



# Hughston Health Alert

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**ATHLETIC GEAR AND YOU**

Volume 19, Number 4 - Fall 2007

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- Kevin J. Collins, MD

## Equipping the High School Football Player

Protective equipment is one of the most important factors in reducing the risk of injury in football. However, even with protective gear, athletes still sustain injuries. During 2005, over 1 million high school male athletes played football and from those players it is estimated that 517,726 injuries occurred during the season.<sup>1</sup> The American Academy of Orthopaedic Surgeons reports that more than 448,000 football-related injuries in youths under the age of 15 are treated each year in hospitals, doctors' offices, clinics, ambulatory surgery centers, and hospital emergency rooms.<sup>2</sup> There is no way to guarantee that an athlete will not sustain an injury if he or she wears protective equipment. However, if the equipment is worn and properly maintained, it will reduce the risk of injury.

### Why wear the equipment?

A high school football player can sustain any number of injuries during practice or competition. Some injuries, such as minor sprains and strains can heal in weeks, while more serious injuries, such as fractures or concussions can end a player's season or football career. Football equipment is designed to protect an athlete from injury during practice and competition, and is also helpful in preventing re-injury. For football equipment to be functional and useful it should not interfere with the athlete's ability to perform. On the other hand, it should not enhance the athlete's performance and create an unfair advantage over other athletes. It must not be harmful to either the athlete wearing the equipment or to other athletes on the field.

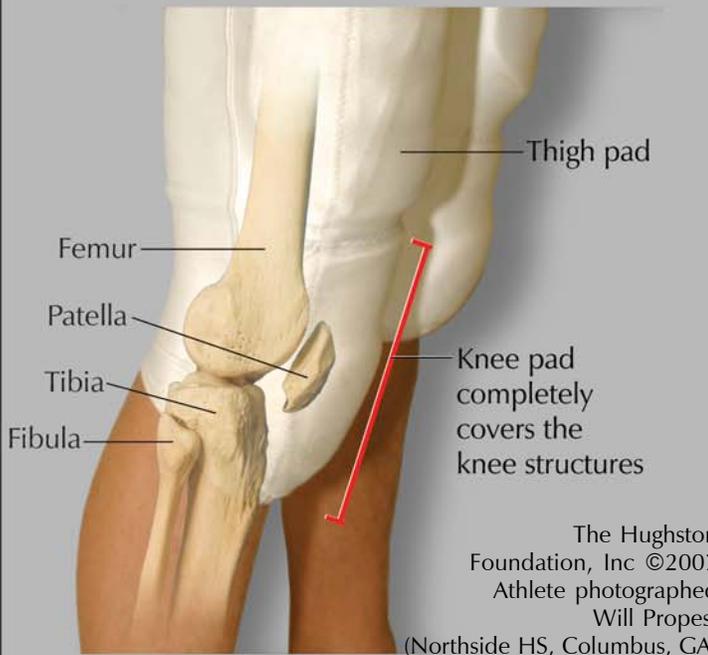
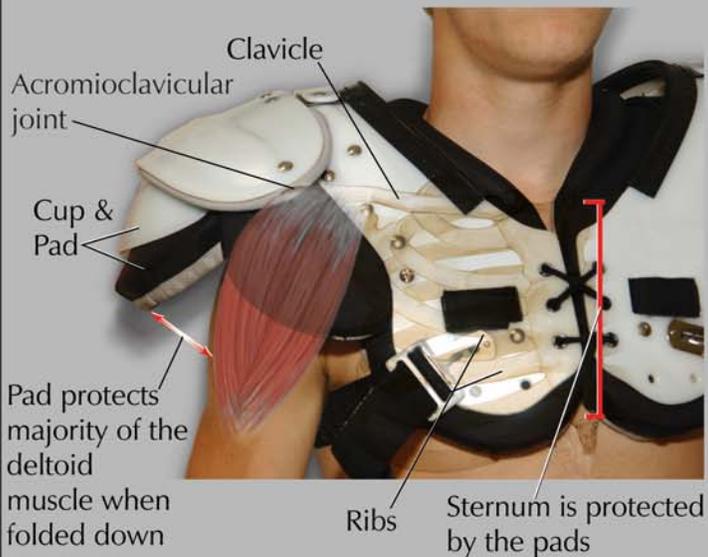
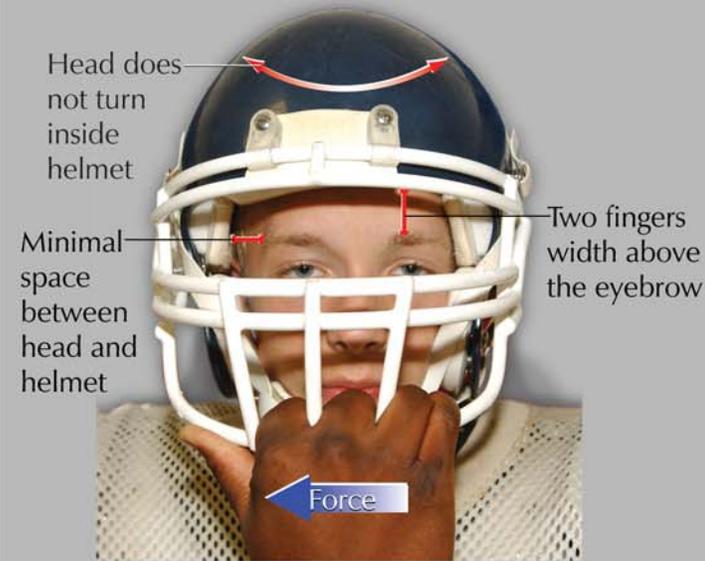


**Fig. 1.** Equipment protects football players during a typical football tackle.

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The equipment must fit properly for it to do its job of protecting the athlete. In a contact sport, such as football, exposed and vulnerable areas must be protected from impact with the surface or other athletes (Fig. 1). Protective equipment for a high school football player includes the helmet with face mask, shoulder pads, hip pads, tail pads, knee pads, pants, thigh guards, jersey, mouth guard with a keeper strap, athletic supporter, shoes, and if needed, non-shattering eyeglasses. The equipment protects the primary contact points, such as the head, shoulders, arms, and legs. Equipment that is too large tends to move or shift during the athlete's movements, especially during a tackle or fall. On the other hand, equipment that is too small can leave areas vulnerable by not completely covering the area it is meant to protect. Mouth guards are worn to protect the teeth, gums, and jaw and to help reduce the risk of concussion. To be sure the athlete is correctly fitted before each game and practice, coaches, athletic trainers, parents, and the athlete should know and understand the benefits of proper fit and maintenance of protective equipment. A plan for purchasing, replacing, tracking, and maintaining equipment should be closely followed.

**Fig. 2** Correctly fitted football equipment



## The football helmet and face mask

Football helmets are designed to absorb force levels high enough to fracture the skull. When fitting the helmet, the front of the helmet should be approximately two fingerwidths above the eyebrow and the back of the helmet should cover the skull base without digging into the neck (Fig. 2). The side ear holes should coincide with the ear canals. The jaw pads should fit snugly to prevent the helmet from rocking. Helmet fit must be monitored often because the fit can be changed by factors such as temperature, hair length, padding deterioration, and the spread of the face mask.<sup>3</sup>

To check the helmet fit, the athlete buckles the chin strap and holds his or her head straight ahead. The coach or athletic trainer grasps the sides of the helmet or face mask and tries to turn the helmet from side to side, and then tries to rock it front to back. A properly fitting helmet moves only slightly (Fig. 2).<sup>3</sup> If the athlete's head moves inside the helmet, the helmet is too large (Fig. 3).

The face mask is designed to shield the face from collisions and, most importantly, protect the nose. Broken noses and face lacerations were once quite common before face masks became mandatory during competition.

## Shoulder pads

Shoulder pads tend to take the most abuse during the course of the game. Shoulder pads are extremely important because they cushion the impact a player makes with other players and the ground. They protect the shoulders, chest, and back. Most youth pads are designed as all-purpose pads, and manufacturers usually provide sizing charts to help in selecting the correct size for the athlete.

The inner padding should cover the tips of the shoulders from AC to AC (acromioclavicular joint). Make sure that the shell (outside) padding extends 3/4 to 1 inch beyond the AC joint when the arms are at the athlete's side. Check to see that the cups on the outside of the shoulder pad extend about 1/3 to halfway down the arm. The cup pad should cover the deltoid muscle and allow the movement required by the athlete's specific position (Fig. 2).

The neck opening should not be constrictive, yet should minimize the areas exposed to injury. Straps and lacing should be snug without constricting breathing. Make sure the laces are centered, snug, and tightly tied. Make sure the straps underneath the shoulder pad are snug with all the slack taken out. Pads should cover the scapulae, the sternum, clavicles, and extend down at least 2 inches past the nipple line.<sup>4</sup> Make sure there is a 2- to 3-inch space between the shell padding and the neck. Once fitted, the athlete should be able to raise and lower his or her arms without the pad riding up into the neck opening. Sternum pads, rib protectors, and deltoid pads can supplement shoulder pads for extra protection.<sup>4</sup>

## Other protective pads

Once the appropriate size has been selected, the coach or athletic trainer should have the athlete try on the pads and then inspect them to ensure that they adequately cover the area they are designed to protect.

- Knee pads fit inside the lower part of the pant leg and should cover the patella, or knee cap, completely (Fig. 2).

- Thigh pads protect the quadriceps muscles from collisions with other players and the ground. There are different sizes depending on the athlete's position. Kickers and punters generally wear the smallest size pads because those positions receive the least amount of contact.

- Hip and tailbone pads are often the smallest pads required for competition. They are made of foam and are held in place by the girdle.

- Shock pads are often worn by running backs, linebackers, and receivers, and are designed to absorb impact and provide additional support to the shoulders, chest, and back. These lightweight pads are worn underneath the shoulder pads.

Football equipment must be durable, easy to maintain, and simple to fit. Athletic equipment that is too small or too large for an athlete does not offer adequate protection; therefore, proper fit is essential in protecting the athlete. As the athlete changes during the season—cuts his hair, loses or gains weight, gets braces removed—the equipment must be reevaluated to be sure it still does its job of protection.

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## References

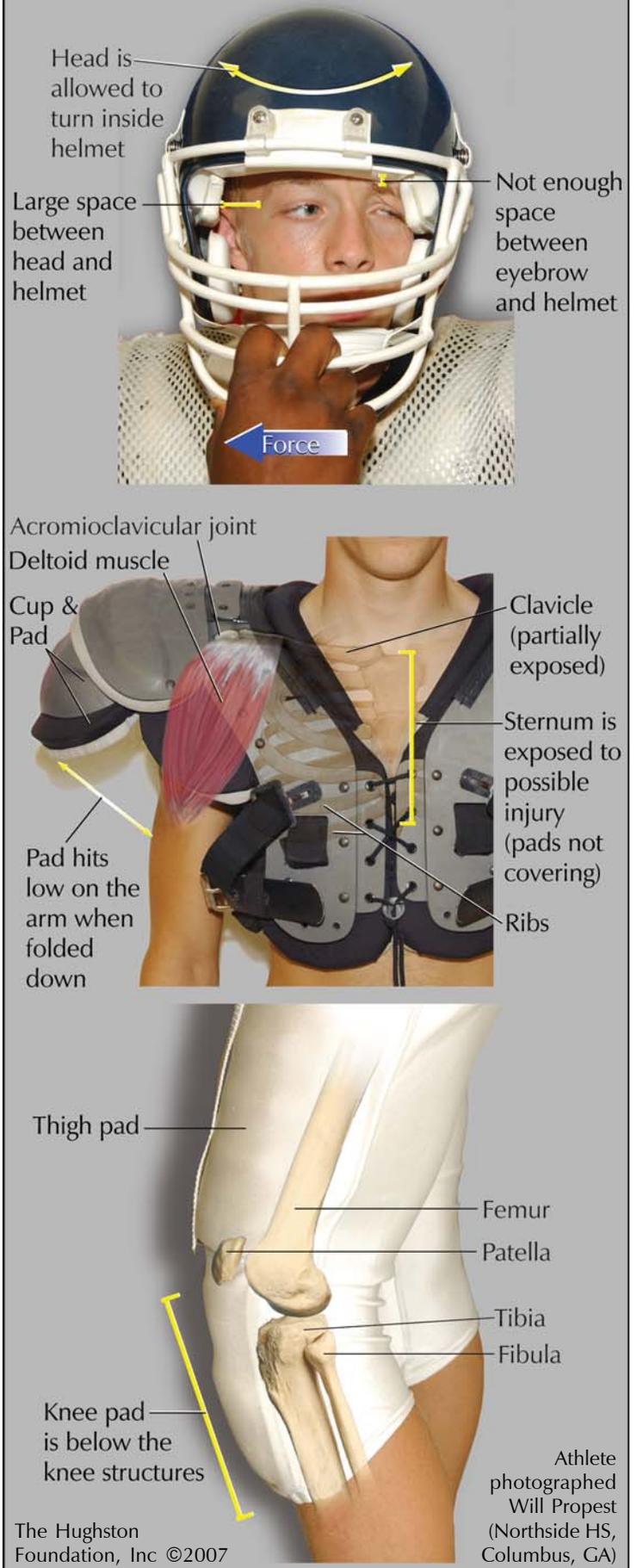
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**Fig. 3** Incorrectly fitted (oversized) football equipment



## Mouth Guards: Essential Athletic Gear

Wearing a mouth guard during practice or during a game is equally important as wearing any other type of sports-related protective gear. Any athlete who has experienced a chipped or broken tooth or any other dental injury during competition would attest that a mouth guard is an essential part of one's athletic gear. The American Dental Association (ADA) reports that an athlete is 60 times more likely to suffer dental injuries when not wearing a mouth guard.

### Types of mouth guards:

The **stock ready-made** mouth guard is designed as a one-style-fits-all guard (Fig. 1). This particular type of mouth guard is popular with many athletic departments because it is inexpensive and relatively efficient for all sports. Stock ready-made guards come in different sizes; thus, the athlete is provided a size that best fits his or her mouth.

The **boil-and-bite** mouth guard is closer to an individual, or custom, fit than the stock ready-made guard, but still remains fairly inexpensive.

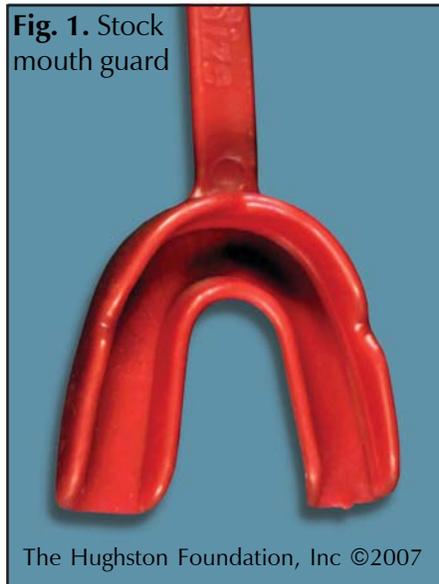
The mouth guard is called a boil-and-bite guard because of the way it is formed. The guard is placed in boiling water for several minutes. Then it is drained and while it is still pliable it is placed in the athlete's mouth. The athlete bites down to get the custom fit for his or her mouth and teeth (Fig. 2).

**Custom made** mouth guards are made for a specific athlete by a dentist. They are more expensive than other guards, but are thought to provide the most protection because of the fit (Fig. 3).

### When to use a mouth guard

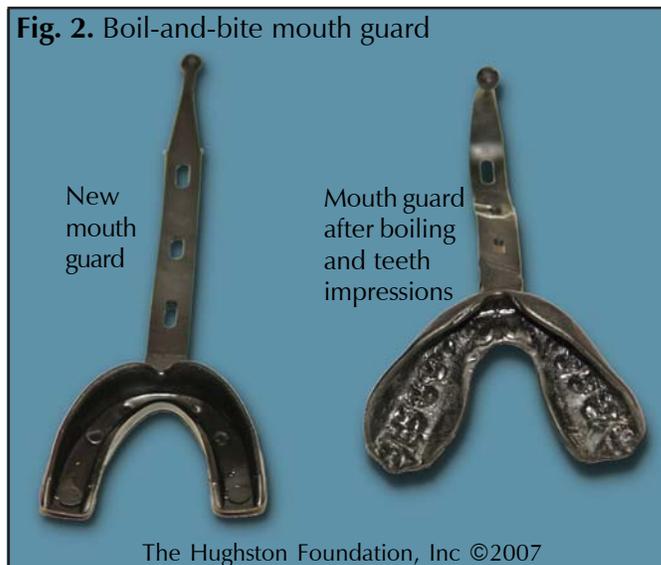
Wear a mouth guard during games,

**Fig. 1.** Stock mouth guard



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**Fig. 2.** Boil-and-bite mouth guard



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**Fig. 3.** Custom mouth guard and case



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practice, or recreational sports activities. You are at risk for dental injuries each time you are involved in sports, whether it's competing, practicing, or just playing a pick-up game with friends. High school sports programs and the National Collegiate Athletic Association (NCAA) requires mouth guards for football, boxing, wrestling, and hockey. Athletes who participate in non-contact sports can benefit from wearing a mouth guard as well. Mouth guards can help protect the teeth and mouth, as well as reduce the chances of concussion during any contact an athlete may have.

### How to care for your mouth guard

Taking care of your guard is relatively quick and easy. After each use, wash your mouth guard by rinsing it with cool water or by brushing it with a toothbrush. You can use toothpaste or you can keep it clean by using cold, soapy water. Do not wash or rinse a guard in hot water, as the heat will cause it to lose its shape. Store and transport your mouth guard in a sturdy plastic case with air vents, or holes, that allow air circulation. Do not leave your mouth guard in extreme heat or direct sunlight.

Check your mouth guard regularly for tears or holes. A mouth guard that is losing its shape or has tears and holes can irritate your mouth, and may not provide the protection you need. Also avoid wearing a mouth guard with other dental apparatus, such as a retainer. If you have braces or wear a retainer, consult your orthodontist about a mouth guard before participating in sports activities. Do not chew on or cut your mouthguard. If you have difficulty talking with the guard in place or if the guard causes you to gag, it is most likely the wrong size. For most athletes, a custom fit guard will alleviate these problems.

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# Athletic Shoes: An Integral Part of Your Athletic Equipment

During the 1960s, athletes pretty much had only one shoe to choose from; the sneaker. Fortunately, today's fitness industry has provided us with hundreds of different brands and styles of athletic shoes for all types of sports. The American Orthopaedic Foot and Ankle Society recommends that if you play a sport 3 or more times a week, you should wear a sport-specific shoe.<sup>1</sup> In today's competitive sports, the sport-specific shoe has become an integral part of athletic equipment because it has been specially designed to help improve performance and protect the athlete from injury.

## How a sport-specific shoe helps improve performance.

A competitive athlete is always looking for ways to improve his or her performance and an easy way to do that is to wear the right shoe. Sport-specific shoes are specially designed to support your feet while playing on a particular terrain or field. This often helps reduce or eliminate stress on the athlete's legs, ankles, and feet.

Consider the movements of a basketball player and a soccer player during a game. Both athletes make similar moves during competition, such as fast-paced running, sudden stops, cutting, and blocking. However, they don't wear the same type of shoes because their field of play is different. The field of play causes different stress areas for each player. The stress from landing the jump a basketball player makes on a court is greater than the stress a soccer

player sustains during a jump on the field. Sport-specific shoes are designed with all these differences in mind.

## How sport-specific shoes protect athletes from injury.

A shoe protects your feet from minor injuries such as cuts and abrasions that can be caused by the environment

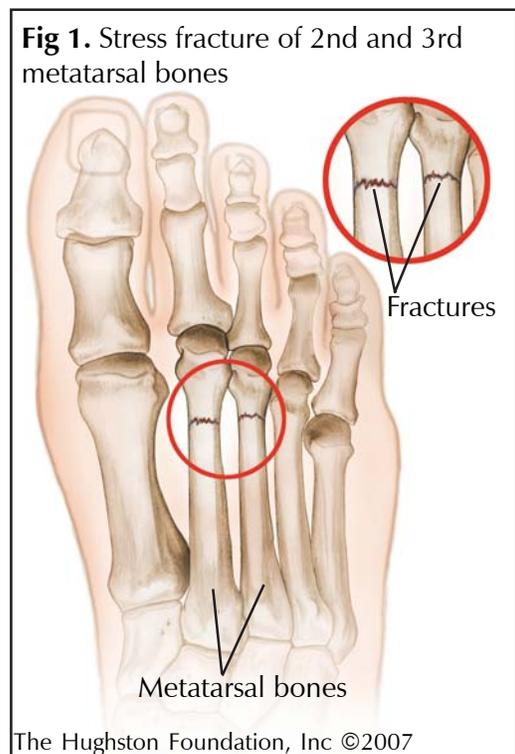
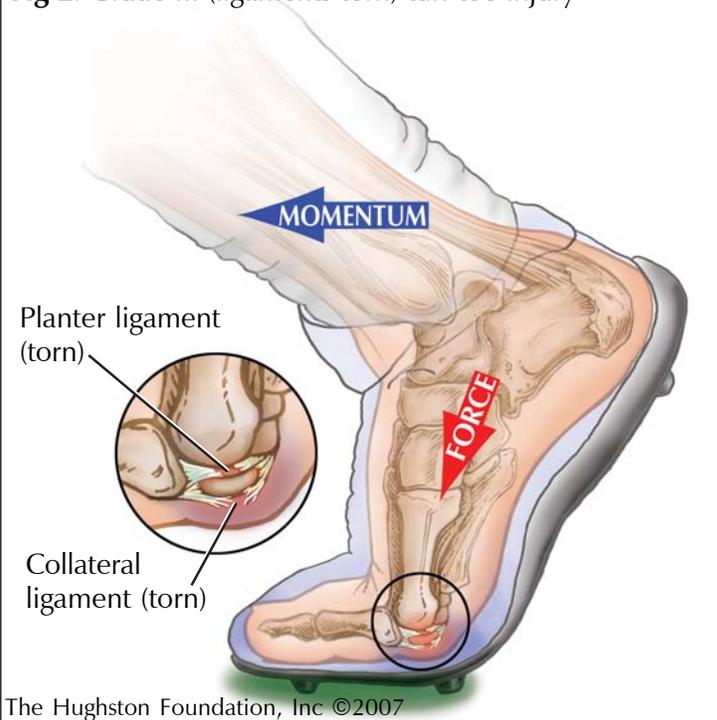


Fig 2. Grade III (ligaments torn) turf toe injury



and terrain; however, shoes can do a lot more. A competitive athlete who spends long hours each week training for competition and then competes 1 or 2 times each week can suffer any number of repetitive stress injuries, such as plantar fasciitis, shin splints, or stress fractures of the foot. Many factors can contribute to a stress injury, but wearing worn-out shoes or shoes that are not designed for your sport can be a major cause.

Stress fractures that occur in the foot often involve the metatarsal bones. A stress fracture of the 2<sup>nd</sup> or 3<sup>rd</sup> metatarsal bone is often called the *march fracture* because soldiers running in boots often suffer from these fractures. More stress is placed on the 2<sup>nd</sup> and 3<sup>rd</sup> metatarsals when ambulating, or moving, so these bones are at an increased risk for stress fracture. The fracture is caused by wearing improper footwear for the intensity, duration, and frequency of the exercise (Fig. 1).

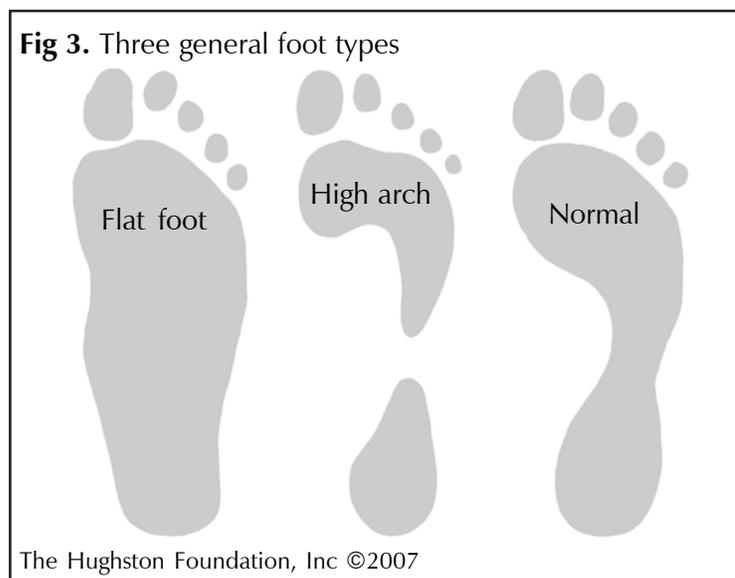
Another example of a footwear-related injury is known as "turf toe", which often occurs in athletes who play sports on an artificial surface. Turf toe is the name used to describe a sprain of the ball of the foot at the great toe. A sprain means that the ligaments (tissues connecting two bones) are stretched or torn. Turf toe occurs when the shoe grips hard on a surface and sticks, causing a sudden stop which in turn causes the body weight to shift forward and in so doing bends the toe up. The injury can occur if you are wearing a soft, flexible shoe instead of a shoe that has a firm sole that will not bend under the pressure of sudden stops (Fig. 2).

## How to buy sport-specific shoes

Before running to the store for shoes, there are a few

things you should consider before you shop. First, consider shopping at a specialty shoe store which carries a variety of brands and styles for your sport. These stores often have knowledgeable employees who know how to fit you for your shoes and can often give you good advice on your purchase. Second, bring along some information to help find the right shoe for your foot and your sport. Here is a list of things you should know and bring with you:

- Your foot type. The type of foot you have makes a difference in the size and shape of your toe box and the insole of your shoe. To find your foot type, you can simply wet your feet and then step onto a sheet of construction paper. The foot print you leave will tell the type of foot you have. If you have a flat foot, the entire outline of your foot will be present on the paper. If you have a high arch, you will leave a big “C” outline, showing very little of your midfoot. If you have a normal arch, you leave a clear midfoot outline (Fig. 3).



- Bring your old shoes. Your old shoes will show your wear pattern.
- Bring the socks you wear during practice or competition to be sure you get a good fit.
- If you wear an insert, shin guards, an orthotic, or a brace, bring the item with you to try on with your new shoes.
- Bring a list of any problems you are having with your current shoes.

Sport-specific shoes can be expensive, and can sometimes seem as if they are just trumped-up hype to sell shoes; however, the shoes can actually help you perform better on the field and help reduce your risk of injury. Spending extra time and money finding the right shoe is just as important as selecting and being fitted for any other equipment that protects an athlete from injury.

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## Rules for Prescribed Equipment in Athletic Competition

Athletes often require the use of a brace or some other form of support when they compete in a sport. However, there are rules and regulations as to what equipment can and cannot be worn during competition. The rules exist to ensure that no athlete gains an unfair advantage over another while wearing the equipment in competition. The rules also allow an athlete who has had a prior injury the opportunity to play with protective gear that would otherwise be unable to play. The National Federation of State High School Associations (NFHS) and the National Collegiate Athletic Association (NCAA) determine the rules and regulations governing what can and cannot be used on the field of play for high school and college athletes.

### NFHS rules and regulations

With the exception of two states, the NFHS mandates the rules and regulations of all sports, including football. For example, in football, most equipment can be deemed legal if it is approved by an official. Tape, bandages, or support wraps can be used as long as their purpose is to cover a preexisting injury. Forearm pads, gloves, and hand pads can be anchored on each end with athletic tape. The exception to this rule is that the tape must not exceed 3 thicknesses. Beginning in 2008, forearm pads must have a securely attached label or stamp indicating compliance with test specifications on file with the Sporting Goods Manufacturers Association as of January 1, 1994.

Hard substances such as leather, rubber, plastic, or fiberglass are illegal unless they are fully covered externally with high density, closed-cell polyurethane that has a minimum thickness of ½ inch. Additionally, a hard substance cannot be used unless it is covering a previous injury and has been prescribed in writing by a physician.

An official must approve knee braces made of hard and unyielding material, unless the hinges of the brace are covered on both sides with all edges overlapping, or if the brace fits under the pants. Any material showing outside of the pants must be covered with padding, or a covering provided by the brace manufacturer. Any hard substance that covers the front of the leg must also be covered with closed-cell foam of a minimum thickness of ½ inch. Plastic material covering protective pads where edges are not rounded, with a radius equal to half the thickness of the plastic is not allowed. All casts and splints must be padded and accompanied by a physician's note. Knee and ankle braces are permitted, but exposed hinges must be covered.

In addition to equipment restrictions and requirements, equipment modification issues must also be taken into

**Fig 1.** ACL brace viewed from the front and side.



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consideration. For example, in basketball, any casts, braces, compression sleeves, and guards are to be worn for medical reasons only. Soccer allows protective face masks to be worn only by players who have suffered a facial injury. The mask can be made of a hard material, but must be molded to fit the face without

protrusions. A medical release form must be signed by a physician and brought with the athlete to the game site in order to participate. In all high school sports, officials have the authority to declare any equipment illegal if it is dangerous or its function is not clearly defined.

### NCAA regulations

There are many issues regarding the legality of protective equipment used in football. If the legality of a piece of equipment is brought into question, the umpire or official is designated to make a determination. The NCAA and its affiliates define "illegal equipment" as any equipment that violates the sanctioned equipment rules. Any equipment worn by an athlete that could endanger themselves or others on the field is considered illegal. In certain instances, artificial limbs can be viewed as illegal equipment. If an official determines that the limb gives the wearer an advantage, the athlete will not be allowed to participate. If deemed legal, the artificial limb should be padded to rebound like a natural limb.

Hard, abrasive, and unyielding materials on the hand, forearm, wrist, or elbow are deemed illegal if they are not covered on the exterior by slow-recovery foam padding, no less than a 1/2 inch thick. Hard material is only allowed if it is

used to protect an existing injury. Casts and splints are only allowed in competition if they serve the purpose of protecting a fracture or dislocation. Tape or any bandages on the wrists, forearm, elbow, and hand can only be used to protect an injury unless deemed legal by an official. Tape can be also used to secure glove fasteners, but cannot be used on any other part of the glove. Pads and arm covers that enhance contact with a football or an opponent are also not allowed.

Thigh guards and shin guards have similar rules to those used on the upper extremities. Hard substances used as thigh guards must be covered externally with material such as closed-cell vinyl foam that is at least 1/4 inch thick and internally by foam that is at least 3/8 inch thick. The foam must overlap the edges and there can be no exposure of the hard material. The shin guards must be covered on both sides as well. A shin guard made of hard material must be covered on both sides with slow-recovery foam padding at least a 1/2 inch thick. Preventative or therapeutic knee braces must be entirely covered (no external exposure) unless the brace is worn under the football pants.

With all of the rules for and against special equipment, it takes some time to become acquainted with them. However, first and foremost, the safety of the athletes is always considered before allowing an athlete to participate who has potentially hazardous equipment. The safety of the equipment is always at the discretion of the official and referees. To make sure your equipment meets safety standards, check the rule book for your particular sport and have the physician's notes ready to present to an official before participating in a competition.

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**Fig 2.** Active ankle strap viewed from the side and front.

Kevin J. Collins, MD, is a native of Macon, Georgia. Dr. Collins received his undergraduate degree from Mercer University. He graduated from medical school at Mercer University School of Medicine where he served two terms as class president. He completed his internship at Louisiana State University Health Sciences Center in Shreveport, Louisiana. He completed his training in orthopaedic surgery at Louisiana State University Health Sciences Center, Overton Brooks VA Medical Center, and Shriners Hospital for Children in Shreveport, Louisiana.



Before becoming a member of our staff, Dr. Collins completed a sports medicine fellowship at The Hughston Foundation, Inc. in Columbus, Georgia. Dr. Collins holds memberships in the American Academy of Orthopaedic Surgeons and the American Orthopaedic Society for Sports Medicine.

Dr. Collins practices general orthopaedics with an interest in sports medicine. He continues academic research in sports medicine at The Hughston Foundation and works at The Hughston Clinic in Valdosta, Georgia.

Dr. Collins enjoys spending time with his wife, Shelly, and his two daughters, Chloe Lynn and Caylee. He fills his leisure time with outdoor activities such as swimming, playing tennis, and running. He also enjoys playing and listening to music.

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