

Addressing the ACL

Ways to help prevent soccer's most dreaded injury

By Jeremy Boone

The prevention of anterior cruciate ligament (ACL) tears was a hot topic at the 2006 NSCAA Convention. In fact, a total of four presentations (two field sessions and two classroom sessions) focused on this problem. For those coaches who were unable to attend, here are some of the highlights from the presentation titled "How to Prevent the Most Feared Injury in Soccer."

Some facts and figures regarding ACL injuries:

- An ACL tear does not necessarily mean something is wrong with specifically the ACL
- Female athletes have a four to six times greater chance of ACL injury than males*
- Estimated 30,000 ACL tears in young female athletes per year*
- Average surgical cost is \$24,000 for a total of \$720 million annually based on the above figure*
- Male versus female force production potential begins to significantly differ during puberty*
- If an athlete has an asymmetrical lower extremity muscle weakness of 15 percent or greater, he/she is 2.6 times more likely to suffer a leg injury*

What is the role of the ACL?

In virtually every traditional textbook definition, the role of the anterior cruciate ligament is to prevent anterior translation of the femur on the tibia. In layman's terms, this means that during a stopping motion when the foot hits the ground, the thigh does not continue to move forward while the lower leg stays still.

However, if you look at the ACL in Figure 1 during knee flexion, you will notice that the ligament also is twisted. Therefore, a more expanded role of the ACL is to aid in deceleration in all three planes of movement. In fact, the ACL is most at risk of injury when the knee is hyper-extended, the foot is externally rotated and the thigh is internally rotated.

Risk factors of ACL injuries in female athletes

There are numerous factors that contribute to ACL injuries, including structural, environmental and hormonal. Each of these categories is uncontrollable and some may still be inconclusive as to positive risk factors. However, the following list focuses on neuromuscular variables that can be manipulated and addressed with proper training:

1. Females tend to be more quad dominant

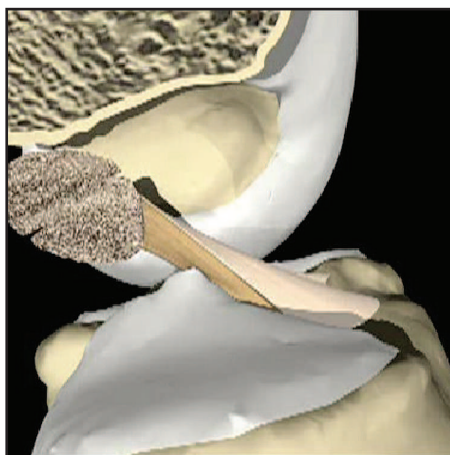
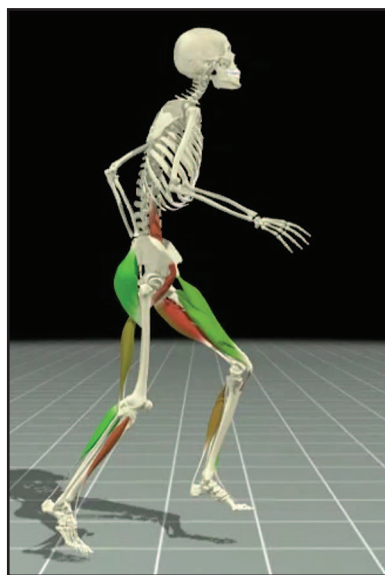


Figure 1 (above) shows how the ACL is twisted when the knee is in flexion. The anterior cruciate ligament should be the last measure of protection during rapid deceleration in all three planes of movement. The foot, hip and trunk all play key roles, as shown in Figure 2 (below).



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2. Females absorb up to five times their bodyweight upon ground contact versus males who absorb up to two and a half times their bodyweight
3. Females tend to have a greater leg dominance, which may lead to 2.6 times greater likelihood of injury

The big question then is whether or not ACL injuries be prevented. According to Dr. Tim Hewitt of the University of Cincinnati College of Medicine, 50 percent of the ACL risk factors can be decreased while up to 90 percent of performance factors can be increased with a proper training program administered.

A new perspective on ACL injury prevention

Almost all of the research on ACL injury prevention focuses on preventing the knee from driving down and in during landing or cutting movements. While this strategy is critical to include in a player's training program, the question of can the knee return back to where it came from is equally important. Addressing this question can provide the coach/trainer insight when evaluating the knee as well as provide guidance when designing an injury prevention program.

Teammates of the ACL

If the body is functioning properly, the ACL should be the last measure of protection during rapid deceleration in all three planes of movement. We must look at the contributions of the foot, hip and trunk during deceleration in order to better understand their role in injury prevention. In other words, addressing any weakness or instability in these areas is critical in a training or rehabilitation type program.

Common questions may address calf tightness, hip instability, hamstring weakness,

hip flexor tightness and core stability issues. If any of these are present, then a player is at a higher risk of an ACL tear. Figure 2 shows all of the muscles that are active during deceleration type movements. Notice that this includes just about all of the muscles in the lower extremity.

How can coaches implement an ACL prevention program?

In a recent study, Hewitt summarized his last six years of ACL research and concluded the following:

- Training programs must occur more than once per week
- Training programs must last a minimum of six weeks
- Training programs must include balance, plyometric, and strength oriented activities

Here are a few practical suggestions for implementing an ACL Prevention Program in a youth team setting. The specific program will vary depending on the number of practices per week and length of time of each practice.

- Teach players proper deceleration mechanics. The emphasis is on bending at the ankle/knee/hip complex. Include a deceleration progression from a seven-step pattern to a five-step pattern to a three-step pattern
- Include balance, coordination, speed, plyometric (multidirectional jumps and hops) and agility exercises during the daily warm-up. This can include the use of speed ladders, mini-hurdles, medicine balls and mini-bands.
- Include strength-based exercises at the end of practice just prior to a cool-down routine. This can include body weight exercises (single leg squats, lunges, and pushups), medicine balls, weight vests, tubing or dumbbells.
- Include deceleration-focused exercises in your plyometric routine. For example, have your players perform a jump squat while landing on one foot. Keep the hands on the hips, bend at the ankle/knee/hip complex, and come to a complete stop under one second for each rep. This is appropriate for high school age players and up. Ⓢ

*For a list of references contact support@soccerspeedacademy.com.

Jeremy Boone is a nationally recognized soccer performance consultant. For more in-depth information, training exercises, or questions regarding ACL injury prevention strategies visit www.soccerspeedacademy.com.



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