# Lower Extremity Stretching Program for Endurance Runners

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Running is a popular sport performed by individuals of all skill levels. Athletes who train for endurance races (5k or more) may be at risk for certain lower extremity overuse injuries. Running athletes should be aware of risk factors that may contribute to the development of an overuse injury.

## Risk Factors

Training errors such as excessive changes in mileage or training intensity, wearing improper footwear, or running on uneven surfaces may lead to stress fractures, medial tibial stress syndrome, muscle strains, Iliotibial band syndrome (IT Band), or tendonitis (2).

Lack of flexibility may contribute to some muscle related running injuries. In one study, researchers found that runners tend to have tighter hamstring and soleus (calf) muscles than non-runners (3).

Avoidance of training errors, maintaining or improving flexibility, and increasing core and lower extremity strength may help reduce your risk of experiencing an injury due to running. This article will feature a lower extremity stretching program for the endurance running athlete.

If you experience an injury related to running, consult with your physician. If appropriate, you may benefit from treatment and video running analysis performed by a sports physical therapist.

## Stretching

Current research recommends that you perform your static stretching routine at the end of a workout (1). When stretching, ease gently into each stretch, maintaining the hold for 30 seconds. Holding each stretch for 30 seconds is generally considered to be more beneficial than shorter time periods. This particular program does not promote the use of ballistic (bouncing) stretching.

**Figure 1. Hamstring Stretch**

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### Hamstrings

The hamstrings consist of 3 muscles arising from the posterior portion of the pelvis with attachments to the femur and tibia. Stretching the hamstring muscles can be performed in many positions. When in a supine position, place a rope (8 ft) around your foot and pull your leg up while keeping your knee straight. Try to pull your toes towards your face (Figure 1). The hamstrings may also be stretched while sitting. As you lean forward to increase the stretch, do so from the hip versus rounding your low back (Figure 2).

### Piriformis

This muscle originates on the pelvis (sacrum) and attaches to the femur. The Piriformis is often tight and painful in athletes with low back or hip pain. The Piriformis can be stretched in multiple positions. Lay on your back with knees bent and one leg crossed over the other (Figure 3). Pull your top knee across the body towards the opposite shoulder. The Piriformis can also be stretched by placing one foot on the opposite knee and pushing your top knee away from the body (Figure 4).

### Hip Flexor Stretching

The Iliacus and Psoas Major are stretched when you perform this exercise (Figure 5). The "Iliopsoas" group arises from the spine and pelvis and attaches on the femur. Place your knee on the ground slightly to the rear of the body. The other leg is in a 90-90 position. Lean forward with the lead leg while maintaining proper torso posture. Performing an abdominal brace (gentle abdominal isometric contraction) will help you to maintain an upright torso. You will feel the stretch in the anterior portion of the hip or thigh of the back leg.

### Quadriceps

The quadriceps (4 muscles) is made up of the Rectus Femoris, Vastus Lateralis, Vastus Medialis, and the Vastus Intermedius. To effectively stretch this muscle group, grab your foot, bringing your foot toward your buttock (figure 6). If you are unable to maintain your hip and back in alignment, use a towel or rope around the ankle to assist with knee flexion.

**Figure 2. Sitting Hamstring Stretch**

**Figure 3. Piriformis Stretch**

### Calf

The calf is made up of the "deep" soleus muscle and the superficial gastrocnemius. The gastrocnemius arises from the femur while the soleus originates on the tibia. Both muscles connect to the heel bone (calcaneus) via the Achilles tendon. The classic runner's stretch with the rear leg extended stretches the gastrocnemius (Figure 7), whereas bending the rear leg at the knee increases the stretch on the soleus (Figure 8). Each stretch should be performed with shoes on and both feet pointing forward.

### Tensor Fascia Latae/ IT Band

The IT band extends from the Tensor Fascia Latae (TFL) muscle, running along the lateral thigh and inserting at the knee. To stretch the TFL stand next to a wall and cross your outside leg over the inside leg. Lean your hips toward the wall making sure not to twist or arch the back. You should feel a stretch down the outside of your leg (Figure 9).

## Conclusion

The stretching program developed in this article provides runners with a comprehensive flexibility program for the lower extremities (Table 1). A NSCA certified strength and conditioning specialist (CSCS) could provide individualized training recommendations based upon one's flexibility status.

## References

1. Nelson AG, Kokkonen J, Arnall DA. (2005). Acute muscle stretching inhibits muscle strength endurance performance. *Journal of Strength Conditioning Research.* 19(2): 338 – 343.

2. O'Toole ML. (1992). Prevention and treatment of injuries to runners. *Medicine & Science in Sports & Exercise.* Sep; 24(9 Suppl): S360 – S363.

3. Wang SS, Whitney SL, Burdett RG, Janosky JE. (1993). Lower extremity muscular flexibility in long distance runners. *Journal of Orthopaedic and Sports Physical Therapy.* 17(2): 102 – 107.

**Figure 4. Piriformis Stretch 2**

**Figure 5. Hip Flexor Stretch**

## About the Author

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**Table 1.**

| Stretching Program | |
|---|---|
| Perform after running. Perform each stretch on each leg | |
| Calf | |
| Soleus | 2 x 30 seconds |
| Gastrocnemius | 2 x 30 seconds |
| Quad Stretch | 2 x 30 seconds |
| Hip Flexor Stretch | 2 x 30 seconds |
| Piriformis | 2 x 30 seconds |
| TFL | 2 x 30 seconds |
| Hamstring | 2 x 30 seconds |

**Figure 6. Quadriceps Stretch**

**Figure 7. Gastrocnemius Stretch**

**Figure 8. Soleus Stretch**

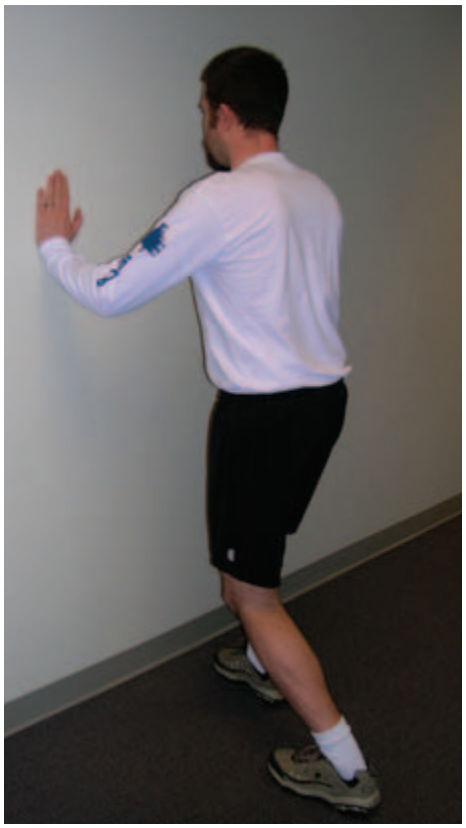

**Figure 9. TFL Stretch**