

Preventing Hamstring Injury in Sports

by Dave Moore, MS, CSCS

That nagging hamstring injury

Strains or sprains to the hamstring muscles have to be one of the most debilitating and more prominent injuries in sport. In fact I have been keeping an eye on the NFL injury report and keeping track of what type of injury exists the most. It appears that almost half of the injuries that keep players out of line-ups and are on the injured list are hamstring injuries!

Hamstring strength versus quadriceps strength

Unfortunately, strength coaches, athletic trainers, and athletes see this injury as "just one of those things" and almost accept it as part of the game. However, I don't believe we should just chalk-up hamstring injuries as "just part of the game". After discovering hamstring injuries were so common, I searched for some reasons as to why the hamstring muscle would strain. My search first led me to the knowledge that muscular imbalances played a strong role in predisposing an athlete to injury. It appears that differences in quadriceps-to-hamstring strength ratios are strong indicator for possible injury. If an athlete's quadriceps are far stronger than their hamstrings, they could face possible injury of the hamstring muscle.

Left leg versus right leg

Another precursor to hamstring injury was the strength differences from the left leg to the right leg. If an athlete's dominant leg is far superior in strength than their left, they could someday experience a debilitating hamstring injury.

Athletes have 1:1 strength ratio for hamstrings: quadriceps

Before I became Strength Coach I worked for years as a physical therapy assistant. In the physical therapy clinic we use what was called a "LIDO Computer Analysis System" to measure leg strength of patients. After performing hundreds of these "LIDO" tests I discovered some interesting trends. I found that the more athletic talent the individual had (in speed, power, strength and etc.) the closer their hamstring strength-to-quadriceps strength ratio came to be 1:1. In other words, the hamstrings were almost as strong as the in the athletes that demonstrated the most speed and athleticism.

Quadriceps over-trained in most people

I noticed something else in the physical therapy clinic. I saw most people carry a majority of their body weight on the front part of their legs (quadriceps). I determined this by the fact that most people have trouble performing even the most basic body-weight squat with proper technique. This is an indication that the hamstring and gluteus muscles are weak. Or, at least much less than the quadriceps muscles.

Practice running at top-speed

Because most sports require more agility and coordination than flat-out maximum speed, a large number of athletes run at 75-85% of their maximum ability most of the time. Really, think about it for a moment, how many athletes' practice running as fast as they can on a daily basis? Not volleyball players, a basketball court is too short to get to maximum speed, and tennis requires little top-speed sprinting. In sports such as soccer, lacrosse, and football we see more injuries because these sports require longer bouts of flat-out-100% to sprinting speed. And, if the athletes in these sports don't practice running a full speed on a regular basis, they are at risk of straining their hamstring muscles. Not only will running at top speed reduce the likelihood of injury; it will also help you become faster.

It seems that only every once-in-a-while an athlete does kick-it into high gear. And that seems to be when "snap"; there goes the hamstring. I believe that most running that athletes do in conditioning and practice is sub-maximal (say 80-90% of top speed). Sub-maximal running uses

primarily the quadriceps and gluteus muscles. Specifically, the hamstring muscles aren't used entirely until you are at flat-out top speed. And since many athletes don't practice at that speed, they often injure their hamstring during games. Of all the athletes you know who have pulled hamstrings, how many of them did it during a game?

Hamstring is the weak link

Something else to keep in mind is the fact that hamstrings are usually the muscle to strain first is an indication that the hamstring is the weak link during sprinting. Moreover, research indicates that hip extension (from the hamstrings) is the vital element in maximum sprint speed. You see, I believe the hamstrings work as a hip extensor of the leg and not as a knee flexor. However, most coaches and athletes think that the best way to strengthen the hamstring is by hamstring (or, leg) curls which is a knee flexor exercise.

Squats, Stiff-Legged-Dead-Lifts, or Leg Curls?

Which is the best way to strengthen the hamstring muscles; Leg Curls, Stiff-Legged Dead Lifts (SLDL), or Squats? Researchers looked at the EMG activity (how many muscle fibers used) of the hamstrings during Squats and found that Squats strengthen primarily the quadriceps and gluteus muscles. Leg Curls and SLDL's yielded the most hamstring muscle activity in comparison to the Squat exercise. Therefore, since I believe the hamstrings act as hip extensors (and not knee flexors), I use SLDL's to strengthen the hamstrings of my athletes. For beginners, I have them perform Good Morning exercises before advancing to SLDL's. One side note, I NEVER have athletes perform Leg Extensions. Reason #1- the quads are over trained in most athletes and reason #2- this movement places too much stress on the patellar tendon.