

ACL Injury Prevention Training for Young Athletes

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ACL injury is devastating to a young athlete, virtually always requiring surgery, and at least 4 to 6 months of rehabilitation before returning to a competitive level. Nearly 80% of the time, injury occurs without contact from another player (1). In other words, at a high speed, the muscular system failed to protect the knee joint adequately, excessive stress was transferred to the ACL, and it simply snapped.

Females are at an even greater risk than males, injuring their ACLs at six times the rate of males (2). There are numerous theories as to why this occurs including hormone estrogen level (3), anatomical differences related to pelvic structure (4) and the smaller size of the female ACL coupled with a narrower notch where it attaches on the femur (5).

Recently, research has shifted focus to the movement patterns and training techniques of the male and female athletes. From that research, some startling discoveries have been made.

In a landmark study in 1996, female athletes were found to have a marked imbalance of the strength and power between their hamstrings and quadriceps as compared to males (6). Because of this imbalance, forces within the knee when decelerating from a jump or sprint were much higher in those athletes with less active hamstrings (6). Studies have shown that the hamstrings play a pivotal role in stabilizing the knee and protecting the ACL when the knee is bending while decelerating (6-8).

What is most exciting is that these studies, along with others, have found that training to correct this imbalance appears to result in a lower incidence of ACL injury (9,10)

At Seneca, through our [Beyond Fitness](#) program, we have taken this research a few practical steps further. We recognize that in normal, efficient sports movement mechanics, **the hip joint should take the majority of the stress of deceleration**. In other words, athletes who frequently injure their knees, generally over-use their knees and under-use their hips.

If you watch a mature, seasoned, well-trained athlete move, you will see them move through their hips quickly and efficiently. This means that the athlete dominates with his or her hamstrings and gluteals (which cross the hip) more so than the quadriceps (which for the most part does not cross the hip). This goes beyond strength, and has more to do with what part of the body the brain tells to stress first and stress most. **A young athlete at risk will often over-flex the knees during movement. This can be seen by the knees translating far in front of the feet when decelerating, landing and squatting.**

I have included 3 exercises that are designed to teach the hamstrings and gluteals to be more dominant, thereby **creating movement patterns in the athlete which will allow forces to be decelerated at the hip and less at the knee**. This is accomplished by emphasizing the hamstrings and gluteals.

While these are very basic exercises and represent only a fraction of a thorough ACL injury prevention program, they provide an excellent beginning foundation.

THE SQUAT

This is one of the most important movements in sports. If an athlete cannot perform this correctly, he or she will be unable to use the hips efficiently, placing entirely too much stress on the knees.

Squat down to the floor as shown. Have someone watch to make sure your back is straight, you are bending at the hips, and that your knees do not go in front of your toes. Keep your head over your feet.



Do 20 correct repetitions of this each afternoon and each night, for a total of 40 each day. You should feel this primarily in your hamstring (back of the leg) and gluteal (buttock) region, but not get overly fatigued there.

Stop if you feel this in the knees at all or if all the fatigue is felt entirely in the quadriceps muscle (front thigh). Have someone else look at the picture and watch you at the same time to critique your form.

LATERAL LUNGES

The lateral lunge forces the athlete to decelerate movement through one hip at a time, placing greater emphasis on the gluteals and hamstrings. It also trains the young athlete to move correctly in the lateral direction, where many injuries occur.

Step to one side and squat toward the floor. **Drop your hip down and back.** Let your trailing leg relax and lag behind as shown. Keep the back straight and **your knees behind your toes.** Get down toward the floor by dropping and bending your hip. Hold for one second. You should feel this mostly in the hamstrings and gluteals. Stop if you feel anything in the knee joint itself.



LATERAL BOUNDING

The next step is to take the lateral lunge and turn it into a ballistic training exercise. Lateral bounds train the hamstrings and gluteals to decelerate the body at real-time speed, making it a very functional ACL prevention exercise. And because the ankles are involved in slowing the momentum of the lateral movement, this becomes an excellent ankle sprain prevention exercise as well.

Lateral bounds are performed by hopping from one foot to the other in a quick motion, with very little ground-contact time. Imagine you are bouncing from one trampoline to another. The same form applies - **knees should not be in front of the toes when landing.** Keep the back straight and bend at the hips. Landing should be soft and quiet with minimal ground-contact time (see movie below).

Try doing two sets of 20 to 30 seconds with a one-minute rest in between. As with the previous two exercises, it is important that you feel this in the hips, hamstrings and/or gluteals and NOT in the knee or too much in the quadriceps.

