Mass General Brigham

RADIATION IN RESEARCH

Human Research Affairs

Institutional Review Board

The Mass General Brigham Institutional Review Board (IRB) has prepared this brochure to help you understand more about radiation exposure in research.

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Radiation in Research

People are sometimes concerned about the risks of radiation. The real risks are often less than most people think. The purpose of this brochure is to provide information about the risks associated with radiation exposure in research.

It is important to remember that your participation in any research study is voluntary. You will receive more information about a specific study before being asked if you would like to participate. You can also stop participation in any research study at any time.

What is Radiation?

Radiation is simply energy that moves in the form of waves or particles and is commonplace. Think of sunlight, radio signals, and microwaves. Most of our daily exposures are harmless. Due to the potential risks of some radiation exposures, there are procedures in place to protect patients, healthcare workers, and the public. All research involving radiation is reviewed by committees of experts to protect research participants.

What is Ionizing Radiation?

Ionizing radiation imparts enough energy to remove electrons from atoms or molecules. Though this can cause damage to the cells in your body, it is used to produce medically useful images. Ionizing radiation is used in X-Rays, CT scans, DEXA, fluoroscopy, and in nuclear medicine with PET and SPECT scans, and radiation therapy.

What is Non-Ionizing Radiation?

While non-ionizing radiation can heat tissues, it does not remove electrons from the tissue it passes through and does not cause the same risks as ionizing radiation. MRI and ultrasound use non-ionizing radiation.

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How is Radiation Exposure Measured?

There are many units used in radiation, for example, rad, Gray, and Sievert (Sv). The Sv takes into account the absorbed dose, the tissues exposed, and their relative sensitivity to radiation. It is often used to describe how much radiation exposure is received by medical staff, patients, and the public.

1/1000th of a Sievert is a millisievert (mSv), which is used to compare radiation doses. See Table 1 for some comparisons of radiation received from natural sources such as the sun, sky, and earth, as well as from various medical imaging procedures.

How Much Radiation is OK?

Keep in mind that the clinical and research use of radiation is always considered in context. The risks are "balanced" by the desired benefits of the information obtained from the imaging procedure, whether in screening for disease, diagnosis, in monitoring therapy, or in research potentially benefiting science or society.

What are the Risks of Radiation Exposure?

Generally, when we think about the risks of radiation, we are talking about the risks of ionizing radiation.

Ionization events occurring in tissues impart a radiation absorbed dose. High doses, especially over a short period of time, can be harmful to cells and tissues in the body. Cumulative low doses potentially can contribute to a slight increase in lifetime cancer risk, though this is extremely difficult to estimate. We cannot define the likelihood of this risk exactly, but we do believe that it is low, and there may be no risk at all. For these reasons, radiation doses are maintained at the lowest amounts possible.

Since the effects of ionizing radiation can add up over time, it is important to consider your past radiation exposure in considering your risks. If you have more medical procedures that expose you to radiation or have other risk factors or radiation exposures, your risk of cancer may be higher.

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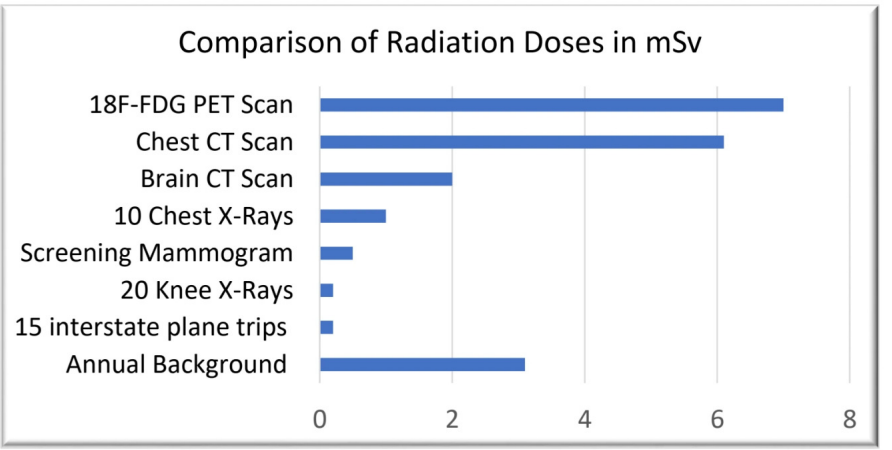
Where Can I Find More Information?

If you have questions about the radiation exposure and related risks from a particular study, please contact the study staff or the investigator running the study. They will be able to provide additional information about the study and to answer your questions about the study.

You can also ask your doctors who can help you better understand your personal health history and how that might impact your decision to take part in a research study.

Table 1: Examples of Radiation Doses

Type of Exposure	Approximate Effective Radiation Dose (mSv)
Annual Background Radiation from Natural Sources in the United States	3.1
15 round-trip airplane flights from New York to Chicago	0.2
20 Knee X-Rays	0.2
Screening Mammogram	0.5
10 Chest X-Rays	1
Brain CT Scan	2
Chest CT Scan	6.1
PET Scan	2 to 9



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Please contact the IRB if you have questions at IRB@mgb.org