# Hughston Health Alert

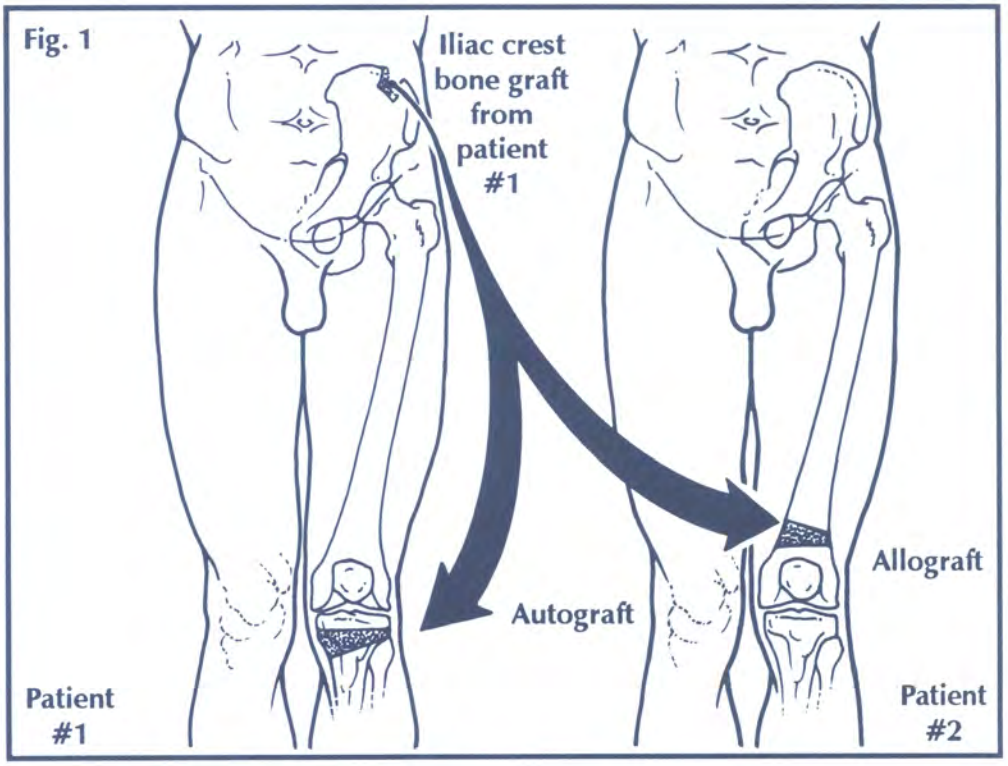
6262 Hamilton Road P.O. Box 9517 Columbus GA 31908-9517

VOLUME 7, NUMBER 4 | *For a Healthier Lifestyle* | FALL, 1995


## Bone and Cartilage Substitution and Regeneration

***Filling in the Gaps***

One of the most difficult problems orthopaedists must treat is a major structural defect, or injury, in bone or cartilage. The defect can be caused by trauma (a sudden forceful injury), a mechanical deformity (wearing down of bone or cartilage due to the abnormal way your bones fit together at a joint), or an underlying degenerative condition (wearing down of bone and cartilage). Recent developments in materials science and biochemistry have given doctors some new tools to combat these structural problems.




### Inside This Issue:


- Roller Blades
- Shoulder Injuries in Bow Hunters
- Micro-Breaks in the Workplace
- What Is an MRI?
- Bean Cuisine


### Building new bone

Often, extra bone needs to be added, or grafted, into the defected area to ensure fractures heal properly. Sometimes, part of the bone is splintered or compressed so badly that it must be replaced. An ideal bone graft provides a structure that gives immediate support, stimulates bone growth, and allows new bone to grow into it. The most often used bone supplementation is called an **autograft** (Fig. 1). This means bone is taken from another place in your body and transplanted to the injured area. An autograft provides both the framework and living cells that help the injured bone heal.

Another type of bone graft is called an **allograft** (see Fig. 1). This means bone is donated by another person (like a heart, liver, or kidney is donated) and transplanted to the injured area of your body. Typically, the donor bone is processed to remove any infections so it will be ready to be transplanted into areas of your bone that need structural support or need large bone defects filled.

Researchers are creating artificial, or man-made, substitutes for bone grafts, such as ceramics. Ceramics exhibit some of the same chemical and structural properties as human bone. They are porous like human bone, which allows bone to grow into the graft. However, because they do not have living cells, the ceramics are initially brittle and must be protected from stress and motion until bone has grown into this graft.

Bone matrix gels are another option available. This substitute is made from human cortical bone (the hardest part of bone) that is processed into a thick gel consistency. It is injected into the defect with a syringe. The cells in the gelled bone promote bone growth, but, initially, the gel does not give as much structural support as natural bone. Therefore, it is often combined with another type of bone graft, a metallic implant, or a cast to give the needed support.

### Creating cartilage

Cartilage regeneration has been the focus of many news reports, especially since surgeons have successfully regenerated articular cartilage in the knees of a few people. Articular cartilage in the knee is the smooth, protective cushion that covers the end of the thigh bone (femur). When it is injured, the cartilage generally does not heal, often causing the knee to develop arthritis. For years, orthopaedists have treated this defect with surgery, such as arthroscopic abrasion arthroplasty, which means the surgeon smooths off the bone under the injured area and causes a small amount of bleeding from the bone. This technique stimulates the body to form a layer of fibrocartilage, which is scar tissue that acts like cartilage but is not as durable.

A new, still experimental technique developed in Sweden allows surgeons to harvest cartilage cells from a portion of the knee that does not bear weight, making it less likely to develop arthritis (Fig. 2). The cells are cultured and grown in a laboratory and implanted into the injured portion of your knee. A patch made from a small strip of the outer lining of bone (periosteum) taken from your leg holds the cultured cells in place and helps generate new cartilage.

All of these techniques described will help people with small defects in their cartilage surface and, therefore, should help slow the progression toward arthritis. None of these methods can replace large areas of worn cartilage, so they probably will not be used to treat arthritis that has developed throughout a joint.

Another method being investigated involves the use of gene therapy and recombinant DNA to produce new cartilage, which will be implanted in the defect. Researchers hope this method will enable a large block of allograft bone and cartilage to be transplanted to fill a large joint defect caused by resection of a cancer or to fill a traumatic defect in a young adult.

Bone graft substitutes and cartilage regeneration represent some of the newest advances in orthopaedic surgery. Carefully controlled studies in human patients are still necessary to determine if these new techniques will be effective in treating these bone and cartilage deficiency problems.

*David T. Curd, M.S.*
*Columbus, Georgia, and*
*Todd A. Schmidt, M.D.*
*Atlanta, Georgia*

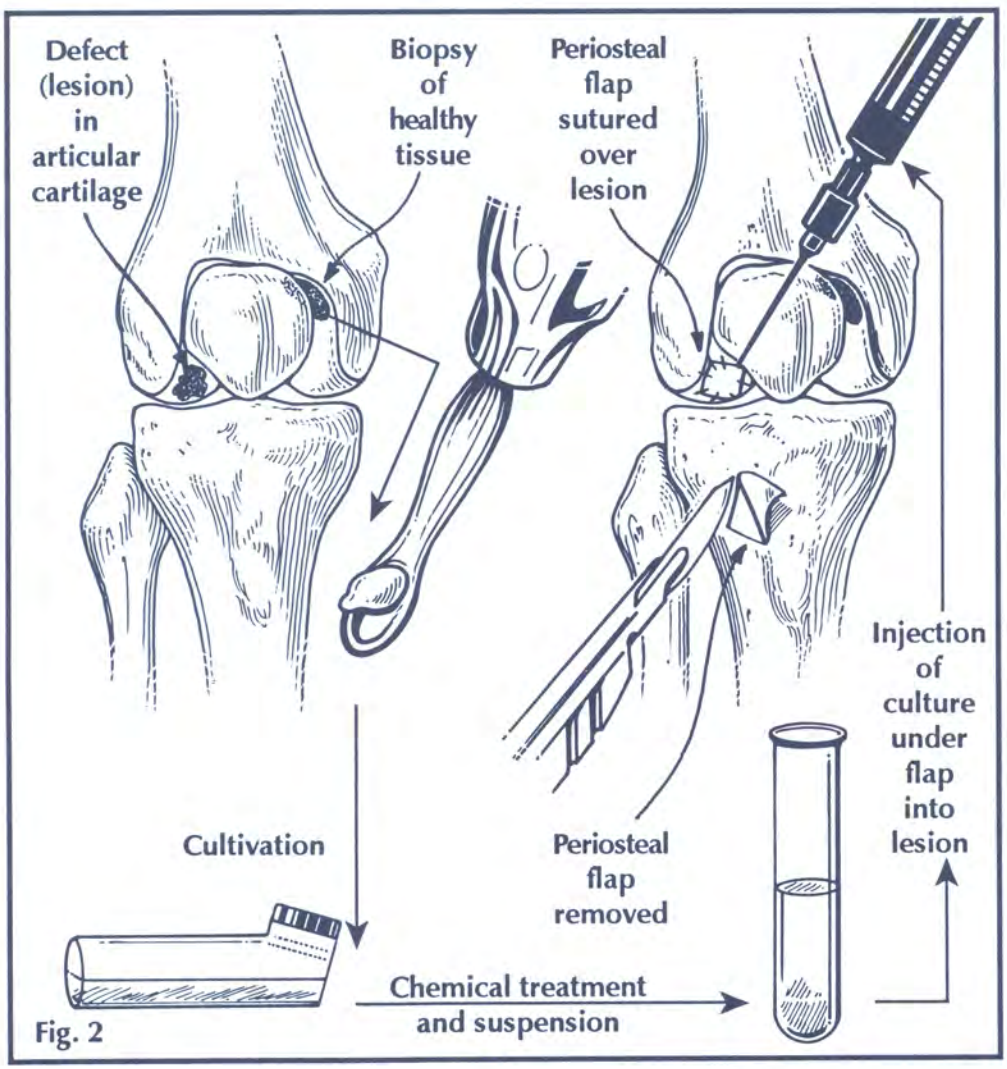


Fig. 2

# Roller Blades

***Skating around Safely***

More than 6 million Americans of all ages skate on in-line wheels, or roller blades. This internationally popular sport is not only fun, but it can be an excellent form of aerobic exercise.

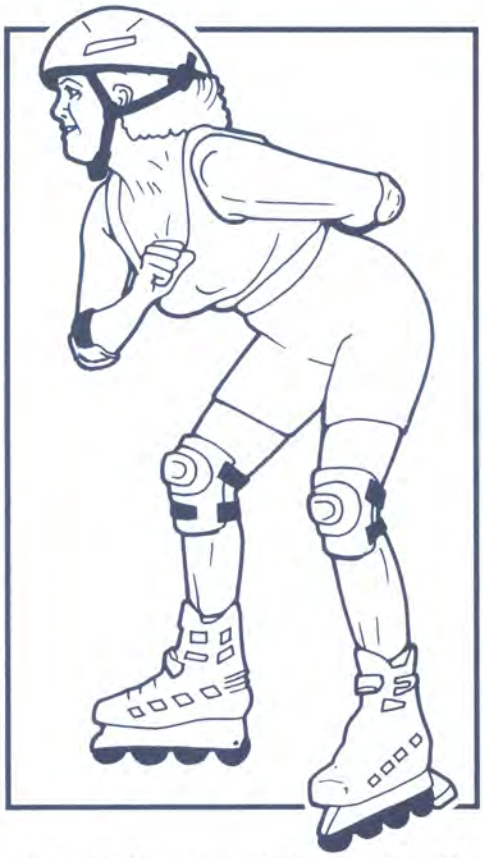
### Anatomy of a roller blade

Roller blades function much like conventional roller skates; however, they are different in several important ways. Roller blades have a rigid plastic boot, similar to the boot used in snow skiing. They have between three and five polyurethane (plastic) wheels that are arranged in a line and secured to the bottom of the boot. Because the wheels are narrow, roller blades can reach much higher speeds than roller skates. The braking mechanism is also different. The brake pad on roller blades is on the heel of either one or both of the skates, while the brake pad on roller skates is on the toe.

### Exercise safety

The number of skating-related injuries has risen with the popularity of roller blades in recent years. The most frequent injuries are bruises and broken arms and legs from falls. Less frequent, but more serious, injuries (such as head and facial injuries) occur when skaters collide with motor vehicles or fall hard.

Injury prevention is a very important aspect of all sports. You can prevent many roller blading injuries by following a few simple rules. Use the appropriate gear designed for skaters, including wrist guards, elbow and knee pads, and a helmet, to prevent bruises, broken bones, and head injuries. Learn how to brake on a flat driveway or empty parking lot. Brake pads wear down with use and should be replaced before excessively worn; ask your salesperson for replacement guidelines. If you are a beginning



skater, make sure you are comfortable starting and stopping on flat surfaces before attempting to go up or down hills. Also, try to skate on surfaces that are relatively free of small debris. Driveways, sidewalks, parks, and empty parking lots are usually ideal. Avoid skating on streets if possible.

Many people wear roller blades when they play street hockey. In addition to the guidelines above, street hockey players should take the following precautions: always keep the blade of the hockey stick below waist level, even while shooting, and use a helmet specifically designed for hockey, which includes a facemask, to help protect your face and mouth.

Remember, head injuries are the most common cause of serious disability or death. Most head injuries can be prevented by routine use of a helmet when you are using your roller blades. Exercise safely, use common sense, and enjoy your roller blades.

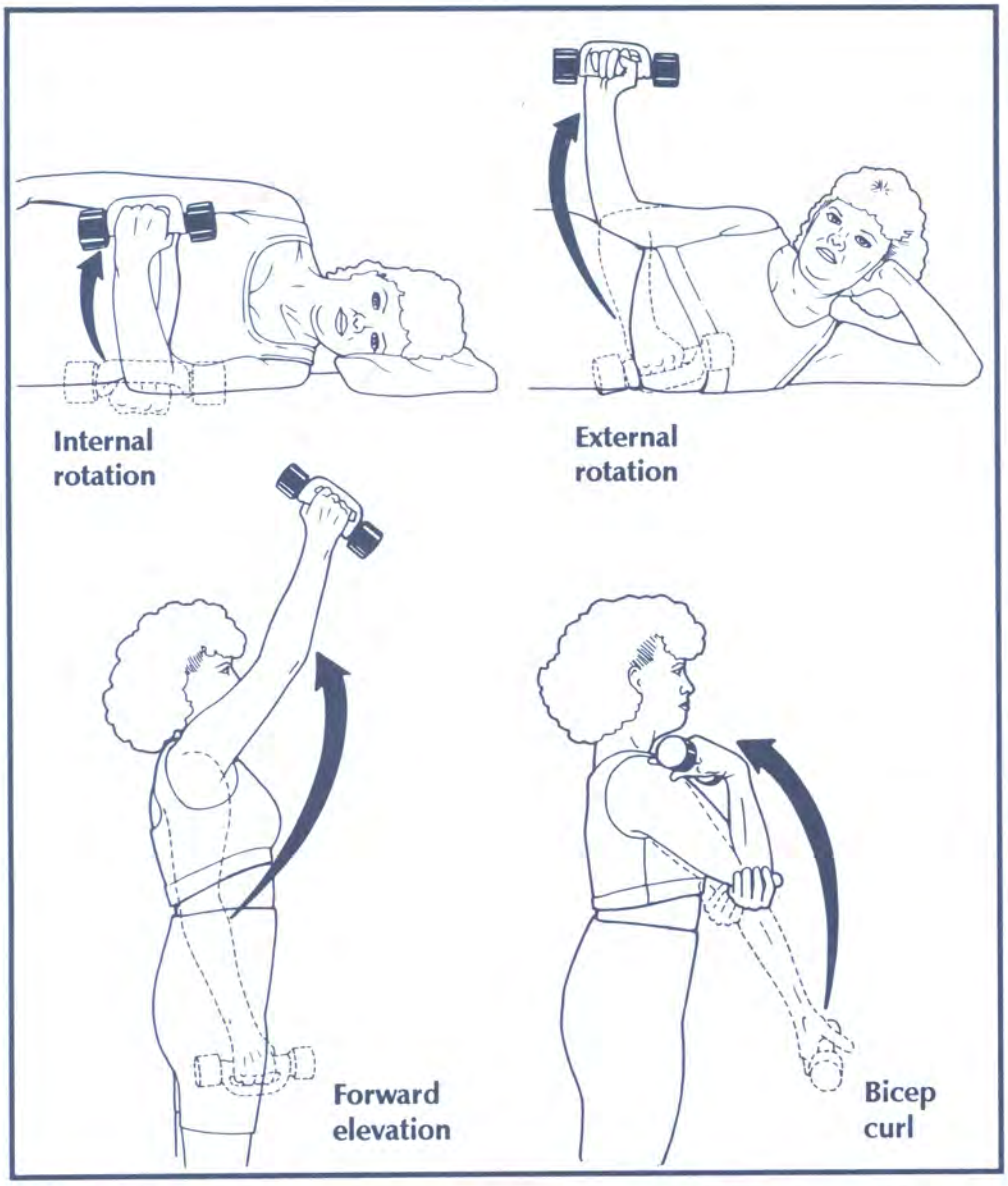
*Jonathan York, M.D.*
*Atlanta, Georgia*

# Shoulder Injuries in Bow Hunters

Each autumn many bow hunters across the country prepare for the upcoming deer season. They practice shooting their bows for hours to increase their accuracy and endurance. During these practice sessions, the hunters draw (pull the string on) their bow back numerous times during a 20- to 30-minute period, 3 to 4 times each week. Doing this same activity over and over can irritate the muscles around the shoulder including the rotator cuff (four muscles that wrap around the front, top, and back of the shoulder). This type of irritation is called an overuse injury. Pain is the main symptom of an overuse injury to your shoulder, and its intensity and location vary. For example, pain may occur suddenly in the top rear of your draw arm as you draw the bow back. Or, pain may begin gradually on the top front of your stabilizing arm.

Unless you have had an acute (recent) injury, having pain does not necessarily mean you need to see your doctor right away. Rest and anti-inflammatory medications (such as aspirin or ibuprofen) may eliminate the problem. However, if your pain persists longer than 3 to 5 days, contact your family doctor or orthopaedist. Chronic (long-term) pain may indicate you have a more serious overuse injury. If it is not treated by a doctor, the injury may progress to a frozen shoulder and even a complete tear of your rotator cuff tendon. Frozen shoulder means the joint capsule (lining) is inflamed, making your shoulder stiff. A complete tear of your rotator cuff tendon (tissue that connects muscle to bone) causes the rotator cuff muscles to pull away from the bone.

To treat your overuse injury, your doctor may refer you to a physical




therapist who may prescribe special exercises to strengthen your shoulder, such as internal and external rotation of your shoulder, forward elevation, and biceps curls (see figure above).

The best way bow hunters can prevent injuries is to practice for the hunting season slowly and early. Use a draw weight (strength of the bow measured in pounds) that is lighter than the one you used during the previous season. You should be able to draw your bow without rotating your torso. If you must rotate your torso, the draw weight is too heavy, and you are at risk for injury. Start with short shooting sessions too (2 to 3 minutes each day). Gradually increase the draw weight and the practice time as your endurance and strength increases. By the time the season opens, you can be shooting safely.

Remember, the best medicine is prevention. Slowly condition your body for bow hunting before deer season begins. Using a heavy draw without slowly building your endurance and strength first can cause a season-ending injury.

*Mark Baker, P.T.,*
*Bill Clemmons, P.A.C., and*
*Garland K. Gudger, M.D.*
*Columbus, Georgia*

# Micro-Breaks in the Workplace

***You Deserve Them!***

Traditionally, breaks in the workplace have been confined to a structured schedule: a 10-minute morning break, a 20-minute lunch break, and a 10-minute afternoon break. Researchers now believe that more frequent, active "micro-breaks" can help prevent injury and raise productivity in the workplace. These breaks must include more than stopping work for a few minutes; they must incorporate stretching and strengthening exercises specific for the task you are doing. For example, if you use a personal computer for long periods of time, you should do some shoulder shrugs, hand stretches, wrist stretches, and neck range-of-motion exercises.

Researchers have found that in jobs where breaks are not given regularly, workers take hidden rest periods that actually cause them to spend less time working than in jobs where breaks are required. One researcher says that a minimal allowance of 6 minutes each hour, divided into short breaks throughout the hour, should be scheduled to stretch and take care of personal needs.[1] Taking several short breaks lets your body recover from work easier than taking one long break. Unfortunately, changing the traditional workplace practices is often hard to sell to management. However, if the break program is implemented properly, production should increase and injuries (and consequently medical costs) should decrease.

The exercises you do during your break do not have to be elaborate, and they should not remove you from your workstation. For example, just do a few simple stretching and strengthening exercises for 2 minutes every 20 minutes to improve your

flexibility and circulation, reduce muscle fatigue, develop better posture, take stress off your lower back muscles, and improve blood return from your legs. Squeezing a sponge or NERF ball at your workstation can provide a simple and inexpensive way to strengthen your forearm muscles and increase your grip strength.

Try the exercises on this page to stretch and strengthen your upper body.

Remember, if any exercise causes you much pain, **stop** it immediately! Take active micro-breaks throughout the workday. Set aside a couple of minutes periodically to stand up and stretch. You will work more productively and feel better.

*William Etchison, M.S.*
*Columbus, Georgia*

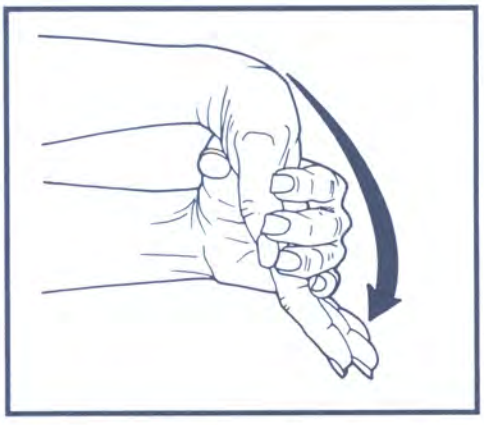
[1]*Goldman RF: Productivity in the United States: A question of capacity or motivation? ASHRAE Technical Data Bulletin 10(4):49-60, 1995.*

***Shoulder shrugs**. With your arm straight beside you, lift one shoulder toward your ear slowly, then lower that shoulder toward your hip. Repeat the exercise with your other shoulder.*

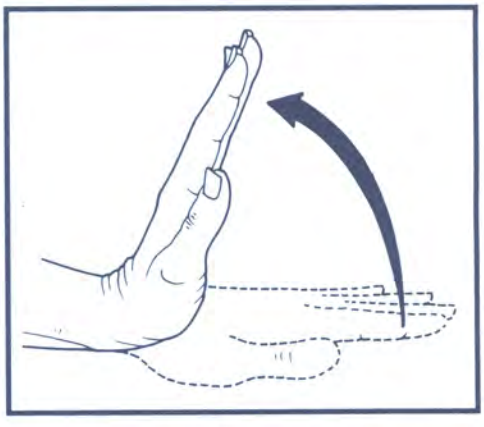
***Arm lifts.** Move one arm away from your side and raise it above your head. Lower that arm back to your side. Repeat the exercise with your other arm.*

***Deep friction massage for the elbow.** Rub your elbow where it is sore. Repeat the exercise with your other elbow if necessary.*

***Grip.** Grip an object, such as putty, a NERF ball, or a small rubber ball. Hold and release. Repeat the exercise with your other hand.*



***Stretch flexors.** Straighten your elbow completely. With your palm facing up, grasp the middle of your hand and thumb. Pull your wrist down with your other hand as far as possible and hold. Release it and repeat the exercise with your other hand.*



***Dorsiflexion of the wrist.** Hold one wrist straight then bend it backward. Repeat the exercise with your other wrist.*

# What Is an MRI?

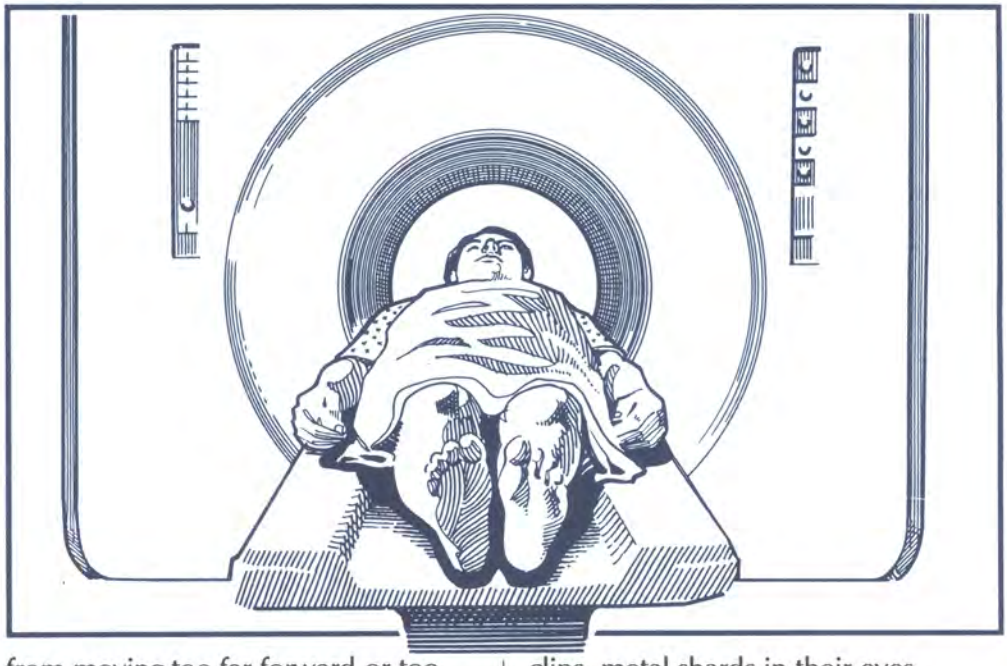
So you've just seen your doctor, and he says that he wants you to have an MRI of your knee. You've heard the term MRI before, but you are not quite sure what it involves. Will it be painful? How long will it take? How much radiation will I be exposed to? And, why do I need this test?

Magnetic resonance imaging (MRI) is a relatively new and painless technique that allows doctors to look at the soft tissues of the body. It is different from regular x-rays like you get in a doctor's office because it does not expose you to radiation. Instead, a radio frequency is used to knock your hydrogen atoms out of line. As they move back to their natural alignment, each hydrogen atom in your cells emits a tiny electric signal. The MRI scanner has very strong magnets in special coils to detect the electric signal. A computer uses these signals to create a detailed image of your soft tissues.

Magnetic resonance imaging allows doctors to see the image of many structures inside joints that cannot be felt by direct touch with their fingers. Some of these structures are ligaments (tissues connecting bones), menisci (tissues absorbing shock in the knee), and tendons (tissues connecting muscle to bone). The ability to look at these structures inside an injured joint has greatly improved patient care because, in many instances, it enables doctors to correctly diagnose and treat the injured structures earlier.

### Looking inside the knee

The knee is commonly evaluated with MRI. Using this technique to help diagnose knee injuries was first described in 1987, and its use caught on quickly. Most often, doctors take knee MRIs so they can see if your menisci or your cruciate ligaments (ligaments that prevent the upper leg



from moving too far forward or too far backward over the lower leg) are damaged. Both of the cruciate ligaments can be seen better on MRI than on any other currently used imaging techniques. Most tears of the medial (inner side) and lateral (outer side) menisci also can be seen on MRI. The MRI does not have the resolution, however, to create a detailed image of every structure in the joint.

In an uninjured knee, menisci and ligaments appear as dark structures that can be seen well (see figures). But, because both ligaments and menisci are composed of thick, tough cords (collagen) with little blood supply, there are only a few hydrogen atoms available to emit signals. Therefore, when ligaments are injured or torn, they may not appear at all, and menisci may appear as relatively white areas where joint fluid has entered a torn portion. Orthopaedic surgeons use MRIs also in the shoulder, ankle, elbow, spine, or any area of an arm or leg where they want to look at soft tissues rather than bones.

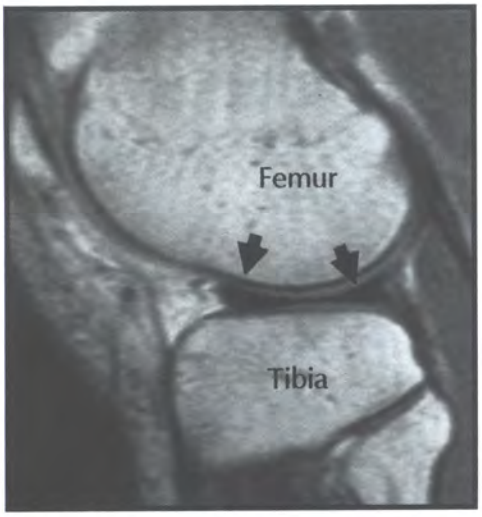
The main safety issue with MRIs is the strong magnetic field present. People who have metal aneurysm clips, metal shards in their eyes (automotive or factory workers are at risk), or pacemakers should not be examined by MRI. In these people, the magnetic field can displace the metal or cause the pacemaker to malfunction. Other metallic implants in the body generally are not affected by MRI, but they can distort the MRI signal. Remember, if you have any type of implant, you and your doctor should discuss whether an MRI is safe for you.

The other main problem for people who have an MRI is that they must be placed into the "tube" of the scanner and remain perfectly still for 30 to 60 minutes to obtain a good quality MRI. Typically, the scan lasts about 40 minutes. Although the procedure is painless, large people, people with claustrophobia, and small children generally do not tolerate this well. Your doctor may prescribe a sedative for you to help you relax or sleep during the scan if you are claustrophobic. Or, you may be placed in a scanner that is open on both ends.

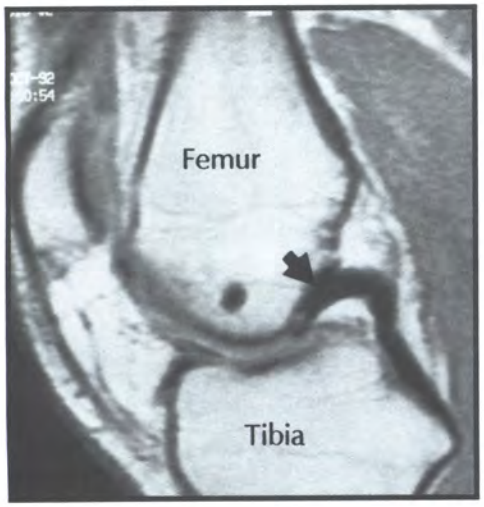
During the scan, the machine will make knocking sounds. These sounds occur when the magnetic field is changed rapidly.

Magnetic resonance imaging has greatly improved doctors' ability to view soft tissue injuries and has been especially useful in speeding the diagnosis and improving the treatment of athletic injuries. It is often an excellent supplement to your medical history and physical examination. Further advancements in the use of MRI will allow doctors to look at injured structures with even more precision. There is little doubt that MRI will continue to be the imaging technique of choice for soft tissue injuries in sports medicine for the foreseeable future.

*Robert F. LaPrade, M.D.*
*Galveston, Texas*




*MRI of an uninjured knee joint. Arrows show lateral meniscus.*




*MRI of an uninjured knee joint. Arrow shows posterior cruciate ligament.*

NUTRITION

## Bean Cuisine

***Nutrition without Side Effects***

Many Americans do not eat beans simply because they cause gas. However, there are ways to prepare dried beans, or legumes (vegetables in pods), that reduce their unpleasant side effect while maintaining their nutritional value.

**The good news about beans**

Beans are filled with carbohydrates and protein, are low in fat and calories, and are cholesterol-free. A one-half cup serving of most types of beans has 110 to 145 calories. Sixty percent to 65% of those calories come from carbohydrates and 21% to 25% come from protein. If you eat soybeans, 34% of the calories come from protein.

The fat in beans is mainly unsaturated, and only 0.8% to 1.5% of calories in most beans come from fat. Soybeans and peanuts are exceptions. Soybeans have 19% fat and peanuts have 46% fat in each one-half cup serving.

Beans are a good source of soluble fiber, with 4 g to 7 g in each one-half cup serving. This type of fiber helps reduce blood cholesterol and blood sugar levels. Beans also provide water-soluble vitamins, which are not stored for a long time in your body and which are excreted in your urine if you have too much. Eating beans each day ensures you have enough of these vitamins, such as thiamine, riboflavin, niacin, and folacin.

**What causes the gas?**

Some of the carbohydrates in the beans come from sugars that your small intestine cannot digest. When the sugars reach the large intestine, bacteria feed on and ferment them. This process produces flatulence and other gasses, such as carbon dioxide and hydrogen.

**Getting rid of the gas**

You can cut 60% of the gas that is normally produced when you eat beans. First, soak dried beans in water for 4 or 5 hours (Use 9 cups of water for every 1 cup of beans). Drain the beans. Second, bring the beans to a boil in fresh water and boil for 10 minutes. Simmer for 30 minutes, then drain the beans. Third, if the beans are not fully cooked, add fresh water, simmer until done (about 1 or 2 hours), and drain.

Another way to prevent gas is to use *beano* (AkPharma, Inc., Pleasantville, N.J.), a product that helps your body digest the sugars. You can find *beano* at your pharmacy or grocery store.

Although much of the intestinal discomfort associated with eating beans comes from gas, some may come from increased fiber in your diet. You can reduce discomfort due to fiber by slowly increasing the amount of fiber you eat each day.

Make beans a regular part of your cuisine. Follow the steps for reducing the unpleasant side effects and reap the nutritional benefits.

From *Kleiner SM: A hill of beans: The latest on legumes. Phys Sportsmed 23(6):13-14, 1995.*

*Jessie Wright, M.S., R.D., L.D.*
*Columbus, Georgia*

## Ask the Doctor

**Q What causes muscle cramps in your legs at night?**

**A** Muscle cramps are a sudden, painful, involuntary contraction of a muscle or muscle group that lasts several seconds to minutes. When the muscle fiber units, which make up a muscle, are stimulated to contract at a faster rate than normal, the whole muscle gets very hard and painful. Stretching and massaging the muscle can shorten the painful period.

Most muscle cramps occur in normal, healthy people. The cause is usually unknown. They most commonly occur in the foot and calf, and they can occur at any time of the day or night. Cramps that occur in athletes who have exercised in a hot environment may be caused by a loss of potassium or sodium in sweat. The cause of nocturnal muscle cramps that often occur in healthy elderly people is unknown. If these nighttime cramps occur frequently, your doctor may prescribe a medication called quinine to decrease the excitability of the muscles and relieve the cramps. Keeping your calf muscles stretched can also help reduce cramping.

Muscle cramps can also be a sign of a new or ongoing medical problem. If they occur frequently or in more than one muscle group, consult your doctor.

*Steven C. Mares, M.D.*
*Columbus, Georgia*

The Hughston Health Alert is a quarterly publication of the Hughston Sports Medicine Foundation, Inc. The Foundation's mission is to help people of all ages attain the highest possible standards of musculoskeletal health, fitness, and athletic prowess. Information in the Hughston Health Alert reflects the experience and training of physicians at The Hughston Clinic, P.C., of physical therapists and trainers at Rehabilitation Services of Columbus, Inc., of physicians who trained as residents and fellows under the auspices of the Hughston Sports Medicine Foundation, Inc., and of research scientists and other professional staff at the Foundation. The information in the Hughston Health Alert is intended to supplement the advice of your personal physician and should not be relied on for the treatment of an individual's specific medical problems.

**Send Inquiries to** Medical Writing, Hughston Sports Medicine Foundation, Inc., P.O. Box 9517, 6262 Hamilton Road, Columbus GA 31908-9517 USA. Telephone 706/576-3321.

*Copyright 1995, Hughston Sports Medicine Foundation, Inc.* *ISSN# 1070-7778*

**Editor**
Todd A. Schmidt, M.D., F.A.C.S.

**Managing Editor**
Elizabeth Tindal
**Art Director**
Carolyn M. Capers, M.S.M.I., C.M.I.

**Editorial Board**
Carol Binns, M.A.
David T. Curd, M.S.
William C. Etchison, M.S.
Albert J. Folgueras, M.D.
Michael G. Popson, A.T.,C., C.S.C.S.
David C. Rehak, M.D.
Craig K. Seto, M.D.
Timothy R. Stapleton, M.D.
Keith Webster, M.A., A.T.,C.
Jessie G. Wright, M.S., R.D., L.D.

**President & CEO Hughston Sports Med. Fdn.**
William C. Behrens

## Health Hints

- Aspirin, ibuprofen, and naproxen are nonsteroidal anti-inflammatory drugs (NSAIDs). NSAIDs reduce inflammation and pain caused by injury and immune reactions. Some musculoskeletal problems treated with NSAIDs are back pain, rheumatoid arthritis, osteoarthritis, tendinitis, sprains, and strains.

Hughston Health Alert
**P.O. Box 9517**
**Columbus GA 31908-9517**

U.S. POSTAGE PAID
BIRMINGHAM, AL
PERMIT NO 1412
NONPROFIT ORG.