

pregnant woman who works around such environments. For these women, our goal is to restrict any gestational irradiation to less than 100 millirem above background levels. Call the Radiation Safety Program if you have any questions about your working environment. Women who are designated radiation workers, and thus fall under the 500 millirem limit, must voluntarily declare their pregnancy to the Radiation Safety Program in order to ensure implementation of any special precautions that might be necessary to monitor or to restrict their radiation exposure. A declared pregnant worker is a woman who voluntarily informs her employer, in writing, of her pregnancy and gives the estimated date of conception. An employee can declare her pregnancy by filling out a Pregnancy Declaration form available from the Radiation Safety Program. If a pregnancy remains undeclared, the radiation worker and her baby are only restricted to the much higher occupational exposure allowed for a radiation worker.

Advice for Employee and Employer

Although the radiation risks to an unborn child of a radiation worker are not appreciable under normal working conditions, it is a regulatory requirement to limit the radiation dose from occupational exposure to not more than 500 mrem for the entire gestation and to not more than 50 mrem in any month. The employee and employer should work together to decide the best method for accomplishing this goal. Some methods that might be used include: reducing the time spent in radiation areas, wearing some shielding over the abdominal area, and keeping an extra distance from radiation sources when possible. The Radiation Safety Officer will be able to estimate the probable dose to the unborn child during the normal nine-month pregnancy period based on the exposure history. If the predicted dose approaches the limit, the employee and employer should work out schedules or procedures to confine the dose to less than the 500 mrem required limit.

External Hazards

External exposure to radiation can occur from a variety of sources in an academic or medical workplace, either radioactive materials or x-rays may be used in research or medical applications. In any of these workplace situations there is a potential for external exposure to radiation.

It should be remembered that the medical effects of any radiation exposure are due to several factors: the type of radiation (alpha, beta, gamma or x-ray), the amount of radiation, the duration, and the part of the body exposed.

Internal Hazards

Workers should be aware that radiation exposure to the fetus could be from internal sources as well as from external sources. In workplaces such as nuclear medicine clinics and research laboratories where unsealed radioactive materials are routinely used, there is a potential risk of radioactive material entering the body. Pertinent standard radiation precautions include the following:

1. *Never smoke, eat, drink, or apply cosmetics where radioactive materials are used.*
2. *Never pipette by mouth.*
3. *Use disposable gloves while handling radioactive materials.*
4. *Wash hands and monitor for radioactive contamination frequently.*
5. *Wear lab coats or other protective clothing around loose radioactive material.*
6. *Use certified ventilation hoods when handling volatile or potentially volatile radionuclides.*

References:

National Council on Radiation Protection and Measurements. Scientific Committee 6-2 on Radiation Exposure of the U.S. Population, National Council on Radiation Protection and Measurements. *Ionizing Radiation Exposure of the Population of the United States*. Vol no. 160.; Bethesda, Md: National Council on Radiation Protection and Measurements; 2009.

N.B. All other references available upon request.

Pregnant Employee's Guide to Radiation

Environmental Health and Safety

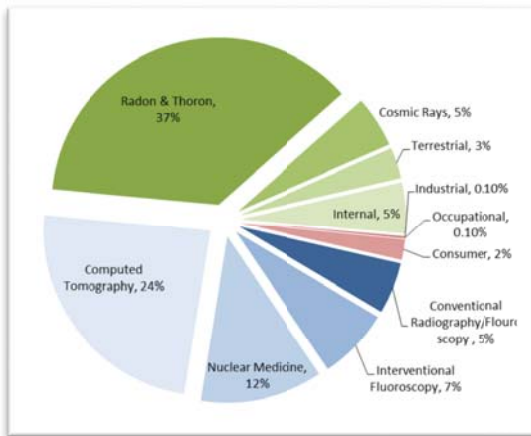


Questions? Please call 713-500-5840 or visit the Radiation Safety Office, CYF-G102.

Pregnant Employee's Guide to Radiation

This document discusses risks that have been associated with radiation and pregnancy. During the course of employment, the informed pregnant employee, who either works with radiation or who works in environments where she might be incidentally exposed to radiation, will be better prepared to protect herself and her child against potential risks. Methods to minimize radiation risks are explained. Our goal is to manage radiation exposures to levels that are as low as reasonably achievable while not compromising the conduct of duties in the workplace.

Radiation has many forms: heat, light, ultraviolet, microwave, ionizing, and so on. We protect ourselves from overexposure to all these radiations. However, humans have no physical sensation to potentially dangerous levels of ionizing radiation and thus can potentially be exposed to harmful levels without knowing it. Therefore, ionizing radiation (x rays, gamma rays, beta rays etc.) requires special consideration for safety and management.



Average Annual Background Radiation in the U.S. - 6.2 mSv (625 millirem)

Sources of Radiation

All day long, everyone is exposed to ionizing radiation from naturally existing sources that include the earth, the sky, the air and even the food we eat. Elevation above sea level also plays a role in the individual exposure. For example, on average Houston residents are exposed to approximately 500 millirem per year from these background sources of ionizing radiation while residents in Denver are exposed to about 960 millirem due to the higher altitude and Rocky Mountain environment. These are de facto safe levels of radiation exposure.

Dose rates from medical exposures that one receives in one's lifetime will be in the same range as one's lifetime dosage of background radiation, but medical exposures occur only when prescribed by a healthcare practitioner when it is judged that the medical benefit will outweigh the risks. The average annual dose from diagnostic x-rays to the U.S. population is 40 mrem, while the average contribution by fluoroscopy, CT scans, radiation therapy, and other nuclear medicine procedures is about 270 mrem per year. It should be remembered that only sick people and people at risk of serious illness principally contribute to these numbers.

Effects on the Embryo/Fetus of Exposure to Radiation and Other Environmental Hazards

Exact risks are not known for low dose radiation. The approximate natural risks for birth defects are as follows: 3-5% of all births have some type of abnormality detectable at birth and an additional 3-5% of all births have some type of condition or disease that develops later in life (not detectable at birth). The risk of a pregnancy ending in a miscarriage or stillbirth is 10-30%, depending on many factors.

Regulatory and the Texas Department of State Health Service Radiation Control

Regulations and guidance are based on the conservative assumption that any amount of radiation, no matter how small, can have a harmful effect on an adult, child, or unborn child. Thus, the risk by this theory is never zero. We can only reasonably restrict the risk to very low levels. Even after more than 100 years of research into this topic, it still is not possible to state that the theory of risk at any level is actually true. This is because at low levels the risks are so small that no increase in adverse health effects above the non-radiation related incidence can be definitely identified. Because it is known that the unborn child is more sensitive to radiation than adults, particularly during certain stages of development, a special dose limit for protection of the unborn child has been established. These limits eliminate risk for birth defects and minimize the risk of induced disease to rates in large populations that cannot be detected even if they exist. For women who do not work in occupational radiation environments the limit is 100 millirem to the embryo/fetus during the entire gestation. For women who work in radiation environments, the limit is 500 millirem per gestation. The former conservatively minimizes risks for the general population, for example persons who visit hospitals or ride on buses. The higher limit is established to assure adequate protection of the child while having minimal effect on employment opportunities for women of childbearing age who seek work in radiation environments. If the limit were unnecessarily low for these persons, many radiation-environment jobs would have to be restricted to men or to women incapable of having children.

Women who do not work with radiation but who are incidentally exposed to radiation during their work should follow the advice of radiation professionals in how to avoid unnecessary exposure to radiation while performing their duties. Special monitoring and protection are available for any