

Hamstring Strains

by Dr. Ken Sheridan

You wake up at o-dark thirty and pile the kids in the car, can't find a parking space and arrive at the starting line late. No warm-up for you!!

Bang!

The gun goes off, and off you go, barreling down the starting shoot at the local 5K in hopes of avoiding the thunderous horde behind you (ok, maybe a bit melodramatic). You hit the first hill and feel a twinge behind your right thigh. You've "pulled a hammy." Congratulations, you are now officially a runner.

Unfortunately, pulled hamstrings are an all too common occurrence that tends to linger for prolonged periods and doesn't go away simply by resting the area. You need to be pro-active in both caring for and preventing hamstring strains.

The hamstring muscle group is made up of three muscles and is located on the posterior aspect of the thigh. These muscles work together and opposite (antagonistic to) the quadriceps muscle group located on the front of the thigh. The hamstring group crosses both the hip and knee joints, producing hip extension (backwards) and knee flexion (bending) (fig. 1). When running, as the lead leg kicks out in front (fig. 2), the hip goes into flexion while the knee straightens and goes into rapid extension. Both of these motions are opposite those the hamstrings create. This stretches the hamstrings across both joints, then, at the last minute the hamstring has to contract quickly to halt the forward momentum of the foot and leg. This stretch and quick contraction is the most common portion of the gait cycle for hamstring strains.

Hamstring strains are associated with poor flexibility, inadequate warm-up, fatigue, deficiency in the reciprocal actions of opposing muscle groups and imbalance between quadriceps and hamstring strength. Let us take each case individually.

Poor Flexibility

Hey, take the time and start stretching more! A lot of people stretch only after exercise, which is OK if you're not injured or dealing with a chronically tight muscle. For problem muscles (anywhere), you are much better off stretching one repetition, 30-60 second hold time, every 90 minutes throughout the day. Another problem with stretching the hamstrings is that most people do it by bending forward, either while standing or seated on the floor. People with loose lower back muscles (occurs with people who sit a lot), can touch their toes by stretching out the lower back muscles and not the hamstrings. The stretch in figure 3 takes the lower back out of the picture.

Inadequate Warm-up

We've all been in the situation where we're running late to meet friends for a group run or getting to a race start late, making a warm-up impossible. The key here is to start at slower than normal pace and give your body a chance to warm up. This is particularly important when

adrenaline levels are high at a race start, or when running a hilly course, especially out your front door. Once you have broken a sweat, you can consider yourself warmed up, until then, start at a slow run or even a brisk walk if going up hill.

Fatigue & Hamstring/Quadriceps Strength Imbalances:

These two issues are related to each other. The hamstrings and quads are called "antagonistic muscle groups," meaning that they work against each other. Quads flex the hip, and hams extend the hip; quads extend (straighten) the knee, and hams flex (bend) the knee, etc. When running, and with most lifting exercises, the quads tend to be stressed more than the hamstrings, and thus tend to get stronger than the hamstrings. For the hamstrings to bend the knee, for example, they have to overcome any opposing force created by the quadriceps muscle group. Studies show that there is increased predisposition for hamstring strain if the hamstring strength is only 50% of the quadriceps strength. Such an imbalance will also lead to early fatigue of the hamstrings, especially on hilly terrain. You can test this on knee extension vs. knee flexion machines, available at almost every health club out there. Try to keep the hamstring strength between 60 and 75% of the quadriceps strength.

Deficiency in the Reciprocal Actions of Opposing Muscle Groups

This is a complicated way of saying there is un-coordination between the quads and hams. What often happens is that part of the hamstring muscle group is turned on when it is supposed to be (when flexing the knee/extending the hip), but will not turn off when it is supposed to. As antagonistic muscle groups, when the quads turn on they are supposed to signal the hamstrings to turn off. Very often part of the hamstrings do not turn off, and work directly against the action of the quadriceps' mechanism, easily being overburdened and torn. Coordination exercises such as single leg squats (Fig 4) help re-coordinate the functioning of the hams and quads.

These are just the basics behind hamstring strain causes and prevention. If you have tried these regularly to no avail, seek out a sports medicine specialist who can take a look at the whole kinetic chain (from foot to back) and treat the whole system. While treating symptoms locally will help the acute stage, getting rid of a chronic/recurrent condition will require a more global viewpoint and treatment plan.

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