

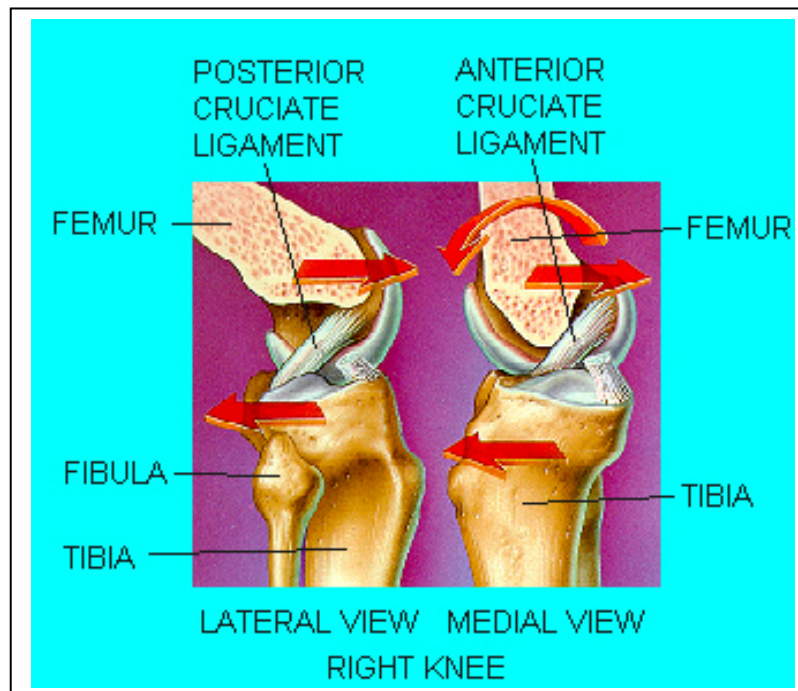
# REDUCING THE RISK OF ACL INJURY

## ACL INJURIES IN WOMEN ATHLETES

Each year, more and more women discover the rewards of sports participation. Unfortunately, an increased number of anterior cruciate ligament (ACL) injuries has accompanied the increased participation. ACL injuries in female athletes are an epidemic problem facing women, coaches, and the sports medicine community. The injuries generally occur without contact from another person and most often occur while the athlete is participating in basketball, gymnastics, or soccer.

Female athletes have four to 10 times more ACL injuries than male athletes have. The reasons for the different rates of injury in men and women are not clear, but some theories include differences in anatomy, knee alignment, ligament laxity, muscle strength, and conditioning.

### *Anatomic differences*



In the knee joint, an intercondylar notch (compartment) lies between the two rounded ends of the thigh bone (femoral condyles). The ACL moves within this notch, connecting the femur (thigh bone) and tibia (shin bone) and providing stability to the knee. It prevents the tibia from moving too far forward and from

rotating too far inward under the femur. Women have a narrower notch than men have; therefore, the space for ACL movement is more limited in women than in men. Within this restricted space, the femoral condyles can more easily pinch the ACL as the knee bends and straightens out, especially during twisting and hyperextension movements. Pinching of the ACL in the joint can lead to its rupture (or tear).

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### **Alignment of the knee**

In the knee, the femur meets the tibia at an angle (called the quadriceps, or Q, angle). The width of the pelvis determines the size of the Q angle. Women have a wider pelvis than men have; therefore, the Q angle is greater in women than in men. At this greater angle, forces are concentrated on the ligament each time the knee twists, increasing the risk for an ACL tear (Fig. 2). A twisting injury in a man's knee may only stretch his ACL; however, because of the greater Q angle, the same type of twisting injury in a woman's knee may cause a complete ACL tear.

### **Ligamentous injury**

Female hormones allow for greater flexibility and looseness of muscles, tendons, and ligaments. This looseness helps prevent many injuries because it enables certain joints and muscles to absorb more impact before being damaged. However, this looseness does not necessarily prevent an ACL injury in a woman's knee. If the other ligaments and muscles around the knee are so loose that they cannot absorb the stresses put on them, then even normal loads or forces may be transferred directly to the ACL, making it prone to rupture. In this sense, the ACL not only has to maintain stability about the knee, but it also must make up for instability in a generally loose knee.

During the menstrual cycle, hormone levels vary and may affect knee stability. Recent studies have shown that, at specific points within the menstrual cycle, the knee becomes looser than normal, and ACL rupture is more common.

### **Reduced muscle strength**

When women and men compete in the same sporting events and at the same levels, they have nearly equal twisting and loading forces placed across their knee joints. However, women have less muscle strength in proportion to bone size than men have. Muscles that help hold the knee in place are stronger in men than in women. Therefore, women rely less on the muscles and more on the ACL to hold the knee in place. Once again, the ACL may have to work overtime, making it more prone to rupture.

### **Conditioning**

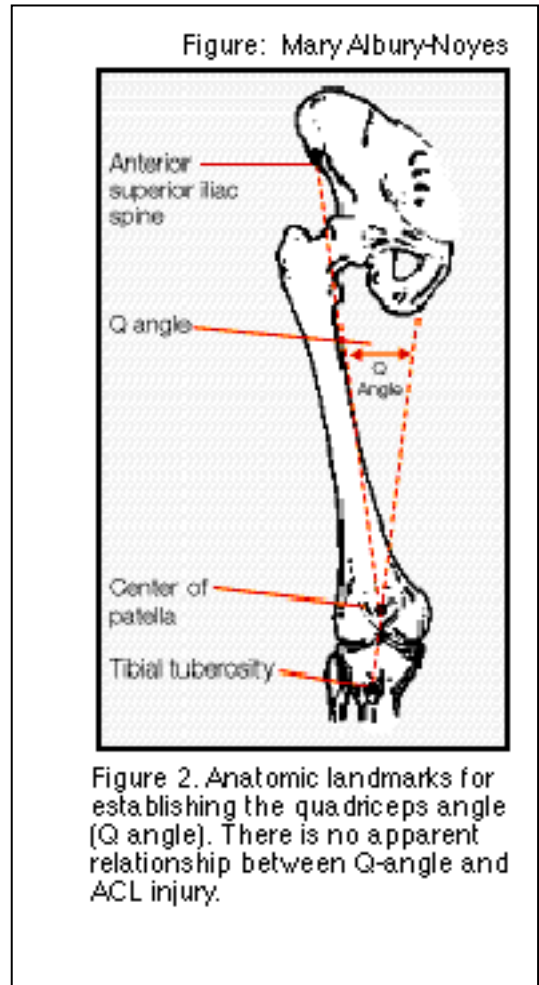
Traditionally, male athletes participate in twisting sports (such as basketball, football, and soccer) from a very early age. They develop muscle coordination and reflexes that can protect the knee once they reach the competitive level. These knee reflexes allow strong muscles to control the knee, thereby maintaining stability in it. Some female athletes do not participate in the same sports until a later age. Therefore, their muscle strength and coordination, as well as reflexes, may not be as fully developed when they reach the competitive level. The ACL must provide most of the stability in these knees.

Researchers currently are investigating epidemics of ACL tears in women's sports. Any one or all of the theories presented here may contribute to the increased number of ACL tears in female athletes. As women begin participating in sports at an earlier age and as they continue conditioning and strengthening the muscles around their knees, we hope that the rate of ACL tears in women will diminish.

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### INJURY TREATMENT & PREVENTION

**Injuries** – The best advice for sport injuries is to see a physician. Unless your coach or personal trainer is also a doctor, they will just not understand the full extent of your injury. So if things hurt more or longer than usual, see a doctor to get the proper help and prescription for rehabilitation.

**Prevention** – A strength coach's best ally in stopping injury is prevention. Athletes must strengthen the area around the possible injury spots. For example, most athletes will be at risk of knee injuries, so the muscles of the legs must be strengthened. Examine your sport, where do injuries occur most? After you have concluded what joints and muscles are at risk, have a personal trainer or strength coach show you the proper exercises to strengthen that area.

**RICE** – Should an injury occur, treat it with respect. **Rest** the area. Immediately apply **Ice** to an injury but do not put heat on it until the swelling has subsided. Wrap the injury (**Compress**) and **Elevate** it, if that is possible. Again, if you are not sure how bad the injury is, see a doctor. --Craig Ballantyne

### OFF-SEASON CONDITIONING

It is very important for athletes to stay in shape during the off season. It is very easy to sit around the house and watch T.V. all day long, but for the athlete who wants to better herself physically, off-season fitness is invaluable.

Playing other sports is fun and good conditioning (cross training). You can have fun playing with friends and trying a variety of sports. If you do indeed play other sports, they will provide plenty of off-season fitness. Throw in a little running and you're all set.

Athletes 14 years and older (high school athletes), who are only playing soccer, should really take off-season training and conditioning seriously. The biggest advantage you will have over your opponent is in how well you prepared for the season. If you come into your season fit and in shape, you will not have to waste time bending over and gasping for air during practices. Off-season training should consist of long distance running. That's right, put your running shoes on and hit the streets. You should be running approximately 15-25 minutes every other day (minimum). You can also mix up your running with strength training exercises such as lunges and squats. Weight lifting is not necessary, but can benefit if you feel ready. --Coach Clay

#### 5 Tips to Be Mentally Tougher than your Competition!

Here are five simple ways to being mentally tougher than your competition that are often overlooked:

**1. Power of Belief-** creating a solid belief in oneself is critical. Here's one theory: "I make mistakes quickly and often, adjust faster, and improve faster than my competition because of it!" In the end, I win, because I wasn't afraid to make mistakes early on.

**2. Create a Compelling Vision-** Setting goals that make you excited makes the season a whole lot more fun, and you end up getting a lot more out of yourself.

**3. Emotions of Power-** Teach yourself how to enjoy the game, competition, and playing. A key way of doing this is learning how to manage your emotions:

a. Self talk- speak positive and powerful words to yourself and your teammates.

b. Self Image- Only visualize yourself being successful, and see yourself adjusting to current challenges.

c. Physiology- Walk tall, smile, breathe, and project confidence.

**4. Risk-** Make mistakes and "Go For it!" If a skill is challenging, keep at it even if you feel silly at first. No one will laugh at you when you beat them!

**5. Prepare, Prepare, Prepare-** The key to winning consistently is to realize that the hard work has to be done weeks and months before the big tournaments. Athletes who get in great shape in the off season, will pass up their competition!

Put these few ideas to use, and notice how quickly you start gaining more and more confidence in what you do! --Ed O'Keefe