

## Medical Imaging Advances Changing Health Care, Saving Lives

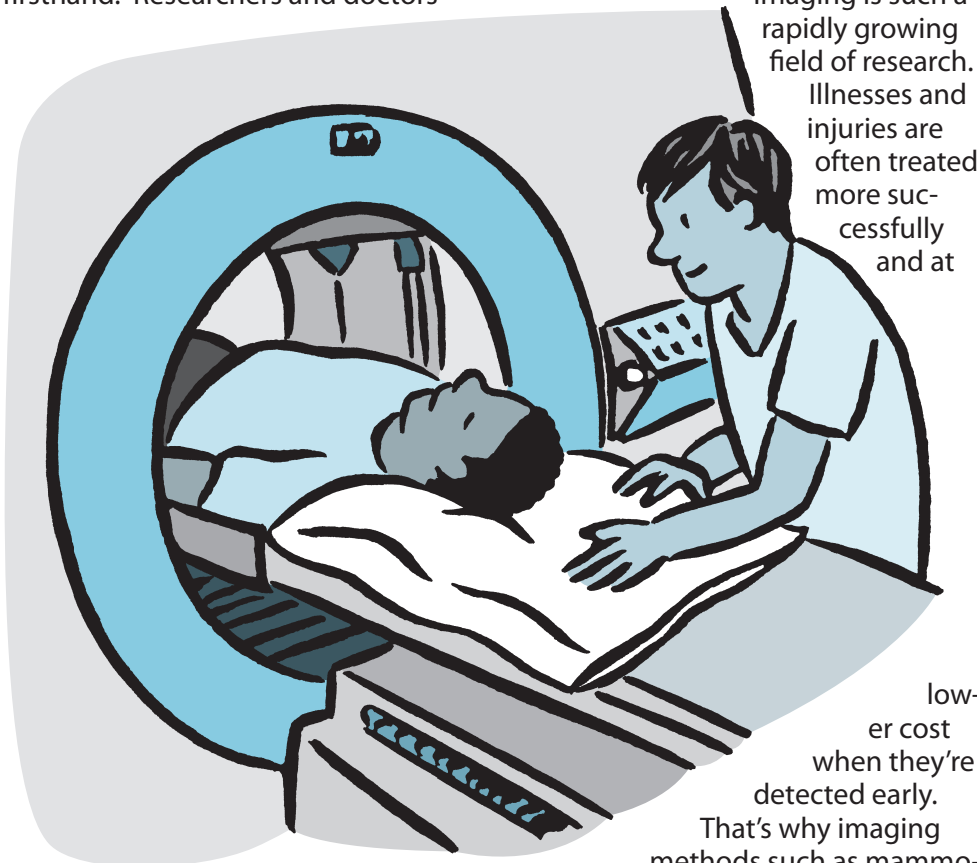
If you or someone you know has had a **mammogram** to check for breast cancer, an **X-ray** to detect a broken bone, or an **ultrasound** to examine an internal organ, then you've seen the benefits of medical imaging firsthand. Researchers and doctors

can now see how the body works in whole new ways. Today's powerful imaging tools help them understand diseases at more fundamental levels, which opens up new treatment strategies. It's easy to see why medical

imaging is such a rapidly growing field of research. Illnesses and injuries are often treated more successfully and at

low-er cost when they're detected early. That's why imaging methods such as mammo-grams, **CT** scans and **MRI** are routinely used across the nation to spot cancer, heart diseases and other problems inside the body. Mammograms, for example, can reveal abnormal areas within the breast before the woman or her doctor feels a lump. NIH's National Cancer Institute predicts that, by the end of 2008, more than 182,000 women nationwide will be diagnosed with breast cancer and over 40,000 will die from it. Early detection of breast cancer is critical for survival. About 98% of women will survive for 5 years or more if their breast cancer is diagnosed before it spreads outside the breast. In fact, early detection by mammograms, along with improvements in treatment, has been driving down death rates from breast cancer since 1990.

Doctors recommend that women *continued on page 2*



### Definitions

#### CT

Short for "computed tomography," this technique uses special X-ray equipment to create pictures of organs and structures inside the body. CT scans can also be used to make 3-dimensional images.

#### Mammogram

An X-ray of the breast used to check for cancer.

#### MRI

Short for "magnetic resonance imaging," this technique uses a large magnet and radio waves to look at organs and structures inside your body. Doctors use MRI scans to examine the brain and spinal cord and to diagnose a variety of conditions, from torn ligaments to tumors.

#### Ultrasound

A technique that uses high-frequency sound waves to look at organs and structures inside the body.

#### X-ray

A technique that uses electromagnetic radiation to make images of bones, teeth and internal organs.

### Inside News

1 Medical Imaging Advances

3 Are Your Wrists at Risk?

4 Health Capsules

- Social Ties Affect Smoking Behavior
- Eating Well as You Get Older
- Web Site: Time to Talk

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## Wise Choices Breast Cancer Screening Guidelines

“Screening” means looking for a disease before a person has any symptoms. The most widespread use of medical image screening is for breast cancer. Here are guidelines from NIH’s National Cancer Institute for finding breast cancer early:

- Women 40 and older should have mammograms every 1 to 2 years.

- Women who are younger than 40 and have risk factors for breast cancer (for example, a family history of breast cancer or certain breast changes on biopsy) should discuss how often to have mammograms with their health care provider.
- Schedule clinical breast exams as well, to have your health care provider examine your breasts.
- Perform monthly breast self-exams to check for any changes. Breast self-exams should not replace mammograms and clinical breast exams.

*continued from page 1*

have regular mammograms once they turn 40, but some women are hesitant because of the discomfort involved. To address this problem, NIH-funded researchers have developed a new imaging technology, the breast CT, that’s more comfortable because the breast isn’t compressed during the procedure. The woman lies face down on a table and places one breast through an opening. The breast CT then uses X-rays taken from many different angles to develop a 3-dimensional image of the breast. The CT scanner gathers about 500 images as it rotates around the breast, so that researchers can look at the breast from any angle.

The breast CT is still being tested,

but it may someday offer a pain-free way to spot cancer in breast tissue. It may also give doctors better insights into treatment options—for example, it could give them a more precise fix on abnormal areas. Researchers expect the device could be available within 3 to 5 years and become the new standard.

Other NIH research has brought changes in medical imaging that are already in practice. One example is a technology developed by NIH-funded investigators led by Dr. Richard Ehman at the Mayo Clinic. This technique, called MR elastography, sends gentle vibrations to the liver and uses MRI to evaluate the liver’s stiffness.

Doctors are now using MR elastography to assess scar tissue, or fibro-



## Web Links

For links to more information about imaging in biology and medicine, see this story online:

- [http://newsinhealth.nih.gov/2008/July/docs/01features\\_01.htm](http://newsinhealth.nih.gov/2008/July/docs/01features_01.htm)

sis, in the liver. The liver does many things in the body, including clearing poisons from your blood and helping control infections. Fibrosis of the liver can often be treated if it’s detected early. But if it’s not treated, it can progress to cirrhosis, an irreversible condition in which scar tissue replaces normal, healthy tissue and blocks the flow of blood through the organ, preventing it from working.

Typically, doctors take a biopsy to assess fibrosis of the liver. They use a needle to take a tiny sample of liver tissue and then examine it under the microscope for scarring and other signs of disease. MR elastography has now emerged as an alternative to this uncomfortable and invasive procedure.

According to Ehman, MR elastography has already made a difference in patient care. Ehman described one patient who has taken a potent drug for the past 15 years to control a severe skin disease. The drug can cause liver damage and fibrosis, so anyone who takes it needs to have a liver biopsy every 2 years to check for problems. At the patient’s last visit to the Mayo Clinic, however, the doctors used MR elastography to assess the liver. They found no evidence of fibrosis. “Patients are now able to avoid the pain, risk and higher expense of an invasive biopsy because of this technology,” Ehman explained.

Imaging by itself is not a treatment, but it can help doctors and patients make better decisions about treatments. NIH research and imaging discoveries are already improving the way health care providers detect and treat disease. Future advances will help doctors find disease earlier, guide treatments and assess whether treatments are working. ■

## NIH News in Health (ISSN 1556-3898)

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# Are Your Wrists at Risk?

## Learn About Carpal Tunnel Syndrome

You're working at your desk, but you're distracted by a tingling or numbness in your hand and wrist. Then a sharp, piercing pain shoots from your palm through your arm. If you've had symptoms like these for several days—or worse, weeks—or if they keep you up at night, you may have carpal tunnel syndrome.

Carpal tunnel syndrome is caused by a nerve getting pinched inside a narrow passageway—called the carpal tunnel—in your wrist. The rigid tunnel is made of bones and **ligament**. It surrounds several **tendons** and an important nerve, called the median nerve, that detects feelings in your thumb and fingers (except for the little finger). The median nerve also helps to control certain hand movements.

Several factors can increase pressure inside the carpal tunnel and squeeze the median nerve. A wrist injury can cause tendons to swell and press against the nerve. Arthritis, diabetes, thyroid disease, pregnancy and menopause can also contribute to swelling and pain. Some people are more likely to get carpal tunnel syndrome simply because they were born with smaller carpal tunnels. Sometimes the cause is unknown.

People who work on assembly lines, such as meat packers, seamstresses and cleaners, seem more likely to get carpal tunnel syndrome. But although people often blame repetitive hand or wrist movements for the disorder, there's little solid evidence that they're the root cause. They may simply make

symptoms worse.

If you suspect you have carpal tunnel syndrome, see your doctor as soon as possible. Early treatment is important to avoid permanent damage to the median nerve. Doctors sometimes use simple tests—like tapping on the wrist—to see if it brings on symptoms that indicate carpal tunnel syndrome.

These tests can rule out other causes of wrist pain, like tendonitis and other disorders caused by repeated hand and wrist motions. Sometimes doctors use small electric shocks to test how well the median nerve is working. Or they may use ultrasound imaging to detect impaired movement of the median nerve. Routine laboratory tests and X-rays can find underlying causes, like diabetes or bone fractures.

Treatments for carpal tunnel syndrome should begin as soon as possible. Your doctor will treat underlying causes like diabetes or arthritis first. You may be advised to use splints or a hand brace to keep your wrist from twisting or bending. Nonprescription pain relievers may help to ease pain and swelling. Steroids, taken orally or injected into the wrist, can offer pain relief for up to 3 months. Once symptoms improve, stretching and strengthening exercises may help to



prevent future trouble.

Severe cases, with symptoms lasting for 6 months or more, may require surgery. Surgery involves cutting the band of ligament that surrounds the carpal tunnel to reduce pressure. Symptoms often improve immediately after surgery, but full recovery may take months.

If you have carpal tunnel syndrome, be sure to talk with your doctor about your treatment options. ■

### Definitions

#### Ligament

Tough band of tissue that attaches bones to each other.

#### Tendons

Tough, flexible cords that connect muscles to the bones they move.

### Web Links

For links about carpal tunnel syndrome, see this story online:

- [http://newsinhealth.nih.gov/2008/July/docs/01features\\_02.htm](http://newsinhealth.nih.gov/2008/July/docs/01features_02.htm)



### Wise Choices Symptoms of Carpal Tunnel Syndrome

- Frequent burning, tingling or itching numbness in the palm and fingers
- A swollen feeling in the fingers (but they may not look swollen)
- Disrupted sleep because of pain or discomfort
- Cramping in the hand or wrist
- Difficulty making a fist or squeezing small objects
- Trouble telling the difference between hot and cold by touch

## Health Capsules

### Social Ties Affect Smoking Behavior

Spouses, friends, siblings and co-workers usually decide to light up or stub out their cigarettes for good at around the same time, a new study has found. A better understanding of how social ties affect smoking behavior may lead to more effective ways to prevent or reduce smoking.

While smoking rates have fallen over the past 4 decades, it remains the leading cause of preventable death in the United States. Previous studies have shown that social ties between 2 people—especially young people—can influence decisions to start or stop smoking. But the effects of more complex social groups have been unclear.

NIH-funded researchers at Harvard Medical School and the University of California, San Diego examined medical records and other data from more than 12,000 adults who had participated in the Framingham Heart Study, a long-term study sponsored

by NIH. The researchers were able to track changes in social relationships over more than 3 decades, from 1971 to 2003, because people in the study regularly updated information about their family, friends and coworkers.

At the beginning of the study, smokers tended to mix equally with nonsmokers. By 2000, smoking in the group had declined, mirroring the national downward trend. There was also another change. The smokers and nonsmokers divided into sepa-

rate clusters as the study progressed. Eventually, the smokers were on the fringes of the network, with fewer social ties to others.

Close relationships seemed to exert a strong influence on smoking. The greatest effect was in married couples. When a husband or wife quit smoking, it reduced the chance of their spouse smoking by about 67%. When a sibling quit, it reduced the chance of smoking in a brother or sister by 25%. Influences from friends and coworkers fell in between.

Last year, the scientists reported on the spread of obesity within the same study group. This research suggests that it may be possible to harness social networks to help people change behaviors that affect their health, such as smoking, for the better. ■



#### Web Links

For links about the topics in these stories, visit this Health Capsules page online:

- <http://newsinhealth.nih.gov/2008/July/docs/02capsules.htm>

### Eating Well as You Get Older

How should you eat as you get older? Which foods are likely to keep you most healthy and which ones should you limit? Is it possible to eat well and stay within a healthy weight?

Your need for healthy foods doesn't diminish with age. As we age, our bodies still require essential nutrients, most of which are found in foods.

"Eating well is vital at any age, but as you get older, your daily food choices can make an important difference in your health," says Dr. Richard J. Hodes, director of NIH's National Institute on Aging (NIA). Eating a well-planned, balanced mix of healthy foods every day may help prevent heart disease, type 2 diabetes, bone loss, some kinds of cancer and anemia.

However, eating healthy may

not always be easy for older adults. Changing appetites, slower metabolism, eating alone, buying ready-to-eat meals and living on a fixed income can all affect the quality of your food choices.

These and other questions are addressed in *Eating Well as You Get Older*, the latest topic to be added to *NIH Senior Health*, the health and wellness Web site developed by NIA and NIH's National Library of Medicine.

In addition to learning how to make wise food choices, older adults who visit the web pages will find information about food labels, food safety, meal planning, food shopping and ways to enhance the enjoyment of eating. To start, go to:

<http://nihseniorhealth.gov/eatingwellasyougetolder/toc.html>. ■



#### Featured Web Site Time to Talk

<http://nccam.nih.gov/timetotalk>

Nearly two-thirds of older Americans use some form of complementary and alternative medicine (CAM), but less than one-third discuss it with their doctors. Doctors need to know about everything you are doing to manage your health. This web site has tips about talking openly to your health care provider about all of your health care practices.



For more health information from NIH, visit

<http://health.nih.gov>