

IDENTIFYING ATHLETES AT RISK FOR ACL INJURY

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Anterior cruciate ligament (ACL) rupture is one of the most common and physically devastating injuries in sports medicine. ACL injuries are a widespread occurrence in basketball due to the high frequency of cutting, pivoting and jumping. Specifically, the women's game has witnessed an epidemic of ACL tears—females are up to 8 times more likely to suffer this injury. Injuries take a physical, emotional and psychological toll on athletes. Athletes who have experienced ACL injury may demonstrate higher levels of fear of injury upon returning to their sport. They have every right to be fearful, 30% of athletes suffer a second ACL tear within the first 2 years of returning to sports.



figure 1. Video assessment of 'bad' default jumping biomechanics at initial SES assessment (left) and follow-up assessment after 2 months of SES training demonstrating low-risk biomechanics (right). Note significant improvement in knee position with landing.

Many athletes at higher risk for ACL injury can be identified through recognition of an athlete's faulty high-risk biomechanics. Biomechanics is the term used to quantify the forces interacting through the body's joints and muscles during movement. Certain movement patterns can contribute to unsafe biomechanics and higher risk for injury (figure 1). There are 2 major ways athletes sustain non-contact ACL injuries; (1) neuromuscular control failure (2) an over-reach injury. Videotape of athletes performing sport-specific movements can help provide insight into identifying athletes at higher risk for ACL injury. Failure in (1) *neuromuscular control* is the body's inability to intrinsically stabilize the joint during a cut, pivot or landing. On video it appears as a knee angle that is collapsing inward (figure 2 valgus angle). If an athlete demonstrates this type of knee position with jumping (take-of or landing) they are at higher-risk for ACL injury during pivoting, jumping and cutting motions during sport.

(2) An *over-reach injury* is less commonly assessed or identified, but equally dangerous for athletes. An over-reach injury occurs when an athlete is single-leg bounding for maximum distance and then quickly changes direction. In this scenario, the athlete's foot lands far outside of their base of support and the whole foot is flat on the floor and knee near full extension (figure 3). When the athlete goes to

change direction they cannot "unstick" their flat foot from the floor because they are so far outside their base of support. As the change of direction occurs the foot stays planted on the ground facing one direction while the rest of the body pivots in the opposite direction. The culmination of these coupled motions often results in an ACL tear.



figure 3. Over-reaching with single-leg bounding. Note that foot is far outside of athlete's base of support, foot is flat on floor and knee is near full extension.

ACL injury risk-reduction programs should focus on systematically correcting faulty biomechanics (figure 2). Stability Enhancement Systems (SES) programs achieve this through training strength and stability progressively

Programs must contain several key characteristics to be effective, but they are often overlooked.



figure 2. High bilateral knee collapse inward. Note the knee valgus angle of 31°. This is a very high-risk knee position and precursor for ACL injury

The following are 3 key program features to focus on: **(1)** Stability must be trained—programs that do not utilize stability equipment (figure 3) are inherently deficient. **(2)** Programs must be progressive—all skills in life are acquired through progressive training. **(3)** Programs should involve an initial assessment of an athlete's deficiencies.

Dr. Selena Budge is an expert in ACL injury risk-reduction training and President of Stability Enhancement Systems (SES). SES supports enhanced sport performance through individualized injury prevention sciences. Through their unique systematic approach and exemplary track record, SES has quickly become a national leader in women's basketball injury prevention. Dr. Budge can be contacted through the SES website: <http://stabilityes.com> or at selena@stabilityes.com