

Twist and Shout

by Stephen Fraser

Preventing dreaded knee injuries in young athletes

Anne Montalto was playing in a preseason soccer game in July 2009 when it happened. She had run down the side of the field, moving into position to receive the ball from a midfielder. Coming to a stop, she planted her left foot and turned her body to get the ball. *Ow!* A sharp pain shot through her left knee. She fell to the ground.



Courtesy of Anne Montalto

"After the injury, I just followed the trainer's instructions-icing and elevating my leg," says Anne. "My emotional reaction was that I just wanted to get on the field. When my leg felt better, I tried to play again, but the pain came back."

Anne's physician sent Anne for a magnetic resonance imaging (MRI) test. The images revealed a torn *ligament* in her left knee. A ligament is a strip of fibrous tissue that crosses a joint, connecting two bones. "When the torn knee ligament was confirmed by the MRI, I was very, very sad," she says. "I knew that I would miss my whole freshman high school soccer season."

The injury Anne experienced isn't unusual for young female athletes. It is something they dread, though, often requiring surgery and a lengthy recovery period. It's also something that medical researchers are studying in an effort to prevent so many girls from suffering.

Muscle Development

Any sport that involves pivoting, jumping, sudden stops, or quick changes in direction increases the risk of harm to the ligament that Anne injured. That ligament is called the *anterior cruciate ligament (ACL)*. It's one of four major ligaments that hold the knee joint together, connecting the *femur* (thighbone) to the *tibia* (shinbone). An estimated 90,000 high school and college athletes in the United States suffer ACL injuries every year.

Female athletes are particularly vulnerable to ACL injuries, says Timothy Hewett, a professor of sports medicine at the Ohio State University. Hewett examined hours of video of athletes in action to learn how ACL injuries happen. What he discovered is an imbalance in the way that boys and girls use their muscles.



Courtesy of Timothy Hewett

During puberty, boys experience a greater increase in muscular strength than girls do. When boys play certain sports, they tend to rely on the muscles at the back of their buttocks and legs and to flex their knees when they jump. Because girls' muscles aren't as strong as boys' muscles, girls rely more on the muscles at the front of their legs and tend to land with their legs straight. "That puts additional stress on the knee joints," says Hewett. That extra stress can cause the knees to collapse inward, tearing the ACL.

Girls are also more susceptible to ACL injuries because they have smaller *intercondylar notches* than boys do. Those are spaces within knees where the ACL and the *posterior cruciate ligament (PCL)* cross.

A mildly torn ACL may heal by itself, but a major tear requires surgery. The injured ACL is replaced with a *tendon* taken from the patient's body or from a cadaver. (A tendon is a band of tissue that connects a muscle to a bone.) Torn ligaments cannot be replaced with a patient's other ligaments, because they're all crucial in their various locations.

Anne was in surgery for only two hours, and she was able to return home the same day. Her recovery period was much longer, though: six months of physical therapy to restore strength and stability.

Strengthening Program

Hewett has used his data to design an exercise program to prevent ACL injuries. Anne wasn't aware of Hewett's program before she injured herself, but she learned about it during her recovery. The program, she says, focused on strengthening her *quadriceps*, *hamstrings*, and *core muscles*. The quadriceps are four large muscles at the front of the thigh. The hamstrings are three muscles at the back of the thigh. And the core muscles are in the area of the belly and the mid and lower back. "I also worked on balance, jumping and landing softly, and making sure my body was in the right

position," says Anne.

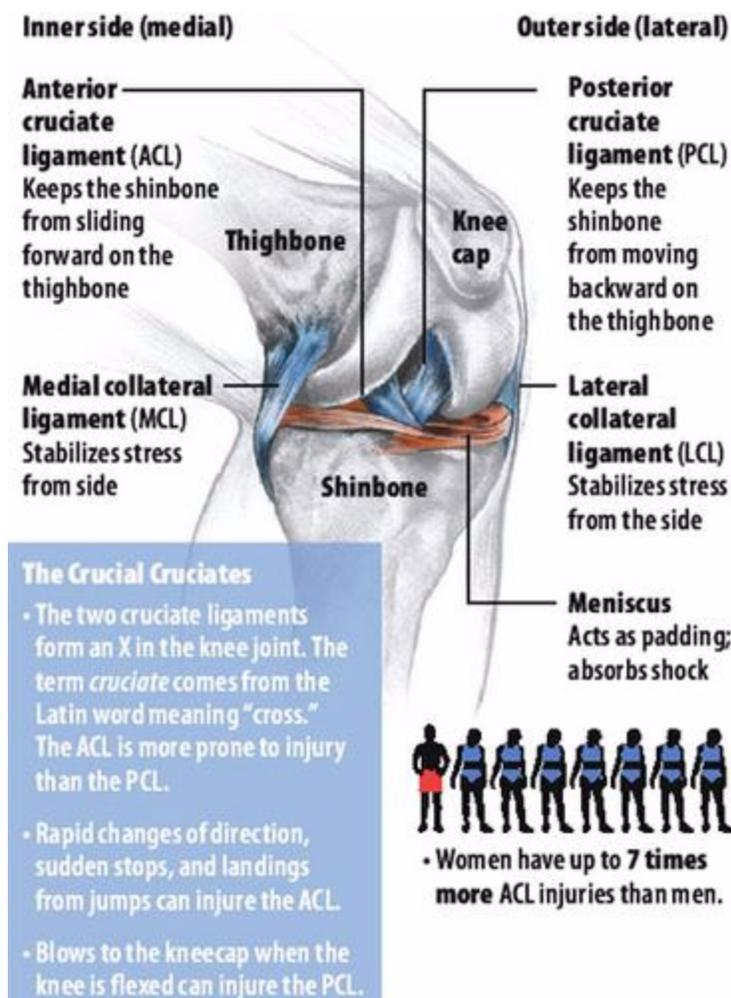
"I continue to use those exercises as part of my warm-up for soccer training and soccer games. I have incorporated the exercises into my routine, so it doesn't feel like I'm doing extra exercises. I just know I'm doing really good exercises!" For people who don't have access to his exercise regime, Hewett recommends a properly supervised program of *plyometrics*. Plyometrics are high intensity exercises that involve jumping and bounding movements. "Jumping on and off a box can also help," he says.

Some experts claim that playing sports all year increases the odds of ACL injuries. Not so, says Hewett. "Nor does alternating the sports an athlete plays during a year help to prevent ACL injuries," he adds.

Anne, now 16, is playing soccer again year-round. Her schedule is rigorous, training four to five days and playing one or two games a week. "I feel great and have had no decrease in performance," she says. "In fact, I may be in better condition due to the great training and instruction that I received."

Knee Brace

Four major ligaments support the knee, the body's largest joint, restraining movement between the upper and lower leg bones.



Source: American Academy of Orthopaedic Surgeons/University of Connecticut Health Center; MCT

Name: _____ Date: _____

1. Review the graphic of the knee in the passage. Which action could cause an ACL injury?

- A. taking off in a jump
- B. rapid change of direction
- C. straightening the leg too quickly
- D. slowly stopping

2. What does Timothy Hewett suggest in his exercise program for female athletes to do to prevent the problem of ACL injuries?

- A. lengthening muscles and building flexibility with yoga and pilates
- B. strengthening the quadriceps, hamstrings and core muscles with plyometrics
- C. building stamina through running increasing distances over a period of time
- D. burning extra calories through intense cardio activities like biking and running

3. Which of the following conclusions about Anne Montalto is supported by the passage?

- A. Anne was unable to continue playing high school soccer after her injury
- B. Anne's training and instruction during her recovery led to her improved physical condition
- C. Alternating the sports she plays could have prevented her knee injury from occurring
- D. Anne did plyometrics regularly before her injury occurred

4. Read the following sentences and answer the question below: "Female athletes are particularly vulnerable to ACL injuries, says Timothy Hewett, a professor of sports medicine at the Ohio State University.

What does the word **vulnerable** mean in this context?

- A. unbeatable
- B. protected
- C. at risk
- D. closed off

5. The primary purpose of this passage is to describe
- A. the experience of five soccer teammates that had ACL injuries
 - B. the exercise program of Timothy Hewett as he tries to prevent hamstring injuries
 - C. the anatomy of the leg to explain how ACL tears occur in female athletes and not male athletes
 - D. the reason that ACL injuries hurt more girls than boys and how they can be prevented
6. What did Anne Montalto do immediately to treat her knee injury?
7. Why might female soccer players be particularly vulnerable to ACL injuries?
8. The question below is an incomplete sentence. Choose the word that best completes the sentence.

When Anne found out she had an ACL injury, she was sad _____ she knew she would miss her freshman high school soccer season.

- A. because
- B. but
- C. so
- D. yet