



# Hughston Health Alert

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## May the Course Be with You

As your feet pound the pavement, you become keenly aware of the hard reality of training for a 5K, or 3.1-mile, road race. While training for a 5K is challenging, it can also be fun and beneficial. Before you begin a training program, however, you will need to plan accordingly. First, particularly if you are over the age of 40, you should schedule a physical exam with your doctor to make sure you are healthy enough to train for and participate in this type of event. Next, to be sure you get the most out of your training, you will want to put a nutrition and hydration program into place. You can then establish a realistic timeline and sound strategy for training.

### Nutrition for optimal performance and recovery

As you train for an athletic event, it can be easy to focus too narrowly on the physical aspects of training, but it is just as important to train nutritionally. If you do not fuel or hydrate adequately, your endurance and overall performance can be compromised. A comprehensive nutrition plan for training should include carbohydrates, protein, and healthy fats. You should also drink plenty of water (**Fig.**).

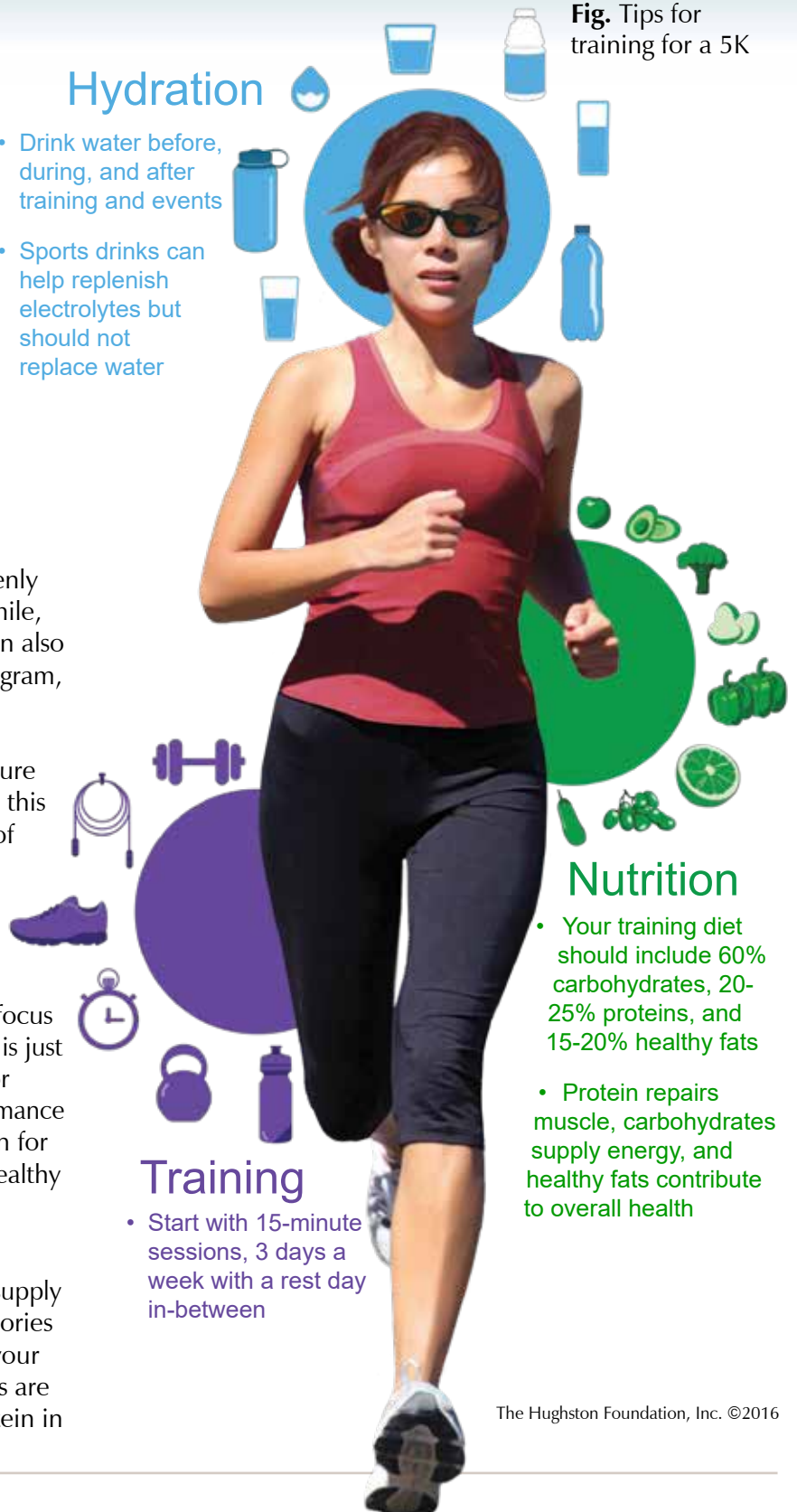
### Fuel: carbohydrates, proteins, and fats

Carbohydrates are a crucial dietary element as they supply the energy you need to run and work out. Ideally, calories from carbohydrates should make up at least 60% of your total calorie in-take. Some great carbohydrate choices are vegetables, fruits, whole grain breads, and pasta. Protein in

## Hydration

- Drink water before, during, and after training and events
- Sports drinks can help replenish electrolytes but should not replace water

**Fig.** Tips for training for a 5K



## Nutrition

- Your training diet should include 60% carbohydrates, 20-25% proteins, and 15-20% healthy fats
- Protein repairs muscle, carbohydrates supply energy, and healthy fats contribute to overall health

## Training

- Start with 15-minute sessions, 3 days a week with a rest day in-between

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appropriate portions constitutes another important component of your diet. Calories from protein should make up 20 to 25% of your total intake. Chicken, fish, eggs, beans, yogurt, low-fat cheese, and nuts are good, readily available sources of protein. Overall, eating protein along with energy-dense carbohydrates throughout endurance training has been shown to improve a runner's performance; it has also been shown to decrease recovery time, probably because protein helps repair muscle tissue. Fats also contribute to a runner's general good health, but because of the stigma associated with eating fat, figuring out which types are healthy to consume can be confusing. Your best bet is to choose the unsaturated, healthy fats found in avocados, almonds, cashews, and fatty fish, such as salmon or tuna, and to avoid saturated fats such as those found in lard and butter. Calories from fat should account for no more than 15 to 20% of daily calorie intake for the runner.

### Hydration

Hydration is another key element of an optimal nutrition program for training and racing. Simply put, without adequate hydration, your body cannot function properly. It is therefore important to hydrate well by drinking plenty of water—in staggered amounts so as not to feel too full—before, during, and after training and events. You may even want to carry a water bottle with you while training or, alternatively, choose running routes in places, such as a park, where you can pass by a water fountain. In the hours following a run or race, drink as much water as you can to rehydrate. When you are completely rehydrated, your urine will be a light yellow color. You can also use sports drinks to help replenish electrolytes—salts and minerals, such as sodium chloride and potassium, that control fluid balance and muscle contraction—but these should not replace water. An article in the Summer 2016 issue (vol. 28, no. 3) of the *Hughston Health Alert* covers proper hydration for athletes in greater detail.

### Training: how much, how often

Once you have adopted an appropriate nutrition and hydration program, you can establish a training timeline and strategy. If you have not participated in any type of physical activity before, a realistic timeline for training to complete a 5K race would be 7 to 8 weeks. To allow both your cardiovascular and musculoskeletal systems to adjust to the new workload, you should train in a steady progression. For the first couple of weeks, mix walking and running, beginning with 15-minute training sessions, 3 days per week with at least 1 rest day in-between. Always adjust your running pace to be within your current fitness level. As you move, you should have the breath to carry on a conversation; if not, you are trying to go too fast. In the coming weeks, as you become more comfortable with your routine, you can gradually increase the amount of running versus walking. You should also be able to increase your

overall training time in 5-minute increments or your overall mileage in half-mile increments each week. However, always listen to your body, and if you become sore or fatigued, back off. As muscles actually grow stronger during rest and not during training, lack of rest can lead to fatigue and even injury. You should also stretch your muscles before and after running. This will help keep them flexible and may prevent injury. An article in the Fall 2008 issue (vol. 20, no. 4) of the *Hughston Health Alert* covers stretching techniques in greater detail.

### The benefits of training

Running has been proven by research to improve your mood and reduce mental stress. As you exercise, your body releases chemicals called endorphins to the receptors in your brain, producing a sensation of overall well being. Moreover, regular running can help you lose weight because your body not only burns calories while you run, but also continues to burn extra calories afterward, a phenomenon known as excess post-exercise oxygen consumption (EPOC). Furthermore, running has been shown to strengthen your knees, keep you mentally sharp as you age, and to decrease your risk of developing diabetes mellitus, certain types of cancers, and cardiovascular disease, as well as increase the number of years you have to live.

### Race day

As race day approaches, remember to adhere to the principles of fueling and hydrating well, particularly the day before. Continue to hydrate the morning of the race, but eat lightly or not at all, as running forces the blood away from the stomach to the working muscles. During the race, run at a pace that feels comfortable and smooth. If you need to drink water on the course, slow up slightly to grab a cup at one of the water stations and sip. If you want to push yourself, wait until you are well past the second-mile marker and don't sprint until you are past the third-mile marker. Once you are over the finish line, get the recovery process going by drinking plenty of water. As a rule of thumb, it will take your body a day for every mile raced—in this case, just over 3 days—to fully recover.

### May the course stay with you

Training for a 5K race is an amazing journey that begins with planning and preparation. Success is based on a realistic timeline and sound training strategy along with a good nutrition and hydration program. Following these principles can lead you not only to the finish line, but also to improved physical and mental well being. Whether or not you plan to participate in other events, by making running part of your everyday routine, you can continue to reap the benefits.

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# Impetigo: A Concern for Athletes

If you are an athlete, you have a greater risk than most people of contracting impetigo, a highly contagious skin infection that affects about 2% of the global population annually. The term impetigo comes from the Latin verb *impetere*, meaning to attack, and refers to the breakouts or skin eruptions that characterize the disease. Impetigo has 2 forms: nonbullous and bullous. The nonbullous form is more common, accounting for 70% of all cases, and appears on the skin as a pustule or golden crusty sore surrounded by red infection. This form is usually caused by the *Streptococcus pyogenes* (strep) bacterium, but can sometimes be caused by the *Staphylococcus aureus* (staph) bacterium. By contrast, the bullous form of impetigo manifests as a macule or red rash that resembles a burn mark. It is caused only by staph bacteria which release epidermolytic toxins or poisonous substances that cause the lesions to form blisters (*bulla* is Latin for “blister”) or fluid-filled sacs called vesicles. Such vesicles tend to be thin roofed and easily ruptured, revealing a moist red infected layer beneath. After a few days, a golden crust will form over the blisters.

Impetigo lesions can erupt anywhere on your body, but the most common sites are the nose and mouth, followed by the arms or legs. While the lesions of either type of impetigo can be itchy, they are not usually painful. The bacteria are transmitted through skin to skin contact or through direct contact with contaminated objects. It usually takes 1 to 3 days after contact with strep, and 4 to 10 days after contact with staph, for the symptoms of impetigo to appear.

## Who is at risk?

You are more likely to contract impetigo if you live in hot, humid climates. Additionally, poor hygiene and poor nutrition, as well as having diabetes or a compromised immune system, can make you susceptible to the infection. The condition occurs most frequently in pre-school and school-age children; in fact, 90% of all impetigo cases occur in children under the age of 2. Impetigo is the most common bacterial skin infection in children and is therefore sometimes referred to as “school sores.”

Impetigo also occurs more frequently in athletes who play sports involving a high degree of physical contact than in the general population. For example, if you are a wrestler, boxer, swimmer, gymnast, or football player, your risk of contracting impetigo is high, due to direct skin contact with other players, gym mats, and the showers in the locker rooms. You can also transmit or contract the disease if you share personal items with people such as clothing, towels, and bedding. If you or a fellow athlete has a skin irritation from eczema, poison ivy, insect bites, cuts, or scrapes, it could easily become infected and develop into impetigo. For instance, one day you might notice that you have insect

## Two types of impetigo

### Nonbullous impetigo

- Itching, usually associated with eczema
- Often a culture is needed to verify infection
- Red sores that quickly rupture and form a yellowish-brown crust



Photo courtesy of Joshua E. Lane, MD ©2016

### Bullous impetigo

- Itching
- Painless, fluid-filled blisters
- Wash with soap and water twice a day. If this is ineffective, a physician may recommend an antiseptic wash for older children and adults



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bites on your lower legs. You continue playing sports and doing your normal activities while waiting for these to clear up, but a couple of days later you find that the bites have now developed into crusty pustules. To avoid spreading the infection to your fellow athletes, you should abstain from playing and see your doctor.

## How is impetigo diagnosed?

Your doctor can usually diagnose impetigo by taking a personal history and examining the appearance of your skin. However, as the skin patches associated with impetigo can resemble those seen in a host of other skin diseases such as eczema, psoriasis, poison ivy, lupus, or shingles,

there is a chance that the condition could be misdiagnosed. To determine the particular type of bacteria causing your infection, and prescribe the best antibiotic, your doctor may take a culture using a swab.

### How is impetigo treated?

While impetigo may clear up on its own within 2 to 3 weeks, primary treatment consists of topical antibiotic ointments; more severe cases will also require oral antibiotics. Since impetigo is highly contagious, you should avoid close contact with anyone until 24 hours after starting the medication. After this, you may return to your normal activities, but be aware that your impetigo sores will take at least a week to heal completely. As an athlete, you should not be allowed to participate in sporting events until you have completed a 72-hour course of antibiotic treatment, have no moist or crusty wounds, and have had no new lesions for at least 48 hours. Lesions should not be covered as a way to allow you to participate.

### What are the possible complications?

Left untreated, impetigo can develop into a more serious form of the disease called ecthyma. This condition occurs when the disease invades the second layer of skin, causing painful fluid or pus-filled sores that turn into deep ulcers and may leave scars. If you develop ecthyma, you may also have swollen lymph nodes. Other complications of impetigo can include cellulitis, another serious infection that affects the underlying skin. Even more rarely, you could suffer kidney damage from the bacteria that cause impetigo.

### How can you prevent impetigo?

To prevent impetigo, avoid contact with infected individuals. If you touch an open wound, wash your hands immediately with soap and warm water. You should also make sure to wash any surfaces, objects, clothing, towels, or bedding that may have come in contact with the infection with soap and hot water. If you have an open wound or a fresh abrasion, avoid scratching as this could allow the bacteria from the impetigo to enter and cause an infection; better yet, cover all open wounds and insect bites. If you do contract impetigo, avoid spreading the infection to other people and to other parts of your body by not scratching and applying antibiotic ointment and proper dressings to affected areas.

### Know the facts, then act

Impetigo is a highly contagious bacterial infection of the skin that can sometimes have serious complications. It is spread through direct skin contact, which means everyone is at risk, but athletes, particularly wrestlers, are at increased risk for contracting the disease. If you even suspect that you have impetigo, avoid contact with others until you know for sure you are not infected or you have been on medication for at least 72 hours. Knowing the facts and taking measures to prevent contracting or spreading impetigo will benefit not only you, but also your fellow athletes.

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## Getting the Facts on Fragility Fractures

If you are over the age of 50, especially if you are also female, you may be at risk for a fragility fracture. The American Academy of Orthopaedic Surgeons defines fragility fractures as fractures that result from a fall from a standing height or that occur in the absence of obvious trauma (**Fig. 1**). These types of fractures affect up to 50% of all women and 25 to 33% of all men over 50 and are often associated with low bone-mineral density. The hip, spine, and wrist are the most common sites where you could sustain a fragility fracture.

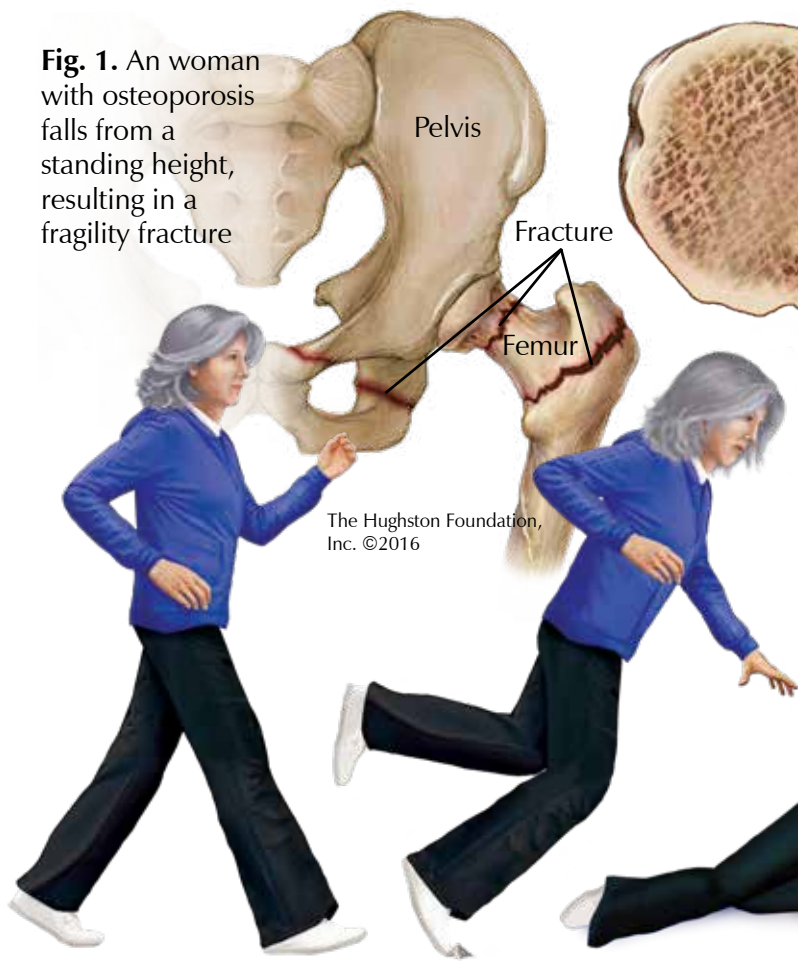
### What causes fragility fractures?

Low-energy fragility fractures usually occur as a result of not just general low bone density, but the presence of osteoporosis. Osteoporosis is a bone disease characterized by the structural deterioration of both the inner and outer bone tissue, resulting in porous bones (**Fig. 2**). These changes lead to overall low bone mass, compromised bone strength, and an increased risk for fractures. If you do have osteoporosis, you are not alone: the National Osteoporosis Foundation estimates that 10 million people in the United States suffer from osteoporosis while another 34 million are at an increased risk of bone fracture due to osteopenia or low bone mass. One of the most serious injuries you can suffer as a result of osteoporosis is a hip fracture; 50% of those who suffer a hip fracture will lose the ability to live independently.

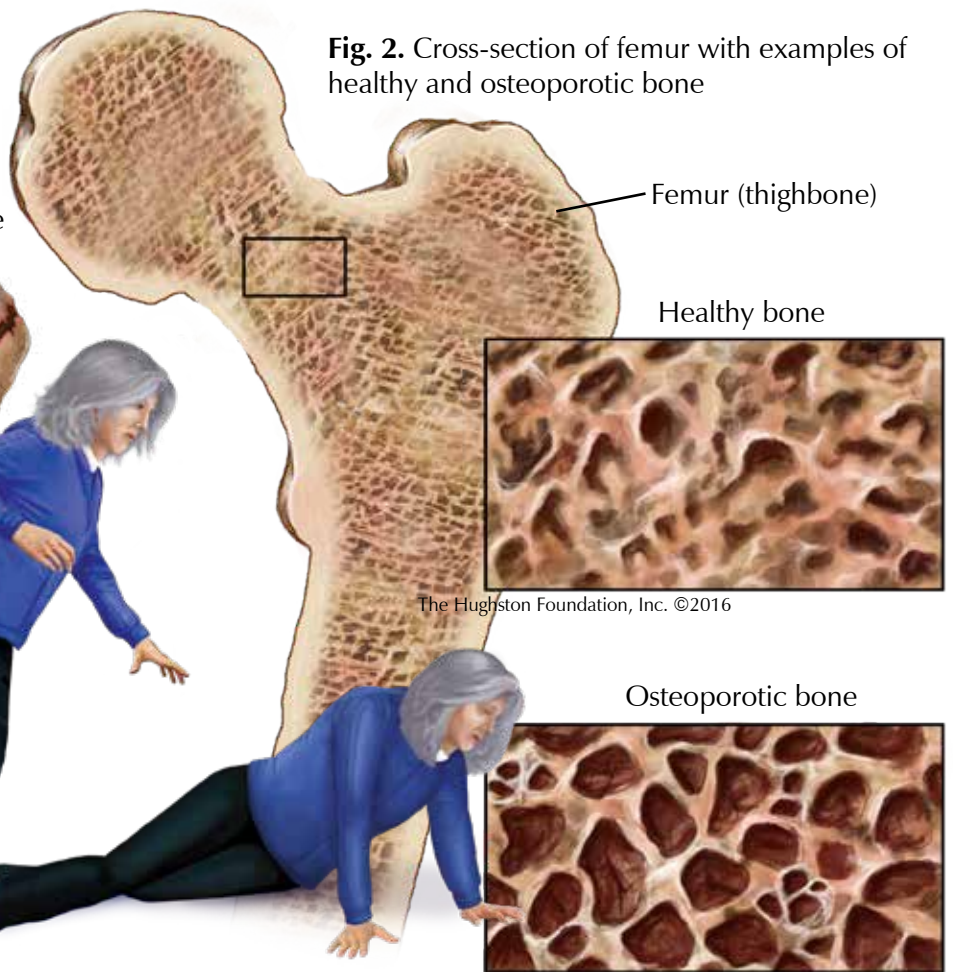
### Additional risk factors

Once you have suffered a fragility fracture, you have a greater risk of sustaining another. Apart from age, gender, and a previous fracture, risk factors include a family history of fragility fractures, frailty, poor health, dementia, Caucasian or Asian race, calcium and vitamin D deficiencies, smoking, and excessive alcohol consumption. Moreover, certain diseases, such as rheumatoid arthritis, diabetes mellitus, and renal disease, as well as any kind of prolonged immobilization, can increase your risk of generalized osteoporosis and fractures. Furthermore, taking certain types of drugs, such as glucocorticoids, immunosuppressants, anticonvulsants, and testosterone antagonists, constitutes a risk factor for the disease. It is best to try to identify all of your risk factors before a fracture occurs.

**Fig. 1.** An woman with osteoporosis falls from a standing height, resulting in a fragility fracture



**Fig. 2.** Cross-section of femur with examples of healthy and osteoporotic bone



## Evaluation

Since an orthopaedic surgeon is the first, and often the only, physician you may see if you break a bone, it is important that he or she have you evaluated for osteoporosis. Your evaluation should include a medical history, physical examination, laboratory tests, bone mineral density tests, and possibly x-rays. Although your orthopaedic surgeon will typically initiate this evaluation while overseeing the care of your fracture, you may be referred to your primary care physician or a bone health clinic to treat the underlying causes of the disorder to prevent future fractures.

## Treatment

As a fragility fracture patient, optimal care will involve not only treating your injury, but also identifying and treating the underlying cause. If it is determined that you have osteoporosis, your treatment will begin with counseling about diet, exercise, and fall prevention. You may be encouraged to perform regular weight-bearing exercises, such as walking, and to get sufficient amounts of calcium (1,200 mg/day) and vitamin D (800 IU/day) through your diet, dietary supplements, and exposure to sunlight. Your treatment plan may also include pharmacologic agents to prevent bone loss, such as bisphosphonates, or various hormone therapies such as selective estrogen receptor modulators, parathyroid hormone, and calcitonin.

## Fracture care

When it comes to fragility fractures, both nonsurgical and surgical management have proven highly successful, depending on the particular fracture. As with other types of fractures, the basic principle for the management of fragility fractures is to first reduce the fracture (manipulate the broken bone back into its proper position); next hold the fracture in this position (non-surgically with a splint or cast, or surgically with plates, screws, or rods); and, finally, to rehabilitate the patient through exercise and physical therapy. Sometimes, in order to provide extra support for weak bone, special techniques can be applied surgically to create a more robust fixation construct. An example of this is the use of special locking screws. Additionally, after surgery you may be instructed to avoid weight bearing on the affected extremity for an extended period of time in order to help it heal.

## Outcomes

You can both reduce your risk level and enhance outcomes for fragility fractures if you and your physician assume an active role in managing your osteoporosis and preventing additional fractures. While it is best to start a preventative program early (around age 30), it's never too late to take care of your bones and improve your odds.

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## ACL Tears in Teens

With more and more young athletes participating in sports each year, injuries to the anterior cruciate ligament (ACL) of the knee have become quite common. Youngsters, particularly during the period of rapid growth—generally around age 12 for girls and 14 for boys—are at increased risk for ACL tears. For various reasons, adolescent girls may be 3 to 8 times more likely than their male counterparts to tear their ACL. Fortunately, new injury prevention programs have emerged that can help at risk athletes, particularly adolescent females, to avoid ACL tears.

### Knee anatomy and the ACL

The knee is a complex joint made up of 3 bones: the femur (thighbone) and the tibia (shinbone) meet to form a hinge that allows for flexion (bending) and extension (straightening) with a minor degree of rotation while the patella (kneecap) covers its front and helps extension. These bones are held together by 4 ligaments: the 2 collateral ligaments and the 2 cruciate ligaments (**Fig. 1**). The collateral ligaments run along either side of the knee, limiting side-to-side motion and providing stability. The outside ligament is known as the lateral collateral ligament and the inside as the medial collateral ligament. Inside the knee joint are the 2 cruciate ligaments, so called because they criss-cross, forming an X. The posterior cruciate ligament or PCL is in the back while the often-injured anterior cruciate ligament or ACL is in the front. The ACL slides within the intercondylar notch, or the space between the 2 rounded ends of the femur. Its primary function is to prevent the tibia from either moving too far forward or from rotating too far inward underneath the femur.

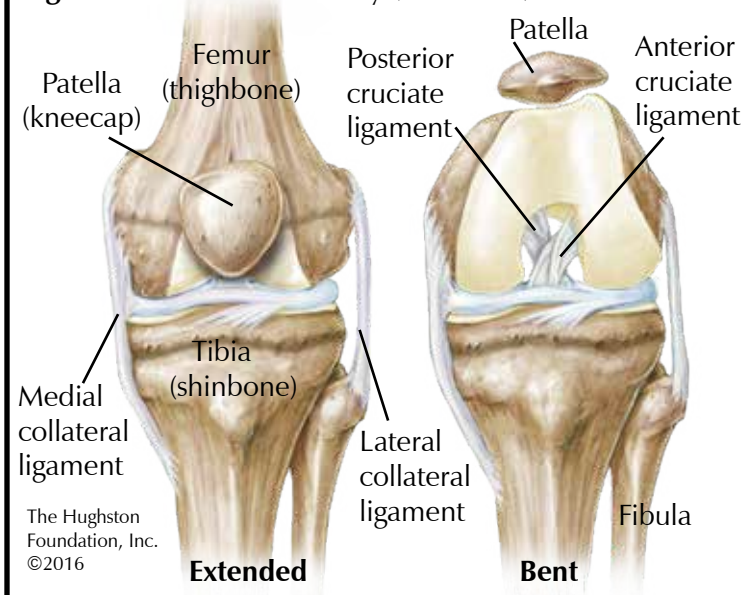
### Risk factors for ACL tears in teens

While participation in demanding sports such as football, basketball, and soccer has been linked to a greater likelihood of ACL tears (**Fig. 2**), further investigation into risk factors has divided ACL tears into nonmodifiable and modifiable categories.<sup>1</sup> Nonmodifiable risk factors include issues with knee structure, hip-knee alignment, hormone function, neuromuscular maturation, and reduced muscular strength. Modifiable risk factors include various neuromuscular imbalances and deficiencies. Both types of risk factors are more closely associated with being female.

#### Nonmodifiable

A narrow intercondylar notch of the femur or notch stenosis (narrowing) as well as variations in tibial plateau (the upper surface of the tibia within the knee joint) anatomy, such as an increased slope, can lead to pinching of the ACL by the femur and possible rupture. Also, by adolescence, females have a wider pelvis than males and thus a greater Q-angle or angle of hip-knee alignment, concentrating more force on the ACL and increasing the

**Fig. 1.** Normal knee anatomy (front view)



likelihood of a tear. Moreover, during their developmental phase, females exhibit less neuromuscular maturation along with greater inner knee rotation and valgus (knock-knee). They also have a greater ground reaction force—the force exerted on the body when landing a jump. Furthermore, young female athletes have less strength in proportion to bone size in the muscles that stabilize the knee than male athletes, yet experience the same twisting and loading forces on this joint. Lastly, hormone fluctuations may cause the collateral ligaments to become looser at certain points during the menstrual cycle and so unable to absorb the stresses placed on them, putting the ACL at risk of injury.

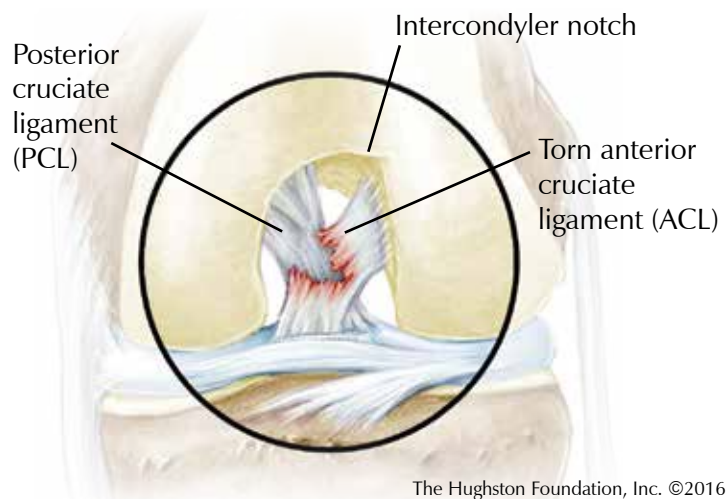
#### Modifiable

Modifiable risk factors for ACL tears include neuromuscular imbalances and deficiencies. Traditionally, boys have participated in sports, such as soccer, that involve twisting movements at an earlier age than girls. By adolescence, they may have developed the muscle coordination and reflexes needed to protect the knee while girls may have neuromuscular imbalances and deficiencies—such as knee ligament, muscle, or overall leg dominance, as well as various muscular weaknesses—that can make them more prone to ACL injuries.

#### Dominance

Ligament dominance is a condition that results in decreased medial-lateral (side-to-side) neuromuscular control of the knee joint. This neuromuscular deficiency can lead to valgus collapse, or medial displacement, of the knee and possibly to an ACL tear. Quadriceps dominance—a condition where the quadriceps muscles in the front of the thigh overpower the hamstrings in the back of the thigh—can cause excessive anterior translation, or forward slippage, of the tibia and strain the ACL.<sup>1</sup> Leg dominance,

**Fig. 2.** Injured anterior cruciate ligament (ACL)



which predisposes the nondominant leg towards valgus collapse, can also be a factor in sustaining ACL injuries.

### **Muscular weakness**

Weaknesses in the gluteal (buttocks), hamstring (back of the thigh), and gastroc soleus (back of the calf) muscles can lead to a valgus collapse and consequent ACL strain, especially during a jump landing.<sup>2</sup> Moreover, weak core (abdominal and mid and lower back) muscles mean an unstable pelvis, resulting in too much lateral trunk motion and pronation (inward rolling of the feet), and thus increased risk of an ACL injury.

### **Prevention programs**

Prevention programs have been created to train athletes to resist injury. Prevention programs for ACL tears focus on neuromuscular imbalances and deficiencies. While each program has its own specific regimen that combines plyometrics (jump training that makes the leg muscles exert maximal force in a brief amount of time in order to increase speed and power) with conditioning and strengthening exercises,<sup>1</sup> all of them concentrate on developing more appropriate landing techniques along with better balance and stability in the lower extremity. For teens, the most effective regimens are those that implement neuromuscular training and emphasize plyometrics and strengthening both pre-season and in season.

While not all studies have shown a reduction in ACL injury for their particular study group,<sup>3</sup> the bulk of evidence indicates that these programs can work.<sup>1,4</sup> One study reviewing several prevention programs saw a 52% risk reduction for ACL tears in females, and for males the rate was even higher at 85%.<sup>4</sup> Two programs that have been shown to significantly reduce ACL injuries in females are Sportsmetrics and Prevent Injury and Enhance Performance

(PEP).<sup>5,6</sup> With all prevention programs, it should be noted that success depends largely on the athlete's degree of compliance.<sup>1</sup> As prevention is still the most efficient and cost-effective method to avoid ACL injuries, screening for at-risk athletes has been considered.

### **ACL surgery**

Over the past 30 years, ACL reconstructive surgery to stabilize the knee and lessen further damage has advanced considerably. While such progress has led to improved outcomes that potentially allow the athlete to return to play, it has also heightened expectations. Affected athletes must realize that they may still have limitations after ACL reconstruction. In their study, Ardern et al. showed that among athletes with ACL injuries, 82% returned to sport, but only 63% to their pre-injury sport, and just 44% at a competitive level. Furthermore, the knee with the ACL tear has been shown to be more likely than the uninjured knee to develop arthritis.<sup>7</sup>

### **The best cure**

An ACL tear can be a significant life-altering injury for a young athlete, and teens, particularly girls who participate in sports, are at increased risk. While more research is needed, appropriate ACL injury prevention programs have been shown to reduce the overall number of ACL tears. As with all types of injuries, prevention is the best cure. Such programs should therefore be seriously considered before a young athlete suffers an ACL tear.

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