Hughston Health Alert

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Inside...

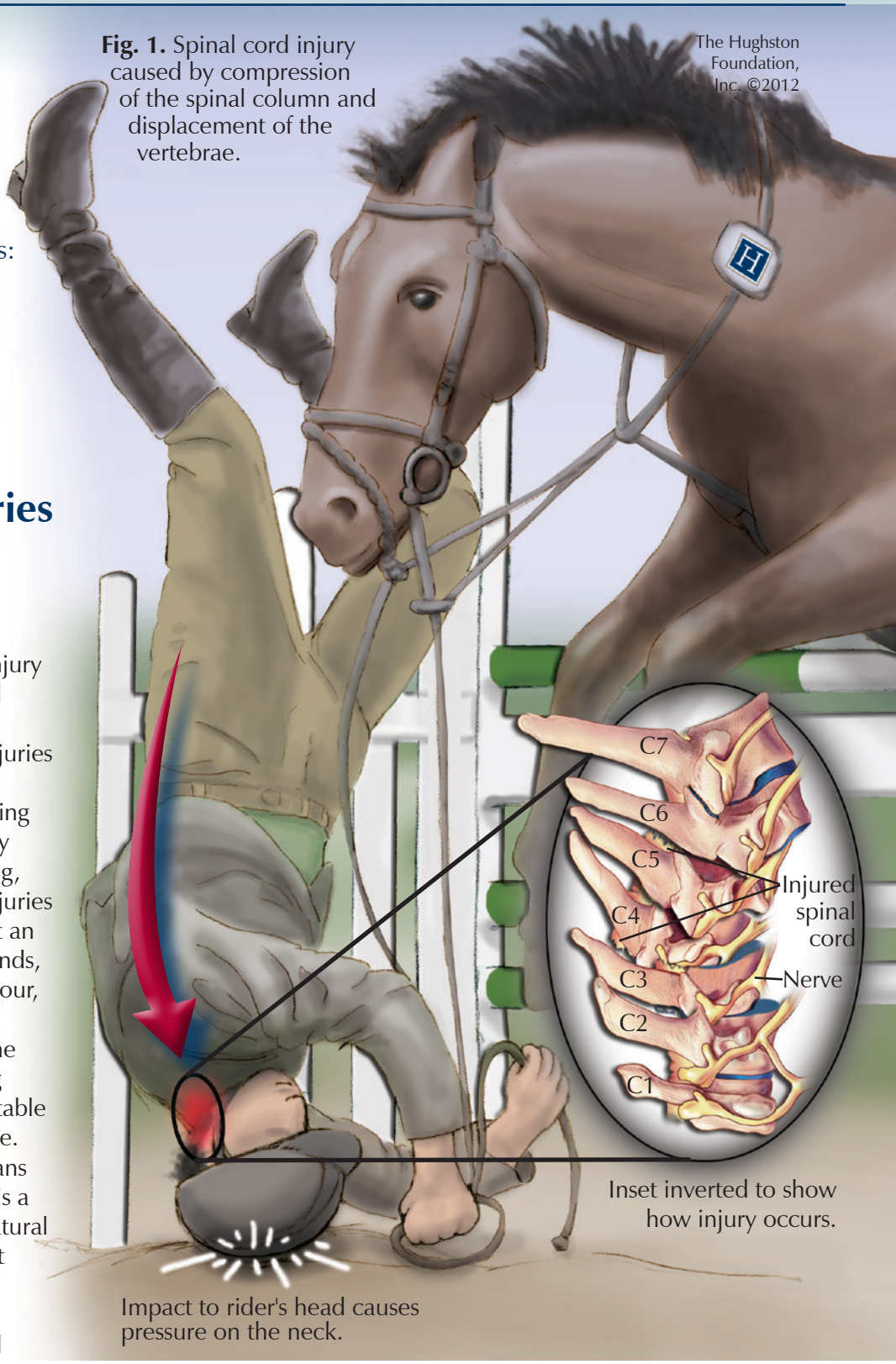

Fig. 1. Spinal cord injury caused by compression of the spinal column and displacement of the vertebrae.

Equestrian-Related Injuries

A REVIEW OF RIDING INJURIES AND HOW TO PREVENT THEM

According to the National Electronic Injury Surveillance Survey (NEISS), an estimated 78,499 people were treated in hospital emergency rooms for horseback riding injuries in 2009. When using a severity score to compare potential injuries, horseback riding can be categorized as a higher-risk activity than automobile racing, motorcycle racing, football, and skiing. Equestrian-related injuries are not surprising when you consider that an average horse can weigh up to 1200 pounds, can run at speeds of up to 40 miles per hour, can kick with the force of 1 ton, and can elevate a rider as high as 10 feet above the ground. Additionally, because it is a living creature, a horse is much more unpredictable than either a motorcycle or an automobile. It reacts to sound and odor just like humans do. To complicate things further, a horse is a flight animal; in other words, a horse's natural instinct is to run away or flee from what it perceives as trouble.

Now combine that knowledge with information about the human body. A fall

from a height as low as 2 feet can cause permanent brain damage. An impact while in motion at 6 miles per hour can shatter the human skull. Sixty percent of deaths related to equestrian injury are a result of brain injury. With this in mind, you can understand the high risk of severe injury, especially to the head, and the need to take protective measures.

What are the rules?

Some associations and governing bodies have issued recommendations and requirements to protect recreational equestrians, but not all of the rules are the same. The associations are dedicated to educating riders about injury prevention, but, to date, there is no overseeing governmental body that enforces recreational equestrian safety. Laws regulating recreational horseback riding are state-specific and range from mandating the use of helmets to simply issuing a warning. For example, the state of Georgia has a statute declaring that all equestrians must be warned of the dangers of horseback riding and be offered helmets when riding. However, a rider can refuse to wear a helmet and the horse owner or stable may not be held liable for an injury.

In organized competition and professional equestrian settings, the United States Equestrian Federation and state laws have gained ground enforcing protective gear, such as helmets and vest wear. The regulations are very strict with regards to protecting children under the age of 16 in organized and recreational settings; however, the regulations are not uniform for all events. The type of equestrian event and level of competition dictates the degree of regulation. To date, there are no enforceable laws that apply to all riders, regardless of age, level, or setting to ensure they are properly protected.

Fig. 2 Equestrian safety gear

Equestrian injuries

The spectrum of injuries ranges from contusions (bruises), sprains, and strains to the most devastating of injuries, such as brain and spinal cord trauma that can lead to disability or death (**Fig. 1**). The tragedy suffered by actor Christopher Reeve brought the dangers of horseback riding to a national stage in 1995 when he became a quadriplegic after being thrown from a horse during an equestrian competition in Virginia.

It is difficult to truly quantify the frequency of certain injury patterns associated with horseback riding. One obstacle is the large number of under-reported injuries in riders who do not go to the emergency room or doctor's office. A 10-year study published in 2007 in the American Journal of Surgery reported equestrian injuries that required medical attention in an emergency room and admission for treatment at a trauma center in Alberta, Canada, where there is a high number of equestrians. Of the patients who survived injuries requiring hospitalization, 22% reported severe physical disability, 12% reported severe mental health disability, and 11% reported chronic pain from the accident.

In the Canadian study, patients were questioned concerning their injury. The study reported that riders believed that the injury they experienced could be attributed to the following: the horse getting "spooked" 35% of the time, rider and horse mismatch of skill 27% of the time, horse with bad temperament 15% of the time, simply fell 9% of the time, equipment malfunction 6% of the time, and rider inexperience only 5% of the time. Something as simple as a hat falling off the rider's head can startle a horse enough to cause the rider to fall or be thrown. It is important to keep in mind that there are many variables contributing to the likelihood of an injury occurring that are not under the control of the rider. The only variables that are truly under the control of the equestrian are injury prevention strategies.

The most common area of injury is the upper extremity as the rider braces for the fall. Brain and spinal injuries can easily occur when falling from the height of the horse at minimal speed. Lower extremity injury, such as ankle and long bone fractures, occur from the impact on the ground or as a result of the rider's foot getting caught in the stirrups and the rider being dragged. Multiple studies reviewing injuries requiring hospital admission indicate that chest and head injuries occur 54% and 48% of the time, respectively.

The Wisconsin Medical Journal reported in a 2005 review article on horse-related injuries in children that the most common cause of injury is being thrown from a horse, followed by injuries sustained from being crushed by a falling horse. Other injuries included being kicked and stepped on. Injuries inflicted by a horse while dismounted have been reported to occur in as many as 20% of total equestrian-related injuries. Often, hoof kicks are suffered while the equestrian is dismounted and grooming the horse; injuries

occur while simply walking by a horse, as well. Due to their heightened sense of peripheral vision, a horse should be approached from the side and not the back. Often, the horse assumes what it can't see to be a threat. Alarmingly, in the Wisconsin review, 91% of the dismounted equestrians injured were not wearing a helmet at the time and 100% were not wearing any facial protection.

Protective gear and injury prevention

The basic and most essential protective measure is the use of protective headgear. Two major types of headgear include a hard skull cap, also known as a "crash helmet" that provides the best protection, and a lighter and less solid hard hat that is only approved when fitted with a safety harness. An easy way to spot the difference is that hard hats typically have a small brim. Most organized equestrian events and competitions require the use of an American Society for Testing and Materials/Safety Equipment Institute (ASTM/SEI)-certified helmet fitted with a safety harness, especially in youth riders.

The wearing of a protective vest is not commonly enforced but is highly encouraged by nearly all equestrian organizations. A vest should reduce the impact to a rider's chest, abdomen, and, to a limited extent, the spine. The design of the vest can vary from rapidly inflating air pockets similar to air bags in a car to heavy Kevlar-woven custom-designed vests. A vest can feel constraining to the rider, limiting movement of the trunk; therefore, riders tend to wear vests less often than they do other safety equipment.

To prevent falling off the horse and getting caught in a stirrup resulting in the rider being dragged potentially for miles, certain precautions can be taken with regard to foot gear and stirrup design. Novice and youth riders should use break-away stirrups. This sensible accessory protects the rider until he or she gains experience and learns to ride with heels level or pointed down at all times. The foot position allows quick disengagement of the boot from the stirrup. Another simple precaution is to wear boots with a "no slip" design and low heels. Minimal heel height decreases the bulkiness of the boot and reduces the chances of it getting caught.

Finally, the horse's saddle and tack should be properly fastened and in acceptable condition. It is easy to imagine the results of saddle or equipment failure. All equipment should be routinely inspected by attentive and well-trained adults. Any damage should be repaired in a timely fashion.

Despite the daunting statistics, horseback riding offers the rider an enjoyable sporting activity that can help promote great mental and physical fitness. If you follow safety guidelines and use protective gear, the benefits of becoming an equestrian can be appreciated without experiencing devastating injuries. Safe riding!

Yaser El-Gazzar, MD
Columbus, Georgia

The American Academy of Orthopedic Surgeons released the following recommendations to prevent horseback riding injuries in October 2011:*

- All riders should always wear horseback riding helmets that meet proper safety standards.
- Wear properly-fitted, sturdy leather boots with a minimal heel. Your clothing should be comfortable and not too loose.
- Inspect all riding equipment to make sure it is not damaged.
- Be sure the saddle and stirrups are appropriate to your size and are properly adjusted.
- Secure all riding equipment properly.
- Children and novice riders should consider using safety stirrups that break away if a rider falls off the horse.
- Novice riders should take lessons from experienced instructors.
- Young horseback riders should always be supervised.
- Amateurs should ride on open, flat terrain or in monitored riding arenas.
- Jumps and stunts require a higher level of riding skill. Do not attempt these without supervision.
- If you feel yourself falling from a horse, try to roll to the side (away from the horse) when you hit the ground.
- Do not ride a horse when you are tired, taking medications, or under the influence of alcohol.
- Always remember that you are riding an animal that has its own reactions to the sights, sounds, and smells you are both experiencing.
- Horses are flight animals. They will run away from sudden noises and movements. Stay alert for anything that might startle your horse. Be prepared to respond quickly.
- When trail riding, do not go off trail, no matter how tempting. Heed warning signs.
- Never walk behind a horse. It is best to approach them at their shoulder. This is less threatening to them.
- To gauge a horse's demeanor, watch the horse's head, particularly its ears. The ear movements of a horse will provide you with information about how the horse is reacting to its environment, people, or other animals. A horse will direct one or both of its ears toward a sound. Ears held to the side can indicate that a horse is sick, sedated, or sleeping. Ears that are pinned back indicate anger or a threat.
- If you are giving the horse a treat, be sure to keep your hand open and your fingers extended and flat. Horses can inadvertently bite and break fingers that are cupped around a treat.

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All-Terrain Vehicles and Orthopaedic Injuries

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The US Consumer Public Safety Commission (CPSC) reported that between 1982 and 2010 there were 11,001 all-terrain-vehicle-(ATV) related fatalities. In 2010, there were 115,000 injuries treated in the emergency room that were related to ATV accidents. The 2010 statistic translates into 108 injuries per 10,000 4-wheeled ATVs in use. With the increasing use of ATVs, it's necessary to raise awareness of potential injuries and of ways to prevent them.

Risk factors associated with ATV use

An adult-sized ATV can travel at speeds in excess of 60 miles per hour, weigh more than 700 pounds, and can cause serious injury during an accident. Studies of risk factors for ATV-related deaths and injuries have shown that injured riders are often male, younger than 18, Caucasian, live in a rural area, have a high-school education or less, are inexperienced drivers, and often are intoxicated at the time of injury. Alcohol was a factor in 30% of ATV-related deaths according to the CPSC. The most common mechanism of injury is a rollover accident, followed by collisions with nonmoving objects, such as a tree, or collisions with other vehicles. Children are significantly more likely to be involved in collisions than adults.

ATV-related injuries

Orthopaedic injuries are the most commonly reported injuries in ATV accidents, followed by head and facial trauma and chest or abdominal trauma. The latest (1997) CPSC ATV-injury survey reported that fractures accounted for 30% of injuries, and strains or sprains accounted for 15%. Most closed head injuries are associated with the lack of helmet use and often result in long-term disability or death. Spinal fractures account for only 4% to 5% of fractures, but they cause significant health and disability problems. Lower extremity fractures are the most common injury in both adults and children. The femur (thighbone) is the most commonly fractured bone in children. Other common injuries include tibia (shinbone) fractures, hip dislocations and partial foot amputations. A partial foot amputation is a rare injury, but it has been needed to treat children injured riding small ATVs. ATVs designed for young riders often have an exposed chain in which the foot can become caught. A child riding as a passenger without foot rests or a chain guard is also at higher risk for injury.

Injury Prevention Guidelines

To help prevent injuries, the CPSC recommends the following:

- You should take a hands-on training course before using an ATV.
- You should wear a helmet while riding an ATV. The helmet can be either a motorcycle or other motorized sports helmet that is certified by the US Department of Transportation or the Snell Memorial Foundation.
- In addition to a helmet, wear protective gear, such as over-the-ankle boots, goggles, gloves, long pants, and a long-sleeved shirt.
- Do not ride as a passenger on an ATV meant for a single rider. For safe handling of an ATV, you must pay attention to the landscape and how your ATV moves. Operating an ATV with more than 1 rider can restrict your ability to shift your weight which is often necessary for safe handling of the vehicle. Most ATVs are not properly equipped with handholds or footrests for a passenger.
- You should not drive on a paved road. ATVs are difficult to control on paved surfaces because the wheel design requires skidding of the inside rear wheel during a turn, making the ATV unpredictable on paved surfaces.
- Children should not drive or ride on an adult ATV. Children under 6 years old should never ride an ATV at all. ATVs greater than 90 cc in engine size should not be operated by children younger than 16 years old.
- Drivers who are under the influence of drugs or alcohol should not operate an ATV.

In addition to the CPSC safety recommendation, the American Academy of Orthopaedic Surgeons suggests limiting ATV usage to daylight hours only. ATVs can be fun to ride, but you should adhere to the safety guidelines to help decrease your risk of an ATV injury. For more information on ATV courses and other safety tips, you can go to www.atvsafety.gov, and the Snell Helmet Safety Standards can be found at http://www.smf.org/stds.

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Skier's Thumb

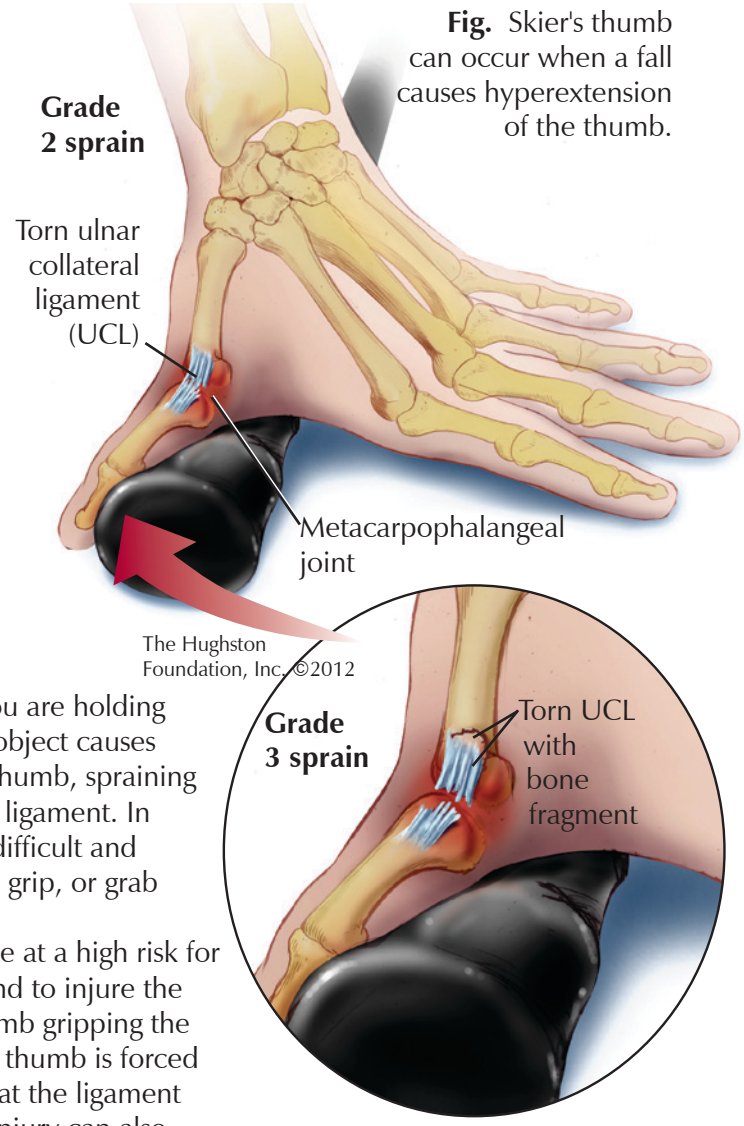

Fig. Skier's thumb can occur when a fall causes hyperextension of the thumb.

The hand is a complex structure with its many articulations and its small bones, ligaments, and muscles. Skier's thumb, also called gamekeeper's thumb, is an injury to the ulnar collateral ligament (UCL) located on the inner side of the knuckle at the metacarpophalangeal joint. The injury can occur from simply falling on an outstretched hand, or it can result from repetitive motion that weakens the UCL over time. Injury to the UCL often occurs when you are holding or gripping an object and the object causes forced hyperextension of the thumb, spraining (stretching or tearing) the UCL ligament. In sports, the injury can make it difficult and painful for an athlete to throw, grip, or grab an object.

Hockey players and skiers are at a high risk for skier's thumb because they tend to injure the UCL while falling with the thumb gripping the hockey stick or a ski pole. The thumb is forced away from the fingers, pulling at the ligament until it stretches or tears. The injury can also occur while a baseball player slides head first and catches the thumb on the base while the momentum of the slide continues to move him or her forward. Football players also injure the UCL while attempting a tackle or while colliding with another player.

UCL sprain grades

There are 3 grades of UCL sprains (**Fig.**). A grade 1 sprain is minor with the ligament stretched but not torn. A grade 1 sprain can cause some range of motion (ROM) loss, swelling, and tenderness over the ligament. A grade 2 sprain is mild with some ligament tearing, and it can cause loss of ROM and grip strength. A grade 3 sprain is severe with the ligament torn completely or a small piece of bone is pulled off as the ligament separates from the bone. A grade 3 sprain can cause a total loss of function.

Treatment

For all 3 grades, RICE (*R*est, *I*ce, Compression and *E*levation) should be applied immediately after the injury has occurred. Once an x-ray confirms that there is no fracture and the swelling has been reduced, ROM exercises and strengthening exercises can be started. For an athlete to be cleared to return to play, grip strength must be equal to that of the opposite hand, and throwing and catching must be pain-free.

Most thumb sprains are minor and do not require surgery unless the ligament is completely torn or it has caused a fracture. If you have surgery, your thumb will be immobilized for 6 to 8 weeks to allow time for the bone and ligament to heal. Often, when you are cleared to resume a sport, a splint or brace is worn to protect the joint against future injury.

If you injure your thumb, you should see your physician as soon after the injury occurs as possible. If the injury is not properly diagnosed and treated, it can lead to chronic pain, stiffness, and swelling. Long-term problems can be avoided with proper treatment, and you can regain full function and return to playing sports.

Kathleen Simone, ATC
Columbus, Georgia

RICE (*R*est, *I*ce, Compression, *E*levation)
Essential elements for managing pain and swelling
• **Rest** from your activity to allow the affected area to heal and to avoid further trauma to the injury.
• **Ice** can be applied for 20 minutes, 3 times a day to help eliminate swelling and discomfort.
• **Compression** can be applied using an elastic bandage to combat further swelling.
• **Elevation** can be accomplished by supporting the arm so it is above the level of the heart. This helps decrease swelling in the affected area.
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Assessing and Treating Osteoporosis:

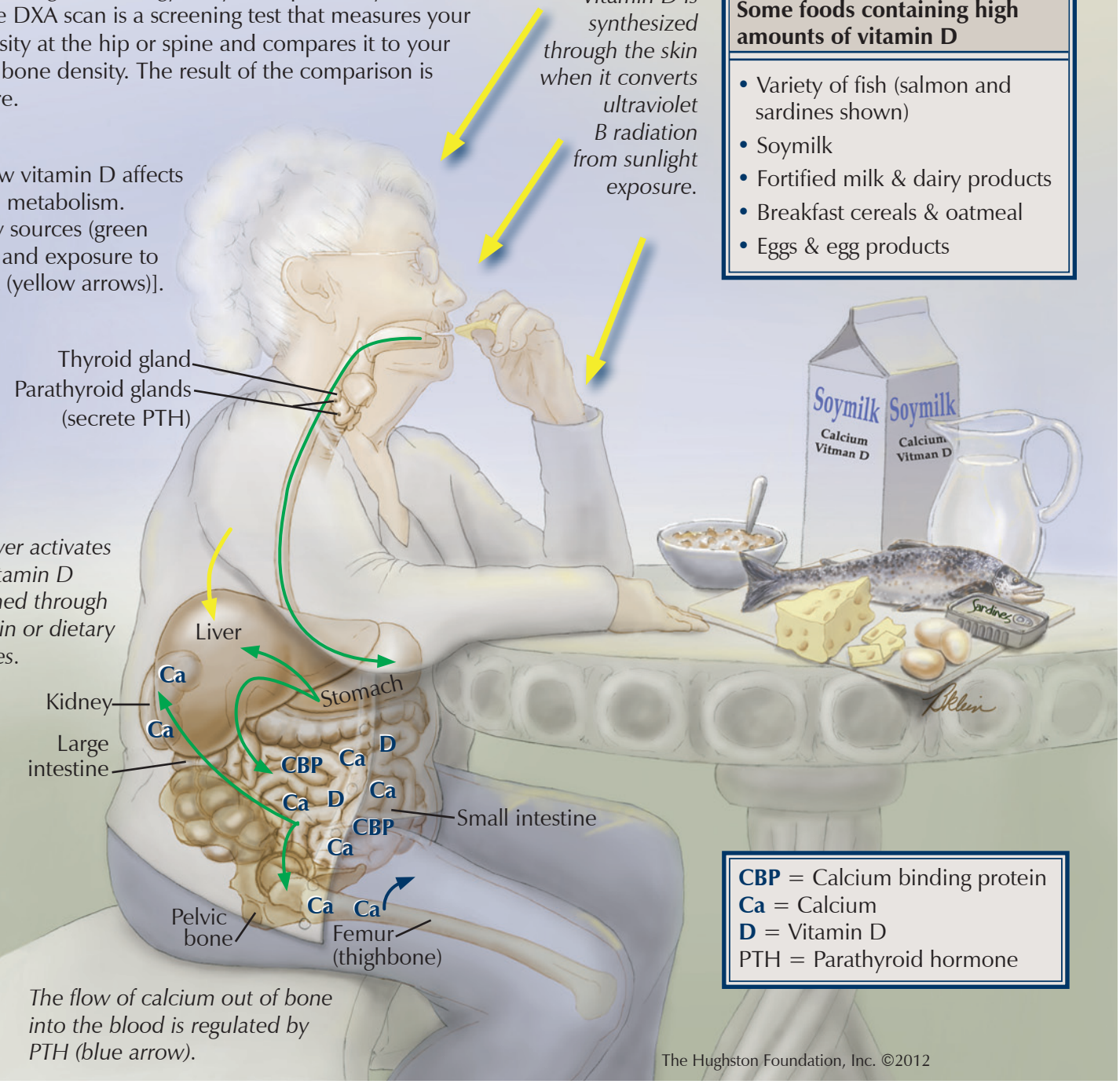
SEPARATING MEDICAL KNOWLEDGE FROM COMMON NOTIONS

Osteoporosis is not in itself a disease; rather, it is a descriptive term that refers to various conditions that manifest as risk factors for low bone density. In fact, as defined by the World Health Organization, osteoporosis really refers to the degree to which a person has lost bone density. The description is based on the measurement of bone density loss indicated by a T-score. Bone density is measured using dual-energy x-ray absorptiometry (DEXA or DXA). The DXA scan is a screening test that measures your bone density at the hip or spine and compares it to your optimum bone density. The result of the comparison is the T-score.

T-score

Osteoporosis refers to a T-score of -2.5 or lower, which indicates that the degree to which a person has lost bone density, as compared to normal, is substantial. The lower the T-score, the greater the loss of bone density. Another term, *osteopenia*, defines a loss of bone density that is milder, ranging from -1.0 to -2.5. However, any loss of bone density, as described by a T-score of -1.0 or less, can be clinically significant because the lower the bone density, the greater the risk of bone fracture and the greater the risk of musculoskeletal pain. For example, people who think they have a nonspecific disease, such as fibromyalgia, can actually be exhibiting symptoms of low bone density.

Fig. How vitamin D affects calcium metabolism. [Dietary sources (green arrows) and exposure to sunlight (yellow arrows)].



Fracture risk

Although the T-score can be an important measure of bone density, it is not without certain biases. A better predictor of fracture risk is the absolute density of bone measured by the DXA scan. If the density of bone is less than 0.90 gm/cm2 at the spine or if it is less than 0.60 gm/cm^2 at the hip, the risk of fracture becomes clinically significant. The lower the numbers are below the critical values, the greater the risk of fracture. Bone density is supposed to be an expression of bone quality, and it often reflects bone quality well. However, there are some clinical conditions for which that assumption is not reliable.

Causes of low bone density

There are a number of conditions that are associated with decreased bone density. The 3 most common groups of conditions that decrease bone density are sex hormone deficiency, various hormone diseases that affect bone, and disturbance in calcium metabolism.

Hormone deficiency

Sex hormones help maintain bone density by various mechanisms, so their positive effects on bone are complex. There is no good substitute for sex hormone replacement; therefore, sex hormone deficiency can be a primary cause of or a contributor to low bone density. Other available treatments can be helpful but in someone who has sex hormone deficiency, the best treatment, if it can be used, is to replace estrogen in women or testosterone in men.

Hormone diseases

The most common hormone condition associated with reduced bone density is chronic hyperthyroidism. The condition can be seen in patients who have a primary disorder of thyroid function, or more commonly, take excessive amounts of thyroid hormone for a long time. The condition washes calcium out of bone. The second most common hormone condition causing reduced bone density is the prescription of cortisone or related drugs taken over a long period of time. There are other hormonal disorders that cause low bone density, including growth hormone deficiency, but they are less common.

Calcium metabolism

Often, people with low bone density believe that all they have to do is to increase their intake of calcium and vitamin D. This is a fallacy. Deficient intake of calcium or vitamin D is a cause or an important contributor to low bone density in only a minority of Americans. People most affected by deficient intake of calcium and vitamin D are older people with decreased nutrition and those who do not get exposure to sunlight often enough.

Obviously, the metabolism of calcium is related to normal bone density. The metabolism of calcium is under complex and very strict control by the body, and for most people who have a disturbance of calcium metabolism causing decreased bone density, increasing calcium intake or the intake of over-the-counter vitamin D is not an effective treatment.

As shown in the **Figure**, calcium taken in through the diet goes into the small intestine where it is absorbed; however, unlike most other minerals, calcium does not freely pass through the wall of the gut into the blood. Instead, calcium is actively transported across the gut wall by a protein, called *calcium binding protein* (CBP). If CBP is not present, calcium cannot flow across the gut wall into the blood, regardless of how much calcium is ingested. The synthesis of CBP is regulated by vitamin D. Once in the blood, body mechanisms actively determine where the calcium goes. It can be moved into bone, or excess calcium can be excreted in the urine. People who take in extra calcium and have high levels of calcium in the urine can get kidney stones. The flow of calcium in and out of bone is regulated by *parathyroid hormone, or PTH*, a hormone secreted by the 4 parathyroid glands that surround the thyroid gland. When PTH levels in the blood increase, it causes calcium to flow out of the bone and into the blood.

Often, problems with calcium balance involve a failure of the gut to respond to vitamin D as it should (vitamin D resistance) and to transport adequate amounts of dietary calcium into the blood or an excessive loss of calcium in the urine (hypercalciuria). Both conditions lead to an increase in PTH levels and excessive loss of calcium from bone. Therefore, in a patient with low bone density, vitamin D and calcium metabolism should be carefully analyzed in detail and treatment decisions should be based in part on that analysis.

Seven percent of patients with low bone density have a primary disturbance of calcium metabolism, known as *primary hyperparathyroidism*. This is a disease in which PTH is secreted inappropriately, resulting in a loss of calcium from bone and causing high blood calcium levels. Primary hyperparathyroidism illustrates why people with low bone density should not blindly take high doses of calcium and vitamin D when they are told they have low bone density, or to prevent the condition, because supplemental calcium and vitamin D make the high serum calcium levels worse.

Calcium and vitamin D supplements are good treatments for some patients with low bone density. But taking the supplements without knowing what caused the condition in the first place does not solve the problem. If you have a low T-score, discuss the need for more testing with your physician. After testing, you may find that supplements are exactly what you need, or you may find that supplemental calcium and vitamin D may actually make your condition worse.

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THE HUGHSTON CLINIC CONGRATULATES

Champ L. Baker, Jr., MD

For being inducted into the Hall of Fame of the American Orthopaedic Society for Sports Medicine

Champ L. Baker, Jr., MD receiving his award from Walton W. Curl, MD.

Champ L. Baker, Jr., MD, a physician at The Hughston Clinic and Chairman of the Board of Directors of The Hughston Foundation, was inducted into American Orthopaedic Society for Sports Medicine's (AOSSM) Hall of Fame at the Society's 2012 annual meeting. AOSSM Hall of Famers are individuals in the sports medicine community who have contributed immensely and set themselves apart from others in the field. In addition to his national involvement with sports medicine, Dr. Baker has been involved with numerous local and regional athletic teams and professional societies. He has served as team physician and orthopaedic consultant for Columbus State University (25 years), University of Alabama, Auburn University, and Valdosta State University.

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