

MAYO CLINIC HEALTH LETTER

Tools for Healthier Lives

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Rotator cuff repair

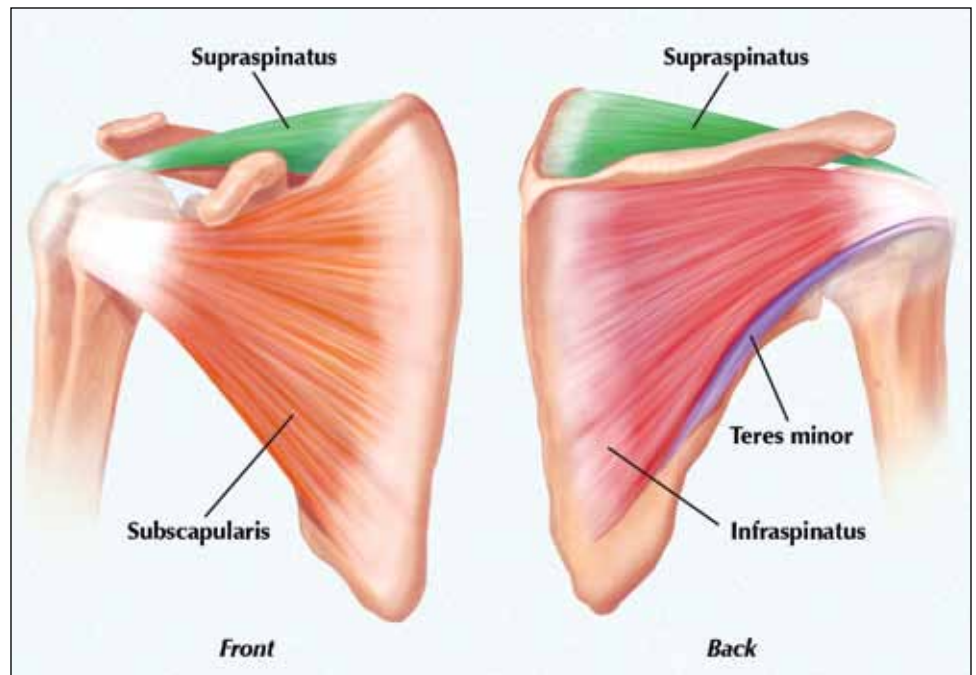
Shoulder pain solutions

You've had a troublesome shoulder for years. The mild wear and tear to your rotator cuff has become worse. You've tried to take a conservative approach. But even with physical therapy and diligent adherence to prescribed exercises, there's been little improvement over the last six months. The pain is too much, and

no amount of rest or modification of your usual activities seems to help.

Your doctor says it's time to consider surgery to address the pain and make needed rotator cuff repairs so that you can use your shoulder more reliably without fear of ongoing pain.

What surgical procedure you'll have depends on the extent of damage to the rotator cuff. Occasionally, the best approach is an open or a mini-open repair with an incision of from 1 to several inches to repair a large tear. However, a less invasive procedure called shoulder arthroscopy also can be an option. In the



The rotator cuff is a group of four muscles that run between the ball of your upper arm bone and shoulder blade. Tendons attach these muscles to the humerus ball. Normally, these muscles work as a group to keep the shoulder's ball centered in its socket while the larger muscles surrounding the shoulder and arm make it possible for you to move your arm.

hands of a skilled surgeon, this can be done through several tiny incisions using specialized surgical tools and an arthroscope, which is a long, thin, lighted instrument with a camera at the end.

Arthroscopy is finding a regular place in the field of surgical repairs for rotator cuff problems and related shoulder joint damage. In addition, rotator cuff repairs using arthroscopy alone often can be done without a hospital stay.

Inside story

The shoulder is a complex ball-and-socket joint and is one of the most mobile in the body. The ball is part of the upper arm bone, called the humerus. The socket is part of the shoulder blade and is called the glenoid.

The rotator cuff is a group of four muscles that run between the ball and shoulder blade, completely covering the shoulder joint from front to back. Each of the four muscles has a large central part that's attached by a tendon to the ball of the humerus.

The rotator cuff's four muscles work as a group to keep the shoulder's ball centered in its socket while the larger muscles surrounding the shoulder and arm make it possible for you to move your arm as needed. However, when your cuff muscles fail to act properly, the result is pain and disability. This failure may be related to a number of different causes.

As you age, collagen, the tissue that serves as the building blocks for the rotator cuff's muscles and tendons, begins to weaken. Normal wear and tear of the tissues or overuse of your arm can cause breakdown of collagen, making tendons and muscles more prone to degeneration and tears. Calcium deposits may develop in the cuff, and arthritic bone spurs can form on the bones overlying the rotator

cuff. These can pinch (impinge) the tendons and irritate your rotator cuff.

A fall on an outstretched arm can bruise or tear a rotator cuff tendon or muscle. Repetitive overhead arm movements or lifting or pulling something that's too heavy can injure your cuff, resulting in tendon pain (tendinitis) or micro-tears. Even poor posture can cause your cuff muscles or tendons to become pinched under the bones of your shoulder.

Rotator cuff-related pain is usually felt over the outside of the upper arm, just below the shoulder. Cuff damage or associated subacromial bursitis may make lying on the painful shoulder at night impossible, and your strength in that arm may be diminished.

Time for surgery

When ongoing rotator cuff pain doesn't improve with conservative treatment — such as medications, physical therapy and home exercise — surgery generally becomes a consideration.

Each rotator cuff problem is unique. Along with a medical history and careful physical exam by an orthopedist, diagnostic images — such as X-rays and possibly magnetic resonance imaging (MRI) or ultrasound — may be used to determine the best approach. If surgery is deemed necessary, your surgeon may recommend one of the following options based on your condition:

■ *Open or mini-open repair* — The procedure is done through one incision over the shoulder or through several smaller incisions. Open repair includes detaching — or more commonly splitting — the overlying shoulder muscle (deltoid) in order to get to and repair a large or complex cuff tear.

■ *Arthroscopy* — Arthroscopic shoulder repair is done through

very tiny incisions that are just big enough to accommodate the pencil-thin arthroscope and small, specialized surgical tools. These tools are used to shave, cut and grasp and to place stitches (sutures). Images from the arthroscope's camera are relayed to a monitor for viewing by your surgeon.

Arthroscopic repairs may address one or more problems found within your rotator cuff, possibly including:

■ Worn tendons that no longer perform properly due to changes from wear and tear

■ Torn tendons that have pulled away from their attachment to the bone due to a fall or injury

■ Bone spurs that rub against worn tendons and cause impingement

■ Thickened and abnormal

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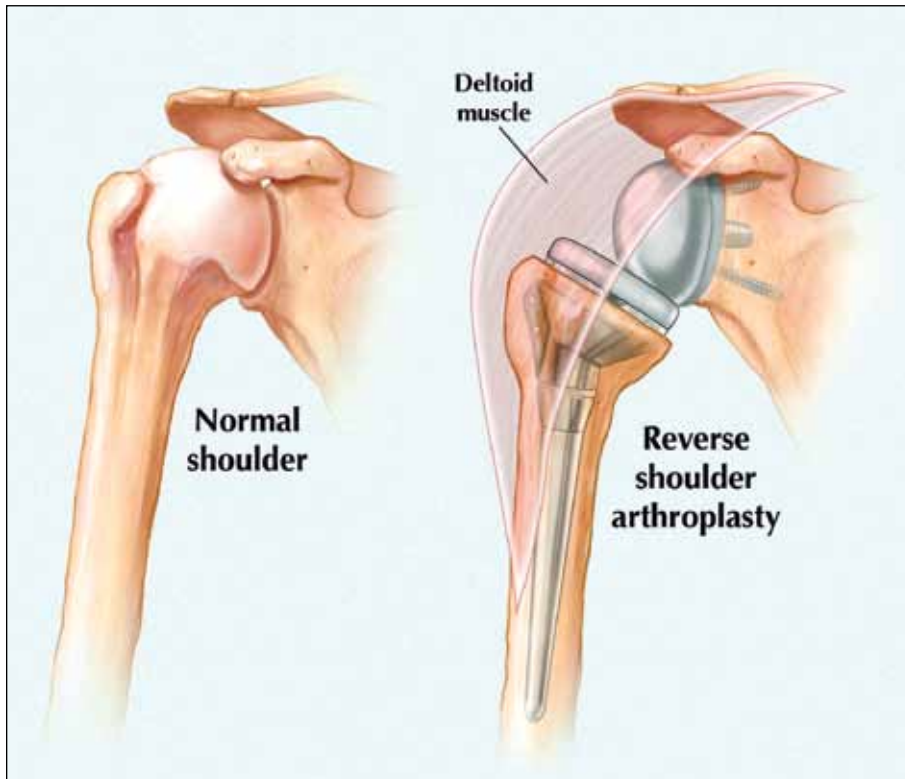
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changes to the bursa, which is the tissue that covers and lubricates the top of the rotator cuff

Beyond simple repair

Sometimes, the rotator cuff is worn-out or torn beyond repair. If this happens, the shoulder joint's mechanics change and eventually arthritis results. So, instead of the four rotator cuff muscles working together to stabilize the ball portion of the joint in the socket when you lift your arm, the ball glides upward and pinches under an archway consisting of bone and tough ligament tissue.

Eventually, this pinching can lead to a painful arthritis called rotator cuff arthropathy.

To address this painful and debilitating shoulder condition, a relatively new surgical procedure has been developed. It's known as reverse shoulder arthroplasty. As the name implies, reverse shoulder arthroplasty changes the usual shoulder anatomy to make the shoulder less painful with use and

to improve its mobility. The shoulder ball is replaced by a socket and the shoulder socket by a ball.

Reverse shoulder arthroplasty is a complex procedure that changes the shoulder joint mechanics so that your arm can be moved comfortably even without a functioning rotator cuff. This results in no further pinching of the ball under the remaining archway of bone and ligament tissue. The reverse shoulder arthroplasty improves the mechanical advantage of the overlying deltoid muscle, which provides the force behind lifting the arm.

Reverse shoulder arthroplasty was developed in Europe and has been done by Mayo Clinic orthopedic surgeons since 2004. The surgeons at Mayo Clinic have performed more reverse shoulder arthroplasties than has any other large medical center in the United States. In the hands of an experienced shoulder surgeon, the vast majority of people having the procedure experience pain relief and improved shoulder function. □

Health tips

Facial hair removal

For women who don't want the expense of prescription medications, electrolysis or laser hair removal, it's possible to keep unwanted facial hair in check by:

- *Plucking* — This removes the entire hair shaft, and the hair usually won't grow back for two to eight weeks. This may not be practical if you have many hairs to remove, and it can cause follicle inflammation or infection and skin-color changes.

- *Waxing* — This is essentially large-scale plucking. A thin layer of warm wax or a cold wax strip is applied to unwanted hair then pulled off, taking the hair with it. Risks include follicle inflammation or infection, skin-color changes, irritation, redness, scarring and possibly hot wax burns.

- *Shaving* — It's quick but needs to be repeated regularly since it only removes hair down to the surface. Contrary to what you may have heard, shaving won't thicken your hair or make it grow faster, as growth rate and thickness are mainly determined by genetics and hormonal factors.

- *Depilatories* — These gels and creams contain chemicals that break down the protein structure of the hair shaft. Results may last up to two weeks, but skin irritation can occur. It's best to test the product on a small area first and to use it exactly as directed on the package. □

News and our views

Exercise improves symptoms of irritable bowel syndrome

If you're dealing with symptoms of irritable bowel syndrome (IBS) on a frequent basis, getting exercise may be the last thing on your mind. However, new research suggests that a moderate exercise plan significantly improve IBS symptoms.



The study, published in the May 2011 issue of *The American Journal of Gastroenterology*, divided 75 women who had IBS into two groups. Women in one group were instructed to continue their usual lifestyle. Those in the other group were asked to increase their activity to 20 to 60 minutes of moderate to vigorous physical exercise three to five days a week.

After 12 weeks, researchers found that 43 percent of women in the exercise group experienced significantly improved symptoms, while only 8 percent had symptoms worsen. In contrast, only 26 percent of women in the non-exercise group experienced improved symptoms and 23 percent had symptoms worsen.

Mayo Clinic experts note that exercise can help reduce stress and improve depression, both of which can contribute to IBS symptoms. Exercise also stimulates the regular rhythmic muscle contractions of your intestines, helping them to function normally and alleviate both constipation and diarrhea. Mayo experts recommend regular exercise as part of an overall plan of reducing IBS symptoms. □

Researchers study new treatment for macular degeneration

Anti-inflammatory drugs that hitch a ride into the eye's retina on microscopic particles may someday help treat the leading cause of vision loss in older Americans. That's the hope of researchers who are conducting laboratory studies using nanoparticles called dendrimers as a possible way to deliver steroids to retinas affected by age-related macular degeneration. The same experimental treatment also appears helpful in treating a condition called retinitis pigmentosa, which is associated with many genetic conditions that affect the retina.

Dry age-related macular degeneration and retinitis pigmentosa cause neuroinflammation and injury to the retina that can lead to blindness. The retina, which normally captures the images you're viewing, is located at the back of your eye and consists of millions of light-sensitive cells and nerve cells. Researchers found that the injected steroids — which were attached to the nanoparticles — targeted inflammatory microglial cells associated with the neuroinflammation. When the microglial cells gobbled up the steroid-carrying nanoparticles, the damaging activity was shut down, while the rest of the eye remained unaffected and vision was preserved.

Results of the collaborative research, which included Mayo Clinic investigators, were published in the journal *Biomaterials* earlier in 2012. Mayo researchers say the findings are encouraging because they demonstrate the value of designing drug-delivery systems that are small enough to be taken into cells. With that capability, investigators can improve the effectiveness of treatments to protect sight. □

Crowns and implants

Faster and more accurate

When your dentist told you that a crown was needed for your cracked molar, you sighed at the prospect of several uncomfortable visits to the dentist's office over the next few weeks. Much to your surprise, your dentist said that with a new in-office, tooth-creating machine, the entire crown procedure could probably be done in a single day.

When it comes to fixing your teeth, the future is here, thanks to recent advances in dental machines that use computer-aided design (CAD) and computer-aided manufacturing (CAM) to create tooth restorations.

Devices using CAD-CAM technology can cut many time-consuming — and drawn out — steps out of the process of receiving crowns. In addition, these technologies can make a restoration tooth or crown in a more accurate way, which minimizes the need for follow-up adjustments.

Lab in a box

CAD-CAM devices involve three main components:

■ *A thin camera device* — Traditionally, developing a tooth restoration required inserting a U-shaped rubber mold into the mouth to create an impression of your teeth. This mold was then filled with plaster to create a model of your teeth. With CAD-CAM restorations, this step is no longer necessary.

Instead, a digital camera wand is inserted into the mouth and many images of the appropriate tooth surfaces are captured. Images of a mold also can be taken. The device senses when your dentist is holding the camera still and snaps the

images automatically. Although these cameras have been around for several years, new technology allows for better image capture with fewer pictures, which makes the process quicker.

■ *A computer console* — Images taken by the camera are instantaneously sent to a computer console. Software compiles the multiple images taken from varying angles into a virtual three-dimensional model of your teeth. For areas in need of crowns or other porcelain restorations, the computer places a virtual restoration, which is a computer version of what will eventually be milled. Your dentist can manipulate the model and the restoration on the computer screen, perhaps by making slight adjustments, testing the bite against opposing teeth or directing the parameters of where the restoration will sit in the mouth. Typically, the level of precision is quite high and only minimal adjustment is necessary.

■ *A box where the tooth restoration is milled* — Once the virtual restoration has been finalized, a small cube of artificial tooth material is placed in a machine in which computer-guided drills mill away at the cube until it's the exact shape of your crown or artificial tooth.

Key timesavers

When it comes to making a crown, the initial steps of the procedure involve grinding away decayed tooth material and creating a natural base on which to cement the crown. It's after this step that CAD-CAM technology diverges from traditional approaches. Specifically, it turns the weeks-long process of waiting for a laboratory to create a crown into a process that may take only an hour or two inside your dentist's office. This eliminates the need to have a temporary crown on your tooth while you wait for the



This image shows an existing dental implant, at left, and a computer-generated replacement tooth, at right.

permanent crown to be crafted. In addition, it often — but not always — eliminates the need for follow-up appointments. The downside to this concept is that you need to devote perhaps a three- to four-hour block of time to getting your same-day crown completed.

Before you rely on getting a crown made in a day, realize that CAD-CAM crowns aren't right for every situation. Limitations include:

■ *Accuracy of front tooth color and texture* — It's difficult to make a crown that exactly matches the color and textures of adjacent natural teeth. Teeth made with CAD-CAM devices are typically a good match in terms of color and texture, but they don't quite have the artistic detail that can be achieved from a highly skilled dental laboratory technician. Mayo Clinic dental experts recommend limiting CAD-CAM restorations to back teeth where teeth are less noticeable.

■ *Crowns that cover more than three teeth* — Creating two or three tooth crown restorations is about the limit for CAD-CAM restorations. The traditional approach of impression making is still the best choice for making crowns that cover more teeth.

Quicker implants

A single tooth implant involves two basic steps. First, an oral surgeon or periodontist places a titanium stud into your jawbone

beneath the gumline. At first, this stud isn't secure enough to support a tooth. It takes about three to four months for bone to naturally grow around the implant and solidly anchor it into the jaw.

Once the implant is secured by bone, the next step is designing the artificial tooth that will be anchored to the stud. Traditionally, this involved waiting until the stud was securely anchored by bone, then making an impression of the implant and surrounding teeth. That impression would be sent to a dental laboratory. Two to three weeks later when the laboratory finished the artificial tooth, your dentist could place it in your mouth.

With CAD-CAM technology, your dentist can take digital images of the implant and surrounding teeth a few weeks after the implant is placed. As you wait for bone to grow into the implant, your dentist can manufacture your replacement tooth in the office — or send it to a dental laboratory. Once the implant stud is secure, no further impressions or waiting is necessary. Your dentist can place the replacement tooth right away.

It's possible to place multiple artificial teeth or fixed dentures on multiple titanium implants in the lower jaw immediately after implant surgery. However, Mayo Clinic doctors don't routinely recommend immediate crowning of a single implant on the same day it's placed. The risk of developing problems and the unpredictability of results is usually too high.

Becoming more widespread

CAD-CAM machines are still in the early stages of adoption and may not be used at your local dentist's office. And they're not always the best tool for a particular job. Still, there's a good chance that in the near future, you'll have a tooth restored much quicker. □

Nails and health

What your nails reveal

Like little shields, your nails help protect the tips of your fingers and toes. They can also reveal a lot about your health.

The presence of common medical conditions — or even severe disease — can produce subtle or more-obvious changes in color or nail growth. When those changes are related to an underlying illness, all of your nails may be affected in a similar fashion.

Nail changes often occur late in the course of an illness, so quite often you and your doctor may already be aware of the condition. Changes in texture, color and the shape of your nails are sometimes associated with serious concerns.

Telltale signs

Healthy nails are generally smooth and free of ridges, grooves, spots or discoloration. Vertical ridges that run the length of the nail and tend to become more obvious with age are one relatively harmless nail change. A minor injury to a nail may show up as white lines or spots that eventually grow out. A crush injury such as from a hammer strike or being pinched in a door may cause a black spot beneath the nail that gradually disappears. For some, nails may become brittle due to aging, repeated immersion in water, or use of strong soap or chemicals.

Potentially more concerning are changes such as the following:

■ **Beau's lines** — These are indentations that run across the nail's width. They can appear when growth under the nail cuticle is interrupted by severe



illness, such as uncontrolled diabetes and peripheral vascular disease, or illness that includes a high fever, such as pneumonia. Chemotherapy drugs also may interrupt nail growth. Beau's lines typically grow out with the nail and eventually can be trimmed off.

■ **Pitting** — Small, random depressions or pits in the nails are commonly seen in people who have psoriasis. They also may occur in those with hair loss.



■ **Onycholysis** (*on-ih-KOL-ih-sis*) — This involves separation of the nail from the nail bed. As the nail separates, the color beneath the unattached portion may appear white, yellow or somewhat green, depending on the cause. Various causes for the separation include injury, fungal infection, thyroid disease — especially overactive thyroid (hyperthyroidism) — and reaction to a medication or a product, such as nail hardeners or adhesives.



■ **Clubbing** — Nail clubbing appears as a broadening and rounding of the fingers and toes as well as curving of the nails around the fingertips and toes. It usually develops over the course of years. Clubbing may be a sign of chronic lack of oxygen in the blood. It's associated with different diseases, including various lung diseases, some forms of cardiovascular disease, liver disease and inflammatory bowel disease.



■ **Spoon nails** (*koilonychia*) — These soft, thin nails appear scooped out. The spoon-like depression is typically capable of holding a drop of liq-



uid. Spoon nails are often a sign of iron deficiency anemia or possibly a liver condition in which your body absorbs too much iron from the food you eat (hemochromatosis). Spoon nails may also develop in association with coronary artery disease and underactive thyroid (hypothyroidism).

■ **Yellow nail syndrome** — This is relatively rare. It may be seen in someone who has swelling (lymphedema) with or without a chronic lung condition, such as a chronic infection of the lungs' bronchial tubes (bronchiectasis) or recurrent pneumonia. Nails may not have a cuticle and may detach from the nail bed in places. New growth slows significantly, and nails often become thicker, taking on a yellowish color.



■ **Terry's nails** — These appear mostly whitish or light pink with a thin band at the tip that's pink to brownish. Terry's nails may indicate liver trouble, chronic heart failure or diabetes.



■ **Half-and-half nails** (*Lindsay's nails*) — Nails may appear dull white as they grow out from the nail bed, with color becoming pink to reddish brown about halfway out. This may be an indication of kidney function problems.



■ **Melanoma** (*subungual melanoma*) — It's relatively uncommon for this deadly form of skin cancer to show up under a nail. However, anything that appears as a brown or black discoloration in a nail — often in the form of a line or streak, but sometimes irregularly shaped — warrants evaluation by a doctor. □



Nordic walking

Exercise with stability

Cross-country skiing has long been touted as one of the most effective forms of exercise because it works all of the major muscle groups. But now you don't have to ski — or even have snow — to gain some of these benefits.

In recent years, walking with poles — often called Nordic walking — has increased in popularity, particularly among older adults. Perhaps you've seen people traversing a local park with these lightweight Nordic walking poles — and wondered what they were all about.

In short, walking poles help get your upper body into the fitness game, and can help with stability, improve posture and possibly lessen the impact walking has on your joints and leg muscles.

Going Nordic

Although humans have used walking sticks and poles for ages, modern Nordic walking got its start as a summer training method of cross-country skiers in Scandinavian countries. Nordic walking has a range of styles, from basic, relaxed walking with moderate pole pushing — to more exaggerated walking with more powerful pole pushes.

The primary benefit of Nordic walking is that you use more energy than with ordinary walking of a similar intensity. Your heart rate is slightly higher, you're breathing a little harder and your body consumes more oxygen. Yet, most people don't feel as though they're working any harder. One study found that people who did Nordic walking burned about 20 percent more calories over a one-mile course than when they walked the same course in an ordinary way.

A few tips

Poles designed for Nordic walking are available in many sporting goods stores and on the Internet. They come with a number of features that may make them a worthwhile investment, including:

■ *Effective straps* — A strap covering most of your palm and the back of your hand allows you to let go of the pole grip as your arm swings back, which is proper Nordic walking technique. When you swing your arm forward, the pole grip snaps back into your hand.

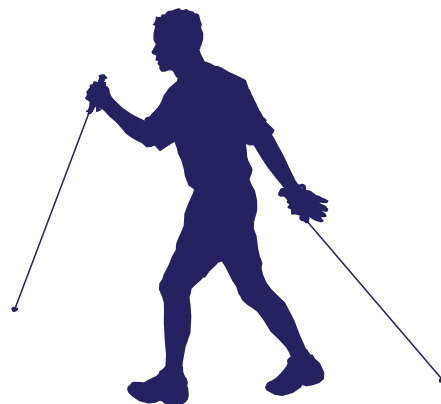
■ *Adjustable length* — In terms of length, your forearm should generally be level with the ground when you grip a Nordic walking pole and plant it vertically. Adjustable-length poles allow you to experiment with varying heights to find what's most comfortable for you. In addition, you can shorten or lengthen the poles depending on terrain.

■ *Beveled rubber tips* — These offer excellent grip on a wide variety of surfaces.

Even then, study participants reported no significant difference in the sense of exertion.

The extra calorie burn may occur because Nordic walking works the muscles of your arms, shoulders, chest, back and torso more than does ordinary walking. It's similar to going for a walk and then performing light upper body strengthening exercises — except that you're doing both forms of exercise in a single workout.

Another benefit of Nordic walking is that it helps you main-



tain proper posture as you walk. Swinging and planting an appropriate-length pole requires a more upright posture, and it's much harder to slump into a stooped posture, which can happen with ordinary walking. Nordic walking also may help to strengthen muscles in the upper back and may even help maintain bone mineral density in the upper spine.

Many who practice Nordic walking claim that the exercise is easier on the hips, knees and lower back than is ordinary walking. However, scientific evidence to support this has been mixed. Regardless of joint impact, walking poles may help give you the balance and stability you need to stay mobile and feel more confident in using walking as exercise.

Pole position

Arm and leg movements with Nordic walking are the same as with ordinary walking. To get the pole timing down, it may help to take a few strides without touching the pole tip to the ground. Next, take some strides while lightly dragging the pole tip on the ground. Finally, start planting the pole tip with gentle force. As you gradually increase pole force, your stride should feel as if it's getting at least some assistance from your arms.

Just as with beginning any new exercise, start at an easy level and gradually increase effort. □

Second opinion

Q: My doctor recently tested my sodium levels, thinking that they might be too low. Isn't having low sodium good?

A: Reducing sodium in your diet is a good idea for many Americans because most people consume too much salt. However, having a certain amount of sodium in your body is critical for maintaining normal blood pressure and fluid balance, and for muscles and nerves to work properly.

Development of low blood sodium (hyponatremia) may occur more commonly in older adults. It's almost never related to not eating enough salt. Instead, age-related changes in kidney function — such as decreased kidney size or decreased blood flow through the kidneys — affect the way the body handles the balance of sodium and water. Other factors contributing to hyponatremia may include:

- Taking certain drugs, such as diuretics for high blood pressure
- Severe vomiting or diarrhea
- Liver, kidney or heart failure
- Drinking too much water
- Having a condition called syndrome of inappropriate antidiuretic hormone (SIADH) secretion, which causes you to retain water
- Underactive thyroid (hypothyroidism)
- Underactive adrenal glands (Addison's disease)
- Certain types of cancer

The signs and symptoms of hyponatremia vary depending on

severity and how rapidly it develops, but may include drowsiness or fatigue, nausea, vomiting or loss of appetite, headache, confusion, restlessness, muscle cramps or spasms, loss of consciousness, seizure or coma.

If hyponatremia occurs rapidly, it's potentially fatal and requires emergency care. However, hyponatremia in older adults usually develops slowly, and less-aggressive treatment is warranted. Treatments may include treating the disease that's affecting your sodium level, drinking less fluid or taking a drug that helps your body get rid of water. □

Q: I had an MRI of my knee and now my doctor ordered regular X-rays. Why do I need X-rays, too?

A: Together, magnetic resonance imaging (MRI) and regular X-rays provide overlapping but somewhat different information that can sometimes tell more than either one alone. MRI may help evaluate a knee problem, but in many cases doesn't provide the whole picture.

A lot of useful information is gained from X-rays along with a thorough physical exam. X-rays are particularly useful for viewing spaces between bones, which are occupied by cartilage and make up the knee joint. If the cartilage wears down, the spaces become narrowed as seen on an X-ray, indicating arthritis. X-rays also can provide a more precise look at

the shape and surface of bones. Special knee X-rays can be done in weight-bearing and action positions. These provide valuable information about the joint's stability and alignment when it's under some stress.

A knee X-ray might be used to diagnose fractured bones or stress fractures in bones. It could be used to demonstrate proper alignment and stabilization of bony fragments after treatment of a fracture or to monitor fracture healing. Doctors might also use it to look for an infection, calcium deposits, abnormal bone growths and bony changes, and even to assist in the detection of bone cancer.

MRIs of the knee have the advantage of being able to visualize soft tissues in much more detail than X-rays. An MRI can help your doctor evaluate joint disorders such as arthritis or joint abnormalities caused by trauma or overuse. □

Have a question or comment?

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