

# Are X-Rays and CT Scans Safe?

Many individuals today wonder if diagnostic imaging procedures are safe. The answer lies in understanding the benefits and potential risks of these types of tests. Diagnostic imaging procedures are an extremely valuable tool in the appropriate diagnosis of illness and disease. However, it is important that individuals also understand the risks associated with certain diagnostic imaging procedures.

The primary risk to individuals undergoing diagnostic imaging procedures is the potential exposure to radiation, which may increase the risk of developing cancer. However, radiation exposure is generally so small that the risk is outweighed by the benefit of having a needed test. The level of radiation exposure depends on a number of factors, including the type of procedure, the size of the body part being examined, and the type of equipment used and its operation.

The measure for absorbed radiation is the millisievert (mSv). It is commonly assumed that the risk for adverse health effects from radiation is relative to the amount of radiation dose absorbed, and that depends on the type and frequency of examinations.

For instance, a computed tomography test (also known as a CT or CAT scan) may be associated with an increase in the possibility of cancer of approximately one chance in 2,000. How does this compare to other causes of cancer? Compared to the natural incidence of cancer in the U.S. population, the risk of radiation-induced cancer is much smaller than the natural risk of cancer. Nevertheless, it is important to be aware of this small increase in cancer risk from CT scans.

The table on the next page shows a list of diagnostic tests and associated radiation doses. The typical amounts cited for radiation dose are estimates only. The actual dose from a procedure could be 10 times larger or three times smaller than these estimates.

## How can you minimize your risk?

As a first step in minimizing your risk, have an open discussion with your physician regarding the risks and benefits associated with the recommended diagnostic imaging procedure. Be sure your physician understands your diagnostic imaging history, such as the other scans you have had and when they occurred, so he or she can develop the most appropriate diagnostic plan for you. Depending on your past exposure, your physician may consider other alternatives.

It is also important to understand the purpose of the imaging procedure. For example, examinations “just to see how things are going” are rarely necessary.

## Diagnostic Imaging Tests with Radiation Exposure

- X-rays
- CT or CAT (computerized tomography) scans
- Nuclear medicine studies
- PET (positron emission tomography) scans
- Bone density scans
- Mammograms

## Diagnostic Imaging Tests without Radiation Exposure

- MRI (magnetic resonance imaging)
- MRA (magnetic resonance angiography)
- Ultrasound (or sonogram)

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Another good way to minimize risk is to receive imaging procedures from a quality imaging facility. A common quality measure is certification by the American College of Radiology (ACR). You can learn more about this certification by accessing the ACR Web site at [www.acr.org](http://www.acr.org).

### Radiation Dose Comparison

Diagnostic Test	Typical Effective Dose (mSv)	Number of Chest X-rays for Equivalent Effective Dose
Chest X-ray	0.02	1
Skull X-ray	0.07	4
CT of the lumbar spine	1.3	65
I.V. urogram (urinary system)	2.5	125
Upper gastrointestinal exam	3.0	150
Barium enema	7.0	350
CT of the head	2.0	100
CT of the abdomen	10.0	500

*Radiation Protection, Referral Guidelines for Imaging, European Commission Directorate-General for the Environment, 2000*

### What does this mean to you?

The bottom line is that X-rays, CT scans, and PET scans *do* involve some potential risk of radiation exposure; however, these procedures can be a valuable diagnostic tool for physicians, and the risk is outweighed by the benefit when used appropriately.

You should feel comfortable having a discussion about the risks and benefits of diagnostic imaging with your physician. In fact, you can and should *discuss* the risk with your physician.

Remember to track your diagnostic imaging tests and share your history with your physician if he or she recommends additional tests. This record of previous tests can be valuable for understanding your medical history and for managing your radiation exposure risk over time.

