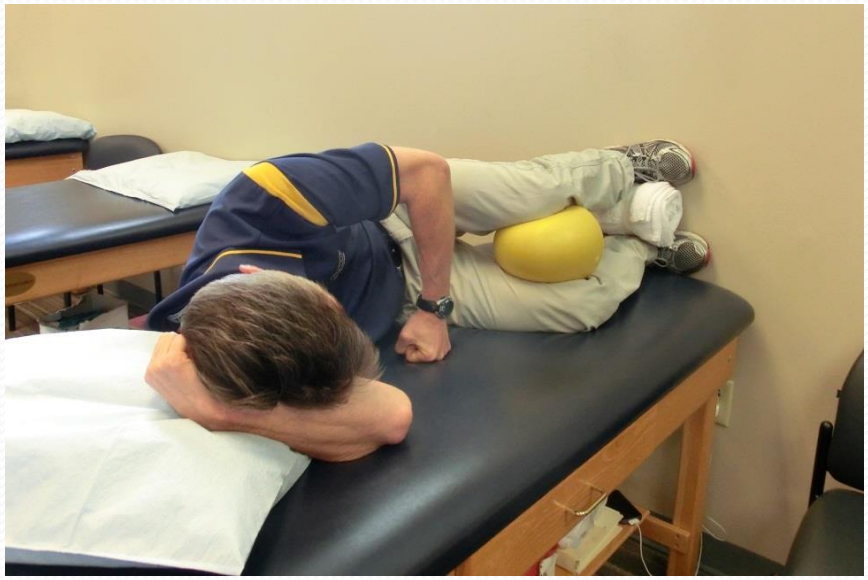
Left LH biceps femoris and Right psoas



Activation of specific musculature for optimizing movement

Frontal

Left adductors and GluteMed



Frontal

Left adductors, Left GMed and Left abdominals

Activation of specific musculature for optimizing movement

Frontal

Left stance, R adduction, start

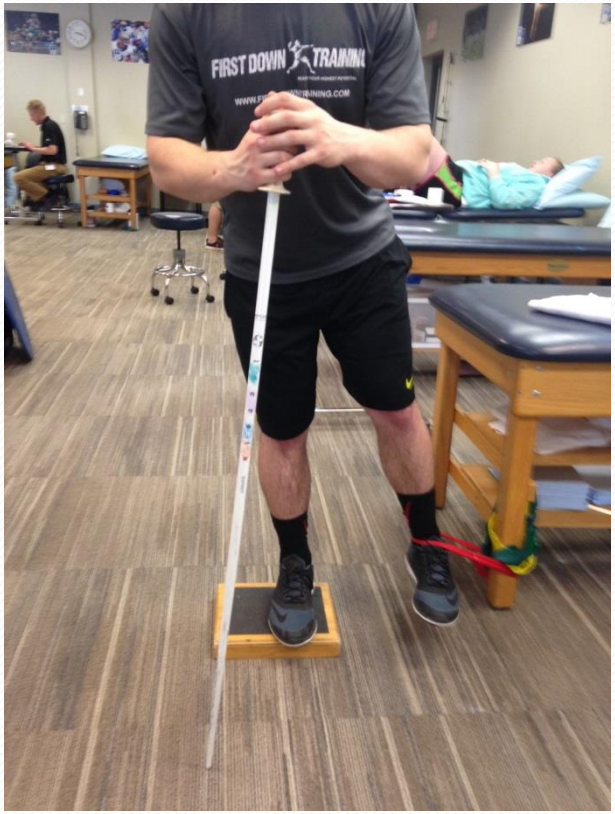
Frontal

Left stance, R Adduction finish

Activation of specific musculature for optimizing movement

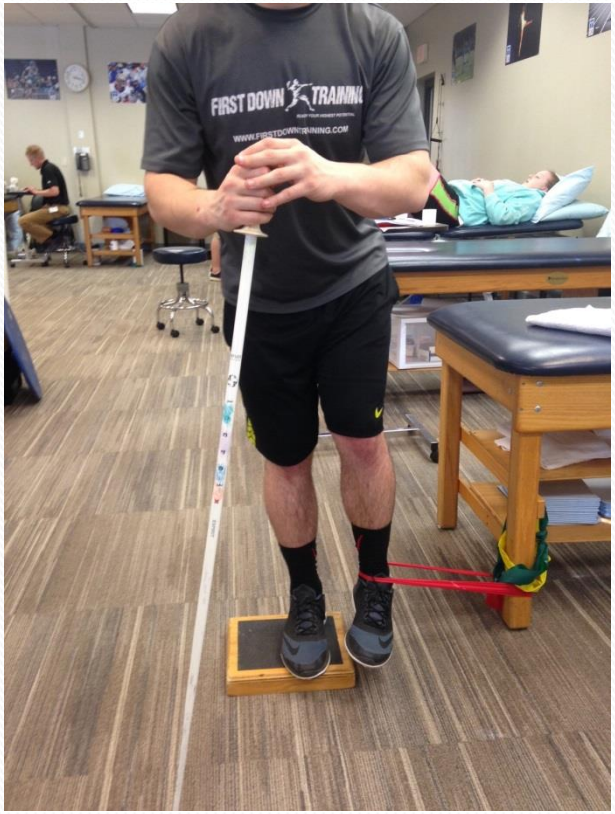
Frontal

Right stance, L adduction, start



Frontal

Right stance, L Adduction finish



Activation of specific musculature for optimizing movement

Transverse

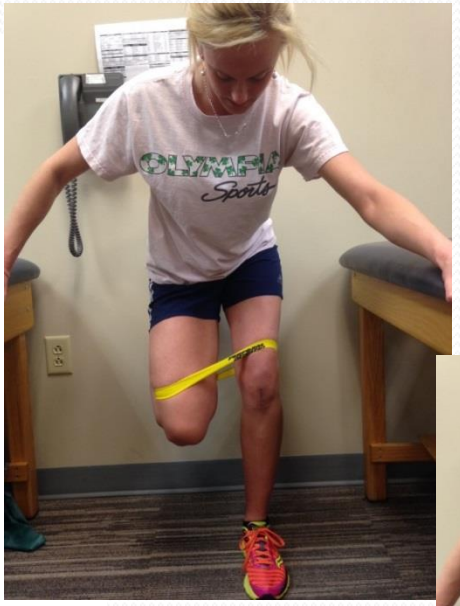
Left sidelying Right GMax

Left Sidelying Right Glute Max

1. Lie on your left side with your hips and knees bent at a 60-90-degree angle.
2. Place your ankles on top of a 3-5 inch bolster and place your feet firmly on a wall.
3. Place tubing around both thighs slightly above your knees.
4. Shift your right hip forward until you feel a slight stretch or pull in your left outside hip.
5. Keeping your toes on the wall, raise your right knee keeping it shifted forward. You should feel your right outside hip engage.
6. Hold this position while you take 4-5 deep breaths in through your nose and out through your mouth.
7. Relax and repeat 4 more times.

Transverse

Standing Left Squat with Right FA ER



Once you get ‘em upright, it’s important that the subtle compensations are addressed….especially with your athletes.

- What’s the difference between these two pictures?
  - Until the trunk rotation was addressed, she did not feel the exercise where she was supposed to.

Many people will be very deliberate in these movements and almost rigid in their efforts to try to find new positions. They have to "flow" into them. There has to be a little wriggle or shimmy....

The *"Mullin Mambo"*?

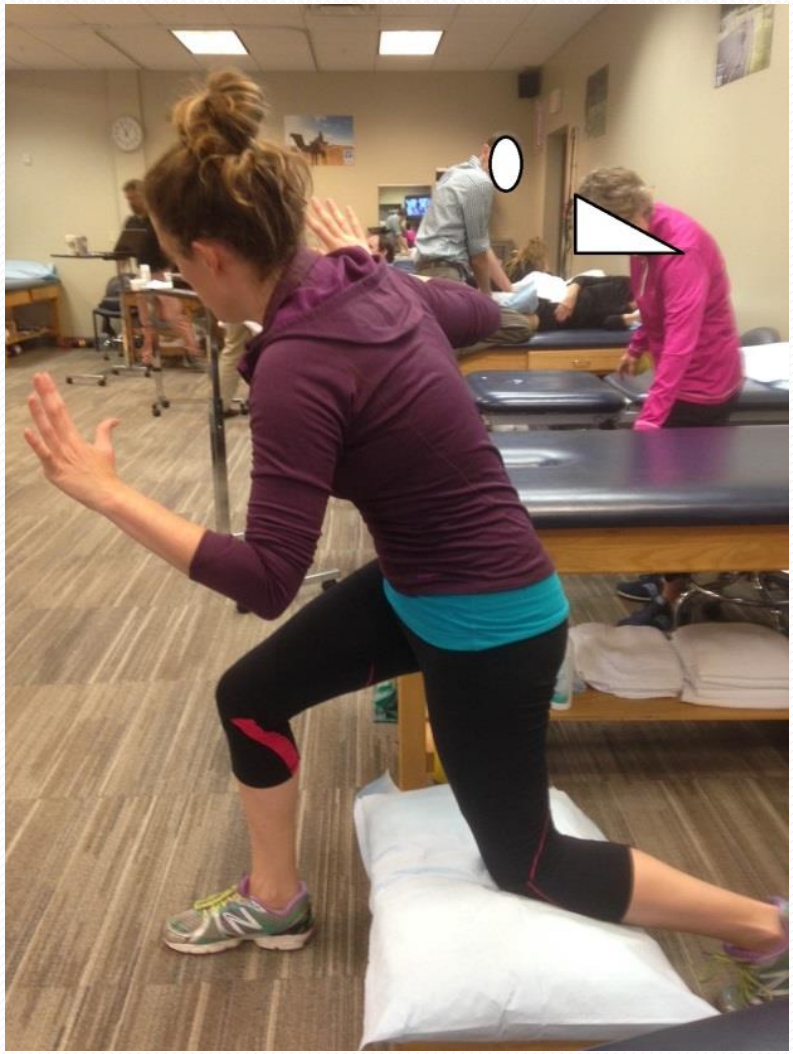
You pull your Left hip back

You bring your Left ribs down

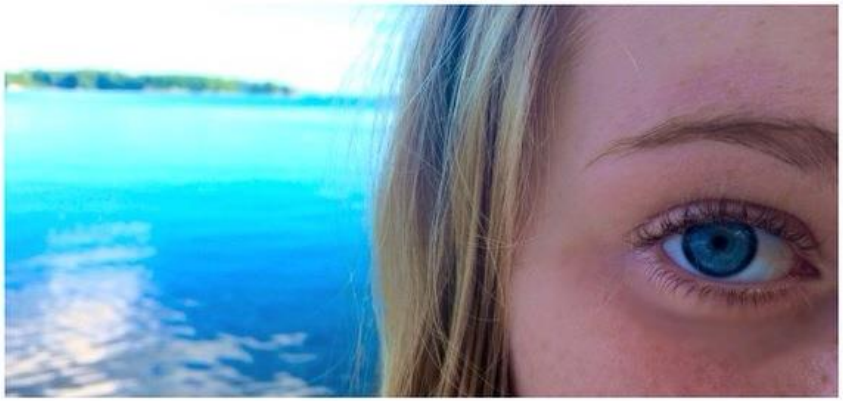
You bring your arms up and you shake it all around

You do the Mullin Mambo then you turn your crown around

That's what it's all about!



You have to keep an eye on them….



….even during warm-up

- They have to be able to find, feel and appreciate the muscles they are trying to access

*"**Where do you feel it?**"*

Sequence #4

Addressing the components that influence rotational capabilities and capacity

Rotational Influences

Inhibition

Neutrality

Centering

Grounding

Transitioning

Reciprocal and alternating

Rotational Influences

- Inhibition
  - Neurological reflex response to motor unit activity creating internal regulation to allow for optimal musculo-tendinous length:tension sequencing.
    - It is along a spectrum of amount, degree, which structures are affected (i.e. agonist vs antagonist), where in the range it occurs, time it takes to occur and the appropriate length of time before needing to re-engage.
  - An appropriate amount of inhibition is critical for allowing the body to be able to balance out lower and higher threshold activities.

Rotational Influences

- Neutrality
  - Neutrality is an effortless ***zone*** (state of transition) between cycles of human activity in which the least amount of tone, torque and resistance is present
    - Forward and back, side to side, tri-planar
  - Neutrality cannot be established unless adequate inhibition has occurred
  - The goal is to establish as much balance in the system as will allow the body to reduce the level of compensation which in turn affects joint position and function
  - Neutrality will allow for the following phases to take place, creating a level of activity which allows optimal movement to occur

*“T8 is our central point between T1-L5 and is considered the mid zone separating the upper core from the lower core. This creates four quadrants where asymmetry needs to be rolled out [identified] for core stability/axial organization. When there is symmetry - there is a neutral **zone** to move through and a homeostatic place to rest... if asymmetry is present there will be tone, torque, etc.... And it will can be further accentuated or exacerbated with symmetrical movement patterns.”*

- Julie Blandin, PT, ATC, CSCS, PRC

Rotational Influences

- With therapeutic treatment interventions, neutrality testing helps determine:
  - If treatment can be introduced safely
  - If adequate positional control is being maintained during treatment
  - If treatment interventions can be advanced
- With training programs, neutrality testing helps determine:
  - How strong a pattern the individual possesses
  - Ability to advance alternating activity from more unilateral
  - Readiness to be able to more safely introduce pulling activities


STAY NEUTRAL
CERVEZA
DOS EQUIS
MY FRIENDS
memegenerator.net

Rotational Influences

- Centering
  - The ability of the system to be able to achieve proper centering requires coordination of ascending and descending inputs, physical and sensory feedback and focal and peripheral awareness. This comes from our senses both directly and indirectly, through a balance of afferent and efferent signals, requiring balanced flow back and forth between cerebral and physical regions of the body through the integration of neuro-stabilization centers.

Rotational Influences

"Menacing Hulk"

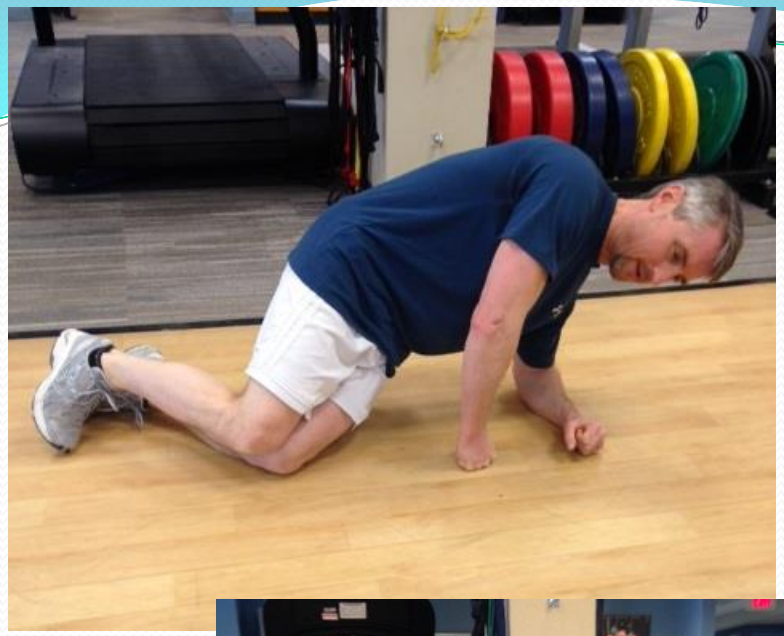
Rotational Influences

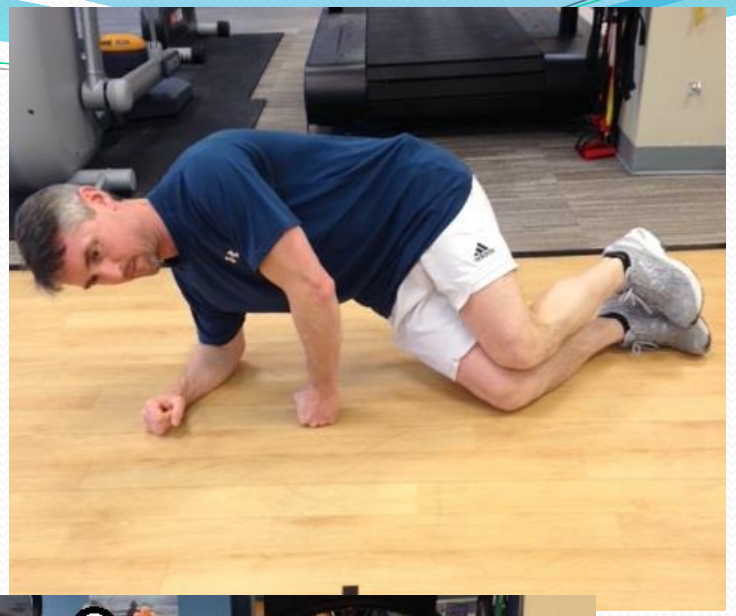
- Grounding
  - The body acts as a conductor between the brain and the ground, receiving efferent stimulus from multiple sources and creating a series of afferent responses aimed at trying to negotiate the current surface and surroundings. It essentially creates a closed-loop system which is neurally driven, which responds to changing inputs as perceived through a multitude of sources, mainly our senses and reference centers. By incorporating the use of more than one of our systems, which is mostly subconsciously driven and is directed based on past experiences, it allows us to effectively respond to the constantly changing inputs. Changing these neurally encoded responses requires conscious awareness before new, subconscious competency of the new pattern can be achieved.

Rotational Influences

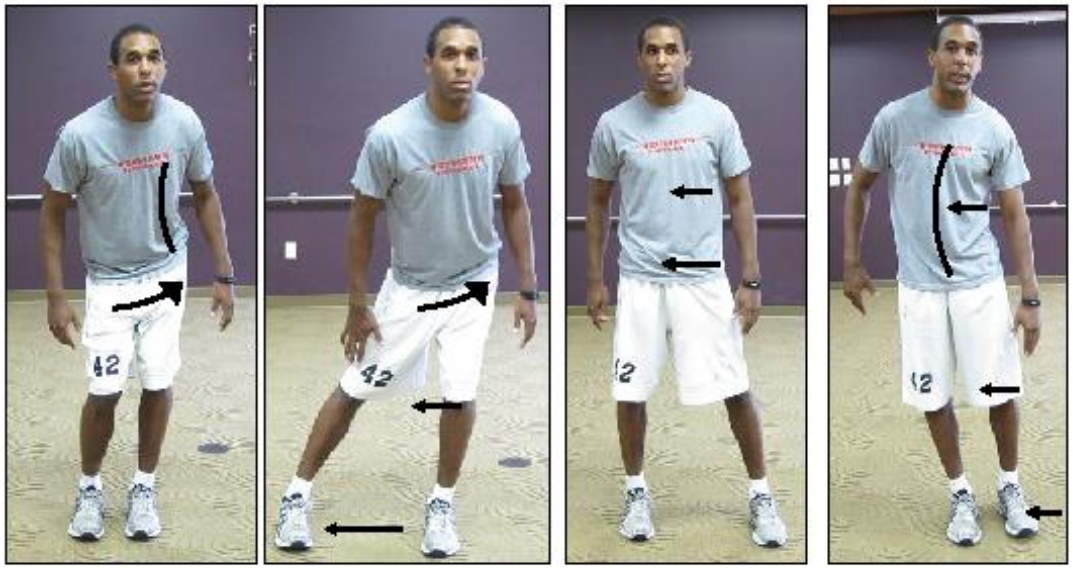
- Grounding
  - "FMS screens whether you are connected to your environment. A '1' on an FMS test means difficulty connecting to your environment."
    - ***Gray Cook, PT / Greg Rose, DC***
  - "Our ability to connect to interact with the ground is the foundation of movement efficiency."
    - ***Emily Splichal, DPM***

#PBFTS2015





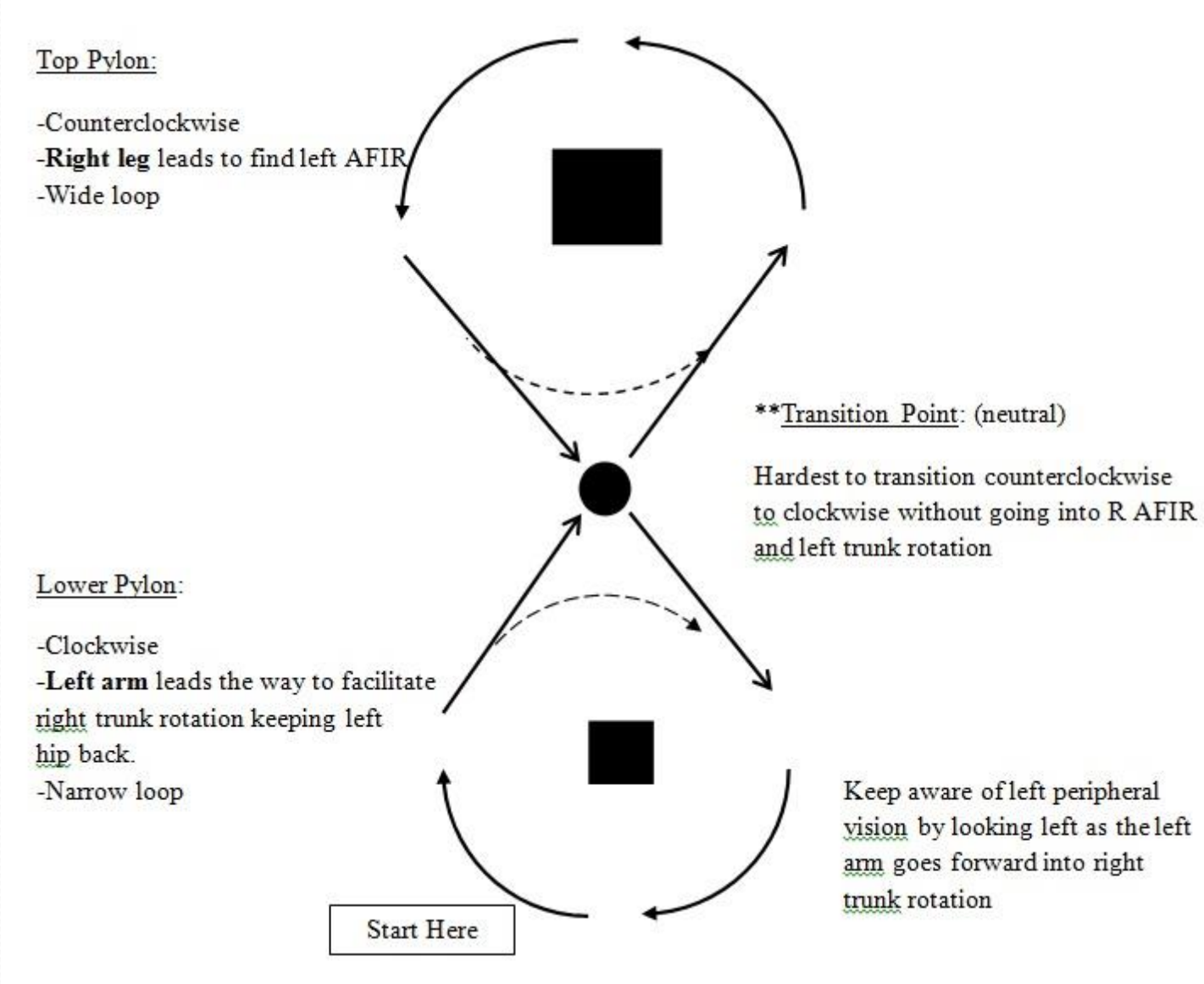
Right Lateral Walking



1. Shift your left hip back, slightly bend your left knee and sidebend your trunk to the left. You should feel your left outer hip (buttock) and left abdominals engage.
2. Maintain this position as you lift your right foot off the ground and move it out away from the midline of your body.
3. Place your right foot on the ground and pull your left knee in slightly. You should feel your left inner thigh engage.
4. Pause and breathe.
5. Shift your body weight onto your right leg, and maintain contact with your right shoe arch as you lift your left foot off of the ground. Slowly bring your left foot towards the midline of your body, keeping your trunk sidebent to the left.
6. Continue this lateral sequence until you have taken 10 steps.
7. Relax and repeat 2 more times.

Rotational Influences

- Transitioning
  - Transition requires the ability to alternate, which comes secondary to the ability to reciprocate. Alternation is dependent on the neurological capability to flow between the left and right sides of our body, even on the cerebral level.
- Transitioning also requires the ability to decelerate effectively using the proper sequencing.
  - Ex: Hamstrings, glutes and abdominals are key for sagittal plane deceleration.
- "Transformational zones": As part of Gray Institute's 3D MAPS (Movement Analysis and Performance Systems
    - ***Gary Gray*** (#PBFTS2015)



Rotational Influences

- Reciprocal and alternating
  - Reciprocal:
    - Flexion/extension/flexion
    - Adduction/abduction/adduction
    - IR/ER/IR
    - Distance/close/distance
  - Your arms are your most important appendages for reciprocity

Rotational Influences

- Reciprocal and alternating
  - Alternating:
    - One side to the other and back
    - Side-to-side
    - Periphery/focal/periphery
    - Flow
  - The legs are critical in their ability to push from one side to the other




Much like life, movement is a balance of moderation, modulation and modification

- Michael Mullin, ATC, PTA, PRC

Rotational Influences

"Faulty training only accentuates the muscular and neurological contributions to the habitual imbalance. Most often the faulty movement patterns are an exaggeration in one direction of a limitation in another direction."

-Shirley Sahrmann

Conclusion

Proper sequencing of muscle activity to allow for proper and optimal rotational patterns requires a good understanding of some of the underlying movement imbalances which will affect the ability to effectively design intervention strategies. Gaining an improved understanding of the intervention hierarchy will help to improve programming in both the rehabilitation and training environments.

Postural Restoration Institute

- www.posturalrestoration.com
- Courses, articles, links, contacts/find a practitioner
- Postural Restoration for Fitness & Movement
  - October 17-18, 2015 Endeavor Sports Performance
    - Philadelphia , PA Julie Blandin/James Anderson
  - October 24-25, 2015 Accelerate Sports Performance
    - San Francisco , CA Julie Blandin/James Anderson

Thank you!

Integrative Rehab Training

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