

# UNDERSTANDING RADIATION PROTECTION & PREGNANCY

by Radiation Detection Company

If you're pregnant or planning to become pregnant, understanding the dangers of radiation exposure is important. It's recommended you discuss any questions or concerns with your doctor and be sure to always inform a health professional that you're pregnant before having any medical imaging performed. Precautions must be adhered to when dealing with pregnancy and medical radiation as well as occupational radiation.

## Radiation Exposure to a Fetus

The most common ways that a pregnant woman can be exposed to radiation are undergoing diagnostic imaging (for example x-rays), radiation therapy (generally used as a treatment for cancer), or an occupational exposure within regulatory limits.

The general principle for imaging during pregnancy is similar to imaging for the general population, with the goal of radiation exposure being as low as reasonably achievable (ALARA).

## Calculating Radiation Dose to the Fetus

The potential health effects to a fetus from prenatal radiation exposure mostly depend on the radiation dose.

Though the human embryo and fetus are sensitive to ionizing radiation doses greater than 0.1 gray (Gy), the fetal radiation dose tends to be lower than the radiation dose to the mother. This is due to protection provided by the uterus and surrounding tissues.

Depending on the development stage of the fetus, the health consequences of exposure to a significant radiation dose greater than 0.5 Gy can be severe. This is true even if the dose is too low to cause an immediate effect for the mother.

The health effects can include growth restriction, malformations, impaired brain function, and even cancer.

Estimating the radiation dose to the fetus requires considering both external and internal (to the mother's body) sources,

including the below:

1. Dose from an external source of radiation to the mother's abdominal area.
2. Dose from the mother inhaling or ingesting a radioactive substance that enters the bloodstream and then may enter the fetus through the placenta.
3. Dose from radioactive substances that may concentrate in the maternal tissues surrounding the uterus (i.e. the bladder), with the potential to irradiate the fetus.

In most cases, radioactive substances that reach the mother's blood will be detected in the blood of the fetus. The concentration of the substance depends on its specific properties and the development stage of the fetus.

## Occupational Radiation Exposure



Radiation dose to occupationally exposed staff working with radiological equipment are generally low. It's unlikely that the equivalent dose limit will be approached. Exposing the embryo or fetus to ionizing radiation carries a risk of causing adverse health effects. For this reason, the National Council on Radiation Protection and Measurement (NCRP) has created recommendations detailing that the total dose equivalent to the embryo/fetus from occupational radiation exposure of the expectant mother not to exceed 500 mrem

(NCRP Report No. 53) throughout the entire gestation period.

Also, once the pregnancy is known, exposure of the embryo/fetus should not exceed 50 mrem in any month (NCRP No. 91) during the gestation period.

The first responsibility lies with the pregnant woman herself, who voluntarily notifies her pregnancy to radiation safety at her company as soon as the pregnancy is confirmed.

After a radiation worker informs her company of her pregnancy, the first step is to implement the fetal dose limit. Then there are three options that are usually considered in radiation facilities:

1. No change in assigned working duties.
2. Change to another area where the radiation exposure may be lower.
3. Change to a job that has essentially no radiation exposure.

There is no single correct answer for all situations. In certain countries there may be specific regulations that must be followed. Ideally the organization will have a discussion with the employee to discuss the best course of action. During this conversation, the worker should be informed of the potential risks, local policies, and recommended dose limits.

## Radiation Detection Company's Fetal Monitoring Solution

Fetal Monitors are available for pregnant radiation workers to ensure the fetus doesn't exceed 500 mrem for the entire gestational period or 50 mrem a month. The badge should be worn close to the embryo/fetus to obtain the most accurate dose and is reported monthly to ensure exposure limits are not exceeded.

If you're concerned about your occupational radiation exposure, you can visit our website [radetco.com](http://radetco.com) to learn more about radiation dosimetry.

