Risk Of Radiation From Diagnostic Imaging

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What Is Radiation?

Radiation is the energy produced by an energy-emitting source that then travels through space or some other material. Light and sound are even examples of radiation! What we often call "radiation" is, in fact, better called **ionizing radiation**. The X-rays used in many diagnostic imaging studies are a type of ionizing radiation.

What Are Other Sources of Ionizing Radiation?

Diagnostic imaging studies are not the only source of ionizing radiation in our world. **Everyone** is exposed to ionizing radiation at all times. This exposure is known as *background radiation*. In the United States, the amount of background radiation we're exposed to averages 3 **millisieverts** (mSV) per year (higher at higher elevations). Remember that number.

The most common sources of background radiation for non-medical persons are the radioactive gas radon, cosmic rays, and **airplane travel!** An airplane flight from coast to coast exposes the average passenger to about 0.25 mSv of ionizing radiation. The average Chest X-ray exposes the patient to about 0.02 mSv of ionizing radiation.

How Much Radiation Does An Imaging Study Expose Us To?

An ankle X-ray exposes a patient to about 0.0015 mSV of radiation; an abdominal X-ray about 0.05 mSv; a *Voiding Cystourethrogram* about 0.33 mSv; an *Upper GI Study* about 3 mSV of radiation.

Computed Tomography (**CT Scans**, or "CAT Scans") expose the patient to a much higher amount of radiation, and therefore should be ordered only when truly necessary. A Chest CT exposes the patient to about 3 mSv; a Head CT about 4 mSv; and an Abdominal CT about 5 mSv. All safe but significant amounts. At such levels, the physician and patient must weigh the risk carefully against the potential benefit of the scan.

What Are The Long Term Risks of Radiation From Diagnostic Imaging?

Chest X-rays and most other plain X-ray studies pose very little, if any, long-term risk to the child patient. Of course, this assumes that these studies are not performed on a *repeated* basis, which would increase the risk somewhat.

The primary risk of repeated exposure to ionizing radiation is cancer. However, keep in mind that no published studies have ever directly attributed cancer to diagnostic imaging studies. We do not know for certain how much the risk of cancer is increased, or how many imaging tests it takes to increase that risk. But we shouldn't take that risk lightly.

However, **the lifetime risk of fatal cancer in our society is 1 in 5.** In other words, we each have a 20% chance of dying of cancer. The amount of increased risk that diagnostic imaging adds to this already high number is likely quite small, and would be difficult to detect unless studies were to involve millions of children followed over their lifetimes. Nonetheless, the risk is real, which is why it is important to keep the number of diagnostic imaging studies to the minimum necessary. Studies such as CT scans should only be ordered if it is clear that the information gathered outweighs the risk of exposure to ionizing radiation.