



## Medical Imaging and Radiation Exposure

### How safe is a CT scan?

There has been a lot of general information and sensational claims in the news recently<sup>3</sup> about the radiation exposure you receive when undergoing a computed tomography (CT) medical imaging exam. Unfortunately, sometimes it's the most ungrounded claims that get repeated over and over again.

The study in question compared the radiation exposure and effects experienced by atomic bomb survivors in Japan to present day patients who receive computed tomography (CT) scans. This may not provide a reliable base for comparison. Most CT exams are performed in a controlled setting which results in limited radiation exposure to a small portion of the body. The atomic bomb survivors experienced instantaneous radiation exposure to the whole body across a full spectrum of radiation. (X-rays, particulate radiations, neutrons and other radioactive materials.)

CT exams expose patients solely to X-rays. The known biological effects are very different for these two scenarios.

The probability is very small for getting cancer from over-exposure to the radiation dosages received from CT imaging. Estimates of the cancer-causing capability from X-ray exposure during a CT scan have a broad range of statistical uncertainty.

Recent studies done by Dr. Joseph Schoepf, an associate professor of radiology at the Medical University of South Carolina in Charleston, on a more accurate patient population (male, age 59, average weight of 91 kgs.) revealed the risk of getting a radiation-induced cancer (1 in 500) is actually far lower than the reported incidence of 1 in 114 in the Brenner study. Dr. Vicky Goh, a radiologist at the Paul Strickland Scanner Centre, Mount Vernon Hospital, in London recently published similar results supporting Dr. Schoepf's lower risk analysis.

### What does this mean to me?

To fully understand the impact of CT radiation exposure on our body, we must first understand that we live in a radioactive world and always have. Exposure to radiation is part of our natural environment. We are continually exposed to radiation from the earth, radiation from outer space, radiation from within our bodies as a result of what we consume and from naturally occurring radiation (radon) in the air around us.

This radiation is normally measured in units called millirems (mrems) in the US and millisieverts (msieverts) internationally. The annual cumulative dosage for an average American is approximately 360 mrems ( or 36 msieverts)<sup>1</sup>.

Dosages can vary greatly from this amount based on the area of the country and altitude where you live, your occupation, how often and how far you travel by airplane, body size, and what medical procedures you undergo. International standards allow for exposure up to 5500 mrems annually for people who work with and around radioactive materials.



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There is little doubt in the medical community that CT scans help save lives. Advancing technology has increasingly allowed imaging exams to replace more invasive techniques, but has also resulted in increased radiation exposure for Americans. This increase should be understood and appreciated but not feared. It is important to remember that when a CT scan is justified by medical need, the associated risk is small relative to the diagnostic information obtained.

Fortunately, the newest CT systems (like the Siemens Sensation in use here at Washington Imaging Services) have an automatic exposure-control option that limits the amount of radiation the patient receives based on body size and the area being imaged. This will go a long way in reducing a patient's radiation exposure during a CT exam.

We can also look at replacing CT use, when practical, with other imaging modalities, such as ultrasonography and magnetic resonance imaging (MRI). The cost of an MRI is decreasing, making it more competitive with CT, but currently there are not many common imaging scenarios in which MRI can match the speed and resolution of a CT scan.

Washington Imaging Services shares the belief of the American College of Radiology (ACR) that no medical test, particularly those utilizing ionizing radiation, should be performed unless the medical benefits clearly outweigh any risk associated with the exam. We also support the 'as low as reasonably achievable' (ALARA) concept which urges providers to use the *minimum* level of radiation needed in such exams to achieve the necessary results.

We also recommend that you keep a record of your CT scan history and, before undergoing an CT exam, ask your physician the following questions recommended by the American College of Radiology (ACR) :

- Why do I need this exam?
- How will this exam improve my health care?
- Are there alternatives that do not use radiation which are equally as good (such as MRI, Ultrasound, etc.)
- Is this facility ACR accredited? (This ensures that physicians and staff meet education and training standards and that the equipment is surveyed regularly by a medical physicist to ensure that it is functioning properly.)

Washington Imaging Services urges patients and providers to visit the "Radiology Safety" section of the ACR Web site as well as the "Radiation Safety" section of [www.radiologyinfo.org](http://www.radiologyinfo.org), the patient information site co-managed by the ACR and the Radiological Society of North America (RSNA), for more information regarding radiation exposure from medical imaging exams.



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