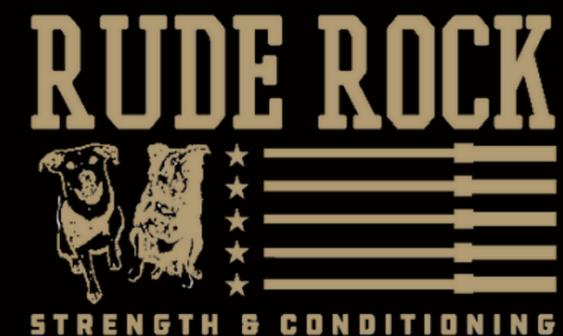


# THE X'S & O'S FROM THE HIPS TO THE TOES

*A Tangible Blueprint for  
Optimizing Lower-Body Training*



**Danny Foley- MS, CSCS,D\*, TSAC-F,D\***



# MY PERSPECTIVE

**The foot is the origin of movement**

Our primary and constant interface with the environment around us. From proprioceptive to mechanical responsibilities, the foot is unquestionably a primary driver of movement.

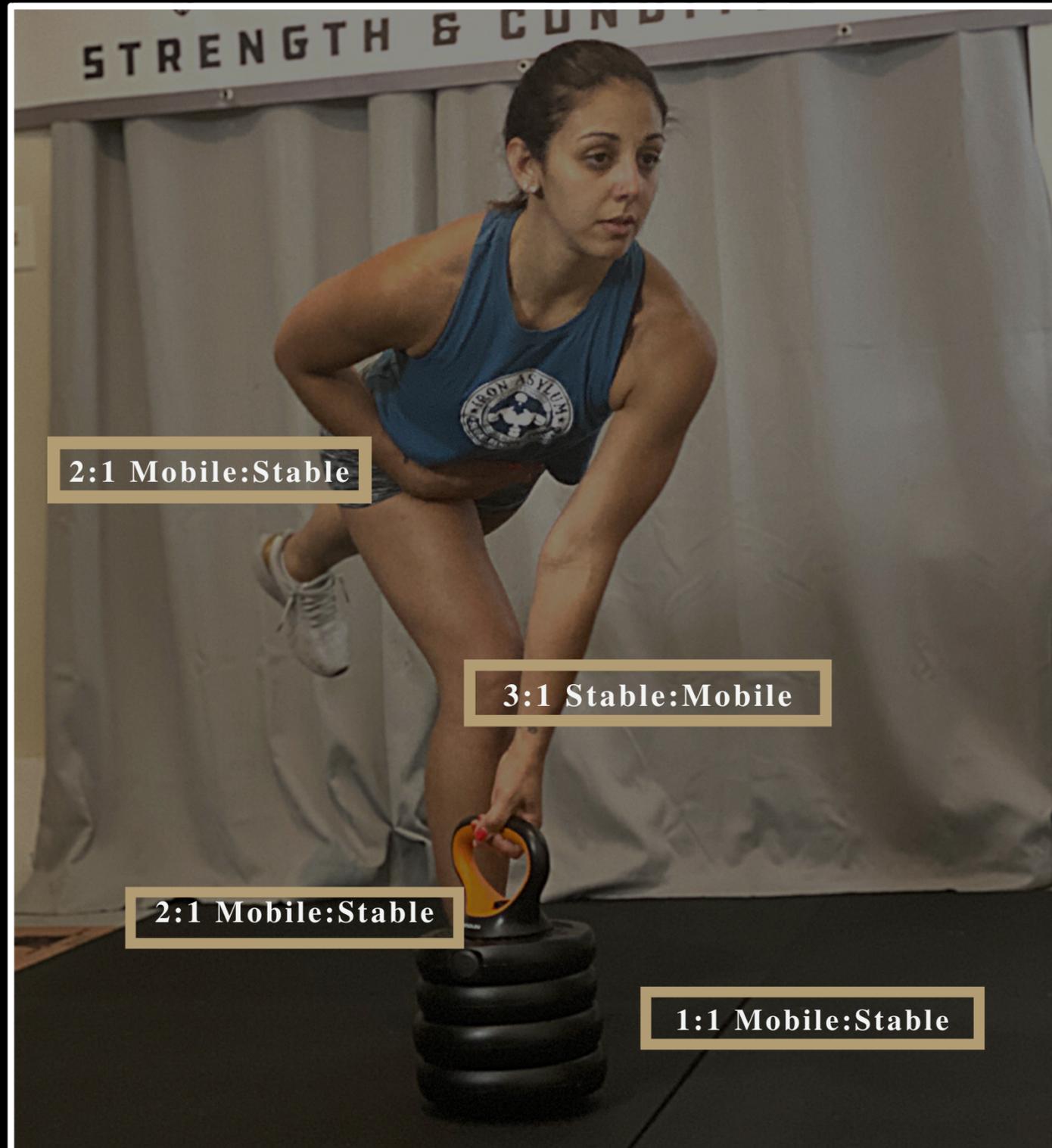
**The hip is the epicenter of movement**

Both to due to proximity & structure, the hips are the major force transfer junction of the body. Irrespective of sport or endeavor, strong, yet mobile hips are quintessential to performance.

**The knee is the barometer of force tolerance**

Due to its uniplanar structure the knee is much less a driver and more a passenger to movement. As the above and below joints begin to lose stability or mobility, the knees suffer. As such, I see them as the barometer of the lower extremity.

# RELATIONSHIPS



- Hip mobility & foot stability
- Knee stability & foot compliance
- Foot stability & ankle mobility
- Hip stability & knee mobility

.....◇ Force production

.....◇ Force acceptance

.....◇ Force dispersion

.....◇ Force tolerance

# CUEING & OBSERVATIONS

## Foot (static)

## Foot (dynamic)

## Knee

## Hip

### *"Melt"*

Eccentric splay  
IFM dominant

### *"Push"*

Force production  
Hip/toe extension

### *"Soft (SL)"*

Optimal ham length  
Glute focus

### *"Shit on wall"*

Hinge mechanics  
Optimal ham length

### *"Stab"*

Mechanical stiffness  
Plantar dominant

### *"Lift (the arch)"*

Supination bias  
Foot/ankle stab

### *"Attack angle"*

Forward drive  
Closed-Chain DF

### *"Coil"*

Split/SL tension  
Drives hip IR

### *"Grab"*

Active toe flexion  
EFM dominant

### *"Pull (foot)"*

Ground prep.  
Open Chain DF

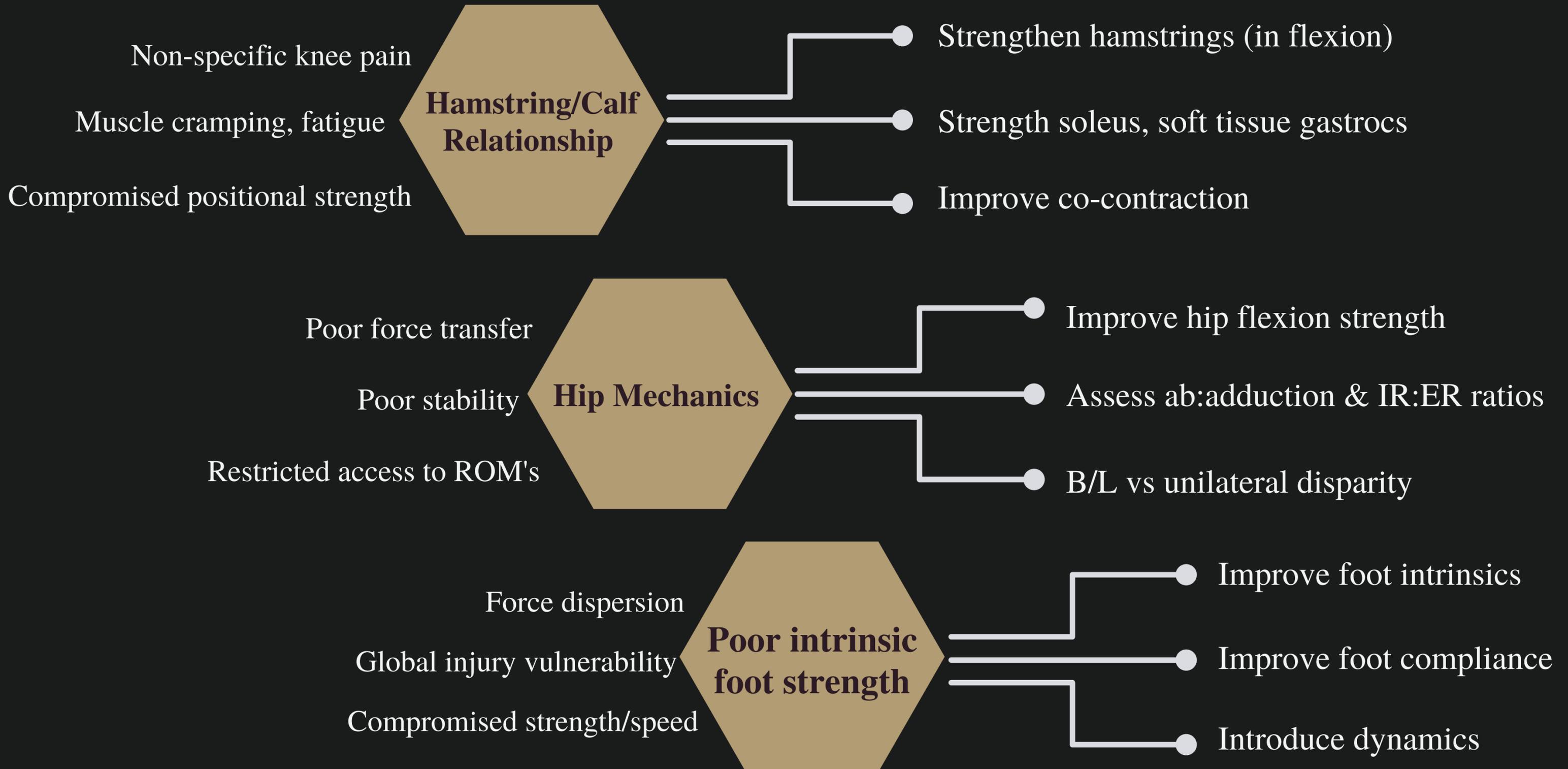
### *"It depends"*

~Knee position on  
bilateral squat~

### *"Stack"*

Neutral pelvis  
B/L or SL variations

# COMMON LOWER BODY DEFICITS



# LOWER BODY TRAINING PRINCIPLES

## FEET & ANKLES

- *Compliance or stiffness limitation?*
- Proprioception & dexterity
- Center of pressure (COP)
  - Positional/loaded/dynamic
- Plantar/dorsiflexion (ratio)
- Achilles/calf complex

## HIPS

- *Mobility or stability deficiency?*
- Internal/external rotation
  - AROM vs PROM
- Traction/scour
- Flexion tolerance
- Gross bilateral vs unilateral differences



## KNEES

- *Impact or ROM limitation?*
- Shear tolerance
- Flexion tolerance
- Valgus/varus control
- Asymmetrical differences
  - B/L vs R vs L

## COLLECTIVE

- Load unilaterally w/ proficiently?
- Kinetic integration?
  - *Do they transfer force?*
- Move in the frontal plane?
- Ability to create deep flexion angles w/ strength/stability?
- Dynamic loading/movement

# TRAINING/PROGRAM CHECKLIST

NOTES	STRENGTH	MOVEMENT	DYNAMIC
<ul style="list-style-type: none"> <li>• All ratios &amp; points of emphasis should be governed by demands of sport</li> <li>• Individual deficits should be prioritized first</li> <li>• Phase of development (age/ability) should also be considered</li> </ul>	<p>SL strength (1.5xBW)</p>	<p>Close gaps between AROM/PROM</p>	<p>Mechanical foot stiffness</p>
	<p>Eccentric loading</p>	<p>Robustness, durability</p>	<p>Kinetic Sequencing</p>
	<p>Positional strength</p>	<p>Lateral ROM</p>	<p>Hi force/low speed vs. Low force/hi speed</p>
	<p>Adductors Hip flexion/IR Plantarflexion Hamstring (flexion)</p>	<p>Adductors Hip ER/IR Dorsiflexion Hip extension</p>	<p>Intrinsic foot muscles Peroneal group Lateral Glutes Calf (isometric)</p>

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# FOOT & ANKLE

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*The foot offers the only constant interface for the human body with the earth. Thus, providing a unifying relationship with the environment around us.*

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# TRAINING PRINCIPLES [FOOT]

*The foot is a magnificent structure and display of mechanics. This is our primary and constant interface with the environment. To think the foot has no significant implications up the chain is patently shortsighted.*

## FORCE TOLERANCE

- Force dispersion across foot segments/structures
- Ground impact (chronic & acute)
- Mechanical stiffness
  - Force transfer (efficiency)

## COMPLIANCE

- Ability to bend and maintain shape/structure
- Ground interface (surface area)
- Center of pressure and weight transference
- Resist deformation

## INTRINSIC STRENGTH

- Eccentric strength/motor control (splay)
- Plantar flexor strength
- Effects on dorsi and plantarflexion

## PROPRIOCEPTION

- Sensory proficiency (kinesthesia)
- Motor control/refined motor skill
- Vestibular function

# NUANCES OF THE FOOT & ANKLE

## MEDIO LATERAL COMPARTMENTS

- Lateral group: Peroneals (eversion/PF), tibialis anterior (inversion DF), ATFL
- Medial group: Posterior Tibialis, deltoid ligaments, FHL
- Spiral chain of lower leg



## SEGMENTS OF FOOT

- Multiple segments performing unified actions; constant reciprocation
- Importance of proper force distribution
- Force coupling (midfoot stiffness) and unlocking

## CENTER OF PRESSURE

- Tripod = Under base conditions, pressure should be even distributed across ball of big toe, pinky toe and heel
  - Lateral bias = Supination, inversion, tibial external rotation, knee varus
  - Medial bias = Pronation, eversion, tibial internal rotation, knee valgus
  - Forefoot bias = Quad & posterior lower leg emphasis
  - Hindfoot bias = Hamstring/glute & anterior lower leg emphasis
-

# ADDRESSING DEFICITS

**Chronic Ankle Sprain**

*SL Variations*

*LL Plyos*

*Dynamic/reactive*

● Improve lower leg strength

● Proprioceptive demand

● Dynamic stability

**Plantar Fasciitis/Turf Toe**

*Strengthen IFM*

*Restore big toe function*

*Soft tissue/external modality*

● Foot compliance

● Eccentric foot strength (splay)

● Distribution of force

**Achilles Rupture/Tendonitis**

*Eccentric loading*

*LL Plyos*

*Hi force loading*

● Tendon compliance

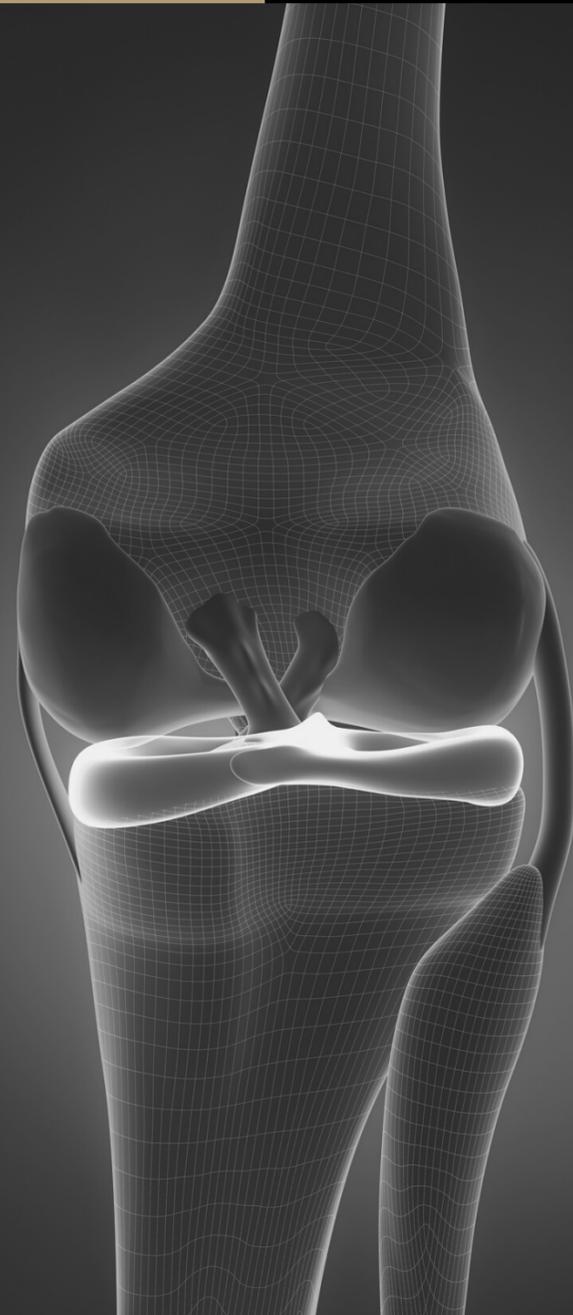
● GTO desensitization

● Mechanical stiffness

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# KNEES

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*Ultimately, the knee is the byproduct of the hip (mobility) and the foot (stability). The knees are the barometer of force tolerance.*

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# TRAINING PRINCIPLES [KNEE]

*Superficially, the knee is one of the more simplistic joints in the body. Nevertheless, with limited POM/ROM, there can often be limitations to influence pain/strength. I think of the knee as the force barometer of the leg.*

## TORQUE TOLERANCE

- Ability for the joint to resist shearing moments
  - Ligaments
- Screw-home mechanism
- Closed vs. open chain

## IMPACT TOLERANCE

- Ability to withstand ground reaction forces
  - B/L vs SL
- Repetition or magnitude
- Weight distribution and landing position
- Vectors are significant

## VALGUS/VARUS

- Preventing excessive valgus pattern during dynamic action
- SL, B/L, split stance may all be different
- More related to hip or foot?

## DORSIFLEXION

- Able to display necessary tibial displacement
- Patellar stretching
- Eccentric quad tendon loading

# NUANCES OF THE KNEE

## LOAD PLACEMENT & BODY ANGLES

- Vertical shin = decreased patellar strain but increased quad strain
- Negative shin = increased patellar strain but decreased quad strain
- Vertical chest = Increased quad stretch
- Trunk inclination = Decreased quad stretch
- Parallel shin/torso angle = Optimal co-contraction
- Load above waist = Increased quad demand (generally less knee friendly)
- Load below waist = Increased hamstring demand (generally knee friendly)



## RECIPE FOR STRONG KNEES

- Strong adductors + strong lateral glutes
- Appropriate quad/ham strength ratio
- Watch for tight calves
- Force tolerance (magnitude and volume)
- Torque/shear resistance
- Floating heel technique = optimal co-contraction between upper/lower leg

## LIGAMENT VS TENDON INJURIES

- Ligaments: Very poor blood flow, enriched w/ mechanoreceptors (position/space), positional strength
- Tendons: Poor blood flow, eccentric stretching, GTO's, reflexive strength
- Ligaments are often acute (absolute load), tendons mostly chronic (volume)

# ADDRESSING DEFICITS

## Ligamentous (ACL)

*SL Variations*

*LL Plyos*

*Dynamic/reactive*

● Improve single leg strength (quad)

● Proprioceptive demand

● Re-establish peak dorsiflexion

## Cartilage (Meniscus)

*Re-intro flexion*

*Transverse plane*

*Manage inflammation*

● Re-introduce deeper flexion angles

● Be mindful of compressive forces

● Shear/torque tolerance

## Quad/Patellar/ITB

*Eccentric loading*

*Quad:Ham ratio*

*Positional ISO's*

● Tendon compliance

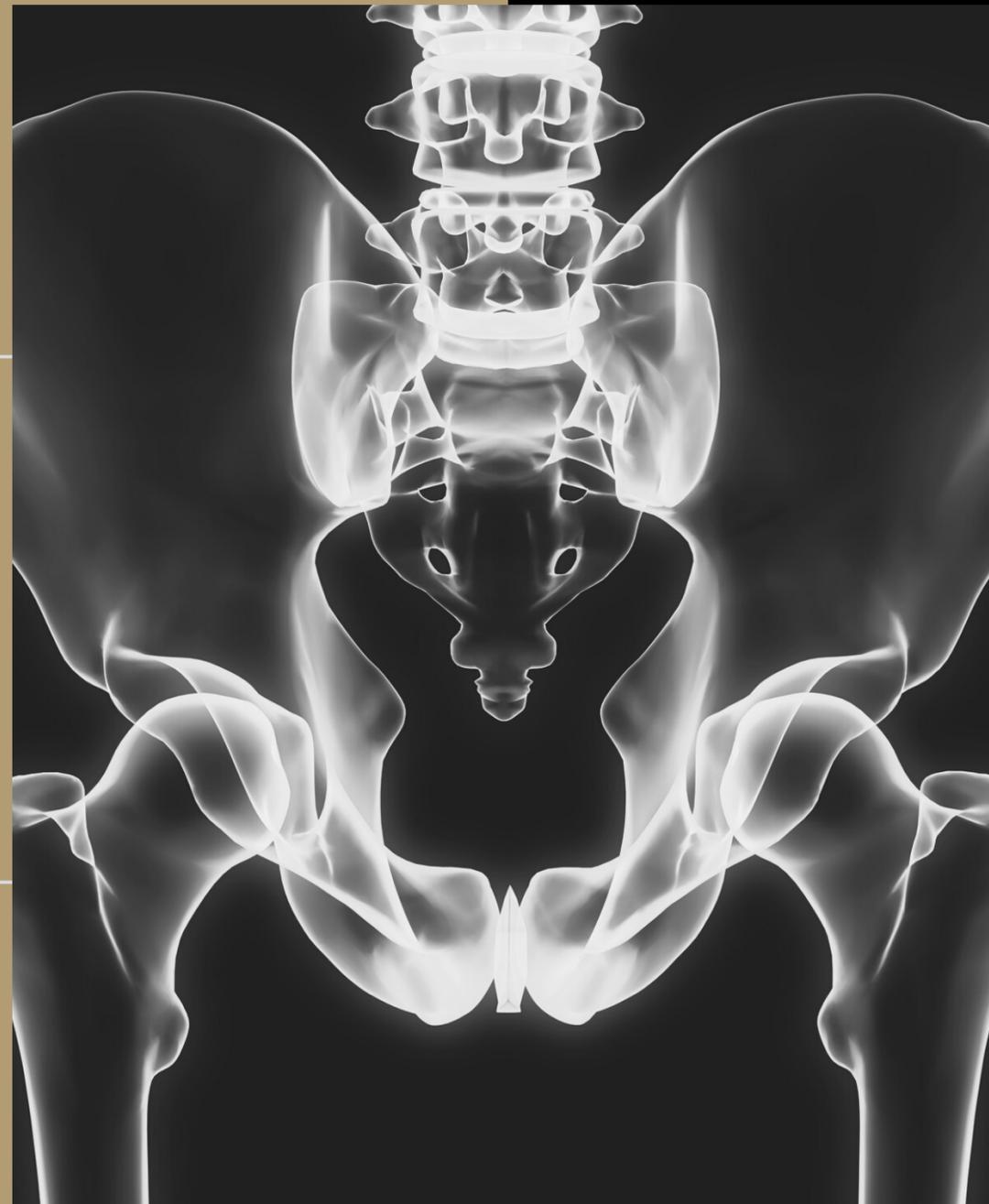
● GTO desensitization

● Muscular co-contraction

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# HIPS & PELVIS

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*The hips are the primary kinetic transfer station of the body. Given the proximity and function, I believe the more proficient the hips are, the easier it is to improve the extremities.*

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# TRAINING PRINCIPLES [HIPS]

*The hips require a complimenting balance of mobility, stability (strength), and flexibility.*

*There is also a strong reciprocity between each hip. Their function should be challenged both independently & collectively.*

## VARIABLE STANCES

- **Bilateral**: Foundational strength
- **Split Stance**: 60/40 split
- **Kickstand**: 80/20 split
- **Floating heel**:  
Hamstring and abduction/adduction emphasis

## SL VARIATIONS

- Hinge patterns
- Squat patterns
  - Pistol vs. Skater
- Step-up/lunge patterns
- Lateral/transverse variations

## ROTATIONAL

- Fixed femur w/ pelvic rotation
- Fixed pelvis w/ femur rotation
- Global rotation ("coiling")

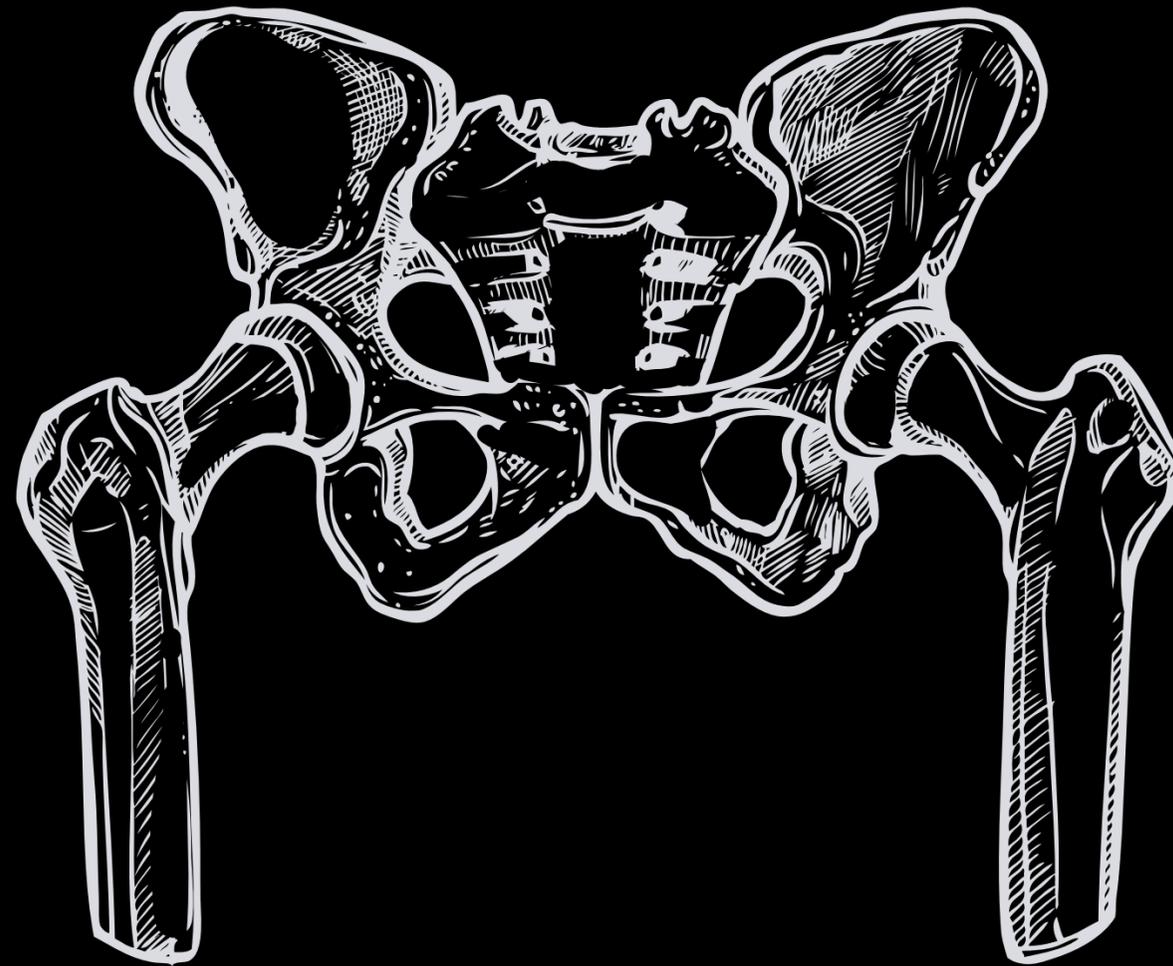
## MOBILITY

- Internal/external rotation
- Flexion/extension
- Adduction/abduction
- Pelvic vs femoral movement
- Meet the demands of sport, no more no less

# NUANCES OF THE HIP

## KINETIC FORCE TRANSFER

- Vertical movement: Finish through aggressive hip and knee extension w/ vertical torso stacked on-top of pelvis
- Rotational movement: Initiate through snapping of hip/leg into internal rotation with hip extension and finish through foot.
- Horizontal Movement: Extending aggressively through the hips and finishing through the feet. Pulling down actively with the hamstrings upon ground contact.



## COUNTER ROTATION

- Having one hip that is anteverted, anteriorly tilted, internally rotated and reciprocated pattern on opposite hip.
- Psoas/QL relationship
- Lateral glutei & adductor relationship
- Space between rib cage and hip crest
- Trunk muscles & spine function

## TRIPLANAR STABILITY

- Strong joint congruency
    - *"Keep the ball on the tee"*
  - A reduction in SL stability can normally be tied to the loss of internal rotation or lateral glute isometric strength
  - Movement occurs in all degrees of freedom at all times
  - Consider load placement and vector loading
-

# ADDRESSING DEFICITS

**Weak IR/Adduction**

*AROM vs PROM*  
*L/R strength profile*  
*Isolate to integrate*

● SL Variations

● Improve hip flexion strength

● Split stance/kick stand set-up

**"Tight" hip flexors**

*Manual strength test*  
*Long vs short lever*  
*Pelvic position*

● Strengthen flexors

● Soft tissue quad

● Assess adductors

**Labrum Tear/FAI**

*Scour/traction*  
*Joint continuity*  
*Positional strength*

● SL Variations

● Improve flexion

● Restore IR/ER

# OPTIMIZING LOWER BODY STRENGTH

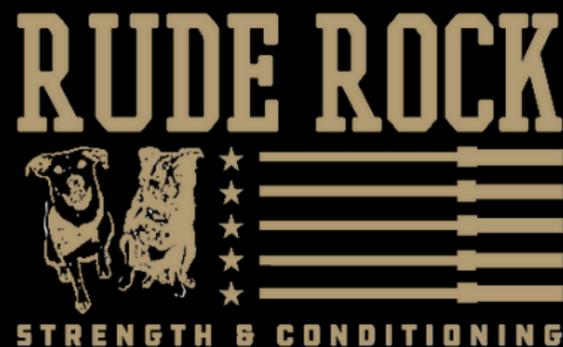
*SAMPLE 4-WEEK PROGRAM INCLUDING:*

~4 Days/wk~

~Warm-Up, mobility, & recovery options~

~Hyperlinks for every exercise~

~Several external links/resources~



## RUDE ROCK STRENGTH & CONDITIONING

DAY 1		WK 1	WK 2	WK 3	WK 4
1A	<a href="#">Depth Jump to SL</a>	2x5 -	2x5 -	3x5 -	3x5 -
1B	<a href="#">SL Lateral Hops</a>	2x10m -	2x10m -	3x10m -	3x10m -
2A	<a href="#">Hex Bar DL (6" lift)</a>	4x10 @65%	4x8 @75%	6x6 @80%	6x4 @85%
2B	<a href="#">SL Skater Squat</a>	4x5 3EE	4x4 3EE	6x3 3IE	6x2 3IE
3A	<a href="#">DB FFE SS w/ Heel Float</a>	4x10 3EE	4x8 3EE	3x6 3IE	3x4 3IE
3B	<a href="#">KB Crossover RDL</a>	4x10 3EE	4x8 3EE	3x6 3IE	3x4 3IE
3C	<a href="#">Heavy Sled Tow</a>	4x20m -	4x20m -	3x20m -	3x20m -

**\*\*SEE LINK IN CAPTION\*\***



# OFFSET TRAINING

Neurological Demand | Trunk Stability | Work Capacity

**DANNY FOLEY**  
MS, CSCS,D\*, TSAC-F,D\*  
HEAD STRENGTH COACH- VHP  
CO-FOUNDER- RUDE ROCK



# 2021 WEBINAR SERIES

- 1.) *Offset Training*
- 2.) *Restorative Strength Training*
- 3.) *X's & O's*
- 4.) *...?*

# RESTORATIVE STRENGTH TRAINING FOR TACTICAL ATHLETES

*An integrative approach for  
improving the health & performance  
of our Warfighter athletes*

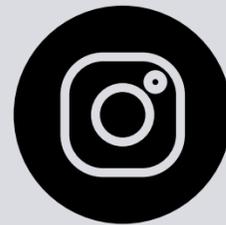
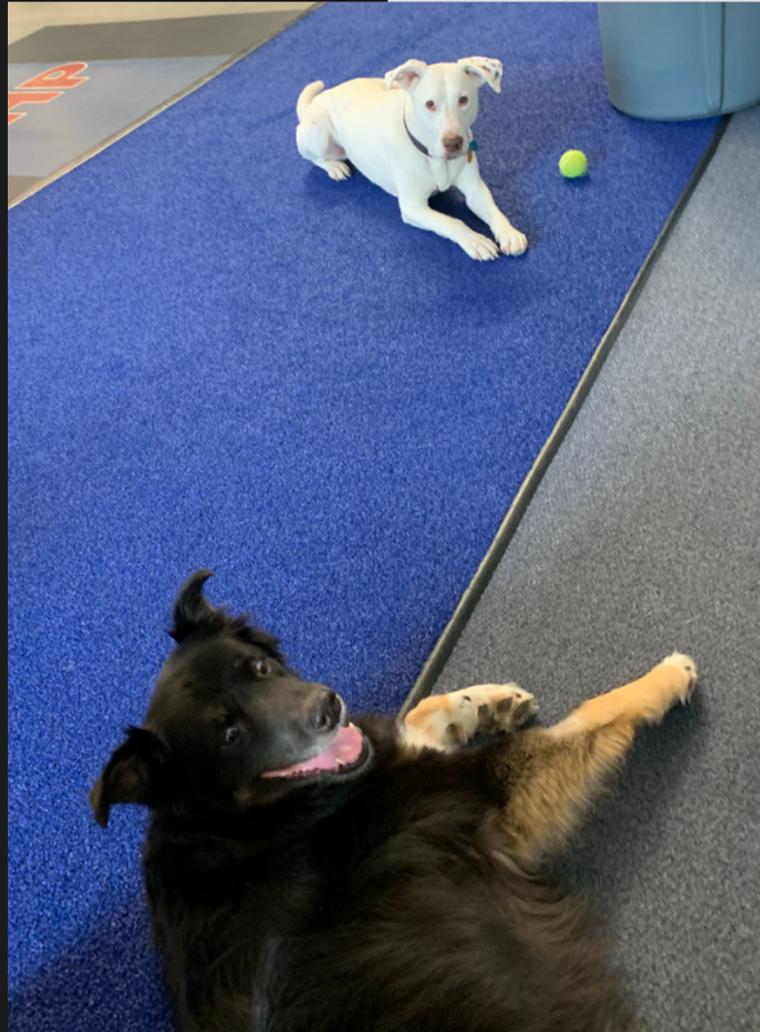
Danny Foley- MS, CSCS,D\*, TSAC-F,D\*



 **SUBSCRIBE**

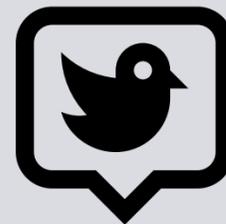
*Rude Rock Strength*

# THANK YOU



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