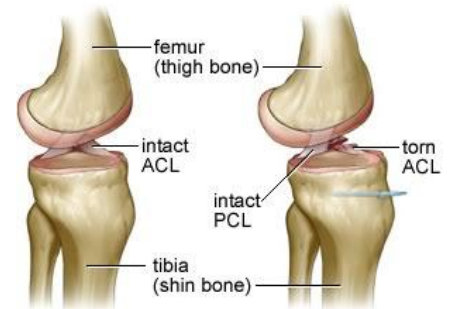


ACL Injury Prevention in High School Athletics

By Robert Silverman, DC, DACBN, MS, CNS, CCN, CSCS, CIISN, CKTP, CES, DCBCN

What is the ACL?

In medical terms, the anterior cruciate ligament (ACL) is the primary restraint to the anterior displacement of the tibia on the femur at all angles of the knee flexor. This means that when the ACL is injured, the shinbone can slide forward on the thighbone, causing the knee to "give way".



The ACL is one of a pair of ligaments in the center of the knee joint that form a cross, and this is where the name "cruciate" comes from. There is both an anterior and a posterior cruciate ligament (PCL). Both of these ligaments function to stabilize the knee from front-to-back.

What causes an ACL injury?

An ACL injury is usually caused by sudden, abrupt change in the force to the knee. This can occur during an unexpected cutting move made during a sporting activity, or during a landing from a jump during a basketball game. Most ACL injuries occur in a non-contact setting and do not involve a collision with another player.



What does an ACL injury mean to an athlete?

When an athlete injures the ACL, it may mean losing an entire season of play. If the injury is severe enough, it could also lead to surgery resulting in long-term rehabilitation, a possible loss of scholarship funding, and emotional and mental impairment affecting the athletes' quality of life¹. ACL injuries could additionally be a lifelong potential for future arthritis in the injured joint.

Why does it occur more frequently in female athletes?

ACL injuries typically occur at a 4 - 6 times higher rate in female compared to male athletes. This may be associated with females being more quadriceps dominant. Another factor may be the decreased neuromuscular performance, and the increased ligamentous laxity during menstrual cycles from the fluctuation of female hormones (i.e. estrogen, progesterone, relaxin). Another possible cause is the decreases in passive and active knee stability in female athletes³. A study in the New England Journal of Medicine⁴ found that there are differences in the leg ailment of males and females where females have an increased rate of knock-knee (valgus deformity). The intercondylar notch-width is smaller in females, thus creating less space for the movement of the ACL, resulting in increased risk of injury.

The National High School Sports-Related Injury Surveillance Study, currently in its fourth year of online data collection spear-headed by Dr. D. Comstock, has found that approximately one ACL tear occurred in every 15,000 times an athlete practiced or competed. On average, athletes are eight times more likely to suffer ACL injuries in competition than practice. Data was collected from a national sample of nine boys and girls high school sports (including football, soccer, basketball, wrestling, baseball, volleyball, and softball)².

3 Most Common Sports for ACL Injury During Practice or Competition²

Girls' Soccer	1 in 6,500 times an athlete practiced or competed
Football	1 in 9,800 times an athlete practiced or competed
Girl's Basketball	1 in 11,000 times an athlete practiced or competed

Football had a lower number of ACL injuries per exposure; however, due to the larger number of players per team, it accounted for 41 percent of all ACL injuries in this study.

Percentage of ACL injuries per sport observed²:

Football	41%
Girls' Soccer	19%
Girls' Basketball	13%
Boys' Soccer	9%

Just in...

The American Journal of Sports Medicine, 2009, concluded that sports injury prevention training program improved strength and flexibility of the competitive female basketball players who were tested, and the biomechanical properties associated with ACL injury, as compared with pre- and post-training parameters in the control group. The clinical relevance is that the prevention program lowered the athletes' risk of injury.

How to prevent ACL injuries

A few of the more important ways to prevent ACL injuries include:

- 1) Plyometric movements to improve lower body coordination, and endurance
- 2) Agility drills to improve lower body agility
- 3) Core stability. The core is the first to fire/activate, therefore stabilizing it allows the head and limbs to move appropriately and safely
- 4) Dynamic neuromuscular and proprioceptive training - these are shown to increase knee stability and decrease knee injury rates in athletes
- 5) Strengthening with weight resistance:
 - a. Improves quadriceps to hamstring strength ratio - especially in females
 - b. Sport-specific training
 - c. Strengthen the surrounding musculature around the hip, knee, and ankle
- 6) Single-leg strength - F.I.T.
 - a. Fierce glute function (especially the medius)
 - b. Incredible 1-leg strength
 - c. Terrific deceleration capabilities

The Super-6 ACL Prevention Exercises

BY Sam Patierno, CSCS



Single-Leg Stiff Legged Dead Lift

- 1) Stand on 1 leg, holding weigh in both hands
- 2) Keep back flat, lean forward at hips and lift free leg to the rear, in line with the torso
- 3) Touch weight to the ground
- 4) Return to starting position



Bosu Plank

- 1) Keep back flat and form straight line from head to heels
- 2) Tilt pelvis and contract abs
- 3) Hold for 20 - 60 seconds



Glute-Ham Raise

- 1) Raise, or extend hips until torso's perpendicular with legs
- 2) Raise body by flexing knees
- 3) Lower body until horizontal by straightening knees
- 4) Repeat



Squat

- 1) Head straight, arms overhead
- 2) Feet pointing straight or slightly toed-out
- 3) Feet slightly wider than shoulder-width apart
- 4) Knees in line with toes
- 5) Squat back, not down



Seated Leg-Curl

- 1) Seated vertical, back flat, chest out
- 2) Place lower calves over pad with legs out in front
- 3) Brace upper body, use handles to assist
- 4) Without moving back or hips, pull the pad down and back as far as you can
- 5) Slowly return to starting position



Squat Jump

- 1) Start the same as the squat, descend slightly above parallel
- 2) Propel body upwards to max height
- 3) Land in similar position, soft on knees

Note: Do not adduct knees (bringing knees together) upon landing

Reference:

- ¹ Giugliano & Solomon, 2007; Parkkari, et.al., 2008
- ² Dr. D. Comstock, Weekly Blog, Training & Conditioning.com
- ³ American Journal of Sports Medicine, 2009, vol. 3, no. 6: pg. 1169-1177
- ⁴ New England Journal of Medicine, Nov. 13, 2008, vol. 359: pg. 2135-2142

See ad on pg.

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