


Spinal Health & Core Training




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

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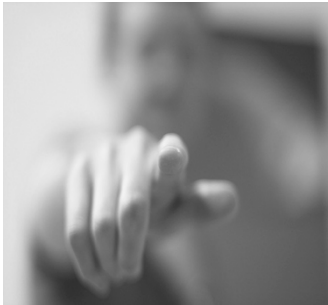
Who Am I?

- 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

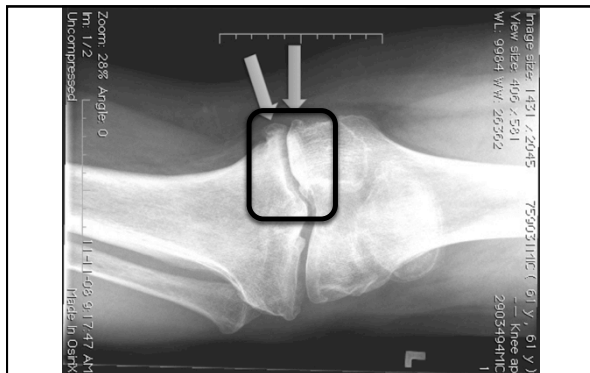


Who Are You??



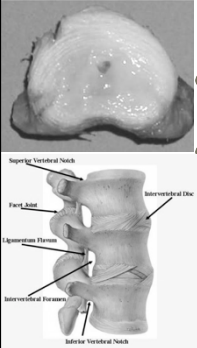
Before we Begin...

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

[illegible][illegible]

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*

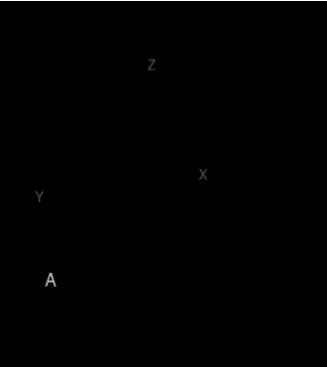


Spine – Functional Anatomy

- 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

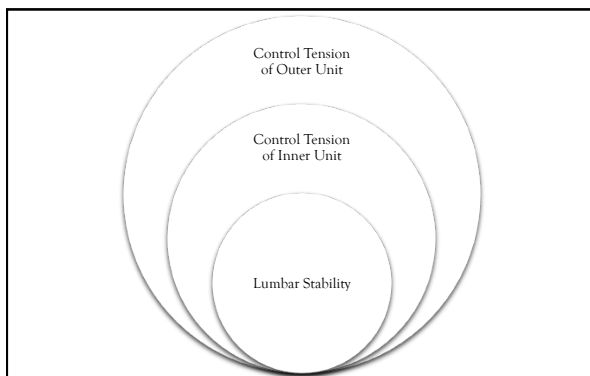


What is the Core??

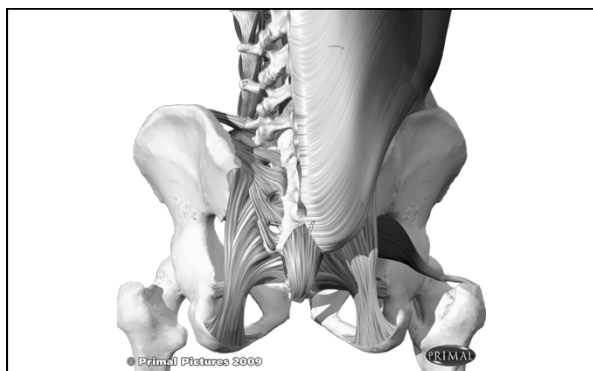
- Common belief of “inner core” & “outer core”
- Inner core – diaphragm, pelvic floor, TvA, multifidus
- Outer core – QL, ROE, ROI, rectus abdominis

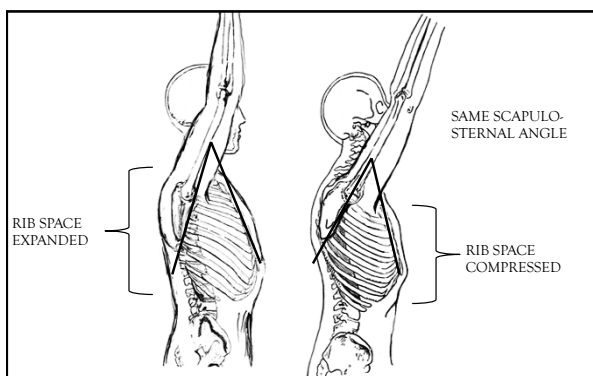
What is the Core??

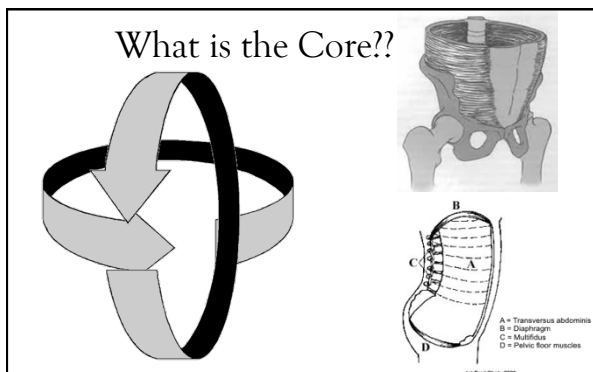
- Panjabi et al (1992), *Therapeutic Exercise for Spinal Segmental Stabilization in Low Back Pain*
- segmental spinal injury caused TvA to down-regulate, took other muscles that specifically controlled that segment
- Forgets to include latissimus dorsi, iliopsoas, transversari, spinalis, glutes, thoracolumbar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



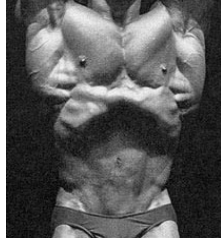








What is the Core??



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



What is the Core??

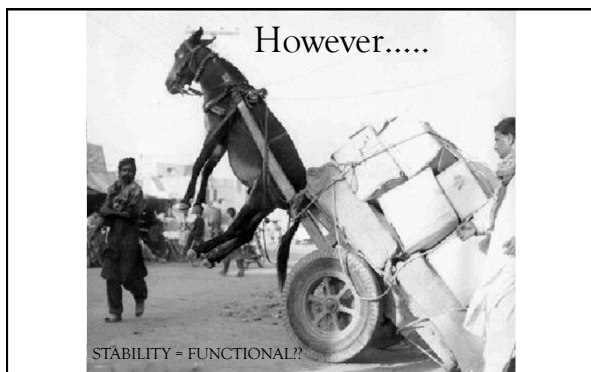
- McGill Model
- Says that drawing in disrupts natural mechanics of core, and can lead to more instability.
- “Bracing” of the abdomen gives the best stability, increases compression & reduces shear forces



Event	Muscle																	
	RHSC	REO	LEO	RO	LIO	RLM	LLM	REO	LEO	RLM	LLM	REO	LEO	RLM	LLM	REO	LEO	RLM
PW	Mean	15.3	20.0	50.6	90.3	110.8	80.3	151.7	100.0	31.4	77.7	143.5	105.8	108.4	114.1	54.0	77.7	
	SD	3.8	12.9	17.4	30.9	33.0	26.3	38.7	35.4	34.7	29.7	36.7	31.1	35.9	20.3	13.7	35.9	
RHSC	Mean	8.6	21.2	29.0	61.5	82.6	47.9	91.4	68.9	32.1	22.1	44.1	77.4	57.3	90.9	48.3	56.5	
	SD	1.8	14.9	17.9	31.9	26.8	45.3	39.1	23.2	17.3	4.4	9.1	21.3	23.6	31.2	8.8	11.4	
LHSC	Mean	14.8	6.3	65.1	12.8	51.8	31.5	65.3	87.4	24.9	47.1	96.9	31.8	64.1	78.2	31.2	41.1	
	SD	4.5	2.3	24.4	5.3	41.5	4.6	6.2	50.7	17.6	6.2	20.4	10.1	38.7	38.5	7.5	9.2	
YW	Mean	22.3	32.5	58.9	47.2	128.3	52.6	45.5	51.6	65.6	69.3	107.4	78.2	108.1	113.0	61.7	106.9	
	SD	18.1	22.2	29.1	31.7	41.7	48.8	31.7	28.1	14.6	17.2	31.5	10.2	39.2	35.1	6.3	23.3	
LL	Mean	27.3	23.1	61.5	49.6	98.1	81.3	145.2	170.1	129.0	135.1	161.7	93.0	156.1	157.6	73.2	100.1	
	SD	27.8	12.4	18.1	27.8	14.0	30.6	100.8	100.2	37.6	37.6	92.5	37.6	103.3	141.1	26.4	69.7	
TF	Mean	87.8	69.3	106.6	80.5	141.5	97.6	227.2	237.8	118.1	100.3	236.2	157.7	179.8	200.4	90.7	154.5	
	SD	89.9	70.6	49.4	12.2	54.6	34.1	145.4	84.1	47.2	21.1	72.2	31.0	75.6	61.5	7.2	86.2	
KWLS	Mean	30.5	45.8	73.8	87.0	105.4	85.3	137.1	108.1	102.3	72.2	114.3	84.8	87.5	64.5	70.0	53.4	
	SD	14.8	42.8	62.2	46.0	14.3	36.9	35.4	17.4	87.3	38.8	26.5	16.3	31.9	7.0	25.8	29.4	
KWRS	Mean	19.9	23.2	64.9	39.7	98.4	79.1	48.4	102.2	91.4	75.3	138.7	92.8	131.7	89.7	75.2	72.0	
	SD	1.7	6.4	21.4	17.7	11.9	20.2	20.1	18.1	29.5	48.8	29.2	38.9	0.3	24.5	22.5	40.8	
SL	Mean	77.6	76.0	97.6	103.6	102.0	117.5	109.3	148.8	131.8	154.1	226.0	137.3	288.6	259.1	85.4	176.8	
	SD	41.6	24.7	67.7	2.9	63.0	67.3	37.5	68.8	77.1	36.4	91.0	30.9	131.6	154.9	7.8	52.1	

PW=tennis ball, RHSC=right hand suitcase carry, LHC=left hand suitcase carry, YW=super yoke walk, LL=log lift, TF=ten flag, KWLS=kag walk-left shoulder, KWRS=kag walk-right shoulder, SL=Atlas stone lift, REO=right neck abductor, LEO=left neck abductor, REO=right external oblique, LEO=left external oblique, REO=right internal oblique, LEO=left internal oblique, RLE=right latissimus dorsi, LLE=left latissimus dorsi, RLES=right upper thoracic erector spinae, LLES=left upper thoracic erector spinae, RLES=right lumbar erector spinae, LLES=left lumbar erector spinae, RGMED=right gluteus medius, RGMAX=right gluteus maximus, RBF=right biceps femoris, RRF=right rectus femoris.

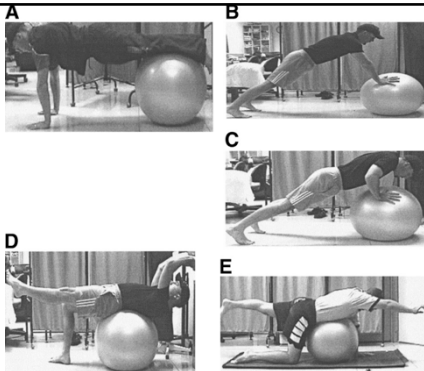
McGill et al (2009). Trunk Muscle Activation and Lumbar Spine Motion, Load and Stiffness. / Strength Cond Res 23(4): 1148-1161



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

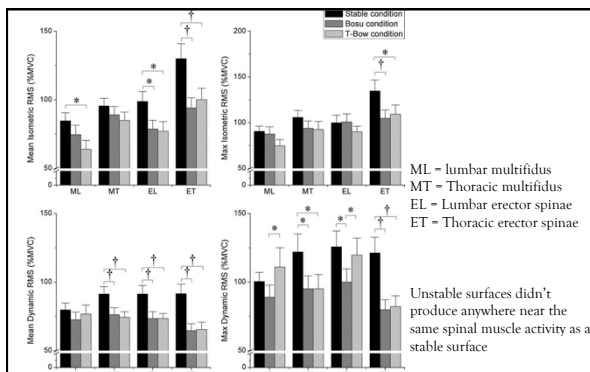
What about the Bosu??



What about Bosus??



ChulistaMedrano et al. JSCR
October 2010 - Volume 24 - Issue 10 - pp 2723-2730



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

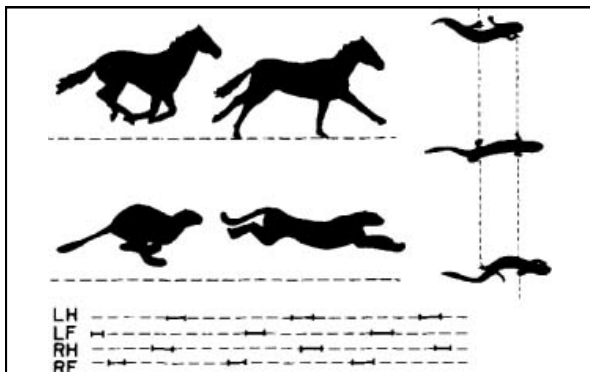


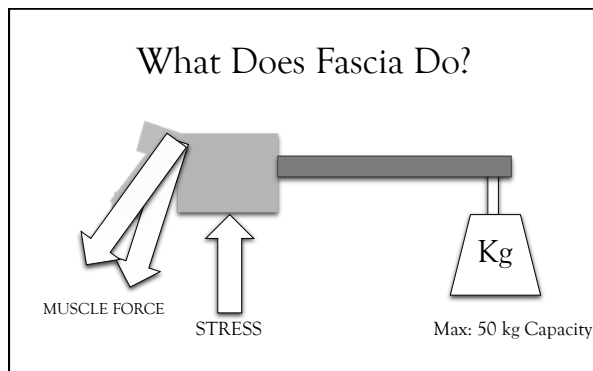
Lift heavy from the floor

You look way cooler

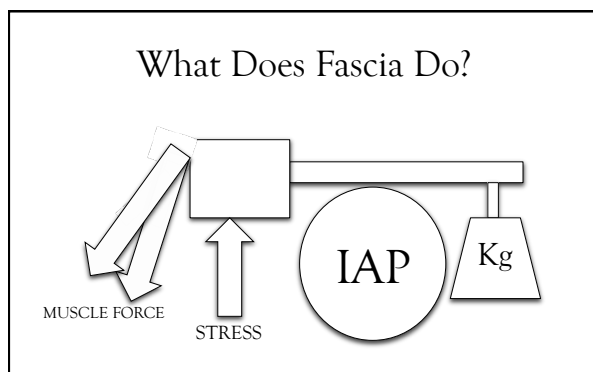








- ### What Does Fascia Do?
- We know humans can lift more than 50kg
 - Old mathematical model left constructs of muscles exerting “negative force,” or muscles pushing
 - Created concept of intra-abdominal pressure pushing up on diaphragm, reducing the load



What Does Fascia Do??



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



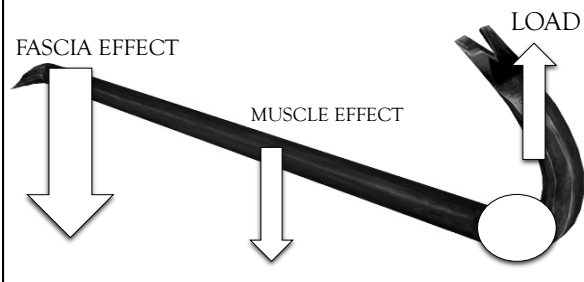
What Does Fascia Do??

- 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?

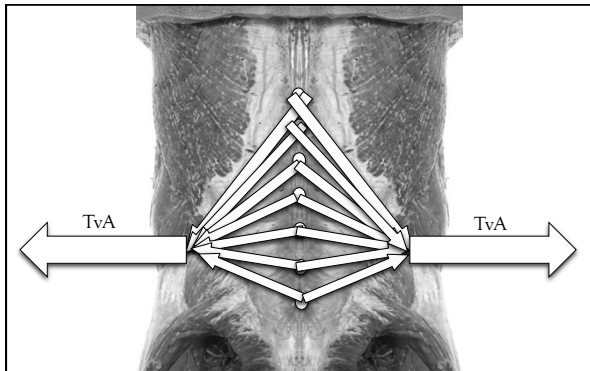
- Fascia wraps diagonally, provides cross-links, additional buttressing systems, and sensory integration to help create tension
- Fascia is farther from axis of rotation and creates greater leverage than the muscles near the joint

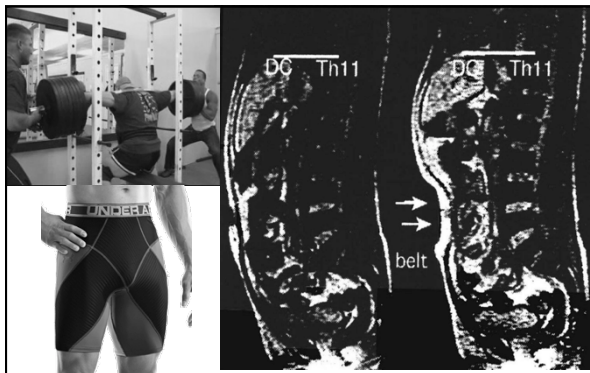
What Does Fascia Do??

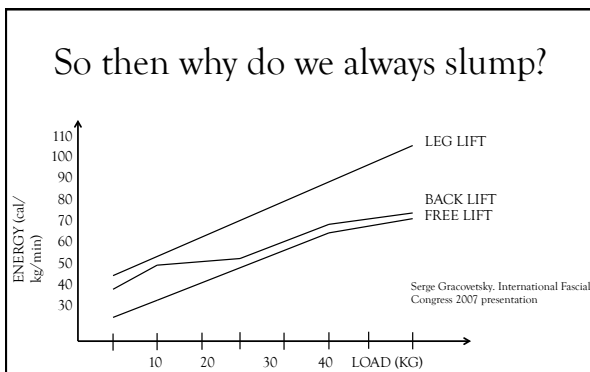


What Does Fascia Do??

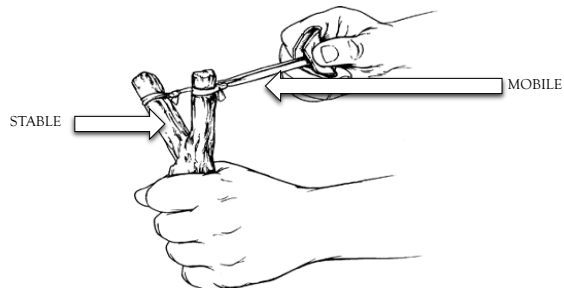
- Low back pain increases muscle activity of spinal erectors, decreases activity of lumbodorsal fascia
- Fascial damage may be result/cause of LBP
- IAP causes fascial contraction, which pulls diagonally and brings transverse processes together, helping in extension



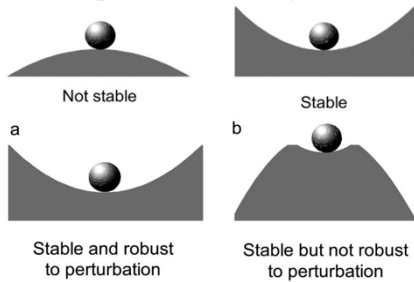




Another Way to Think of It....



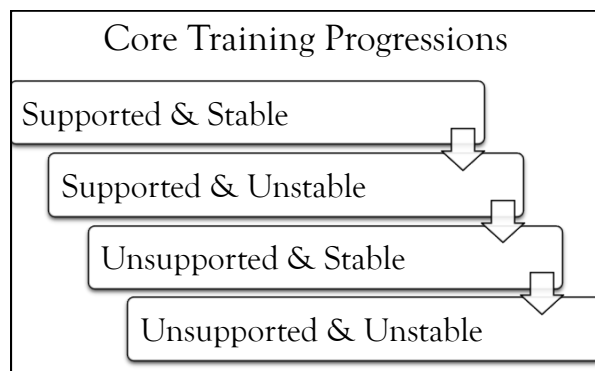
Spinal Stability



Reeves et al (2007). Spine Stability: The Six Blind Men and the Elephant. Clin Biomech. March; 22(3): 266-274

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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Old School Strength with a New-Age Twist



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