



@physicaltherapyresearch

# RAPID RESEARCH

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December 2021

## Inside This Week: All About the Hamstrings

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- ✓ Hamstring Exercises With the Most Muscle Activation

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  - ✓ Mechanism of Hamstring Injuries

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  - ✓ Single Leg Bridge Test to Predict for Hamstring Injuries

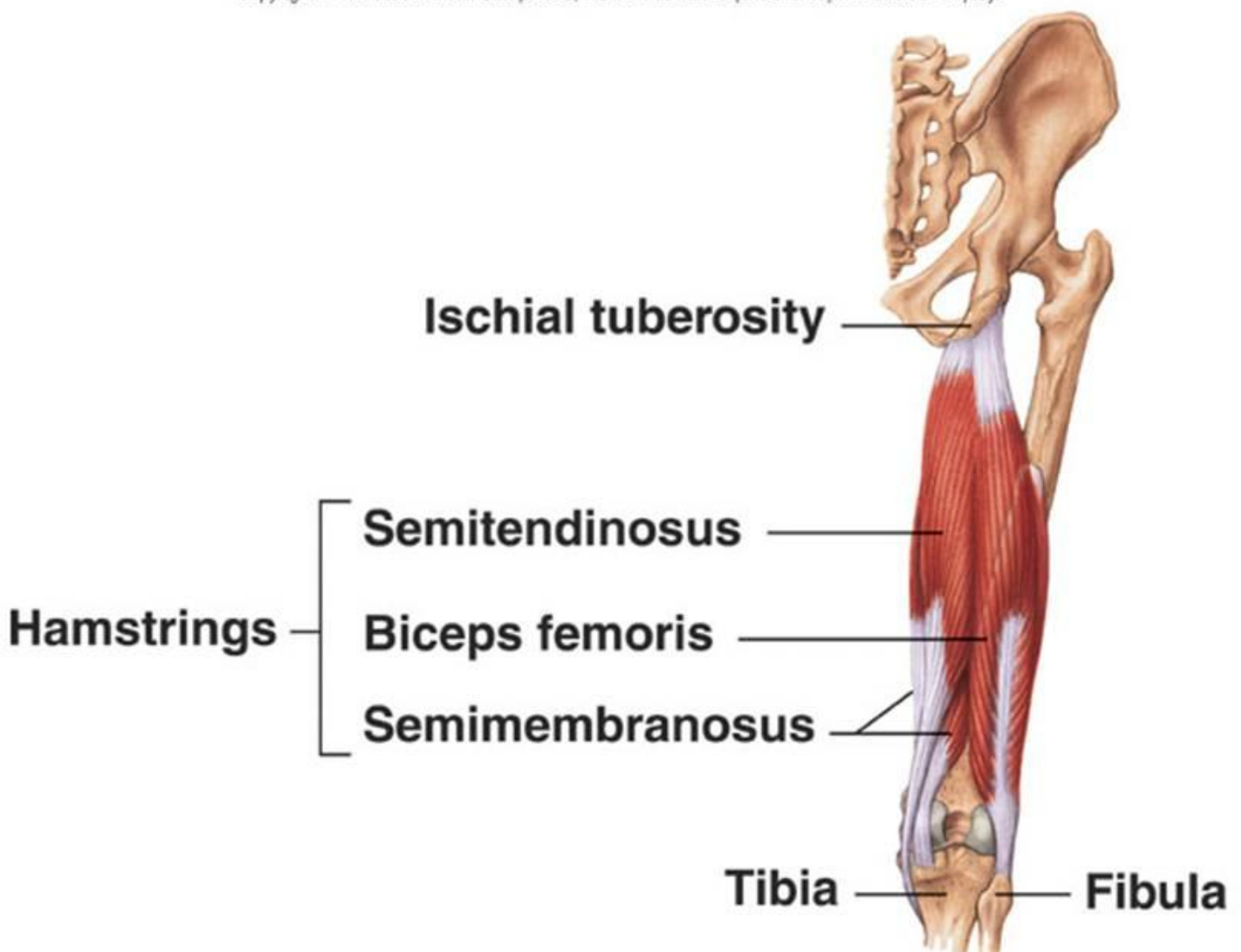


# HAMSTRING EXERCISES WITH THE MOST MUSCLE ACTIVATION

[Click for Full Text \(Bourne et al 2017\)](#)

This research determined if different exercises selectively activate the commonly injured, Biceps Femoris Long Head (Hamstring).

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# KEY FINDINGS

**Cross-sectional study involved 24 active males across 2 parts.**

1. sEMG amplitudes and ratios of Biceps Femoris (BF) to medial hamstring (MH) sEMG activity during 10 strength training exercises.
2. fMRI investigation of 2 best exercises

**Eccentric Exercise:**

**Largest BF/MH nEMG ratio was observed in the 45° hip extension exercise.**

**Lowest was with Nordic hamstring (NHE) and Bent-knee Bridge exercises.**

**Concentric Exercise:**

**Largest BF/MH nEMG ratio was observed during the lunge and 45° hip extension.**

**Lowest was with the leg curl and bent-knee bridge.**

**fMRI revealed a greater activation ratio in the 45° hip extension vs the NHE.**

**Nordic Hamstring Exercise had greater activation for the Semitendinosus than for the other hamstrings.**

## MAIN TAKEAWAYS

The **hamstrings are activated non-uniformly** during hip- and knee-based exercises.

Hip extension exercise more **evenly activates the three long heads of the hamstrings.**

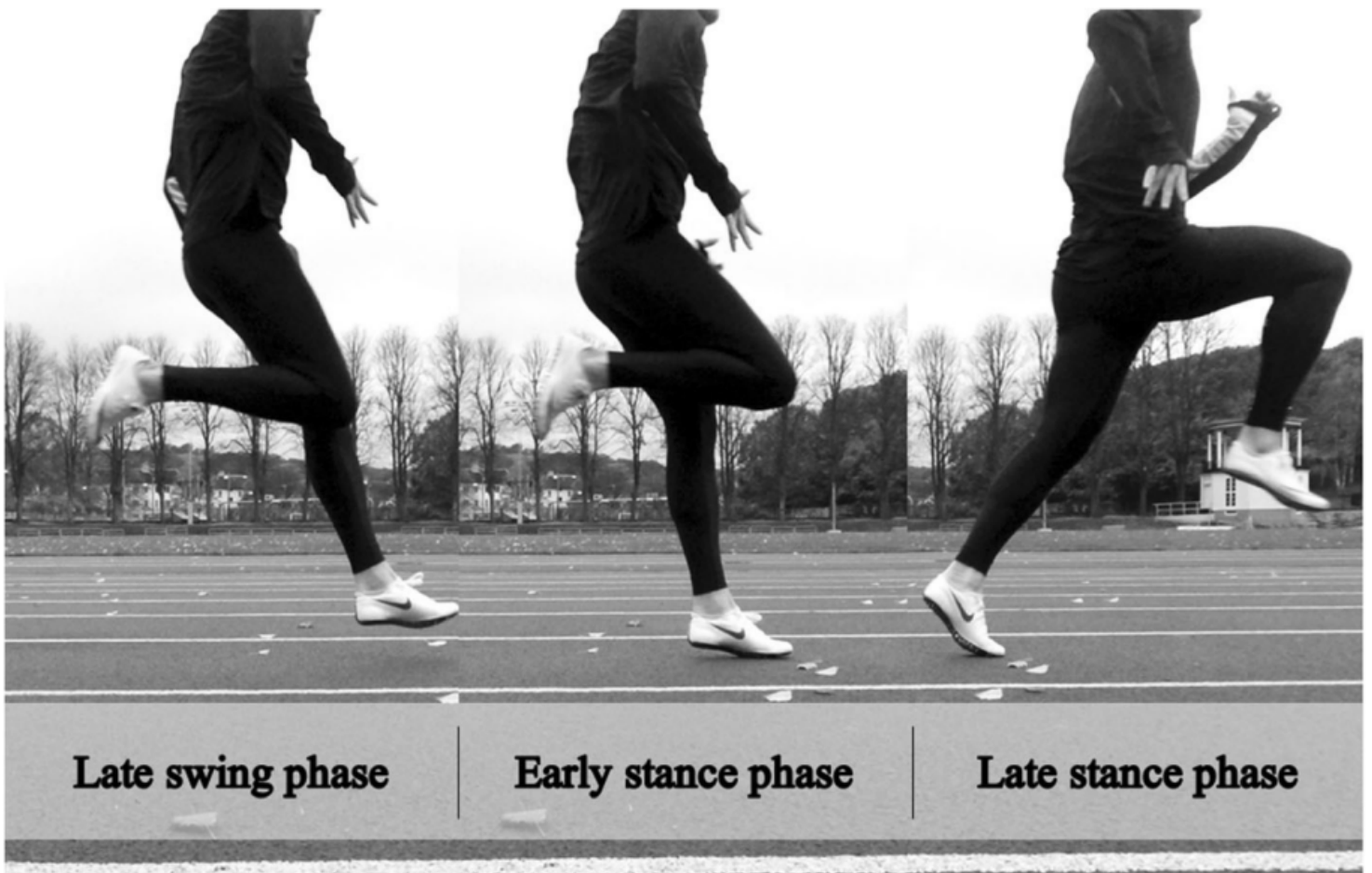
Nordic hamstring exercise preferentially **recruits the semitendinosus (ST)**

These findings have **implications for strength training** interventions aimed at **preventing hamstring injury.**

# MECHANISM OF HAMSTRING INJURIES

[Click for Full Text](#)  
[\(Danielsson et al.](#)  
[2020](#)

This systematic review investigated the hamstring injury mechanism as hamstrings are among the most common injury in sport, and lead to time lost.



# KEY FINDINGS

2372 articles screened & 26 met inclusion criteria.

Studies **stratified to the mechanism of hamstring injury:**

Stretch-related injuries.

Kinematic analysis.

Electromyography-based kinematic analysis.

Strength-related injuries.

**All studies** which reported the **stretch-type injury mechanism**, concluded that injury occurs due to **extensive hip flexion with a hyperextended knee**.

The vast majority of studies on injuries during running concluded that:  
Hamstring **injuries occur during the late swing phase** of the running gait cycle.

## MAIN TAKEAWAYS

A **stretch-type injury** to the hamstrings is caused by **extensive hip flexion with an extended knee**.

Hamstring injuries **during sprinting** are most likely to occur due to:

**Excessive muscle strain** caused by **eccentric contraction** during the **late swing phase** of the running gait cycle.



# SINGLE-LEG BRIDGE TEST TO PREDICT FOR HAMSTRING INJURIES

[Click for Full Text](#)  
[\(Freckleton et al.](#)  
[2014\)](#)

This research examined if reduced hamstring muscle strength assessed with the single leg hamstring bridge (SLHB) was a risk factor for hamstring injury.



Completed for Max Reps

**482 soccer players included.**

**28 hamstring injuries** (16 right and 12 left) were sustained during the playing season.

## **Right Hamstring Injuries:**

Had a significantly lower right SLHB score.

Happened more likely in older, vs younger players.

More likely to have previous right hamstring injury or right knee injury.

## **Left-sided Hamstring injuries:**

More likely to be left leg dominant.

More likely in older athletes.

History of left hamstring injury.

# MAIN TAKEAWAYS

A **reduced preseason single leg hamstring bridge (SLHB) score** was identified for players who sustained a right-sided hamstring injury.

The number of repetitions on the SLHB was **negatively correlated with age**.

SLHB scores were **lower in those players who had sustained a knee injury or hamstring injury** in the past.

SLHB test could be used to **screen and identify athletes who are potentially at risk of sustaining a hamstring injury**.

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