



Hughston Health Alert

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For a Healthier Lifestyle

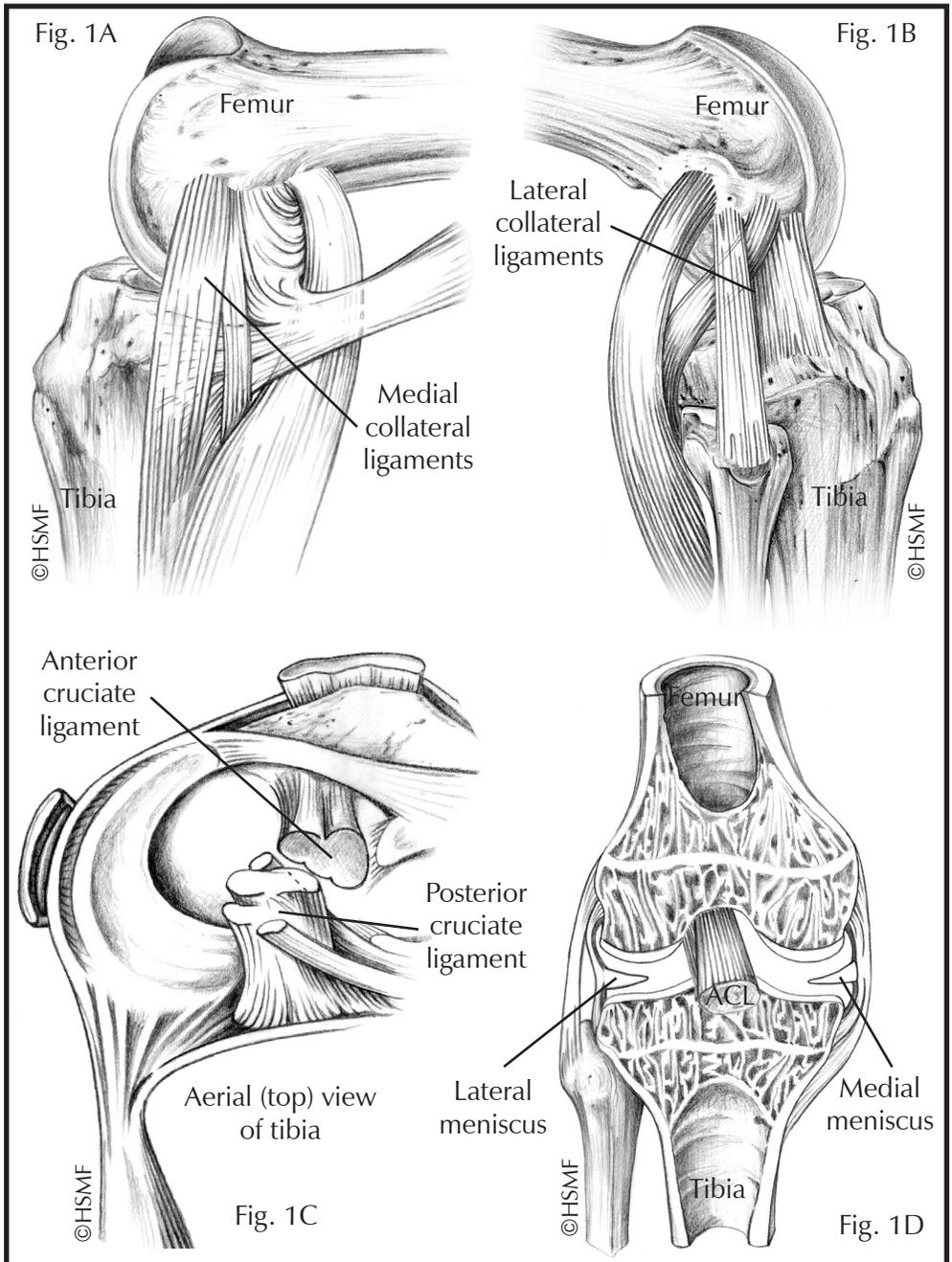
SUMMER, 1999

Anterior Cruciate Ligament Injuries

The knee joint provides mobility and stability for your legs during walking and running activities. However, these functions can be compromised if the knee is injured. With the increased popularity of and participation in sports and fitness activities, the number of knee injuries has increased. The severity of these injuries varies from mild strains (injury to a muscle or its tendon, which connects muscle to bone) or sprains (injury to a ligament, which connects two bones) to complete tears of the ligaments and other soft tissue structures of the knee.

Anatomy

The knee joint comprises the cartilage-covered surfaces of three bones: the femur (thigh bone), the patella (knee cap), and the tibia (shin



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bone). Four main ligaments help stabilize the knee; the medial (inner side) (Fig. 1A) and lateral (outer side) (Fig. 1B) collateral ligaments resist side-to-side motion, and the anterior (front) and posterior (back) cruciate ligaments resist forward and backward motion, respectively (Fig. 1C). The ligaments work together with the medial and lateral menisci (crescent-shaped cartilage) (Fig. 1D) and the leg muscles to stabilize the joint and allow the knee to generate and deliver the large quantities of power required for activities.

The anterior cruciate ligament (ACL) lies inside the knee joint (Figs. 2A and 2B). It consists of strong fibers (or collagen) that function like the strands of a rope or cable. This ligament provides most of the support that prevents the tibia from slipping forward against the femur.

Mechanism of injury

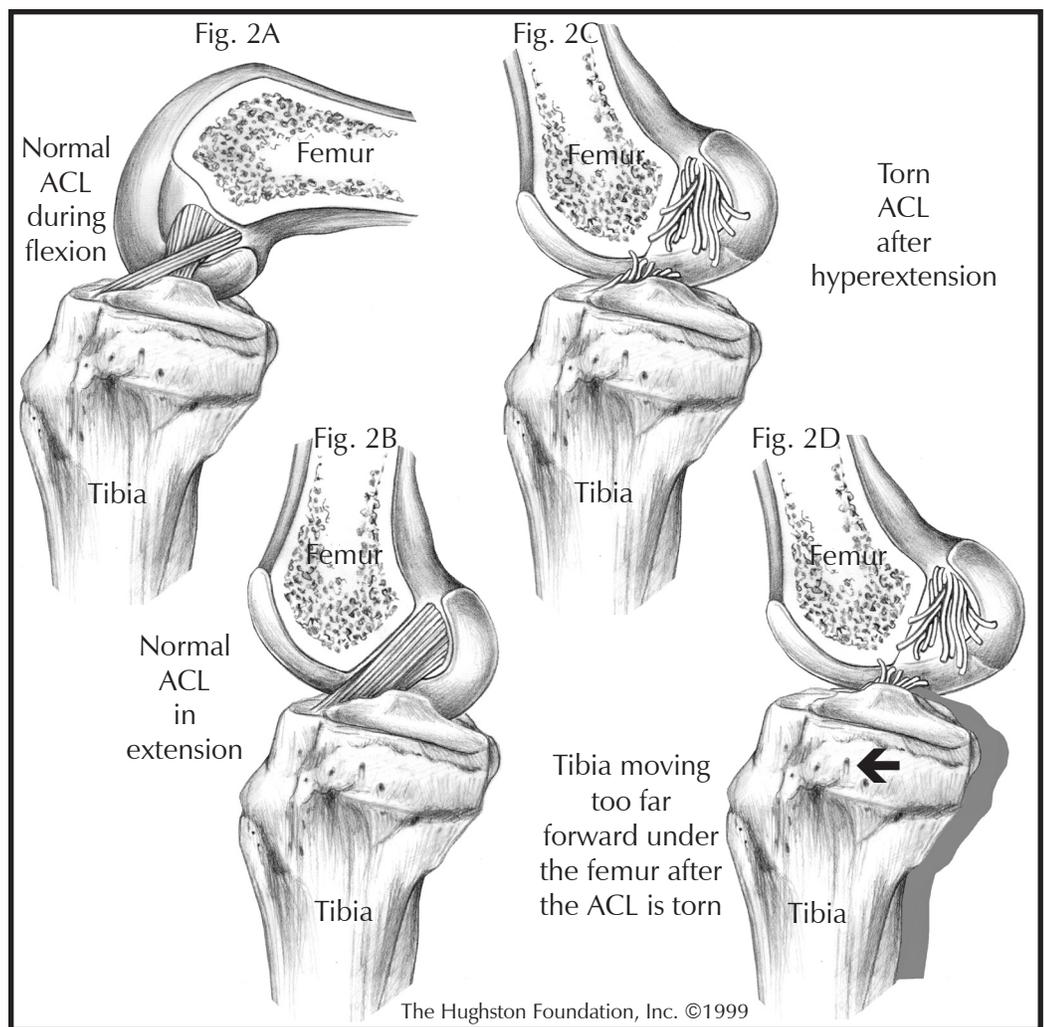
When it functions normally, the ACL can handle large forces with little or no problem. If, however, the knee receives forces of a high magnitude and the muscles cannot help absorb the stress, the ACL may take all the load, and it may tear. High-magnitude loading can occur during a slip and fall, sudden change in direction, landing off balance while jumping, or hyperextension of the knee (Fig. 2C). When the ligament tears, it generally ruptures like a rope, and the knee momentarily slides out of place (Fig. 2D).

Signs of injury

Most people who have torn their ACL say that they heard a “pop” in their knee as the ligament tore. Usually, the knee swells within the first hour after injury and is quite painful. The injured person cannot continue his or her activity.

Treatment

Treatment for an acute (recent) ACL tear involves icing the knee and



seeking prompt medical attention. Do not try to walk on the knee without assistance. You must protect the knee against further injury, which will likely occur without appropriate treatment.

A doctor who is familiar with knee injuries can confirm the diagnosis of an ACL injury through a physical examination. He or she will tailor your treatment to the severity of the instability and to the types of activities in which you plan to participate.

If your activities will place only low demands on your injured knee, you may not need surgery. You may have good results with nonoperative treatment, which may involve using crutches, wearing a knee brace, and participating in physical therapy. If you plan to have an active lifestyle, you probably will need surgery. Through surgical treatment, the

doctor can rebuild or reconstruct the ligament to recreate a maximally stable joint that can meet the demands of work and play.

How can you prevent these injuries?

Unfortunately, completely protecting your knee against ACL injury is impossible. However, if you have a strenuous job or play sports hard, then strengthening and conditioning programs are your best ally. So, before heading to the mountains for a snow-skiing trip or making your debut on the basketball court, talk to a doctor, physical therapist, or athletic trainer to find out how to best prepare for the demands you will soon face.

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ACL Injuries in Women

Each year, more and more women discover the rewards of sports participation. Unfortunately, an increased number of anterior cruciate ligament (ACL) injuries has accompanied the increased participation. ACL injuries in female athletes are an epidemic problem facing women, coaches, and the sports medicine community. The injuries generally occur without contact from another person and most often occur while the athlete is participating in basketball, gymnastics, or soccer.

Female athletes have four to 10 times more ACL injuries than male athletes have. The reasons for the different rates of injury in men and women are not clear, but some theories include differences in anatomy, knee alignment, ligament laxity, muscle strength, and conditioning.

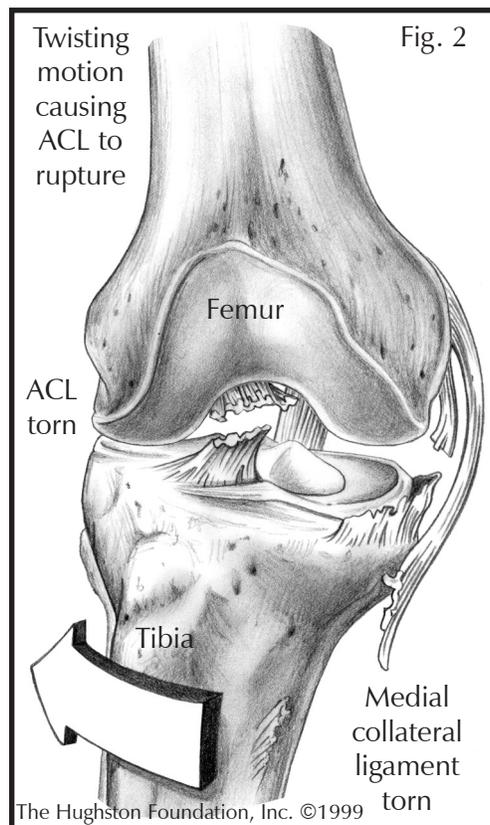
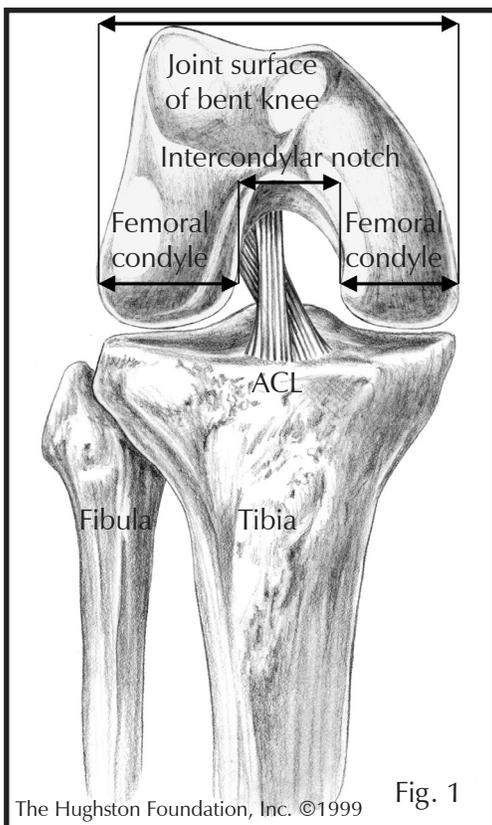
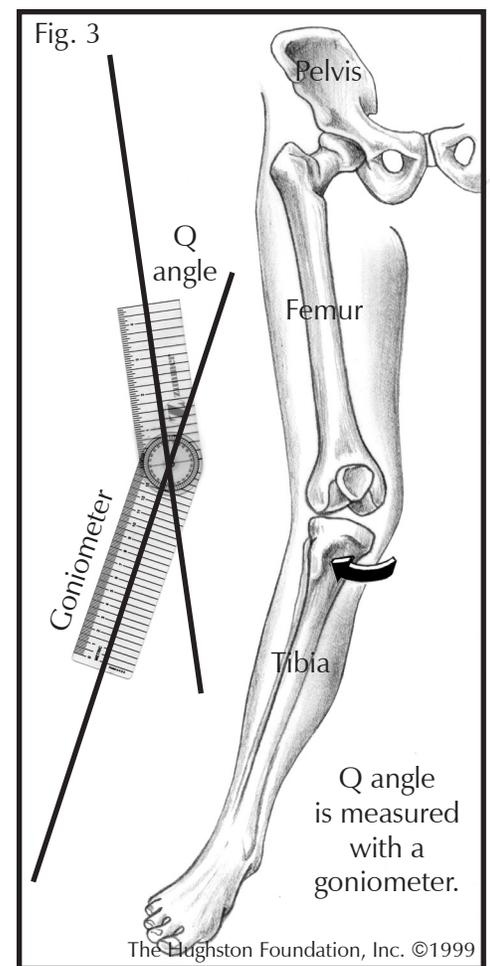
Anatomic differences

In the knee joint, an intercondylar notch (compartment) lies between the two rounded ends of the thigh bone (femoral condyles) (Fig. 1). The ACL moves within this notch, connecting the femur (thigh bone) and tibia (shin bone) and providing stability to the knee. It prevents the tibia from moving too far forward and from rotating too far inward under the femur (see previous article, Fig. 2).

Women have a narrower notch than men have; therefore, the space for ACL movement is more limited in women than in men. Within this restricted space, the femoral condyles can more easily pinch the ACL as the knee bends and straightens out, especially during twisting and hyperextension movements (Fig. 2). Pinching of the ACL in the joint can lead to its rupture (or tear).

Alignment of the knee

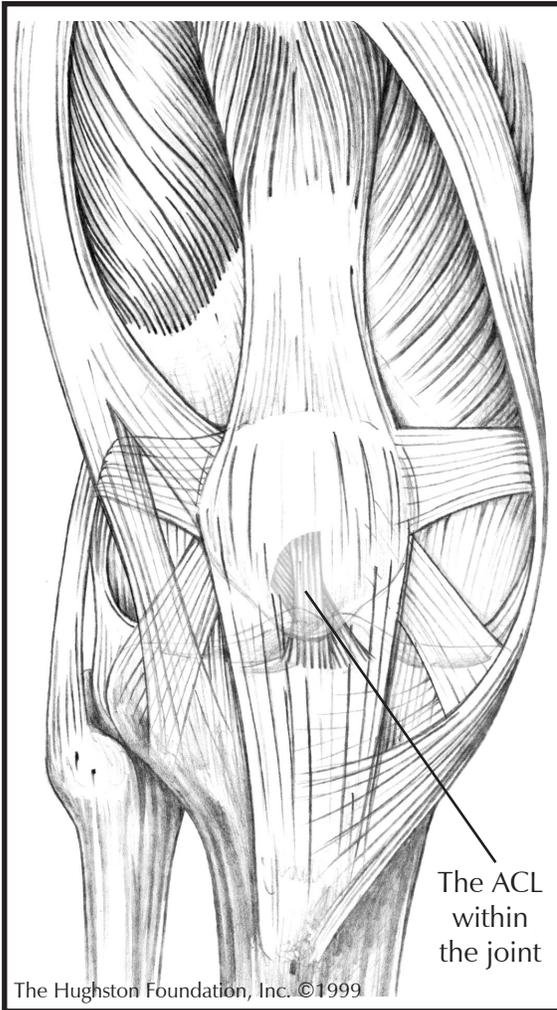
In the knee, the femur meets the tibia at an angle (called the quadriceps, or Q, angle). The width



of the pelvis determines the size of the Q angle. Women have a wider pelvis than men have; therefore, the Q angle is greater in women than in men. At this greater angle, forces are concentrated on the ligament each time the knee twists, increasing the risk for an ACL tear (Fig. 3). A twisting injury in a man's knee may only stretch his ACL; however, because of the greater Q angle, the same type of twisting injury in a woman's knee may cause a complete ACL tear.

Ligamentous injury

Female hormones allow for greater flexibility and looseness of muscles, tendons, and ligaments. This looseness helps prevent many injuries because it enables certain joints and muscles to absorb more impact before being damaged. However, this looseness does not necessarily prevent an ACL injury in a woman's knee.



placed across their knee joints. However, women have less muscle strength in proportion to bone size than men have. Muscles that help hold the knee in place are stronger in men than in women. Therefore, women rely less on the muscles and more on the ACL to hold the knee in place. Once again, the ACL may have to work overtime, making it more prone to rupture.

Conditioning

Traditionally, male athletes participate in twisting sports (such as basketball, football, and soccer) from a very early age. They develop muscle coordination and reflexes that can protect the knee once they reach the competitive level. These knee reflexes allow strong muscles to control the knee, thereby maintaining stability in it. Some female athletes do not participate in the same sports until a later age. Therefore, their muscle strength and coordination, as well as reflexes, may not be as fully developed when they reach the competitive level. The ACL must provide most of the stability in these knees.

Researchers currently are investigating epidemics of ACL tears in women's sports. Any one or all of the theories presented here may contribute to the increased number of ACL tears in female athletes. As women begin participating in sports at an earlier age and as they continue conditioning and strengthening the muscles around their knees, we hope that the rate of ACL tears in women will diminish.

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Medical Concerns Associated with Pregnancy

Pregnancy is both a wonderful and tumultuous time for a woman's body. So many changes are happening for the benefit of the developing baby. Some of these changes are important from a medical standpoint.

Varicose veins

Pregnant women experience numerous skin problems. Some women may notice the appearance of varicose veins (malfunctioning, enlarged veins near the skin's surface). This condition, which impedes circulation in your legs, can be painful. However, you can help treat it. Avoid wearing socks and stockings with tight bands. If you had varicose veins before pregnancy, wear support stockings as soon as you learn you are pregnant. Put your feet up whenever you can. Avoid sitting or standing for long periods of time.

In some women, exercise can help treat varicose veins because it aids in pumping blood back to the heart from these veins. Your doctor can advise you about the best exercise program for your condition.

Headaches

Headaches are another common problem in pregnancy. They include tension headaches; migraine headaches; and more serious types of headaches, such as those associated with high blood pressure. From 30% to 80% of women have fewer problems with migraine headaches during pregnancy than they had before pregnancy. Often, dietary adjustments can reduce the frequency even more. Exercise triggers headaches in some women and helps prevent or limit the severity of them in others. If you experience headaches, talk with your doctor immediately.

If the other ligaments and muscles around the knee are so loose that they cannot absorb the stresses put on them, then even normal loads or forces may be transferred directly to the ACL, making it prone to rupture. In this sense, the ACL not only has to maintain stability about the knee, but it also must make up for instability in a generally loose knee.

During the menstrual cycle, hormone levels vary and may affect knee stability. Recent studies have shown that, at specific points within the menstrual cycle, the knee becomes looser than normal, and ACL rupture is more common.

Reduced muscle strength

When women and men compete in the same sporting events and at the same levels, they have nearly equal twisting and loading forces

Urinary tract infections

Urinary tract infections (UTIs) often increase in frequency during pregnancy. These are usually successfully treated with antibiotics. However, an untreated UTI during the third trimester (week 28 to birth), may promote premature labor. So, do not ignore them. Drink at least eight glasses of water each day. Urinate at least every two to three hours. If necessary, stop exercising to urinate.

Asthma

Asthma is the most common pre-existing lung disease in pregnant women. Its course is unpredictable; your asthma may get better, stay the same, or get worse. Mild asthma usually has no adverse impact on pregnancy, but severe asthma has been associated with increased problems with the fetus. If you have asthma and plan to exercise during your pregnancy, work with your doctor to develop a program appropriate for you.

Anemia

One of the biggest problems during pregnancy is anemia. The signs of anemia include fatigue, pale skin, and heart palpitations. Another possible warning sign of anemia is craving of substances, such as ice, clay, and laundry starch. Often, anemia is made worse by a poor diet. A poor diet is not healthy for you or your baby. During pregnancy, you need to ensure that you eat a well-balanced diet. If you exercise, eating well is even more important because you must compensate for the calories burned during your workout. Ensure that your diet is high in iron, folic

acid, and vitamin B12. Eat when you are hungry, even if that means eating many small meals each day. Your doctor can advise you about how much weight you should gain.

Overheating

When you become pregnant, the amount of blood you have in your body increases. Your body is usually able to compensate for it without difficulty. The increase in blood helps cool the body, but it will not prevent you or your baby from overheating. Therefore, you must take precautions to keep your internal temperature under 102° F. Exercise in a cool environment (such as indoors, early in the morning, or in a pool). Drink plenty of fluids before, during, and after you exercise so you will perspire more freely and will stay hydrated. Ensure that your exercise program is light or moderate (heart rate less than

140 beats per minute) rather than intense.

Breathing

As the baby grows, it pushes against your diaphragm. In response, your ribs flare and your chest expands. Many women find that they are short of

breath and that they cannot tolerate exercise as well, especially as the pregnancy progresses. This is normal. Sometimes, however, your body's reaction can lead to hyperventilation. If you have severe or worsening shortness of breath, see your doctor.

Loose joints

Exercise can help make your pregnancy more enjoyable, but you need to take caution to avoid injury. Pregnant women produce a special hormone called relaxin. The hormone

enables muscles, ligaments (tissues connecting two bones), and cartilage (tissue covering bone ends) to stretch. This stretching of connective tissue enables your hips to accommodate the baby during birth. However, this tissue laxity also puts strain on your joints. You may twist your ankle or hip more easily, and your joints may hurt when you exercise. With the help of your doctor, modify your exercise program, keeping in mind the connective tissue changes.

Slowing down

You may find that your body is not operating as efficiently as it did before pregnancy. You have gained weight, and it takes more energy to do everyday activities. This inefficiency is natural, and you need to adjust your activities to your changing body. When exercising, don't push yourself to exhaustion just because you want to walk or swim the same distance or at the same pace as you did before pregnancy. Going slower, going shorter distances, and resting when you are tired are appropriate when you are pregnant.

These are only a few of the common changes and problems that occur during pregnancy. As always, consult your doctor if you are concerned about a problem that you are having while pregnant. If you plan to start or continue an exercise program, work with your doctor to develop a program that fits your needs and takes into consideration any problems you may have during this time.

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Exercise can help make your pregnancy more enjoyable, but you need to take caution to avoid injury.

Exercising during Pregnancy

The key word in pregnancy is change. During this 40-week period, a woman's body goes through many changes including stretching of muscles, softening of ligaments (tissues connecting two bones), and loosening of joints. You can better adapt to these physiologic changes through regular exercise. By using common sense and understanding

your individual needs, you can plan and participate in a safe and effective exercise program throughout your pregnancy and your life.

Whether you're a seasoned athlete or a self-proclaimed couch potato, exercise can make your pregnancy much more enjoyable. If you exercised regularly before pregnancy, the American College of Obstetricians and Gynecologists recommends that you take precautions and receive ongoing guidance from your doctor. Focus on maintaining your

precede any physical activity. It should consist of slow walking or stationary bicycling for five to eight minutes followed by a gentle, sustained stretch to the point of mild tension. Do not stretch to the point of pain and do not stretch as far as you can go. Remember, your connective tissues, such as muscles and ligaments, are lax.

Cardiovascular exercise

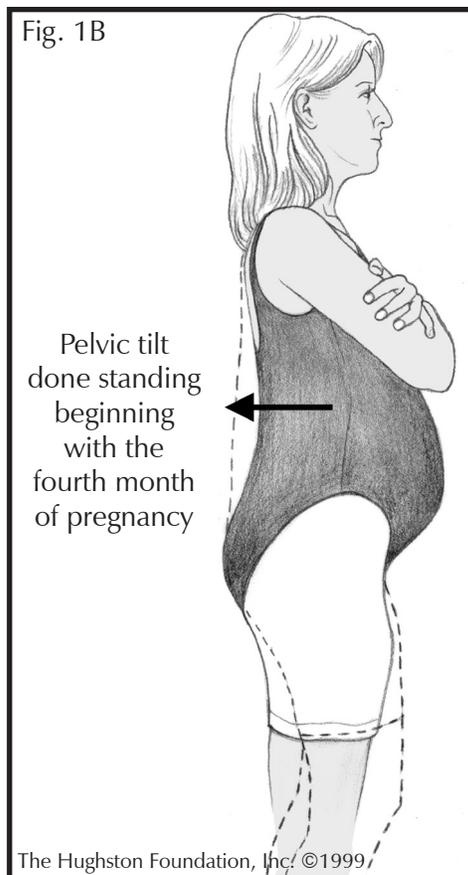
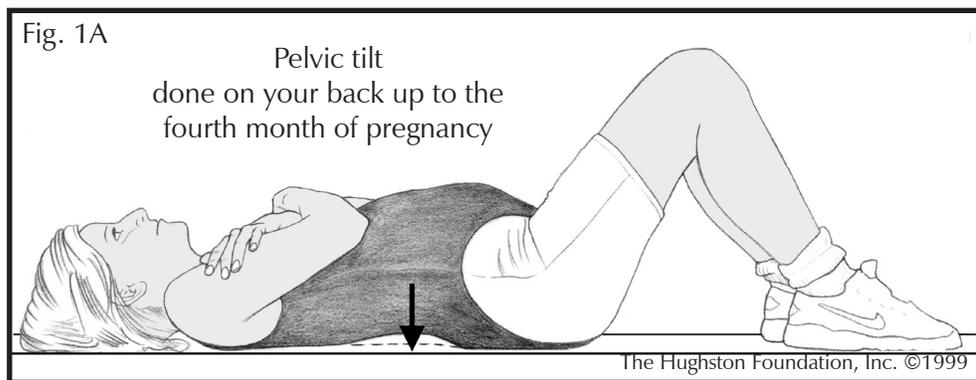
The ideal type of cardiovascular exercise during pregnancy is nonweight-bearing activities, such as stationary bicycling, swimming, and aquatic exercising. Exercising in the water provides buoyancy, increases joint cushioning, and enhances heat dissipation. While in the water, you may find that the strain on your back decreases — a welcome relief, especially late in pregnancy. However, when exercising in a heated pool, limit the amount of time you spend in that environment. The warm water may cause your internal temperature to rise, which can be unsafe for your baby. If you are uncomfortably warm, you need to get out of the pool.

Walking is another good activity for the beginning exerciser and for the long-time athlete who wants to maintain a good level of fitness. If you are an avid exerciser, take common sense precautions and consult your doctor if you plan to continue more strenuous activities, such as jogging or low-impact aerobics.

Strengthening

In addition to aerobic activity, you need to strengthen your muscles. The extra weight carried during pregnancy can cause back pain. To prevent this pain, strengthen your abdominal and back muscles by doing the pelvic tilt (Figs. 1A and 1B).

If you lift weights, make sure you only lift a weight equal to or less than the weight you lifted before pregnancy. You are lifting to maintain



previous level of fitness rather than on advancing your fitness level. If you have been inactive and want to start an exercise program, talk with your doctor. He or she can help you design a program best suited to your needs and abilities. You should wait to start this program until the second trimester (weeks 13 to 28) of pregnancy. Starting the program before this time potentially can lead to birth defects and other complications due to overheating.

A safe type of exercise program for most pregnant women includes cardiovascular fitness, muscle strengthening, stretching, and relaxation. These exercises should be done regularly — at least three times each week. The workout intensity should be light to moderate, and your heart rate should not exceed 140 beats per minute.

Warming up

A warm-up exercise should

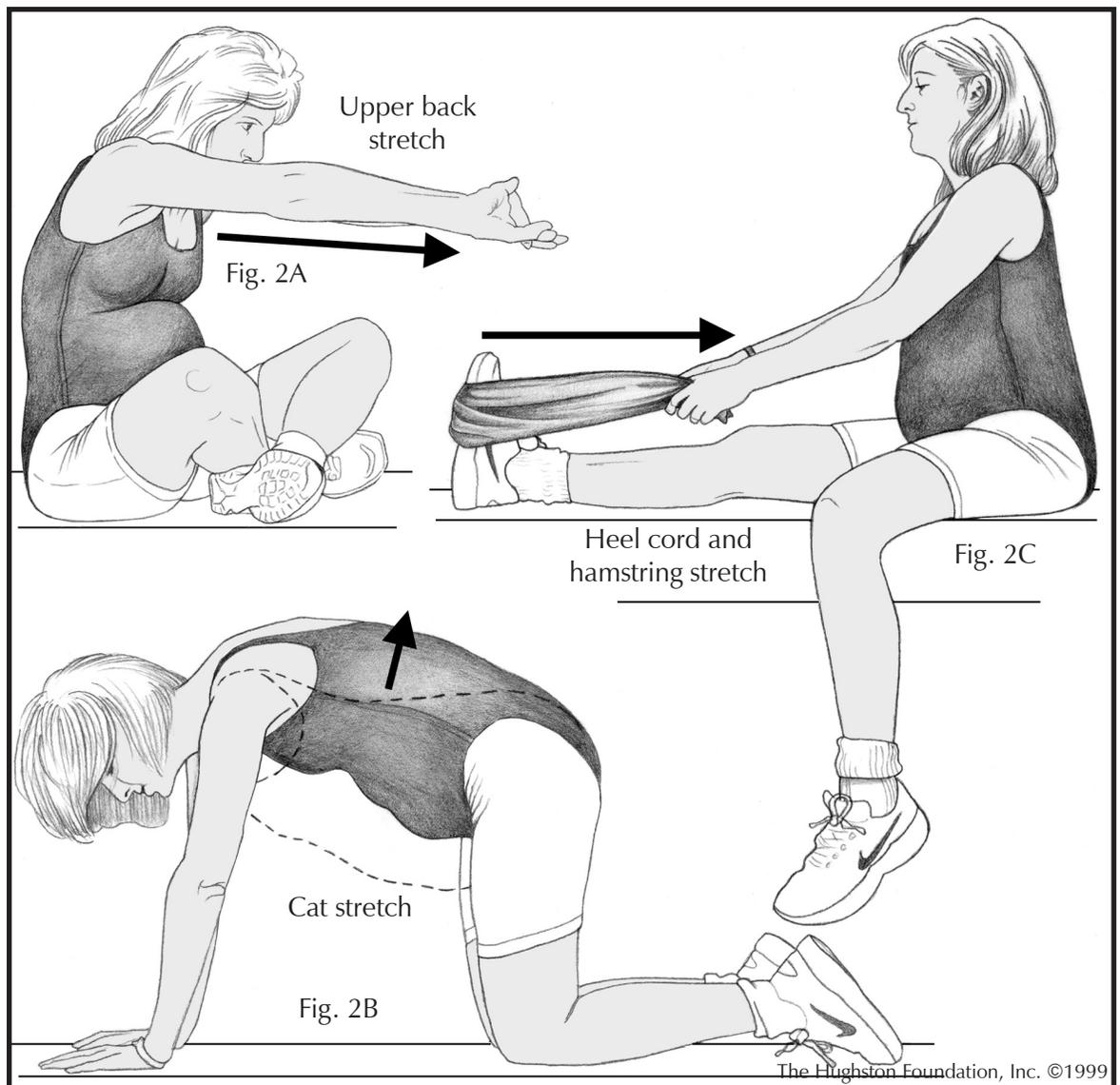
previous muscle tone and not lifting to build muscle mass. Remember to exhale on the contraction of the muscle. Holding your breath then forcibly exhaling (the Valsalva maneuver) while lifting these weights decreases blood flow to your heart. During the third trimester (week 28 to birth), you can use hand-held weights if you are careful; your body has had many physiologic changes and is not as balanced as it was before pregnancy. If you experience chronic fatigue or exhaustion from exercise, discontinue exercising and consult your physician.

Include Kegel exercises to strengthen the muscles used in labor. To do these exercises, contract and release the perineum (the pelvic floor and associated structures).

This movement is the same one used to stop the urine stream.

Stretching and relaxing

Take the time to stretch and relax during pregnancy (Figs. 2A and 2B). Always avoid jerky or bouncy motions when you stretch. Control your breathing by slowing inhaling and exhaling. Remember to stretch your entire body, especially the heel cords to prevent leg cramping (Fig. 2C). After the fourth month, avoid lying flat on your back or on your right side when exercising or relaxing. This position restricts the blood flow to the uterus. It is best to lie on your left side.



Special considerations

Exercising mothers-to-be need to avoid overexerting themselves. Limit your exercise outings to 15 minutes. Wear supportive shoes and watch the surface carefully to avoid losing your balance and injuring yourself. On hot, humid days, find a cool place to exercise, such as a mall or a health club. Drink plenty of water before, during, and after exercising to avoid dehydration. Drink at least eight glasses of water each day and, on workout days, drink extra glasses to replenish the fluid lost. Do not participate in activities, such as ball sports, that put you at risk for a blow to your abdominal area.

Your body needs more energy from food during pregnancy. A pregnant woman normally needs to consume about 300 calories more than she did before pregnancy. When you exercise, you need to consume enough calories to offset the calories you burn.

Exercise can help you maintain a positive self-image and physical well being during this time. It can help you feel in control of your body and can make pregnancy a little easier. Continue exercising throughout pregnancy, the postpartum period, and the rest of your life.

Mary Ann Collins
Columbus, Georgia

A New Class of Arthritis Drugs

By now, you may have heard of the new nonsteroidal anti-inflammatory drug (NSAID) called Celebrex (celecoxib) from Searle Pharmaceuticals. NSAIDs reduce inflammation and pain by blocking prostaglandin production in the body. Most NSAIDs, such as naproxen and ibuprofen, block this production by blocking cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2). Celebrex, however, belongs to a new type of NSAIDs called the COX-2 inhibitors. Researchers believe that this type selectively inhibits COX-2 but does not inhibit COX-1, which helps regulate protective enzymes in the gastrointestinal (GI) tract. Therefore, people who take Celebrex have fewer cases of GI bleeding and ulcer formation than people who take other types of NSAIDs, but they still receive the anti-inflammatory, analgesic, and anti-pyretic (fever-lowering) properties.

Some caution needs to be followed when taking Celebrex. Although this medication causes fewer cases of GI bleeding than other NSAIDs cause, GI bleeding and ulcer formation does occur in some people who take it. If you are allergic to sulfonamide ("sulfa") drugs or to celecoxib (the active agent in Celebrex), do not take Celebrex. Talk with your doctor or pharmacist about drug interactions or any physical conditions that may prevent you from taking Celebrex.

Vioxx (rofecoxib), a COX-2 inhibitor from Merck, will be available soon.

Seth Feldman, D.O., 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 athletic 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.

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Exercise & Fitness

Many people believe that any exercise that makes you sweat will help you burn fat. While both cardiovascular and muscle-strengthening exercises will help burn calories, the initial calories burned during these exercises are mainly **carbohydrates**. To burn up calories from **stored fat**, you must continue the activity for a longer period of time. Aerobic and anaerobic exercise are two types of exercise that will help you maintain and improve your health.



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