

Anterior Cruciate Ligament Injury Prevention for Female Athletes

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Anterior cruciate ligament research has resulted in thousands of scientific articles outlining the incidence, mechanism, surgical repair and rehabilitation of this important stabilizing ligament of the knee. Despite a better understanding of injury mechanisms, the advancement of surgical techniques, and appropriate rehabilitation, ACL injuries still occur at an alarming rate in recreational, amateur and professional athletes. In addition, the long-term effects of these injuries leads to an earlier development of knee arthritis and cartilage degeneration.

With regards to the female athlete, epidemiologic research has documented that females have a higher risk of suffering from a devastating knee injury. Adolescent female athletes who participate in sports such as soccer, volleyball and basketball have a four to six-fold increase in serious knee injury, specifically ACL injuries. Recent data from the National Collegiate Athletic Association (NCAA) reports that 150 000 women participate in varsity sports each year with an average knee injury incidence of 1 in 10 female athletes. From this more than 15 000 debilitating knee injuries are expected to occur in varsity NCAA athletics every year. In addition, data from National Federation of State High School Athletics in the U.S. shows that in female varsity soccer, basketball and volleyball there are more than 40 000 serious knee injuries each year. The majority of these are ligamentous injuries.

Opposite to what is seen in pre-pubescent male and female athletes, during puberty the incidence of ACL injury in females increases significantly and remains elevated into maturity. Standard anthropometric measures of growth and development show similarities between genders, however during and after puberty during the “growth spurt” these measurements start to diverge considerably. In essence, men demonstrate a “neuromuscular spurt” corresponding to their increase in growth and development whereby there are increases in athletic measures such as power, strength and coordination which have protective effects against knee injury. Unfortunately females do not exhibit this spurt and thus, show no or very little increases in power, strength and coordination. This leads to inappropriate adaptation and subsequently an increased risk for joint and ligament injury.

This information has led to a paradigm shift in the literature with a major focus on the prevention of ACL injuries especially in female athletes. Numerous recent studies have investigated the effects of various training methods, timing of the intervention, and performance enhancement measures in an attempt to utilize the information gained to properly implement an injury prevention program into practice.

The individual components of this program have all been shown in the literature to have a positive effect on reducing non-contact ligament injuries in the knee. The specific

components are plyometric jump training, core strengthening, balance training, resistance training and speed and agility training.

When implemented correctly, these training methods have lead to an astounding decrease in the incidence of ACL injuries in female soccer, volleyball, and basketball players. In one recent study the overall reduction was 88% in one year. Not only has this training lead to a significant reduction in injury it has also had positive effects on abnormal lower extremity landing and cutting strategies, abnormal knee joint loading, and it has lead to an overall increase in lower extremity and core strength and balance. With all of these factors put together not only is there a reduction in the number of injuries but there is an increase in measures related to sport performance, which suggests that not only will you be less likely to be injured but you will also perform at a higher level.