

# ACL injuries continue to rise in female athletes

By David Bertone, PT, OCS

The anterior cruciate ligament (ACL) of the knee is fast becoming the most studied and understood area in sports medicine and rehabilitation. Over my years of practicing, I have seen a steady rise in the number of ACL injuries sustained by female athletes. The reasons for this are becoming better understood but clearly the influence of lower extremity control is a major factor.

A study published in the British Journal of Sports Medicine demonstrated that female athletes are four times more likely to sustain an injury to the ACL of the knee than their male counterparts. This has steadily increased over the years as more and more sports were made available to female athletes with the passage and implementation of Title IX. Since this rise in injury rates, sports research has investigated this area extensively.

A review of the most prominent studies researching this area reveals several factors that are influential in a vast majority of ACL injuries sustained by female athletes. The first factor is neuromuscular control. This is the way muscles contract and react which is critical in those sports that require cutting, pivoting and jumping. The research shows that female athletes tend to have a muscular imbalance when it comes to the major muscles of the thigh which are responsible for controlling stress to the knee. The muscles of particular importance are the hamstrings located in the back of the thigh. The hamstrings control forward movement of the lower leg bone (tibia) on the thigh bone (femur). This is the same movement controlled by the ACL. If the hamstrings are not strong enough to control extreme forces, added strain is placed on the ACL.

Another factor for the rise of ACL injuries in female athletes is anatomical. The female athlete is built differently than males with a wider pelvis and angled thigh bones causing a "knocked-knee" position. This angle creates unnecessary forces upon the ligaments of the knee that control excessive forces. The ACL tends to be smaller and the notch in the thigh bone where the ACL

travels is also smaller in females.

Lastly, the influence of the female hormonal system should be considered when examining the factors associated with ACL injuries. The influence of hormonal changes on the ligamentous system of the body is fairly well understood. During menstruation, females undergo fluctuations in estrogen and progesterone levels which play a factor in ligamentous laxity.

Unfortunately, the only factor that can truly be controlled is the neuromuscular component. The Santa Monica Injury Prevention Project was a study of 1,435 athletes that underwent a specially designed program to reduce the incidence of ACL injuries in females. The results demonstrated a 41% decrease in ACL injury rates in those athletes that successfully completed the program. The Santa Monica Program was titled "PEP" or Prevent Injury, Enhance Performance. The 15 minute program which should be performed 2-3 times per week consists of a warm-up, flexibility, strength, plyometrics and agility activities. It teaches the athlete true neuromuscular control and prepares the body for the rigors and demands of sport.

It is important that an athlete be properly screened before participating in any preseason or in-season prevention program such as PEP. Other factors should be analyzed before designing the specifics of the program and the appropriate modifications made. A physical therapist with the proper training and experience can design a comprehensive prevention program to reduce the incidence of ACL injuries.

*Mr. Bertone is a licensed Physical Therapist and Board Certified in Orthopedic Rehabilitation by the American Board of Physical Therapy Specialties. His solo practice, db Orthopedic Physical Therapy, PC is located in Lincroft, New Jersey. Mr. Bertone can be reached at 732-747-1262 or via e-mail at [dbertone@dborthopt.com](mailto:dbertone@dborthopt.com).*