



ACL Injury Prevention

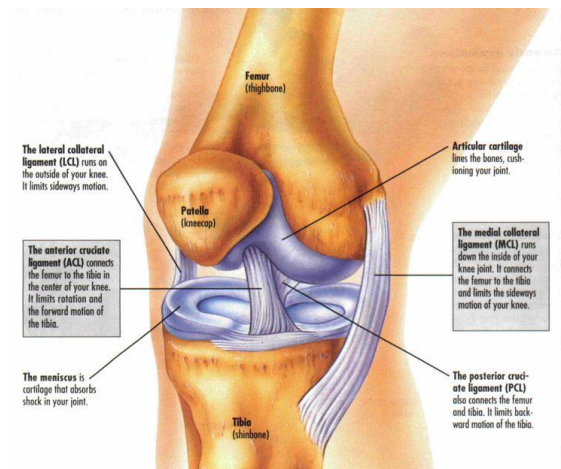
ACL tears are one of the most common injuries in a number of sports including soccer, netball and basketball. Injury to the ACL can be devastating to the athlete, often resulting in surgery, time off the field and extensive rehabilitation.

What is the ACL?

The Anterior Cruciate Ligament is one of the major ligaments of the knee. It is a strong rope like structure that attaches to the femur (thigh bone) and travels within the knee joint to the upper surface of the tibia (shin bone). It forms a cross pattern alignment with its counterpart, the posterior cruciate ligament (PCL).

The function of the ACL is to provide stability to the knee and minimise stress across the knee joint by limiting:

- Excessive forward movement of the tibia in relation to the femur
- Rotational movements of the knee.



How Does Injury Occur?

Most incidents are non-contact, resulting from sudden twisting of the knee when the foot is firmly planted on the ground or landing from a jump involving deceleration at the foot and knee. If an impact injury takes place at the knee, then it is very likely the medial ligaments and the menisci may also be injured in addition to the ACL. When the ACL ruptures you will often feel something giving way in the knee or hear a **popping** sound.

Most people cannot continue with their activity and the knee generally swells up within hours due to bleeding into the knee joint from torn blood vessels in the damaged ligament.

When an ACL injury occurs, the knee becomes less stable. The ACL injury is a problem because this instability can make sudden, pivoting movements difficult, and it may make the knee more prone to developing arthritis and cartilage tears.





Risk Factors of ACL Injury

Did you know females are up to 8 times more likely to suffer ACL tears than male athletes participating in the same sports?!

Other risk factors include:

- Post-pubertal women (due to anatomical, hormonal and neuromuscular factors)
- Hyper-mobility
- Poor landing biomechanics
- Poor trunk stability
- Previous ACL injury



Preventing ACL Injuries

The latest research has shown neuromuscular training to be most effective at reducing the likelihood of ACL injury. This of training addresses muscle strength, power, coordination and activation patterns.

Poor landing techniques (reliance on the quadriceps muscles and deficits in hamstring strength) as well as poor trunk control increase the risk of ACL injury. Neuromuscular training incorporates balance and strength exercises to improve trunk stability, and poor landing techniques by reducing reliance on the quadriceps muscles and increasing hamstrings strength.

Plyometric exercises are explosive movements such as jumping and hopping. They help to develop more powerful muscle contractions by first eccentrically contracting the muscle, and then concentrically contracting the muscle immediately afterwards. This can improve lower limb alignment by reducing excessive knee abduction and flexion when landing, which can lead to ACL injury. Examples include tuck jumps, hops and box drops. These exercises are progressed from two-legged jumps to multidirectional two-legged jumps, to single leg hops and to multidirectional single leg hops. Your physio will guide your progression!



Functional core exercises can improve single-limb postural stability and neuromuscular control. Examples include bridges, lunges, squats with upper body rotation and single leg balance exercises.



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Sports & Injury Prevention

The FIFA 11+ is an internationally recognised warm-up program aimed at reducing lower limb injuries in football players of any age and gender. For more information, visit <http://www.footballaustralia.com.au/article/prevention-the-key-to-injury-reduction-in-oz/4z0bw1k3kysa16287awwtfwn8>

Similarly, Netball Australia have developed the KNEE Program, an on-court warm-up program designed to enhance movement efficiency and prevent injury before playing. Their aim is to reduce ACL injuries in the sport by 70%. For more information, visit <http://knee.netball.com.au/>

Finally, the PEP (Prevent Injury and Enhance Performance Program) has been shown to decrease first time ACL injuries and further injury after reconstruction. The program would be of benefit to players of any sport, and should be incorporated into their training regime at least twice per week. See the image:

*Image obtained
www.justinroe.com.au*

*Information in this newsletter
obtained from Hewett et al 2016*



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Recent studies have documented that the incidence of ACL injury can be reduced by up to 70% with the implementation of a specific warm up program. We have found that the incidence of injury after 12 months from ACL reconstruction is 1% per year for the reconstructed knee and 1% per year for the opposite "normal" knee. This is higher than is seen in the normal population. This incidence is even higher in young patients who have their first injury under 21 years.

The PEP program (Prevent injury and Enhance Performance Program) has been shown to decrease both first time ACL injuries and further ACL injuries after reconstruction. This program is a highly specific session that replaces the traditional warm up. It consists of a warm-up, stretching, strengthening, plyometrics, and sport specific agility training. Athletes can reduce their risk of ACL injuries by performing training drills that require balance, power and agility. Adding plyometric exercises, such as jumping, and balance drills helps improve neuromuscular conditioning and muscular reactions which decrease the risk of ACL injury. It is important to use proper technique during jumping moves (jump straight up and down jumps without excessive side-to-side movement), and aim for soft landings. Optimally the program should be performed at least 2-3 times per week during the season.

We encourage all patients after ACL reconstruction to familiarise themselves and their trainers with this program to prevent further injury.

Basic Components of the PEP Program

1. Warm-up (50 metres each):
 - A. Jog line to line of soccer field (cone to cone)
 - B. Shuttle run (side to side)
 - C. Backward running
2. Stretching (30 s x 2 reps each):
 - A. Calf stretch
 - B. Quadricep stretch
 - C. Figure 4 hamstring stretch
 - D. Inner thigh stretch
 - E. Hip flexor stretch
3. Strengthening:
 - A. Walking lunges (20 metres x 2 sets)
 - B. Russian hamstring (3 sets x 10 reps)
 - C. Single toe-raises (30 reps on each side)
4. Plyometrics (20 reps each):
 - A. Lateral hops over 2 to 6 inch cone
 - B. Forward/backward hops over 2 to 6 inch cone
 - C. Single leg hops over 2 to 6 inch cone
 - D. Vertical jumps with headers
 - E. Scissors jump
5. Agilities:
 - A. Shuttle run with forward/backward running (40 yards)
 - B. Diagonal runs (40 yards)
 - C. Bounding run (45-50 yards)

Additional details and supplemental replacement exercises available from the developers of the program, The Santa Monica Orthopaedic and Sports Medicine Research Foundation at www.aclprevent.com. Video examples of this program can also be found on www.youtube.com
Further Reading: Gilchrist et al. (2008). A Randomized Controlled Trial to Prevent Noncontact Anterior Cruciate Ligament Injury in Female Collegiate Soccer Players. Published in American Journal of Sports Medicine. 2008; Issue 36; pages 1476-1483

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