

# NSCA COACHES CONFERENCE

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CHARLOTTE  
N. CAROLINA



# The Non-Contact ACL Epidemic- The epidemic that doesn't need to be

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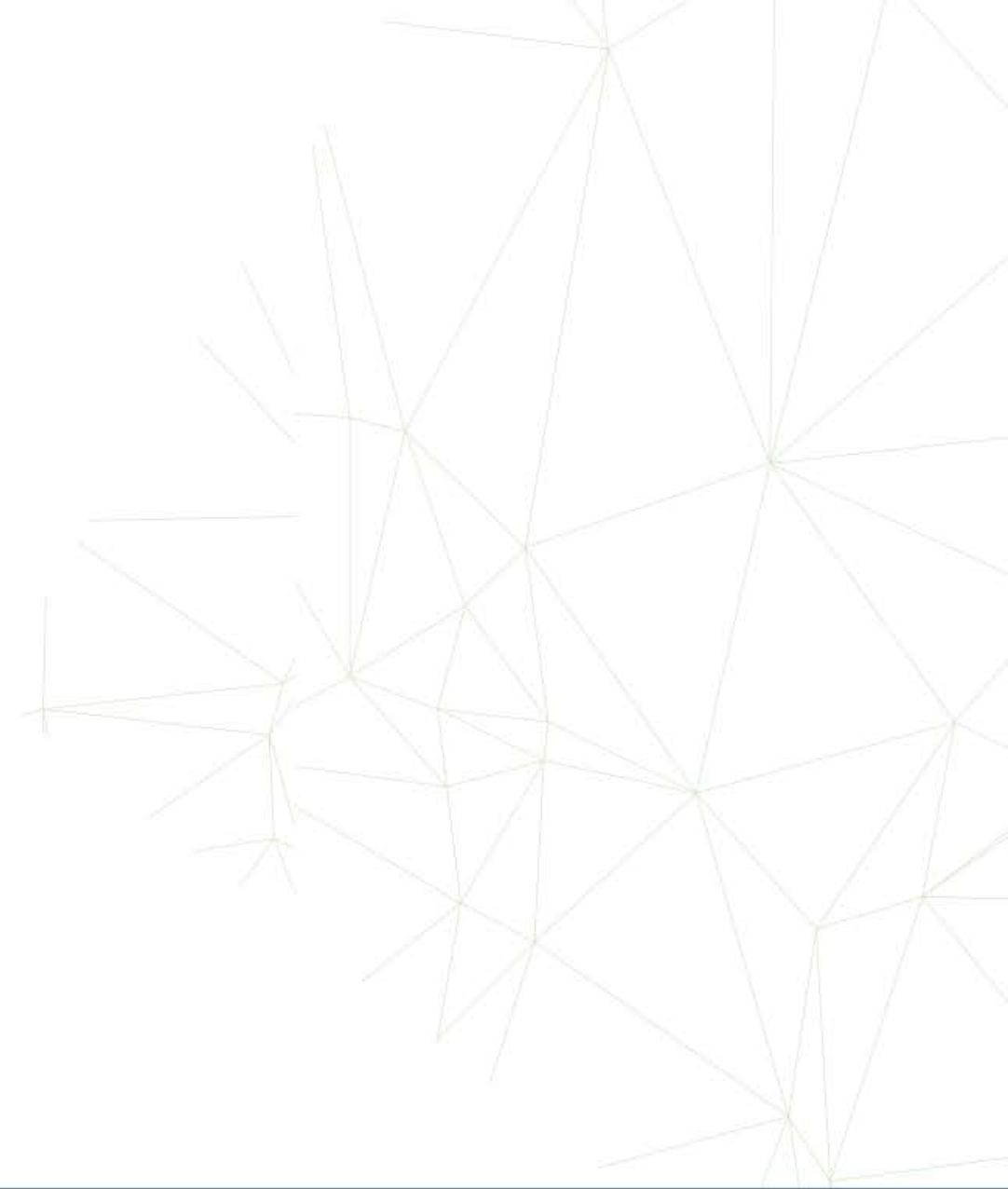
University of Missouri

# Conflict of Interest Statement

- **I have no actual or potential conflict of interest in relation to this presentation.**

# ACL Tear Epidemic

- Non-contact vs Contact



# Non Contact



# Contact- not preventable

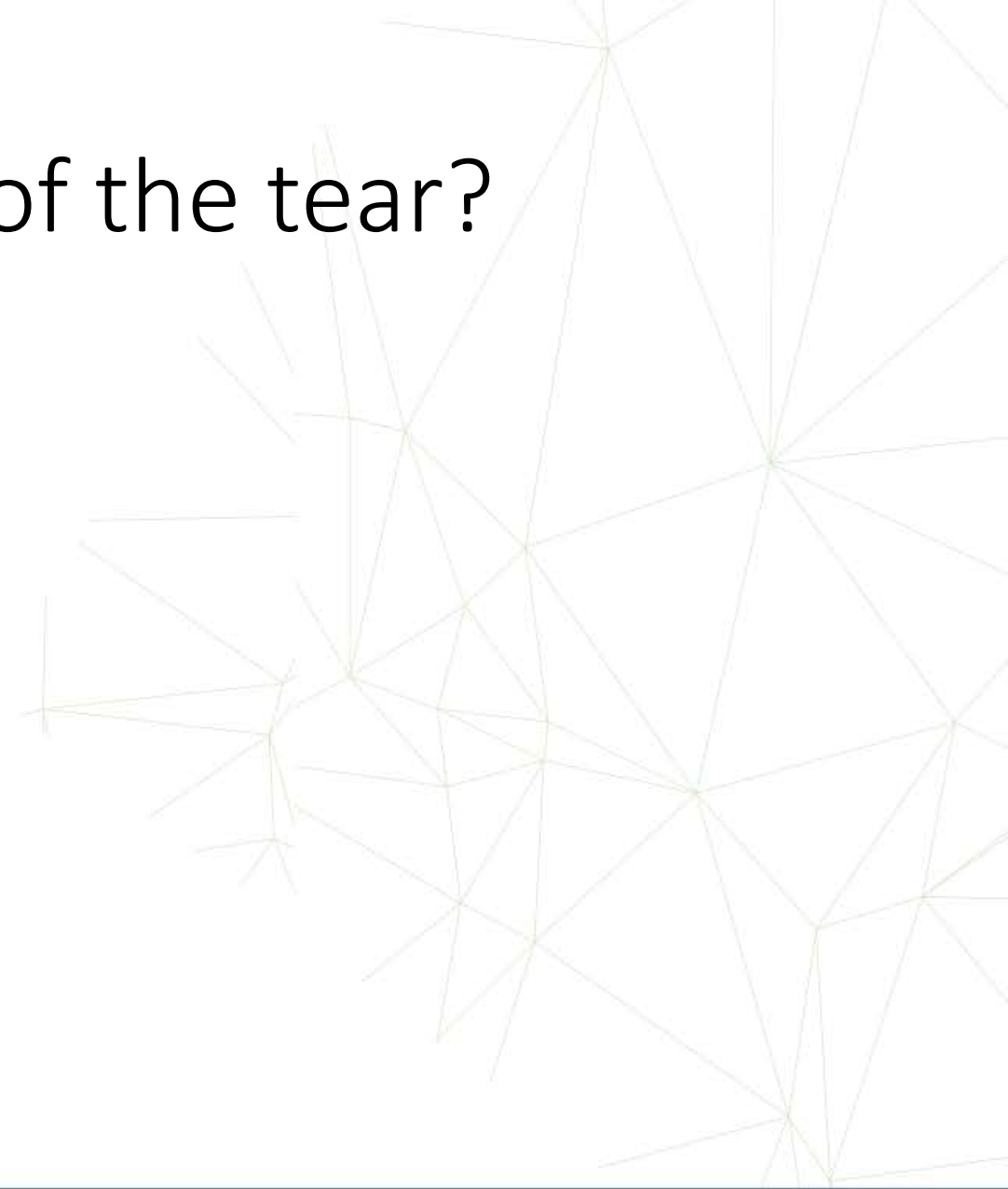


# Background

- SMSU Women's Soccer story
  - VMO
- Fast forward to Mizzou- 8 years with 0 non-contact ACL tears.

# What are the mechanisms of the tear?

- Hip Adduction
- Hip Internal Rotation
- Tibial Anterior translation





# Other causative factors?

- Accumulated fatigue
  - Think acute:chronic loading type
  - Most non-contact ACL tears happen early rather than late in the game
- Outside stressors

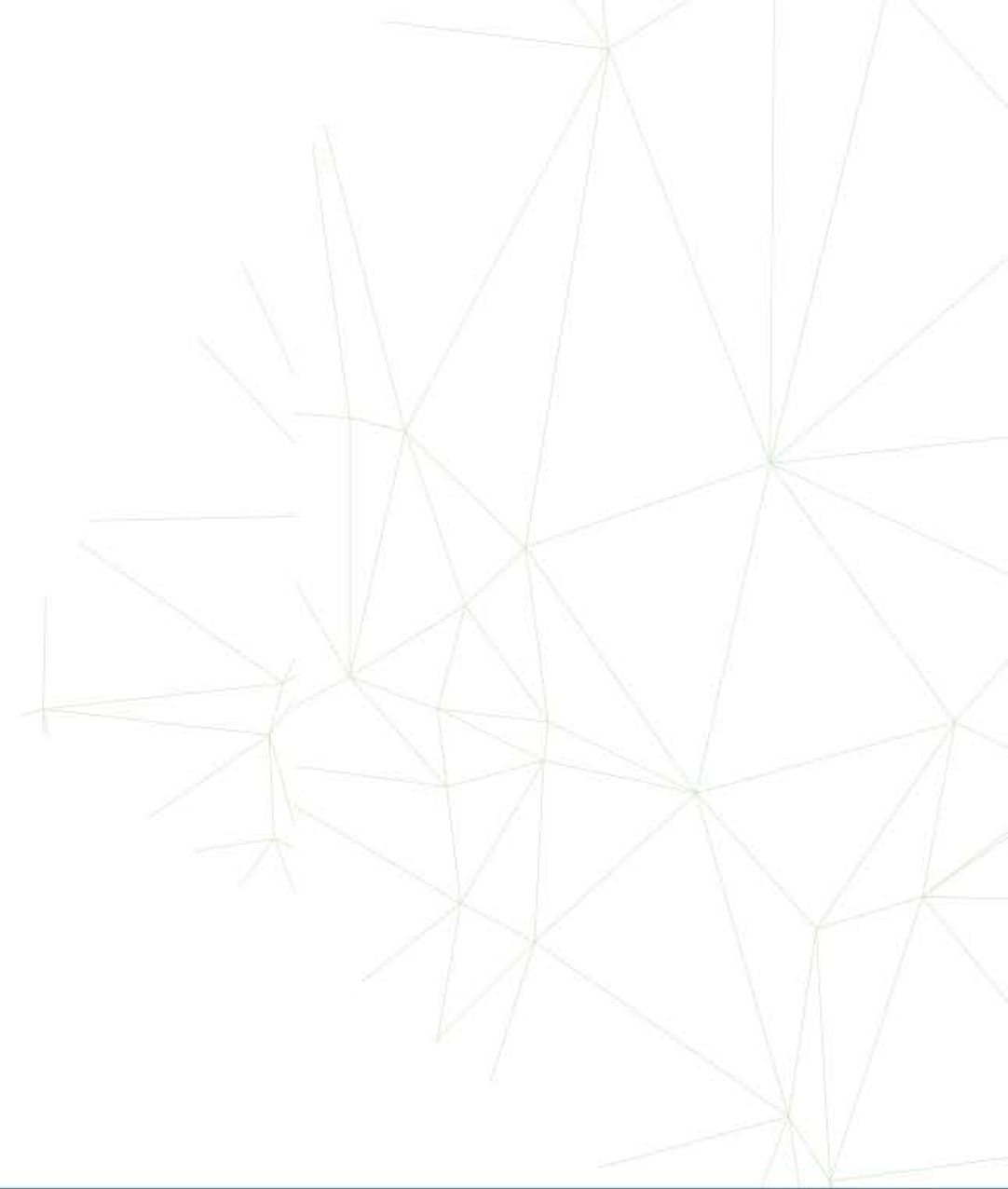
Table 3. Results from hierarchical logistic regression using A. all subjects (n=101), B. only subjects that played (n=46) and C. subjects that did not play (n=51)

	<b>Odds Ratio (OR)</b>	<b>95% Confidence Interval</b>	<b>p</b>
<b>A.</b>			
HPS/HAS	2.05	(1.39, 3.03)	0.0003
HPS/LAS	3.65	(2.50, 5.32)	<0.0001
HAS/LAS	1.78	(1.16, 2.74)	0.0088
<b>B.</b>			
HPS/HAS	1.13	(0.55, 2.32)	0.7505
HPS/LAS	2.84	(1.49, 5.42)	0.0016
HAS/LAS	3.19	(1.61, 6.34)	0.0009
<b>C.</b>			
HPS/HAS	2.315	(1.340, 3.996)	.0026
HPS/LAS	1.710	(1.039 , 2.815)	.0348
HAS/LAS	1.376	(2.504, 6.258)	<.0001

HPS = High Physical Stress; LAS = Low Academic Stress; HAS = High Academic Stress

# What can we do?

- Counter the mechanisms
- Strength!!!
- Preventative warmups



# Counter Mechanisms- Hip Adduction

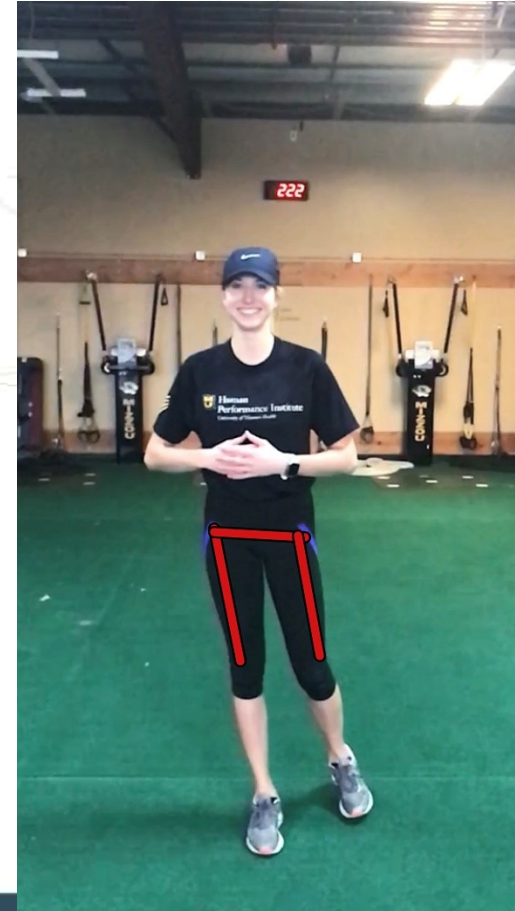
- Improve strength of abductors
  - Clam shells are not a favorite of mine
  - Glute Medius standing leg raise
  - Single leg standing- make yourself as tall as possible and keep leg in line with body
    - This forces abduction



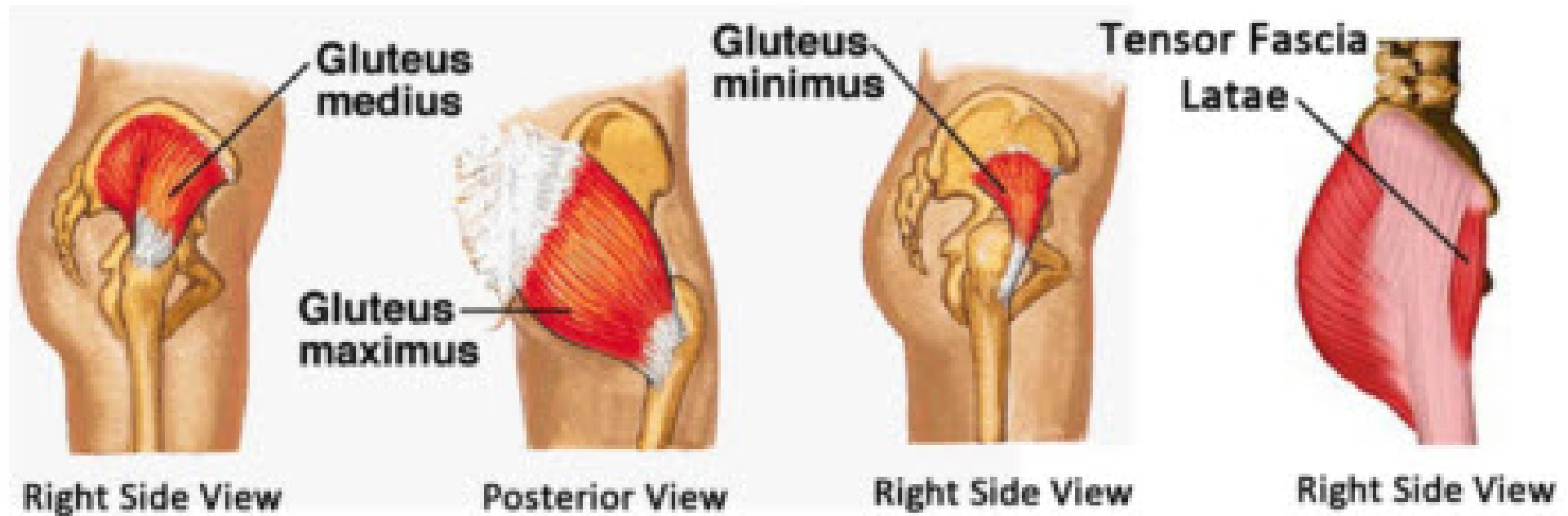
# Side lying hip abduction good and bad



# Single leg support as a hip abduction exercise



# How?



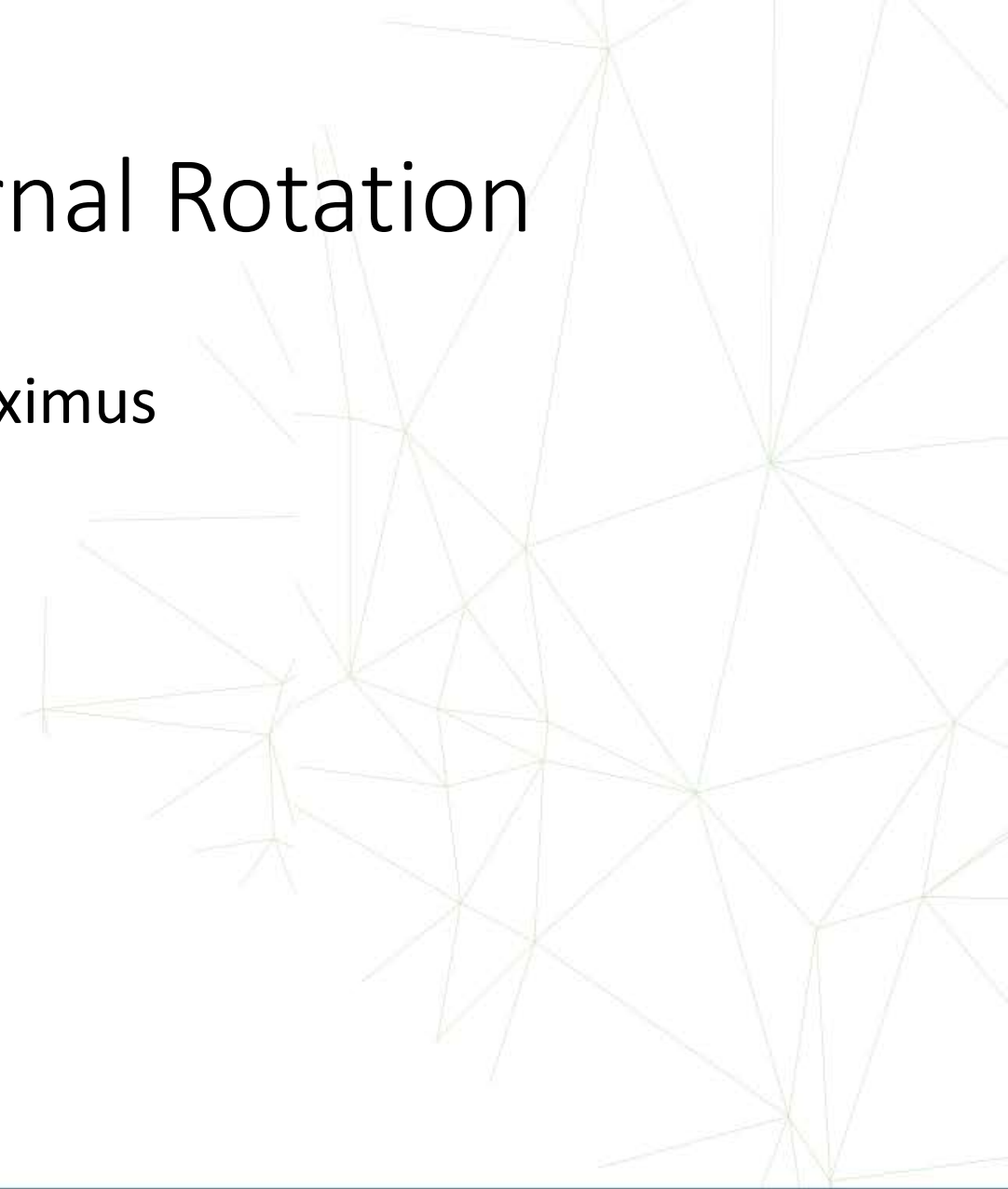


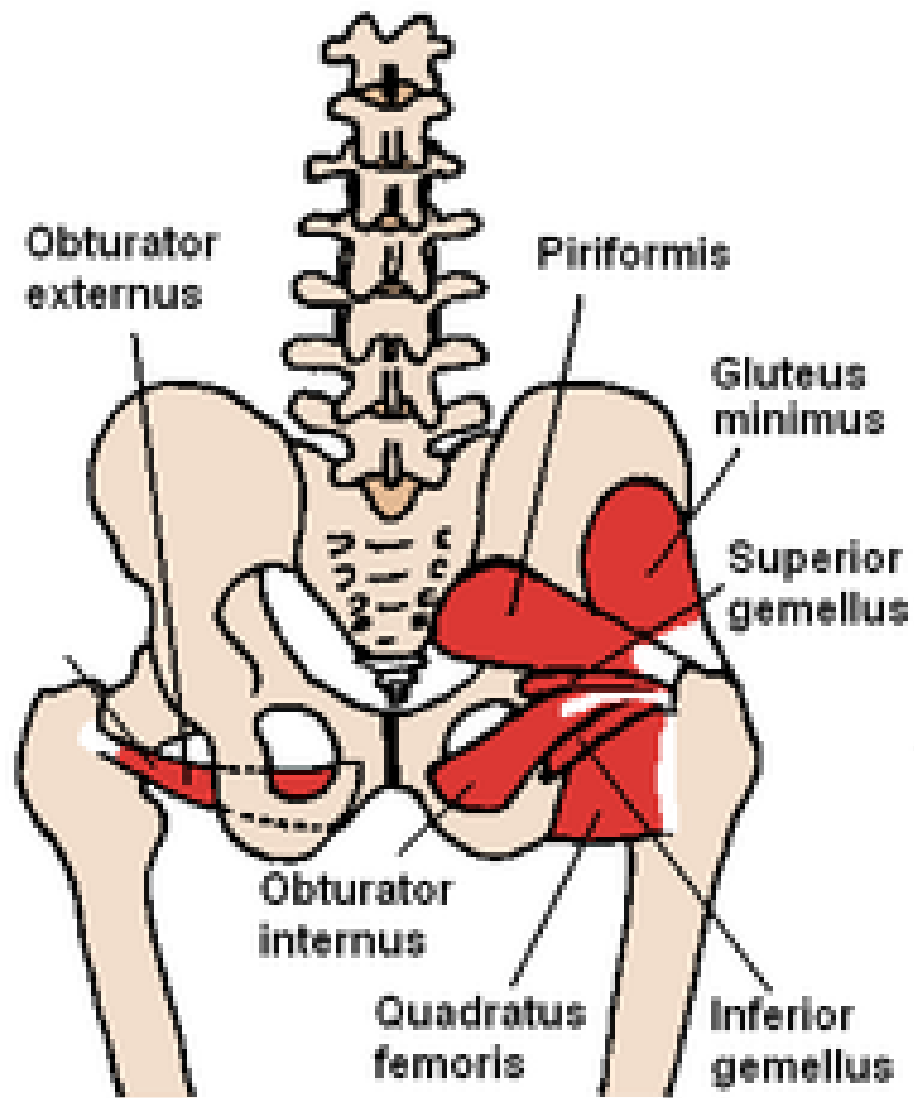
# Good abductor vs bad abductor

- TFL- it's a booger
  - TFL is an abductor but also an internal rotator
  - It takes over for weak or tired gluteus medius
    - Essentially creates the mechanism
- If you strengthen this instead of Gluteus Medius, you're making the problem worse

# Counter Mechanisms- Internal Rotation

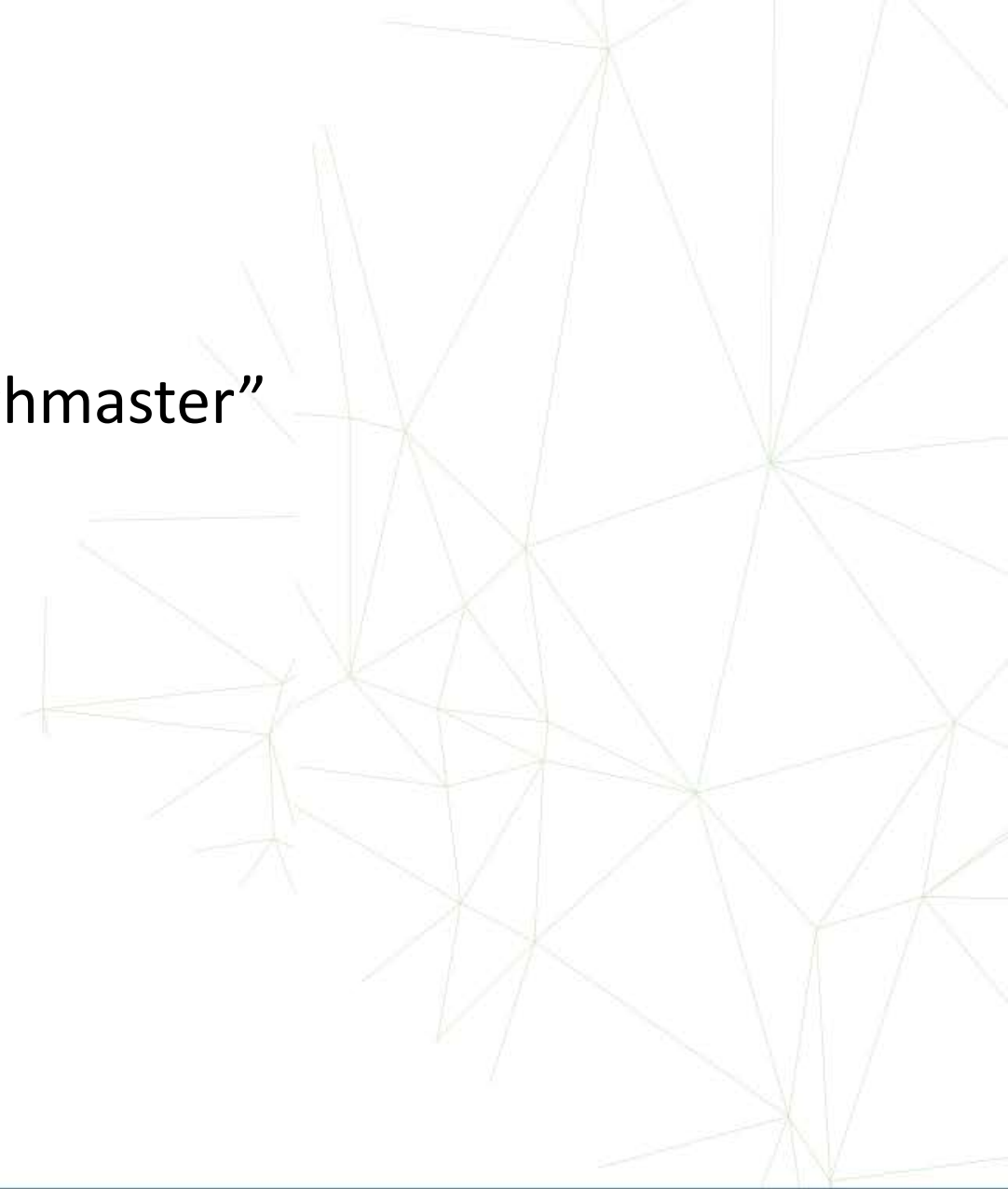
- Strengthen the deep six plus Gluteus Maximus



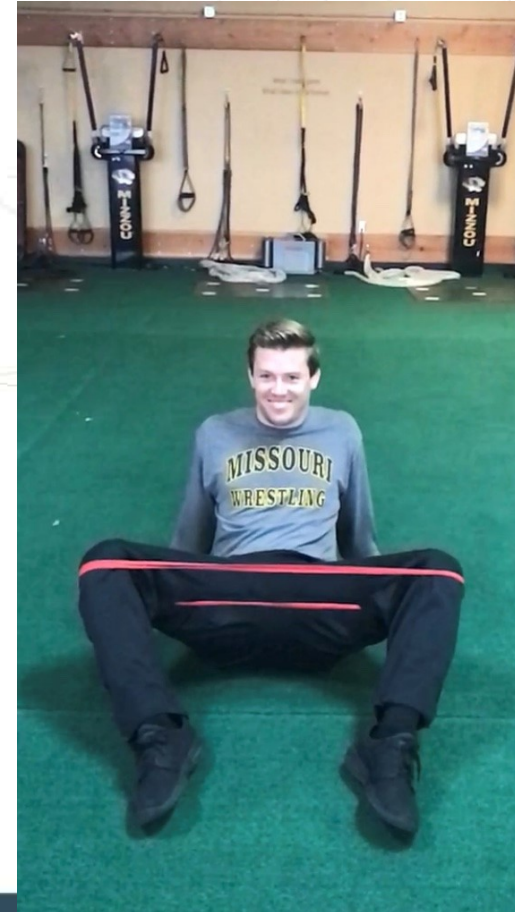


# Exercises

- My personal favorite is the “Reverse Thighmaster”

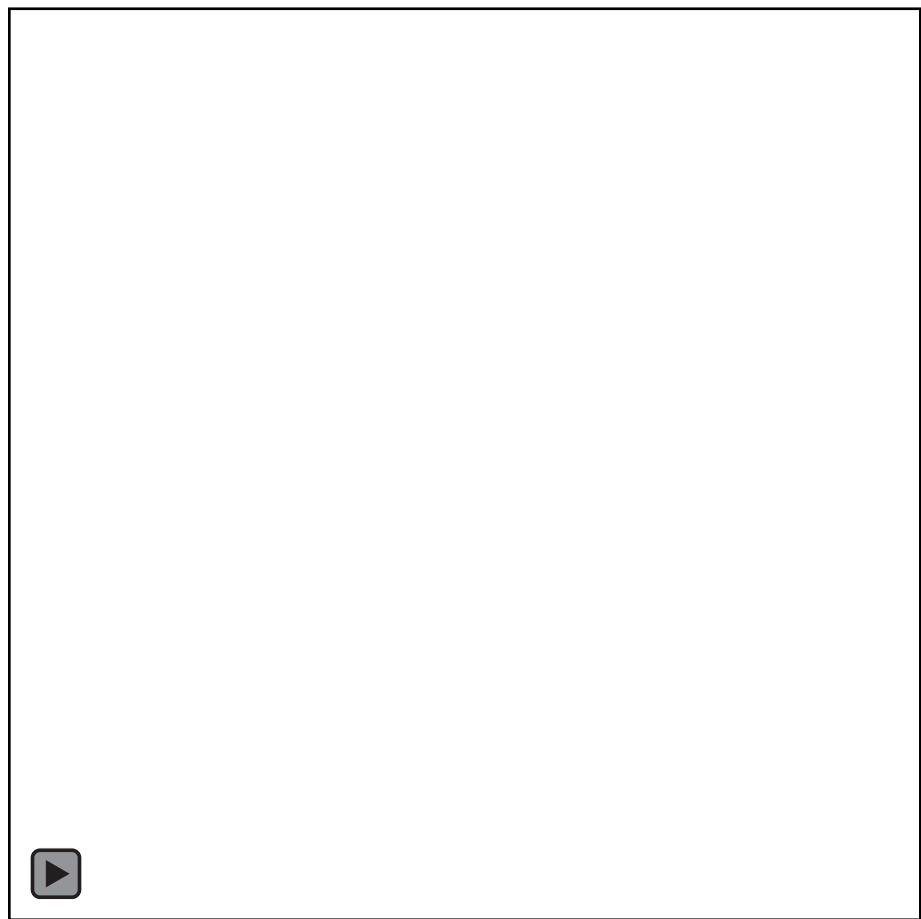


# Reverse thighmaster



# Counter mechanisms- anterior tibial translation





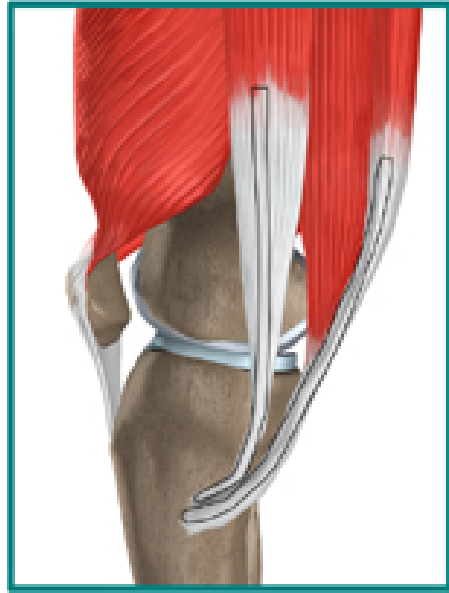
# What prevents this?

- Ligaments
  - Anterior Cruciate Ligament of course
- Muscles
  - Semitendinosus, Semimembranosus, Biceps Femoris Long head, Biceps Femoris Short head



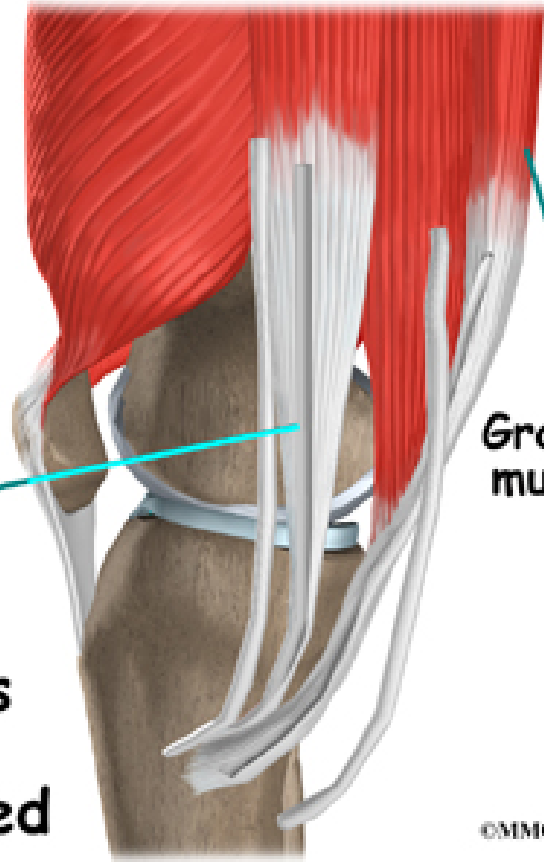
# Anterior tibial translation 2

- Can come from the ankle
- Inability to dorsiflex causing greater knee flexion angle
- Alternative strategy to lower center of mass for change of direction
- To counter this- increase ROM
  - Soleus stretching/Seated calf raise
  - If that doesn't work, send to a PT (could be bony block, or multitude of other factors at the foot)



Semitendinosus muscle

Parts of semitendinosus and gracilis tendons removed



Gracilis muscle

©SMG 2000



# Fatigue

- Greatest number of ACL tears was in August
  - Orthop J Sports Med. 2016 Mar; 4(3): 2325967116631949.
  - Anterior Cruciate Ligament Injuries in National Football League Athletes From 2010 to 2013
  - A Descriptive Epidemiology Study
  - Christopher C. Dodson, MD,\*† Eric S. Secrist, BS,‡ Suneel B. Bhat, MD,† Daniel P. Woods, MD,§ and Peter F. Deluca, MD†

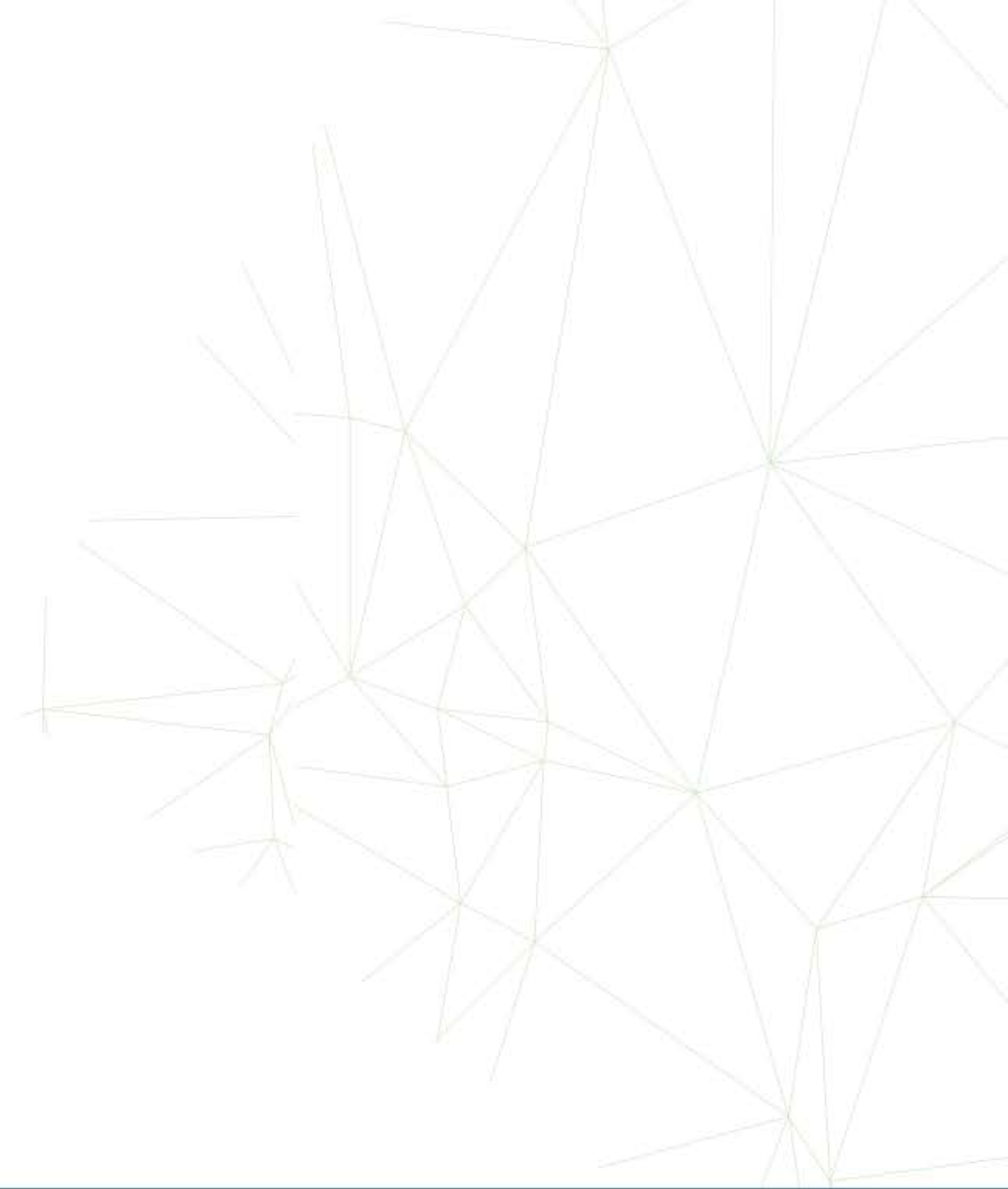
- Often accumulated fatigue of training camp causes injuries
  - Accumulated and not acute fatigue
    - Most non-contact ACL tears happen earlier in games
      - Muscles are producing more force.

# Strength

- Overall, strength can be a mitigating factor for this injury
- When stronger, it requires fewer motor units to do the same muscle action
- When muscles fatigue, you are still above threshold
- How strong is strong enough?
  - 2x bodyweight squat
  - IMTP 5x bodyweight for males, ~4.25 for females.

# Specific Warmups

- There are tons
  - P4ACL
  - Santa Monica PEP
  - FIFA 11+





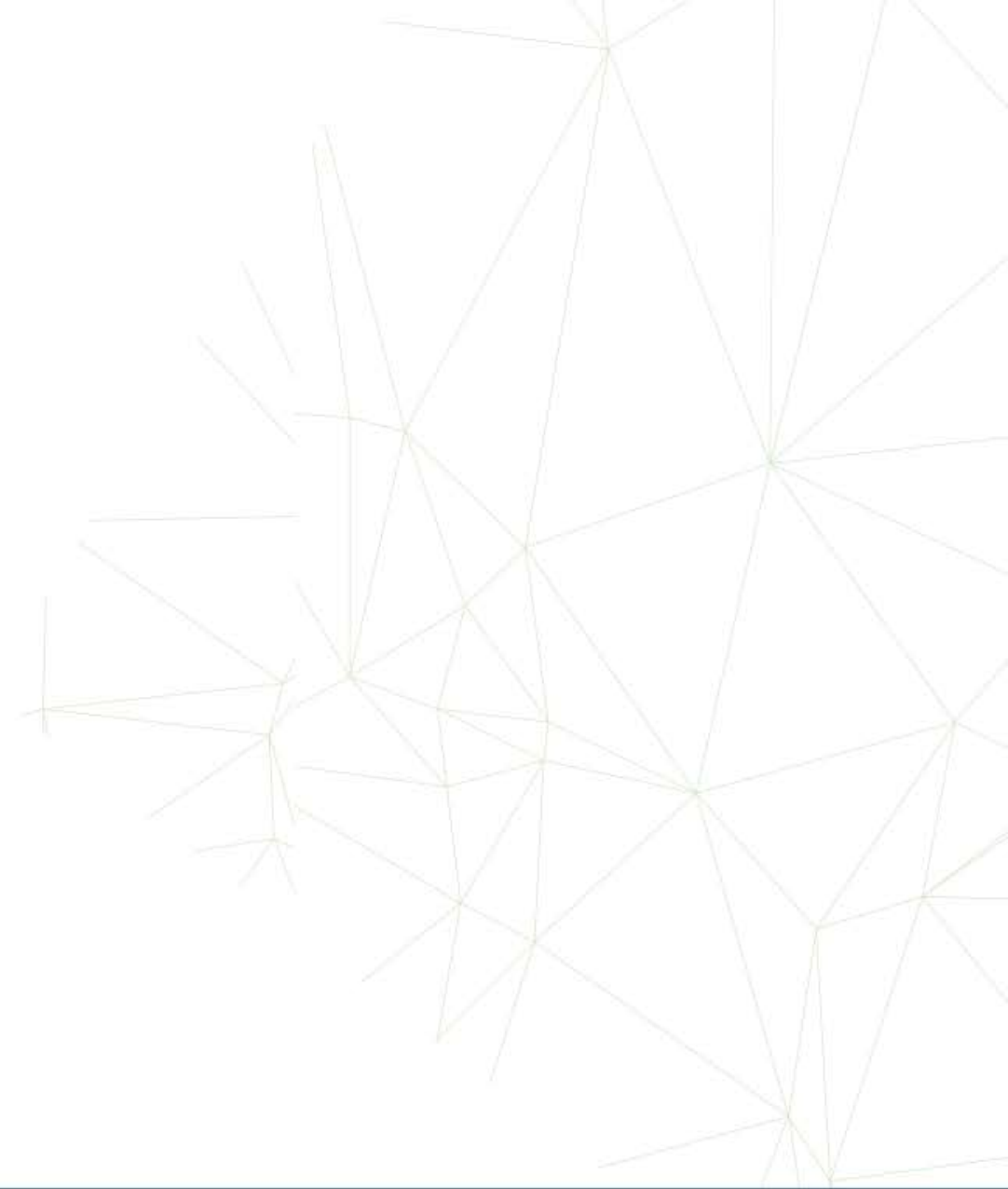
# Guidelines

- Always teach/re-enforce change of direction mechanics on a daily basis
- Moderate to high level of plyos to “wake up” mechanoreceptors within the knee
  - “Line hops ain’t going to get the job done.” –Dr. Tim Hewett



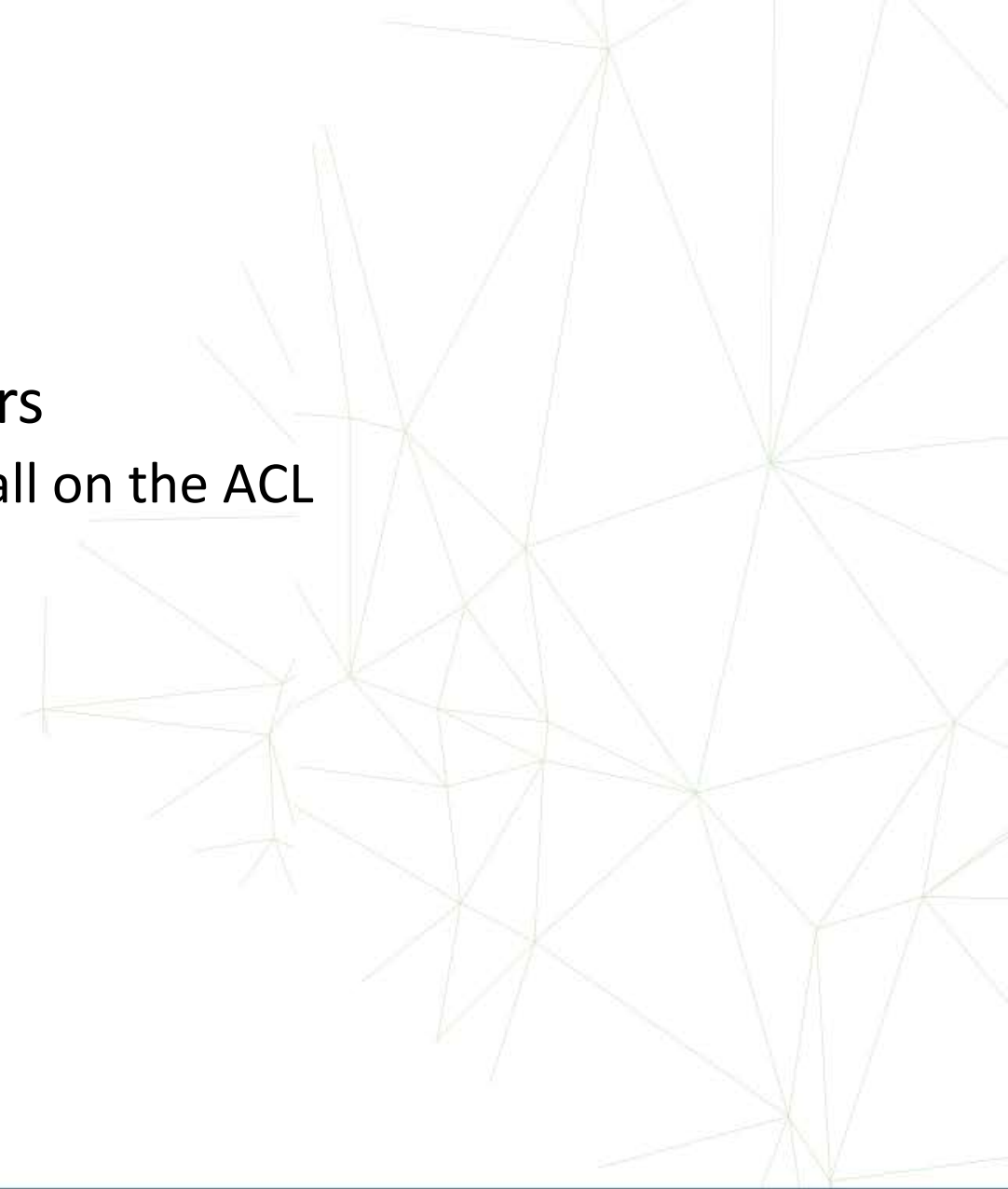
# In conclusion

- Strengthen causative factors
- Get strong



# Citations

- Different route- Look up these researchers
  - Tim Hewett- been cited over 35,000 times, all on the ACL
  - Greg Myers
  - Chris Nagelli
  - Kate Webster



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