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TOOLS FOR HEALTHIER LIVES

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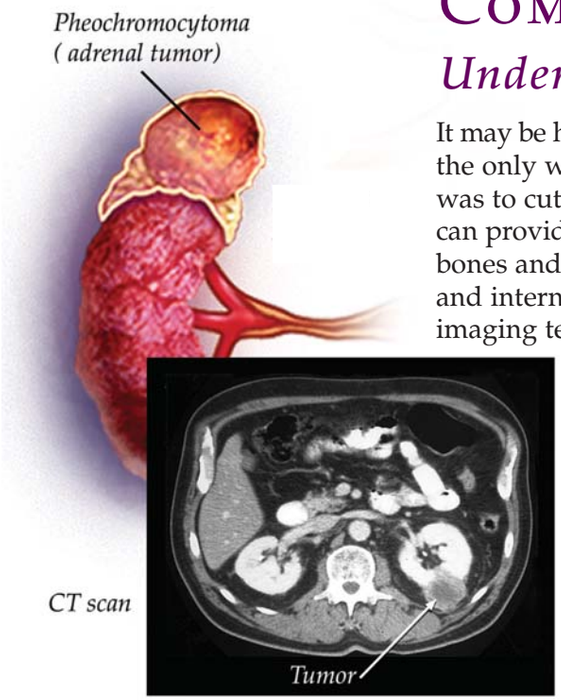
Computerized Tomography

Understanding the Risks and Benefits



A CT scan can quickly produce detailed views inside the body and pinpoint problems such as a tumor on an adrenal gland (see arrow).

It may be hard to imagine, but at one time, the only way to look inside the body was to cut it open. Now, medical X-rays can provide images of everything from bones and body tissues to blood vessels and internal organs. Plenty of different imaging techniques exist. But one of the most revolutionary is the computerized tomography (CT) scan, which can quickly produce detailed views inside the head, chest, abdomen or other parts of the body.

Today, CT scans are commonly used to detect internal injuries or bleeding; locate tumors, infections or blood clots; diagnose and monitor diseases; and guide surgeries or other medical procedures. That may help explain why more than 70 million are performed each year.

Despite their popularity, CT scans are not without controversy. In recent years, concerns have been raised about how the increasing use of these imaging exams — which expose individuals to more radiation than do traditional X-ray exams — might affect cancer risk. However, in most cases, experts say the benefits of a CT scan outweigh the risks. Here's more of what you should know.

An inside look

The images taken by CT are often likened to the slices in a loaf of bread. That's because multiple X-rays are taken at many different angles and then quickly processed by a powerful computer, producing a series of 2-D pictures that correspond to thin sections or "slices" of the body. These cross-sectional images can also be combined to create a 3-D view of a particular organ or part of the body.

When you have a CT exam, you're placed on a movable table that slides through a device containing an X-ray tube and detector. This device then rotates around you, producing X-rays that are recorded by the detector after they pass through your body. In many cases, a contrast material, or dye, is injected through an intravenous line and used to highlight a specific organ or study internal structures, such as blood vessels. Other contrast materials may be given orally or administered via an enema, depending on what's meant to be examined.

What are the benefits?

CT scans have greatly reduced the need for many invasive procedures — such as exploratory surgery. They've also led to improvements in the early detection, diagnosis, treatment and monitoring of many cancers, vascular diseases and other conditions.

With cancer, for example, CT images can detect the presence of a tumor, suggest what type of tumor it is, and offer accurate information about whether or where the tumor has spread in the body. CT scanning can then be used to help plan and guide treatments, such as surgery or radiation therapy, or monitor how well a cancer is responding to treatment. A CT scan can also examine blood vessels in key areas of the body, including the brain, heart and abdomen. This can help identify blockages that

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can lead to a heart attack or stroke or detect bulging areas (aneurysms) that can cause life-threatening blood vessel ruptures. In many cases, CT scans can also help doctors use minimally invasive procedures, rather than perform riskier open surgery, to repair diseased or damaged blood vessels.

What are the risks?

Although a CT scan is considered a low-risk procedure, it's not completely risk-free. The most common problem is an allergic reaction to contrast material that's used for some types of CT imaging. In some cases, this material can be damaging to kidneys. However, most allergic reactions are minor and short-lived. In addition, screening methods are used to identify people who shouldn't receive contrast materials because they may be at risk of kidney damage.

Still, the concern that has received the most attention, particularly in recent years, is the amount of radiation delivered by CT exams. Much of this concern stems from the fact that the use of CT exams and other advanced imaging procedures has increased about sixfold since the 1980s. In fact, medical sources of radiation now represent the largest man-made source of radiation exposure to the U.S. population.

Some studies have suggested that a small percentage of current or future cancers may be caused by radiation exposures of similar magnitude to CT scans. To date, however, no cases of cancer have been directly linked to a CT exam. There's also no clear evidence that the radiation dose used in a typical CT scan increases cancer risk.

If an increased cancer risk does exist, experts say it's extremely small. For instance, it's been estimated that a standard CT scan of the abdomen, which exposes an individual to 10 millisieverts (mSv) of radiation, would increase an adult's lifetime risk of dying of cancer by about 0.05 percent. By contrast, the estimated lifetime risk of dying of a naturally occurring cancer not caused by medical radiation is about 21 percent.

Nevertheless, the risks associated with radiation exposure are being taken seriously. Experts in medical imaging have set guidelines that can help prevent unnecessary CT exams from being ordered. They've also been working on ways to reduce the doses of radiation needed for effective CT scans. That includes tailoring CT scans to individuals by taking into account such factors as the size of the body, the body part being examined and the disease that's suspected. For instance, at Mayo Clinic in Rochester, Minn., there are more than 41 different variations used for abdominal CT scans alone.

The Food and Drug Administration also has launched an initiative to help reduce unnecessary radiation exposure from medical imaging. This may include promoting safeguards for medical imaging equipment to help ensure proper radiation dosing during procedures.

In the meantime, it's important to understand what benefits a CT scan may have for your medial care in order to put the risks of radiation exposure into perspective. If you're uncertain why a CT exam is being ordered or whether another type of imaging might be an option, ask your doctor. At the same time, don't insist on having a CT exam, especially if your doctor recommends against it. ■

Radiation Dosages

Radiation can come from many sources, including medical-imaging tests and the natural environment. Here's a look at the amount of radiation you may be exposed to from both medical and nonmedical sources.

Sources of radiation	Radiation dose
Dental X-ray	0.005 millisieverts (mSv)
Bone density scan	0.01 mSv
Six-hour airline flight	0.03 mSv
Chest X-ray, two views	0.1 mSv
Mammogram	0.7 mSv
Natural environment (average annual exposure)	1-10 mSv
CT scan of chest	7 mSv
CT scan of abdomen	10 mSv ■