X-rays

This sheet is about having X-rays while pregnant or breastfeeding. This information is based on published research. It should not take the place of medical care and advice from your healthcare providers.

What are X-rays?

X-rays are a form of energy known as ionizing radiation. X-rays have enough energy to pass through the body. As the X-ray moves through the body, it passes through bones, tissues, and organs differently. This allows an image of the inside of the body to be created. These images are used to help guide medical treatment.

If you have an X-ray, it will be performed with a standard X-ray machine or with a CT (computed tomography) machine. X-ray machines and CT machines only make radiation when they are turned on and actively in use. X-rays will lose energy as they travel through an object. Having X-rays will not make your body radioactive.

This sheet will focus on having diagnostic X-rays taken as a patient. For people who work around X-ray machines, MotherToBaby has a fact sheet at https://mothertobaby.org/fact-sheets/ionizing-radiation-workplace-pregnancy/.

What is radiation?

Radiation is a type of energy. Radiation waves can't be seen, felt, or smelled. Radiation comes from our natural environment (called background radiation) and can be made by machines.

Radiation is grouped into 2 categories: 1) non-ionizing radiation and 2) ionizing radiation.

- Non-ionizing radiation has less energy than ionizing radiation. Non-ionizing radiation includes radio waves, microwaves, and lower-energy ultraviolet (UV) sunlight rays. Common sources of non-ionizing radiation include light bulbs, computers, Wi-Fi routers, cell phones, Bluetooth devices, FM radio, GPS, airport body scanning units, and broadcast television.
- Ionizing radiation refers to X-rays, gamma rays, and some of the higher ultraviolet (UV) sunlight spectrum. A small amount of ionizing radiation is used to make X-ray images. Higher doses of ionizing radiation are used to kill cancer cells with cancer radiation therapy. Gamma radiation has also been used in medical treatment

Could I be exposed to ionizing radiation if I need to go through airport security body scanners?

In the United States, airport body scanning units do not use ionizing radiation. These machines use millimeter wave technology to scan a person's body. Millimeter-wave technology is non-ionizing radiation in the form of low-level radio waves. Women who are pregnant or breastfeeding a child can use body scanners at airports.

How is the dose of ionizing radiation measured? For example, what is milli-sievert (mSv) or milli-rem (mrem)?

Radiation is measured in several different ways. The international unit of measurement for radiation dose is the milli-sievert (mSv), and in the United States you may also read or hear about "milli-rem".

1 milli-sievert (mSv) is about the same 100 milli-rem (mrem).

People are surrounded by ionizing radiation every day. Ionizing radiation is in our soil, water, and air. These sources of radiation are called background radiation. Most people are exposed to about 3 mSv (300 mrem) of background radiation every year. During pregnancy, a fetus is exposed to around 1 mSv of background radiation (about 100 mrem).

What is the effective dose of ionizing radiation to me from a diagnostic x-ray?

This depends on what part of the body is being X-rayed. The table below shows the average estimated dose after an x-ray. These doses have not been associated with increased risks to a pregnancy.

X-ray	Effective dose in mSv	Effective dose in mrem
Abdomen	0.6	60
Chest	0.1	10
Dental Bitewing	0.005	0.5
Dental Panoramic	0.026	2.6
DEXA (whole body)	0.001	0.1
Mammogram (4 views)	0.7	70
Pelvis / Hip	0.4	40

What is the effective dose of ionizing radiation to my fetus if I had a diagnostic x-ray?

When an X-ray is taken, the actual dose to the embryo/fetus is less than the dose listed in the table above. This is because some of the X-ray is absorbed by the pregnant woman's body before reaching the inside of the uterus (where the fetus is developing). For typical diagnostic X-rays on a pregnant woman, a fetus is not expected to be exposed to levels that could cause pregnancy complications. This is true even if no shielding (like a lead apron or other barrier) is used during the x-ray.

I had X-rays taken. Can it make it harder for me to get pregnant?

If a woman has had X-rays taken, it is not expected to make it harder for them to get pregnant.

Does having an X-ray increase the chance of miscarriage?

Miscarriage is common and can occur in any pregnancy for many different reasons. Having typical diagnostic X-rays will not increase the chance of miscarriage.

Women with exposure to X-ray doses greater than 50 mSv (5,000 mrem) in the first 2 weeks after conception, which is the time before the egg implants into the uterus, might have a higher chance for miscarriage This dose is much higher than the dose from a typical diagnostic X-ray.

Will having X-rays taken increase the chance of birth defects?

Birth defects can happen in any pregnancy for different reasons. Out of all babies born each year, about 3 out of 100 (3%) will have a birth defect. We look at research studies to try to understand if an exposure might increase the chance of birth defects in a pregnancy. Having a typical diagnostic X-ray will not increase the chance of birth defects. X-ray exposure of less than 50 mSv (5,000 mrem) has not been linked with an increased chance of birth defects.

Does having an X-ray increase the chance of other pregnancy-related problems?

Typical diagnostic X-ray exposure in pregnancy is not expected to increase the chance of other pregnancy-related problems, such as preterm delivery (birth before week 37) or low birth weight (weighing less than 5 pounds, 8 ounces [2500 grams] at birth). Exposure to high doses (around 250 mSv (25,000 mrem)) of ionizing radiation might increase the chance of having a baby with small head size or poor growth. It would be rare for a person to have an exposure that was this high.

Does having an X-ray affect future behavior or learning for the child?

Typical diagnostic X-ray exposure in pregnancy is not expected to increase the chance of learning difficulties or behavior disorders in the child. Exposure to high doses (more than 500 mSv or more than 50,000 mrem) of ionizing radiation during a pregnancy could increase the chance of learning difficulties and intellectual disabilities. In addition, exposure to more than 100 mSV (10,000 mrem) of radiation between the 8th week and the 15th week of pregnancy might be associated with learning difficulties and intellectual disability. It would be rare for a person to have an exposure that was this high.

Breastfeeding after having an X-ray:

Exposure to diagnostic X-rays only happens when an X-ray image is being taken and leaves no radiation or radioactivity in the body or milk. Diagnostic X-rays do not affect the breastmilk at the time of a procedure and would not be expected to affect milk production. Be sure to talk to your healthcare provider about all your breastfeeding questions.

If a man has an X-ray, could it affect fertility or increase the chance of birth defects?

Several studies have not found a connection between diagnostic X-ray exposure and lower fertility (ability to make healthy sperm) or an increased chance for birth defects. In general, exposures that men have are less likely to increase risks to a pregnancy. For more general information, please see the MotherToBaby sheet Paternal Exposures at https://mothertobaby.org/fact-sheets/paternal-exposures-pregnancy/.

Where can I look for more information?

- Health Physics Society: Ask the Experts page: https://hps.org/publicinformation/ate/
- Health Physics Society: Pregnancy and Radiation page: https://hps.org/hpspublications/articles/pregnancyandradiationexposureinfosheet/
- Health Physics Society: Radiation Answers page https://www.radiationanswers.org/
- Radiology Info.org for patients: https://www.radiologyinfo.org/en/info/safety-xray

Please click here for references.

Questions? Call 866.626.6847 | Text 855.999.3525 | Email or Chat at MotherToBaby.org.

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