



Medical X-Rays

From broken bones to life threatening illnesses, x-rays help doctors detect numerous medical conditions.

This fact sheet includes information about:

- Medical X-Rays.
- Dental X-Rays.
- Mammography.
- CT Scans.
- Fluoroscopy.

About Medical X-Rays

Medical x-rays are used to see what is happening inside the body. X-rays pass through objects, including internal organs, body tissue, and clothing, and project a picture onto film or a detector linked to a computer monitor. In general, denser objects, like bones, absorb more radiation, reducing the amount of radiation that passes through to the detector. This is why bones appear white on x-ray images. Specially trained physicians called radiologists can read these images to diagnose medical conditions or injuries.

A conventional (or regular) medical x-ray produces a two-dimensional picture that can help find fractures (broken bones), tumors and foreign objects. Medical x-rays are also used in other types of examinations and procedures, including CT scans and fluoroscopy.

Different imaging procedures expose patients to different amounts of radiation. Conventional and dental x-ray procedures and mammography use relatively low amounts of radiation. CT scans and fluoroscopic procedures involve multiple exposures and/or a longer exposure to radiation resulting in higher doses. As with any medical test, the information gained from an x-ray procedure should outweigh the risk from radiation. Medical imaging is a very powerful and valuable technique that can provide important and lifesaving information.

DENTAL X-RAYS

Dental x-rays let your dentist see the condition of your teeth from the crown to the roots. They also show the bones of the jaw and the overall condition of the bones of your face. During a dental x-ray, radiation passes through your cheek, gums and teeth to strike the special x-ray film clamped between your teeth. Newer x-ray machines use digital imaging instead of film. All types of dental x-rays use a small amount of radiation to take the pictures.



X-ray of hands and fingers.



A typical x-ray machine with protection wall for a radiologic technologist.

MAMMOGRAPHY

A mammogram is an x-ray picture of breast tissue intended to detect breast cancer. There are two kinds of mammograms, screening and diagnostic. Screening mammograms are used to check healthy women with no signs of disease. Screening mammograms use very small doses of x-ray radiation. Diagnostic mammograms are used when there are some symptoms of breast cancer. Diagnostic mammograms require views from more angles. As a result, more x-rays are needed and patients receive more radiation.

CT SCANS

Computed tomography scans (also known as CT scans, CAT scans or computed axial tomography scans) are advanced x-ray procedures that create cross-sectional views and three dimensional images of a patient's internal organs. When a person has a CT scan, many x-rays of their body or body part are taken at nearly the same time.

CT scans are useful because they help doctors diagnose problems by creating very clear images of internal organs. The detailed images help identify problems inside the body, such as tumors or damage to organs. CT scans can also help doctors prepare for surgery by providing a map of the inside of the patient that surgeons can follow when operating.

When a person has a CT scan, they are being exposed to more radiation than when they have a conventional x-ray. The radiation exposure of a CT scan can be up to several hundred times that of a conventional x-ray. Like any medical test, the beneficial information gained from a CT scan should outweigh the risk of radiation exposure from the test performed. Medical imaging is a very powerful and valuable technique that can provide important and lifesaving information.

FLUROSCOPY

Fluoroscopy is like a real-time x-ray movie. It can show the movement of a body part (like the heart) or the path that a medical instrument or dye (contrast agent) takes as it travels through the body.

Unlike conventional x-rays, fluoroscopy uses an x-ray beam that is passed continuously through the body. The image is transmitted to a monitor so that doctors can see the body part and its motion in real-time. A medical instrument or dye is then added to show the function of the body part. The total exposure to x-rays depends on the length of time of the fluoroscopy procedure.

Fluoroscopy is used in many types of examinations and procedures, including:

- Viewing movement of materials through the stomach and intestines.
- Directing the placement of a catheter during heart surgery.
- Visualizing blood flow to organs.
- Helping doctors properly set broken bones.

Rules and Guidance

THE STATES

Individual states regulate the practice of medicine by licensing doctors, including radiologists. A licensed radiologist is then permitted to use professional experience and discretion when deciding how much radiation should be used to diagnose or treat a patient. For that reason, the use of radiation in medical imaging is exempt from federal dose limits.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS), U.S. FOOD AND DRUG ADMINISTRATION (FDA)

While states regulate use of x-ray equipment, FDA's Center for Devices and Radiological Health (CDRH) regulates the manufacture of electronic radiation-emitting products, such as CT scanners and x-ray machines.

What you can do

It is important to have your questions answered before getting an x-ray. The U.S. Food and Drug Administration (FDA) recommends taking these steps:

- **Ask your health care provider how an x-ray will help.** How will an x-ray, CT scan or fluoroscopy procedure help find out what is wrong or determine treatment? Ask if there are other procedures that might be lower risk but still allow for good assessment or treatment.
- **Don't refuse an x-ray that is medically necessary.** If your health care provider explains why an x-ray is medically needed, then do not refuse the test. The risk of not having a needed x-ray is greater than the risk from radiation.
- **Don't insist on an x-ray.** If your health care provider explains there is no need for an x-ray, then do not demand one.
- **Tell the x-ray technologist in advance if the patient is, or might be, pregnant.**
- **Ask if a protective shield can be used.** If you or your children are getting an x-ray, ask whether a lead apron or other shield is appropriate.
- **Ask your dentist about the type of x-ray equipment used.** Ask if your dentist uses the faster E or F speed film for X-rays. It costs about the same as the conventional D speed film and offers similar quality images with a lower radiation dose. Using digital imaging detectors instead of film further reduces radiation dose.
- **Know your X-ray history.** Keep a list of your imaging records, including dental x-rays. When an x-ray is taken, fill out the card with the date and type of exam, referring physician, and facility and address where the images are kept. Show the card to your health care professionals to avoid unnecessary duplication of X-rays of the same body part. Keep a record card for everyone in your family.

Where to learn more

You can learn more about medical x-rays by visiting the resources available on the following webpage: <http://www3.epa.gov/radtown/medical-xrays.html#learn-more>.