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PRESS RELEASE

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September 23, 2013, Norwell, MA - ACL Injury and the Female Athlete

Tearing the anterior cruciate ligament or ACL is any athlete's worst nightmare. The ACL is one of the four major ligaments that connect the femur to the tibia and provide stability to the knee joint. Anterior cruciate ligament tears often occur as a result of landing awkwardly from a jump or cutting quickly to change direction. The athlete often hears a "popping" sound while experiencing pain, swelling, and instability in the knee joint. Statistics show that this devastating injury affects female athletes far more frequently than males. In fact, female athletes are four to eight times more likely to suffer an ACL injury during the course of their athletic careers. These injuries most often occur in cutting sports such as basketball, soccer, and lacrosse. In fact, 70-80% of ACL injuries are non-contact. Recent research indicates that there are several factors that may contribute to the higher injury rate in females, including anatomical, hormonal, and biomechanical differences between males and females. Understanding what causes this higher incidence of ACL tears in female athletes can help to design training programs aimed at preventing these serious injuries.

Women are more susceptible to ACL tears in part due to anatomical differences, specifically in the alignment and internal structure of the knee. First, women have a wider pelvis to account for child-bearing. As a result, females have a greater Q-angle. The Q-angle is the angle at which the femur, or thigh bone, meets the tibia, or shin bone. This often results in a "knock-knee" position which increases the forces on the ACL, especially as the knee twists. Women also have anatomical differences within the knee joint. Inside the joint is a space called the intercondylar notch, which is the space between the two ends of the femur, and also the space in which the ACL moves. The primary job of the ACL is to prevent the tibia from moving too far forward on the tibia and it also helps to control rotation. Females tend to have a narrower intercondylar notch compared to men, thus reducing the space for the ACL. As a result, the ACL can become pinched between the two ends of the femur, especially during twisting movements and hyperextension of the knee. Women can also have a smaller ACL that can be more easily torn. The combination of a narrow intercondylar notch, smaller ACL, and increased Q-angle can put an athlete at risk for ACL rupture.

Females also have hormonal differences that may contribute to the increased risk of injuries. When there are changes in specific hormones during the menstrual cycle, women can experience increased laxity or looseness of the ligaments and other soft tissues surrounding the knee. When the soft tissues that support the knee joint become loose, any increased stress on the joint is not absorbed as well, making the strain on the ACL more than it can withstand. Many studies have been conducted trying to identify if there is a specific point in

the menstrual cycle when ACL injuries tend to occur. It is believed that more injuries may occur during the pre-ovulatory phase of the menstrual cycle but more research needs to be done.

The most significant reason why female athletes suffer a greater number of ACL injuries is likely due to biomechanical differences between them and their male counterparts. Women exhibit different neuromuscular control of the knee, particularly when pivoting and landing from a jump. For instance, the hamstring muscle group is important in helping the ACL control the forward movement of the tibia. Females have weaker hamstrings compared to the quadriceps, often about 50% as strong as the quadriceps. Men, however, have hamstrings that are closer to 65-70% as strong as their quadriceps. As a result, men are able to activate the hamstrings faster, resulting in less forward movement of the tibia and better knee stability. Women, on the other hand, are not able to recruit the hamstrings as quickly and the quadriceps can pull the knee into more extension, increasing the strain on the ACL. As a result of these muscle imbalances, when females jump, they tend to land in a straight, knock-knee position, directly stressing the ACL. Most prevention programs focus on improving neuromuscular control of the knee by including plyometrics, balance, strengthening, and stability training.

While much research has been done to determine the factors that contribute to female ACL rupture, more studies need to be done to ascertain just how significant these gender differences are in playing a role in higher injury rates. Prevention programs aimed at improving biomechanics seem to be the most helpful in decreasing the incidence of ACL injury, as anatomical and hormonal factors cannot be altered. An ACL tear can be a devastating injury; however, it does not have to be career-ending. Fortunately, most athletes can return to their prior level of competition following a structured rehabilitation program. As the number of women in sports increases, it is that much more important to understand the causes of injury and shift the focus to preventing them.

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