

## Hamstring injuries are a pain in the butt

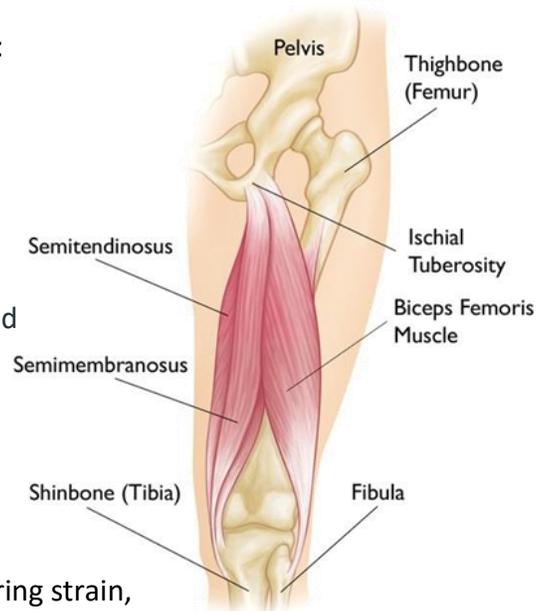
by James Wolf, PT, DPT

Strained (pulled) hamstrings are a common injury among both recreational and competitive athletes participating in sports that require repetitive sprinting activities. Because a mild strain can sideline an athlete for at least two weeks and re-injury rates are high, it is important to properly manage this injury so it does not become a chronic or recurrent issue.

The hamstring is comprised of a group of muscles including:

- Semitendinosus
- Semimembranosus
- Biceps femoris

They originate from the ischial tuberosity of the pelvis beneath the gluteus medius muscle (buttock) and run down the back of the thigh to cross the knee joint and insert to bones in the leg below the knee. The hamstring muscle fibers attach the bones on both ends through their tendons composed of tough collagen. The hamstring muscles function to allow the knee to flex (bend) and extend (straighten) the hip.



Previous injury is the greatest risk factor for another hamstring strain, and re-injury rates are reported to occur 30 percent to as high as 60 to 70 percent in some studies. The most common mechanism for athletes to strain their hamstring muscle is while sprinting or kicking. As the leg swings forward rapidly with kicking or sprinting, the hamstring fires eccentrically to slow your leg down at the end of the stride or kicking movement. Powerful eccentric contraction of the hamstring muscle typically results in strain (tearing) at the muscle tendon junction with limited separation, bleeding and inflammation at the site. Several factors can make you more susceptible to this injury including inadequate warm-up, cold weather, muscle fatigue, poor flexibility and poor body mechanics. The other way people hurt their hamstring is overstretching it as the result of a fall. Overstretch injuries are less common but frequently more severe and may result in proximal avulsion (pulling off) of the hamstring tendons from the ischial bone of the pelvis.

When a hamstring is strained, you typically feel an immediate pain and sensation of tightness in the back of your thigh generally just below the buttock, but may extend down the leg or even behind the knee. Bruising, a large area of tenderness, limping while walking, or prolonged weakness suggest a more severe injury. "PRICE," which stands for Protection, Rest, Ice, Compression and Elevation, is the first step to managing any hamstring strain. Hamstring strains at the muscle-tendon

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junction respond well to simple, nonsurgical treatments. You should not stretch the injured muscle for the first six days and avoid intentionally heating it for three days. As with any injury, if it does not improve within a week, or if any of the symptoms worsen, you should be examined by an experienced medical professional. Proximal hamstring avulsions from the pelvic bone often require surgery within a few weeks. Delays in a diagnosis can result in retraction of the muscle, inability to primarily repair the tendon and permanent pain and hamstring dysfunction that prohibits running.

There are other nonsurgical methods that have been tried but are not supported by quality research. If you watch the news or follow injury reports on professional athletes, you certainly will hear about a variety of alternative treatment options used on professional athletes. These include steroid injections and platelet-rich plasma (PRP) injections. Steroid injections typically are not recommended and are controversial. It is not clear that PRP injections are of benefit in terms of faster return to play or to reduce the risk of re-injury. Other nonsurgical treatments including low-intensity, pulsed ultrasound, therapeutic laser and extracorporeal shockwave treatment are modalities that also are not supported by evidence-based research. The key to recovery is an accurate and timely diagnosis followed by proper treatment and physical therapy.

For hamstring muscle tendon strains, complete rehabilitation and careful progression through the three phases of rehab are crucial to reduce your risk of re-injury and ensure you fully recover before returning to running or sports. These phases consist of:

- **Phase 1**  
Focuses on protecting the injury and minimizing muscle atrophy. It can include activities like stationary bike, planks, bridges, and single leg balance. You must work in this first phase until you can walk and jog slowly without pain in addition to regaining 50 percent isometric strength.
- **Phase 2**  
Focuses on regaining strength throughout the entire range of motion. This phase includes activities like side shuffles, bridge walkouts, lunges, and single leg deadlifts. Progression to Phase 3 can occur once you are able to jog at a moderate speed pain-free and demonstrate full isometric strength.
- **Phase 3**  
Involves more dynamic activities and mimics sporting movement. Eccentric strength, which is controlled lengthening of a muscle, is a critical component of this final phase before returning to sports. Return to sports can be considered once you have full strength, full range of motion, no pain, and less than 10 percent difference in side-to-side hamstring strength.

Whether you have had a previous hamstring strain or not, the best thing you can do is try to prevent this disabling injury. In addition to a proper dynamic warm up prior to participating in running or sporting activities, hamstring stretching and eccentric hamstring strengthening have been proven to reduce the risk of a hamstring strain. Careful progression of eccentric strengthening with exercises such as the kneeling Nordic hamstring exercise (see next page) can help reduce the

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risk for injury as compared to a standard strengthening program. This is a very challenging exercise and an appropriate progression typically involves two sets of five repetitions the first week, then slowly progresses to three sets of eight repetitions by the fourth week. **HOWEVER, performing this exercise in-season without sufficient pre-conditioning and time to recover (more than two days) before the next competition, practice, etc., may over train the hamstrings and predispose them to injury.**

If you are looking to stay healthy and reduce your risk of injury (or re-injury) as you return to your favorite sport this spring, take care of your hamstring so that you can enjoy your activity all season.

### Kneeling Nordic Hamstring\*

Repetitions	Sets	Rest Time	Days per Week
5	2	1 minute	1



1. Begin in a kneeling position as shown above.
2. Have a partner hold both of your ankles firmly on the ground.
3. Place both your arms in front of your chest and slowly begin to lower your body to the ground. Do not allow yourself to drop. Lowering should be slow and controlled.
4. Keep your back straight and avoid bending at the waist.
5. **USE YOUR ARMS TO PUSH YOURSELF BACK INTO THE STARTING POSITION.**
6. Repeat exercise to complete repetition recommendations above.



Based on his research and expertise, Dr. Steven Chudik and his health performance team specially designed an in-season strength and conditioning program to help prevent ACL and hamstring injuries. It is simple but sufficiently efficient to fit into the regular season practice schedule. Incorporating plyometrics, agility, single leg strength, core and flexibility exercises into regular practice, better prepares athletes to compete at their best and helps minimize the risk for injury. Download a copy of this in-season program at: <http://www.otrfund.org/sports-performance-programs/>.