

Spinal Health & Core Training



FROM BROKEN TO BADASS & EVERYTHING IN BETWEEN: CORE TRAINING FOR THE FITNESS MASSES

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Who Am I?

- Personal trainer for past 10 years, specializing in injury rehabilitation (sub-specialization in spinal recovery), clinical exercise physiologist
- Published author, international speaker
- Cancer & exercise expert, worked with over 200 cancer patients in gym & clinical research trials
- Meathead who lifts heavy things

LIVESTRONG

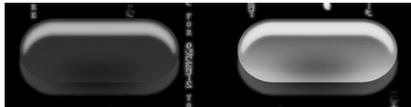


Who Are You??



Before we Begin...

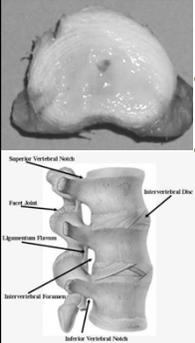
- Knowledge is power, but only if used
- Make it as simple as possible, but no simpler
- Movements train muscles, muscles don't train movements





Spine - Functional Anatomy

- Thoracic Spine Mobility:
 - Flexion/extension - 4-12° increasing T1→T12
 - Lateral flexion - 6-9° increasing T1→T12
 - Rotation - 2-9° decreasing T1→T12
 - Lumbar Spine Mobility
 - Flexion/extension - 13-14°, more flexion than extension
 - Lateral flexion - 3-8° lowest at L5-S1
 - Rotation - 2-5°, most at L5-S1
- *Low Back Disorders, 2nd edition. Dr. Stuart McGill, 2007*

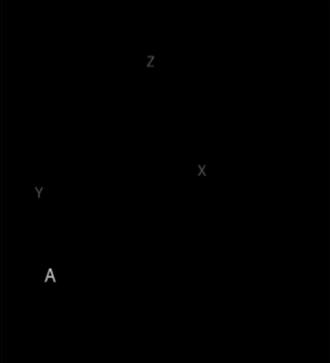


Spine - Functional Anatomy

- disc consists of 10-20 fibrous annulus rings around jelly-like nucleus centre
- Extremely high water content (80%), subject to dehydration, easily damaged when dehydrated
- Strong against compression, weak against shear, torque

COUPLED MOTION - ABILITY TO MOVE THROUGH MULTIPLE PLANES OF ACTION AT ONCE.

FLEXION MOMENT THAT ALSO CAUSES ROTATION & LATERAL FLEXION

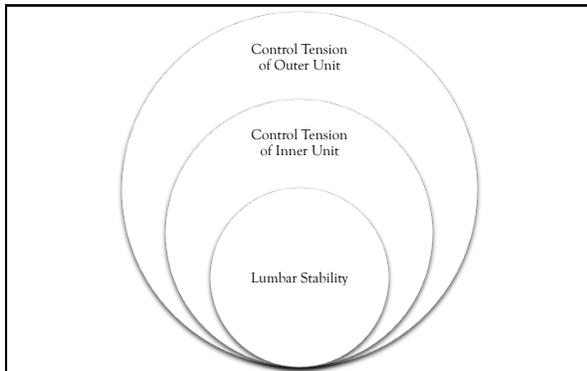


What is the Core??

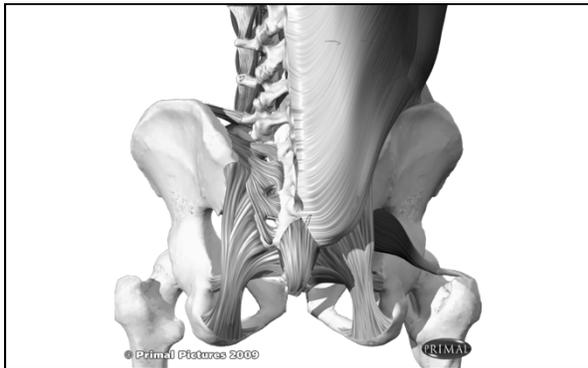
- Common belief of “inner core” & “outer core”
- Inner core - diaphragm, pelvic floor, TvA, multifidus
- Outer core - QL, ROE, ROI, rectus abdominis

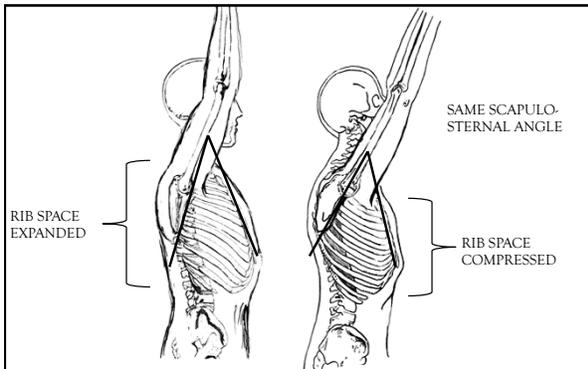
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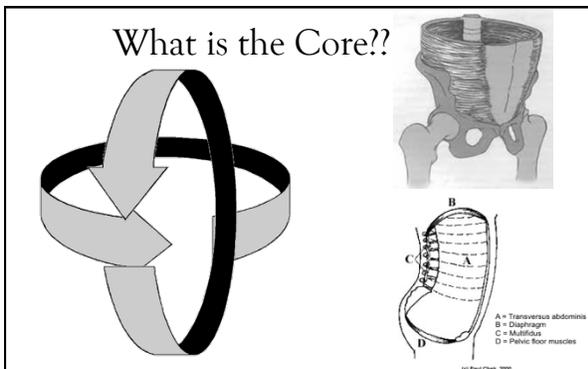
- Panjabi et al (1992), *Therapeutic Exercise for Spinal Segmental Stabilization in Low Back Pain*
- segmental spinal injury caused TvA to down-regulate, took other muscles that specifically controlled that segment
- Forgets to include latissimus dorsi, iliopsoas, transversari, spinalis, glutes, thoracolumbar & intraabdominal fascial sheaths.....



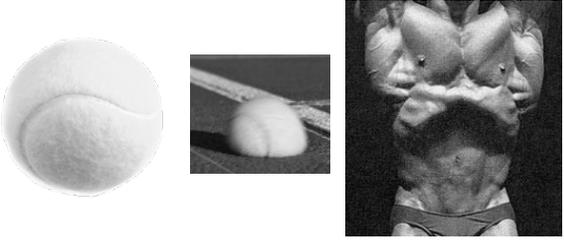








What is the Core??



The first image shows a cross-section of a human torso, highlighting the internal organs and the abdominal wall. The second image is a close-up of the abdominal wall, showing the layers of muscle and skin. The third image is a photograph of a muscular male torso, showing the external muscles of the abdomen.

What is the Core??

- Australian Method:
- Belief that TvA is major influencer of spinal stability
- Activated through a “drawing in,” can influence multifidus function & increase spinal stability



The two ultrasound images show a cross-section of the right side of the torso. The top image is labeled 'RIGHT RELAX' and shows the abdominal wall in a relaxed state. The bottom image is labeled 'RIGHT CONTRACT' and shows the abdominal wall in a contracted state, with the internal oblique muscle (IO) and transversus abdominis (TrA) muscles appearing more prominent.

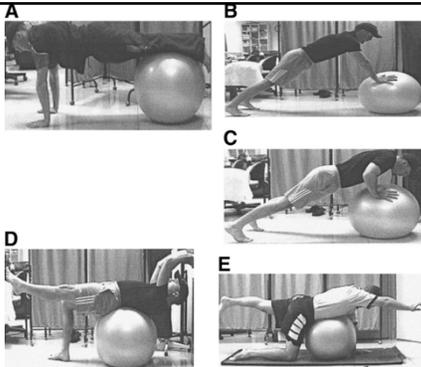
What is the Core??

- McGill Model
- Says that drawing in disrupts natural mechanics of core, and can lead to more instability.
- “Bracing” of the abdomen gives the best stability, increases compression & reduces shear forces

However...

- Spine MUST flex and extend....
- Moment of impact requires spine to instantly stiffen to buttress forces, limit shearing
- Normal gait REQUIRES ~8 degrees between flexion & extension per vertebrae, or you look robotic & waste energy

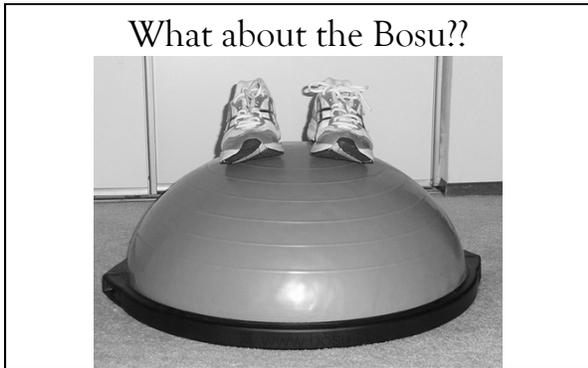
Do Stability Balls Do Anything??

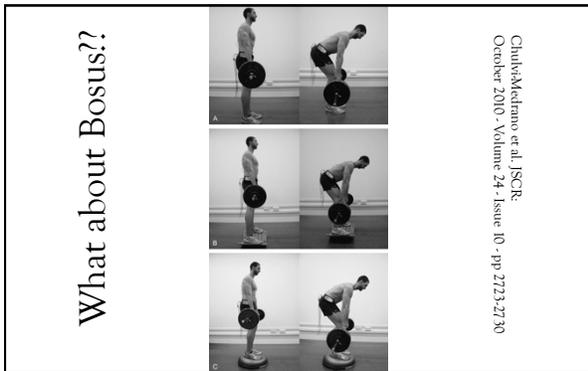


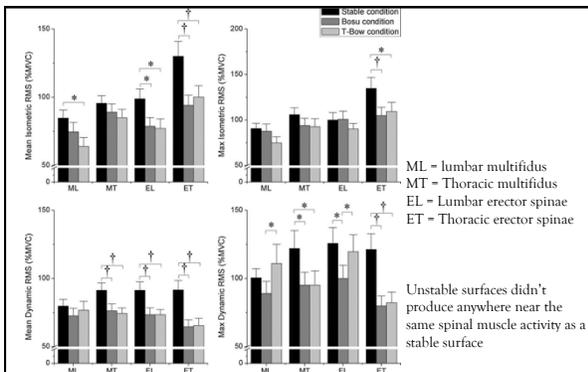
Marshall, Archives of Physical Medicine and Rehabilitation
Volume 86, Issue 2, Pages 242-249, 2005

Do Stability Balls Do Anything?

- Found a greater level of muscle activation in rectus by using unstable surfaces (GREAT!!)
- These also altered the relationships between different muscle activation patterns between the exercises compared to stable surfaces (BOOO!!!)
- Lots of clinical research has shown less activation of RA compared to increased activation of obliques and transverse is necessary for LBP patients (HUH????) *Aust J Physiother* . 1993;39:187-193







What About the Bosu??

- Standing on an unstable surface is more challenging than on a stable surface, isn't related to muscular activity
- Muscle activation on unstable surfaces < stable surfaces or altered enough to produce new firing sequences



Conclusion...

Diesels don't ride on skinny tires

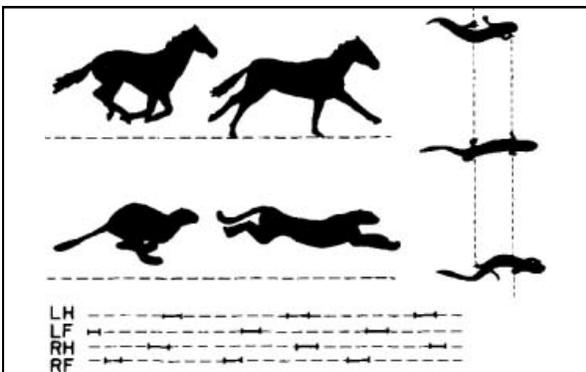


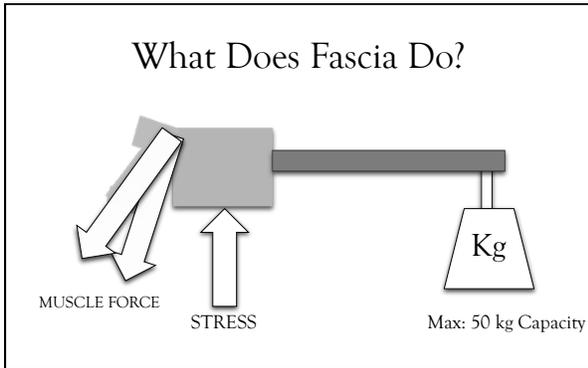
Lift heavy from the floor

You look way cooler

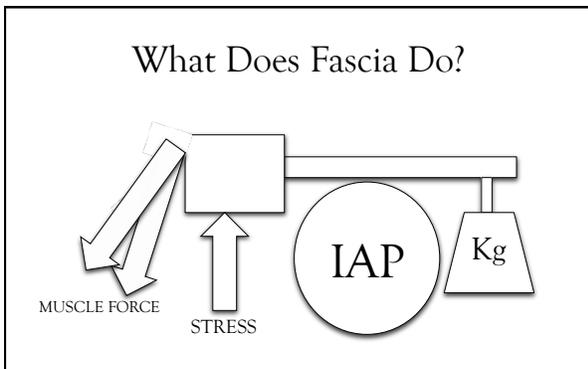








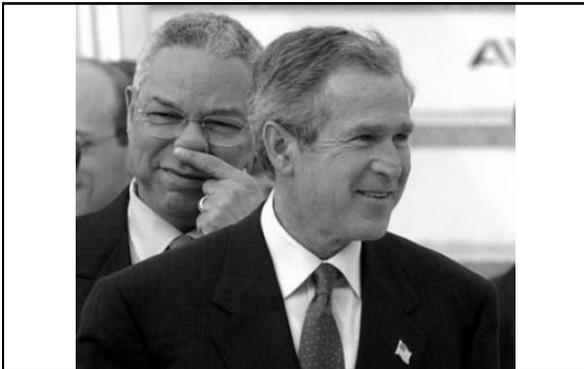
- ### What Does Fascia Do?
- We know humans can lift more than 50kg
 - Old mathematical model left constructs of muscles exerting “negative force,” or muscles pushing
 - Created concept of intra-abdominal pressure pushing up on diaphragm, reducing the load



What Does Fascia Do??



- Biomechanical model left undesirable side effect of clients exploding under heavy loads
- How embarrassing.....



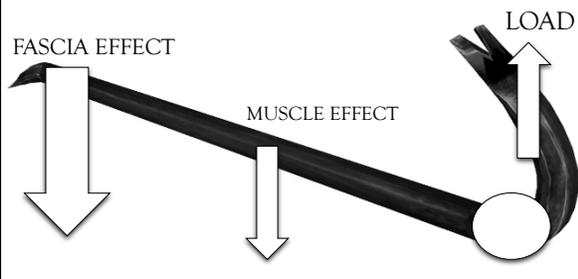
What Does Fascia Do??

- Provides additional forces to assist musculature, contractile elements, and “negative force” requirements
- Common surgeries disrupt fascia → decreased lumbodorsal fascial integrity → decreased lumbar stability → explosions

What Does Fascia Do?

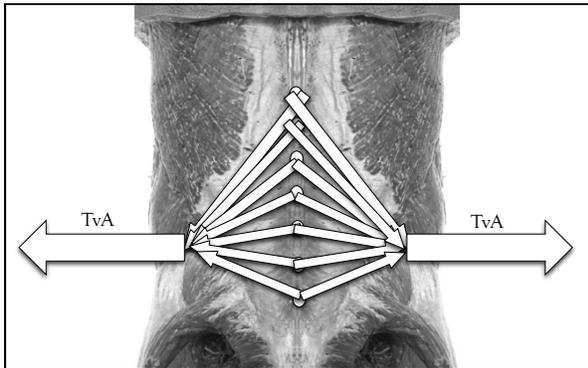
- Fascia wraps diagonally, provides cross-links, additional buttressing systems, and sensory integration to help create tension
- Fascia is farther from axis of rotation and creates greater leverage than the muscles near the joint

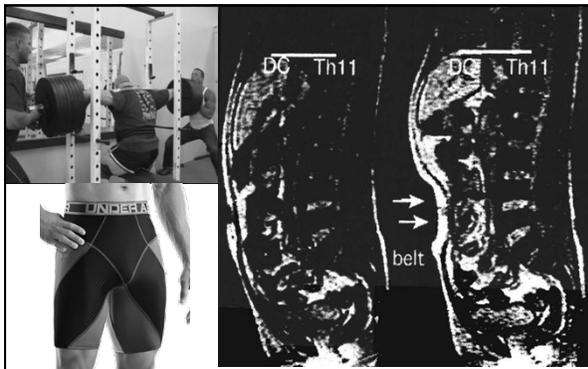
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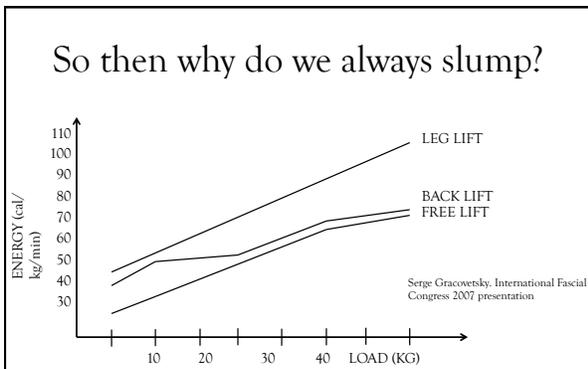


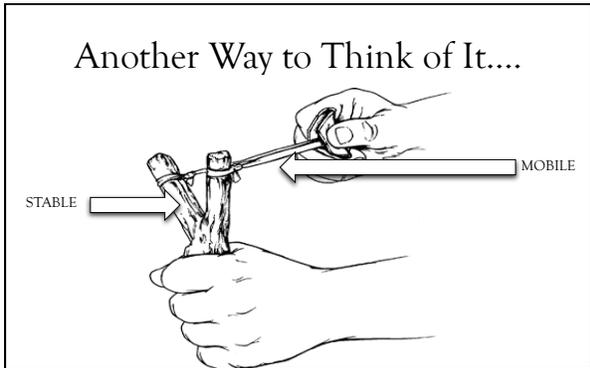
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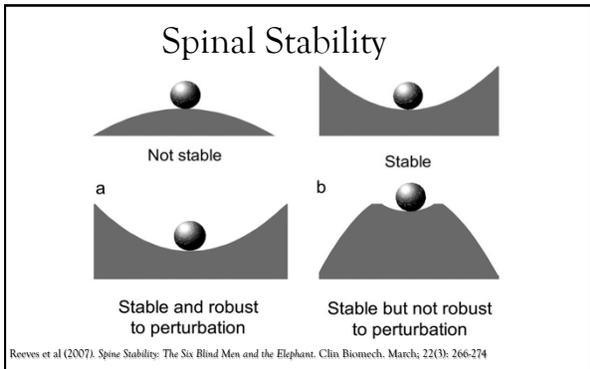
- Low back pain increases muscle activity of spinal erectors, decreases activity of lumbodorsal fascia
- Fascial damage may be result/cause of LBP
- IAP causes fascial contraction, which pulls diagonally and brings transverse processes together, helping in extension



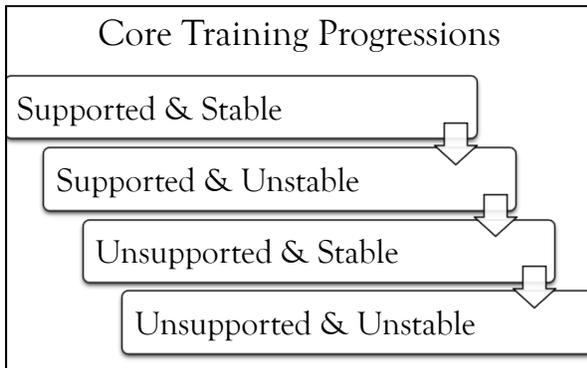








- ### Dean's School of Core Training
- NEUTRAL, BRACE, BREATHE
 - Train stability, anti flexion/extension and anti-rotation
 - Train pelvic mobility with stable stiff spine
 - Train rotation by teaching hip and shoulder rotation instead of localized spinal rotation
 - Train T-spine mobility, specifically extension, and scapular depression & retraction
 - 6-packs are dietary, strong cores are trained



Core Training ALGORYTHM

$$\text{CORE INFLUENCE} = \frac{F \times L^2 + P}{B \times D}$$

F - FORCE
 L - LEVER ARM LENGTH
 P - PERTURBATION, FREQUENCY OF APPLICATION
 B - BASE OF SUPPORT
 D - DIRECTION OF FORCE APPLICATION

EXAMPLE...

Dead Bugs	Force	Lever	Perturbations	Base of Support	Direction
Supported & Stable					
Supported & Unstable					
Unsupported & Stable					
Unsupported & Unstable					



Back Pain Pointers

- Figure out offending movements, avoid them
- GET OFF YOUR BUTT!!
- Train the glutes
- Train the glutes
- Work on vertical pulling, core stability, T-spine mobility, neutral spine, dynamic stability
- Breathing mechanics!!!

Thanks!!!!



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