



What are ACL injuries?

The anterior cruciate ligament or "ACL" is located inside the knee joint. Along with the posterior cruciate ligament, the ACL controls the back and forth motion of the knee and provides stability.

Many athletic moves can cause ACL tears and sprains: changing direction quickly, slowing down or stopping, colliding with other players and landing after a jump. Athletes in contact sports like football, basketball and soccer are particularly susceptible to ACL injuries. However, ACL problems are common in many non-contact activities like gymnastics and tennis.

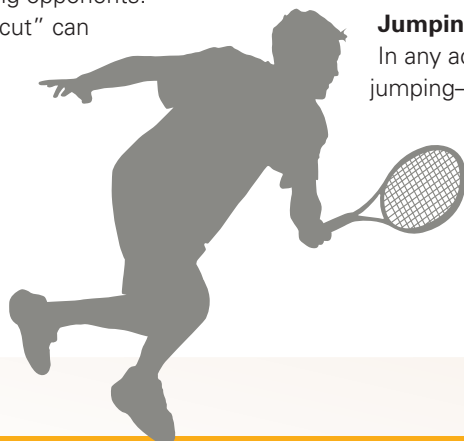
Fortunately, overall fitness, targeted exercises and proper athletic technique can reduce the risk of ACL injuries. What's more, treatment of ACL injuries has improved to the point where more than 90 percent of injured athletes are able to return to their normal levels of activity with relatively short recovery times.



Player Safety

How do ACL injuries occur?

Changing direction rapidly: In games like soccer, football, field hockey, lacrosse and rugby, players need to change direction quickly when running plays and dodging opponents. A rapid turn or "cut" can put extreme pressure on the ACL.



Slowing down or stopping suddenly: Athletes who run then slow down or come to a complete stop increase torque to the knee ligaments.

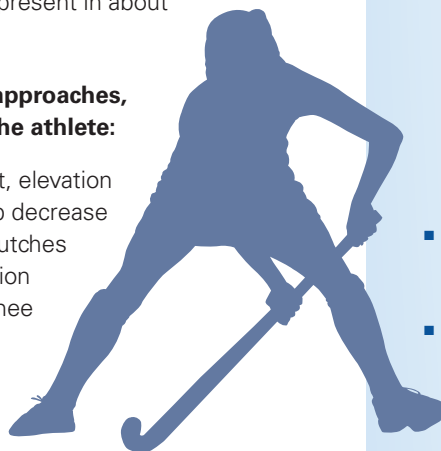
Jumping and landing: In any activity that involves jumping—volleyball, basketball, figure skating, gymnastics—hard or awkward landings can damage the ligament.

Contact and collisions: The ACL is at risk when an athlete's knee is hit by or collides with another player or object. For this reason, ACL injuries are common in all contact sports, including football, soccer, rugby, wrestling and ice hockey.



Diagnosing and treating ACL injuries

- **Some athletes hear a “popping” sound when they sprain or tear their ACL.** Many also feel their knee give out from under them, making them unable to put pressure on the knee.
- **Usually when the ACL is injured, the knee swells and is tender.** In addition, people with injured ACLs can't fully bend or straighten the knee, and they are in great pain when they try to walk.
- **Through a physical examination, a doctor may be able to determine if the ACL is:**
 - **Sprained**, in which the ligament has been stretched but is still stable
 - **Partially torn**, in which the sprain stretches the ligament until it becomes loose
 - **Torn**, in which the ligament has been split in two pieces, and the knee joint is unstable
- **X-rays, magnetic resonance imaging (MRI) and arthroscopy (putting a small camera in the joint) can be used to examine the ACL for possible tears or fractures.**
- **In addition, the doctor will look for other damage.** Injuries to other parts of the knee, such as cartilage, meniscus and other ligaments, are present in about 50 percent of ACL injuries.
- **ACL injuries are treated with non-surgical and surgical approaches, depending on the severity of the injury and the age of the athlete:**
 - **For sprained ACLs**, non-surgical treatments like rest, elevation and pain medications (e.g., acetaminophen) can help decrease pain and swelling. Some patients use braces and crutches when recovering. Physical therapy and range-of-motion exercises that strengthen the muscles around the knee and help bring the joint back to full movement are recommended.
 - **Intra-articular surgery**, in which small incisions are made, is a common procedure. A small incision is made, and “tissue grafts” or pieces of tissue from another part of the body are used to rebuild the knee. An athlete who undergoes “inside the joint” surgical reconstruction for an ACL injury may need six months or more of recovery time before returning to full activity.
 - **A combination of intra-articular surgery and extra-articular surgery** (surgery that takes place outside the joint) is usually performed on young athletes with ACL tears who are still growing and have open “growth plates”—the developing tissue on the ends of long bones, like the tibia and femur. With these techniques, the iliotibial tract (a band of tissue that runs from the lower pelvis to the bottom of the shinbone) is tightened to stabilize the knee. To recover, patients are advised to limit physical activity, walk with crutches and wear a full leg brace for several weeks.



How to reduce the risk of injury

ACL injuries are not entirely preventable. Still, athletes and active young people can reduce their risk by:

- **Maintaining general health and fitness all year round.** Coaches and trainers may work with athletes on the following approaches:
 - **“Plyometrics” or jump training.** For example, jumping off a box and keeping the knees straight can strengthen the muscles around the ACL.
 - **Agility training that focuses on changes in direction**
 - **Exercises that strengthen the hamstring and legs.** (This is particularly important for girls because certain anatomical differences concerning the knee make them five to eight times more susceptible to ACL injuries.)
 - **Flexibility exercises, including stretching**
 - **Training that focuses on balance and positioning** (known as “proprioceptive” training)
- **Following sport-specific conditioning and practicing the movements, forms and techniques unique to your sport**
- **Getting proper nutrition and plenty of sleep** helps keep you strong and alert, which helps to prevent injuries.
- **Using proper sport-specific gear**
- **Playing other sports** (“cross-training”) to give the body a rest and work muscle groups that may not be emphasized in your main sport



**Reviewed by Mininder S. Kocher, MD, MPH,
Boston Children’s Hospital**

This piece is part of an informational series on sports injury prevention produced by the Orthopedic Center/Sports Medicine Division at Boston Children’s Hospital. For materials on preventing injuries in other sports, call 617-355-3501 or visit bostonchildrens.org/sportsmed.



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