



Health Physics Society
Specialists in Radiation Safety

Fact Sheet
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Radiation Exposure and Pregnancy

The birth of a child is a life-changing experience. It is hard to prepare yourself for the joys—and yes, anxieties—of pregnancy and the subsequent raising of your child. It can be a truly joyful, yet uncertain, experience. Unfortunately, the time may come when a health care professional advises you to undergo a medical procedure that you perceive puts your unborn baby at risk. The information in this fact sheet is intended to help answer the question “Does a medical procedure involving radiation during pregnancy increase my baby’s health risks?” The short answer is that it is very rare that a medical procedure involving radiation would cause harm to your baby. This fact sheet will provide general information about radiation exposure during pregnancy and references for further research.

Everyone is exposed to radiation. According to the National Council on Radiation Protection and Measurements (NCRP) Report No. 160 (NCRP 2009), the average annual radiation dose to a member of the U.S. population due to natural background radiation is about 3.1 millisieverts (mSv). But of course, there is a large degree of variability in this number across the United States. For example, about 2.5 million of the 300 million people living in the United States receive annual background doses in excess of 20 mSv. Naturally occurring radioactive materials are found in the foods we eat, such as potassium-40 (^{40}K) in bananas. Naturally occurring uranium and thorium may be found in building materials such as brick and concrete. So it is not possible to avoid exposure to ionizing radiation.



Photo courtesy of Steve Sugarman

In addition to unavoidable background radiation, one may be exposed to radiation from medical procedures such as nuclear medicine scans or medical x rays. If you are, or think there is a possibility that you may be, pregnant and are told you need a diagnostic or therapeutic procedure involving radiation or radioactive materials, you should discuss possible radiation risks with your health care provider prior to the procedure.

A number of studies of women exposed to radiation before becoming pregnant and during pregnancy have suggested no greater risk for birth defects due to radiation doses. These studies have been performed on atomic bomb survivors from Hiroshima and Nagasaki as well as on pregnant women who received x-ray exams, radionuclide medical tests, and other medical radiation procedures. Since the discovery of x rays over a century ago, the number of women exposed to medical radiation has increased dramatically while the rate of birth defects and miscarriages has changed very little.

Potential radiation effects vary depending on the stage of fetal development and on the magnitude of the radiation doses received. According to NCRP Report No. 174 (NCRP 2013), doses below 100 mSv should not increase the risk of reproductive effects (birth defects or miscarriage). As a pregnancy progresses, the dose associated with adverse reproductive effects increases (that is, it takes a higher dose to cause an adverse reproductive effect), until about 20 weeks into the pregnancy. After 20 weeks, the dose associated with adverse reproductive

effects remains about the same throughout the rest of the pregnancy. While it is true that elevated radiation doses can result in fetal abnormalities, it is rare that fetal dose levels of this order are encountered in the medical setting.

If during your pregnancy you are considering having an abdominal/pelvic x-ray or computed tomography (CT) exam, nuclear medicine test, or any type of radiation therapy, talk with your physician or obstetrician. Your doctor may consult with a qualified physicist, radiologist, oncologist, or nuclear medicine physician (depending on the type of procedure) to determine the best treatment option. Your doctor will help you understand whether any potential increased risk is significant. If there is a considerable risk, the physician should discuss with you whether the procedures may be delayed until after the child is born or whether another medical procedure, such as an ultrasound or magnetic resonance imaging (MRI) exam, could be used instead (Radiological Society of North America [RSNA] 2017). If you are in a life-or-death situation, your physician will determine which procedures are appropriate (with your input if you are able to discuss it).

According to the American College of Radiology (ACR) and RSNA, if the abdomen or pelvis is not being imaged (such as in a chest or head CT scan), radiation-related concerns for the baby are minimized. Most individual diagnostic x-ray procedures will not result in doses exceeding the 100 mSv threshold. However, certain medical procedures may give doses potentially resulting in an increased risk (ACR/RSNA 2017).

Nuclear medicine procedures involve radioactive materials that are introduced into the body. Radioactivity in

a pregnant woman's urine or intestines could give a moderate dose to the fetus, and some compounds can cross the placenta as well. Once the baby is born, a woman who chooses to breast-feed may have to stop breast-feeding for a period of time after receiving a radiopharmaceutical for a nuclear medicine exam. The nuclear medicine staff should provide information to pregnant women regarding potential fetal doses, as well as to breast-feeding mothers when they need to interrupt breast-feeding.

If you discover you are pregnant after you have had a test or treatment that causes you concern, you should consult with the doctor who ordered the test. If the doctor does not know the information, he or she should consult with a medical physicist or health physicist to estimate the radiation dose to your fetus. The calculated radiation dose and developmental stage of your fetus will help the medical team determine the potential health risks. This information should be shared with your personal physician.

If you are pregnant and medical procedures involving radiation or radioactive materials are scheduled, always inform the person performing the exam that you are pregnant. If you are concerned about radiation exposure during pregnancy, discuss those concerns with your physician. Your doctor should have access to radiation professionals who can help gather and interpret the information you need to make the best decision for your situation.

Note: Units of millisieverts are used to describe absorbed dose and equivalent dose to improve ease in reading and comprehending the information.

More questions and answers about radiation and pregnancy can be found on the Health Physics Society "Ask the Experts" Web site.

References

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Radiological Society of North America. RSNA statement on safety of the developing fetus in medical imaging during pregnancy. April 2017. Available at: http://www.rsna.org/uploadedfiles/rsna/content/role_based_pages/media/rsna-imaging-during-pregnancy-statement.pdf. Accessed 5 June 2017.

Resources for More Information

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Health Physics Society. Ask the Experts provides questions and answers on a wide variety of radiation-related topics. Available at: <http://hps.org/publicinformation/ate/>. Accessed 5 June 2017.

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The Radiation Dose Assessment Resource (RADAR) website includes radiation dose calculators, risk communication, internal dose information, and other pertinent links. Available at: <http://www.doseinfo-radar.com/>. Accessed 5 June 2017.

The Radiation Emergency Assistance Center/Training Site (REAC/TS) provides tools that can be used to estimate the magnitude of radiation doses. Available at: <https://orise.orau.gov/reacts/>. Accessed 5 June 2017.

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The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Formed in 1956, the Society has approximately 5,500 scientists, physicians, engineers, lawyers, and other professionals. Activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.