

Pregnancy Toolkit



Monitoring dose

There are well-established limitations and guidelines for occupational exposure of radiation (note this does not include medical exposure) of pregnant workers. Radiation safety officers (RSO) and radiation safety programs strictly adhere to these regulations. The International Commission on Radiological Protection (ICRP) advises that the embryo and fetus should be given the same level of protection as that offered to members of the general public. The ICRP and the European Commission recommend that, once an occupational worker has declared her pregnancy, the equivalent dose to the unborn child should be maintained “as low as reasonably achievable” (ALARA). The fetal dose is not expected to exceed 1 mSv during the remainder of pregnancy. These same guidelines are followed by the International Basic Safety Standards.

A declared pregnant woman (DPW), as classified by the National Regulatory Commission (NRC), is any radiation worker who voluntarily discloses in writing her pregnancy and the estimated date of conception. The choice to declare by any radiation worker is not a requirement in the United States regardless of the fact that it may be obvious that she is pregnant. Once declared, the National Council on Radiation Protection (NCRP) has set a monthly limit for the embryo/fetal radiation dose of 0.5 mSv equivalent dose. Again, note that this does not include medical and natural background radiation. The limit for occupational exposure of a DPW is 5 mSv from the time of declaration until delivery, as recommended by the U.S. Environmental Protection Agency (USEPA), U.S. Department of Energy and the NRC.

Once declared, the DPW should be given a dedicated fetal dosimeter. This should be worn at the waist level and inside all radiation protective garments to provide an accurate fetal dose. In institutions where two-dosimeter monitoring systems are used, the fetal dosimeter should be on the inside at the waist level and the other dosimeter on the outside of the thyroid shield. A qualified medical physicist should monitor the DPW’s dosimeter and radiation dose to the fetus. For the dosimeter that is worn under protective apron, the dose to embryo and fetus is estimated as one half of personal equivalent dose at 1 cm. If the inside dosimeter shows an average dose of 0.1 mSv per month or less, then these workers are in accordance with recommendations set forth by ICRP and NCRP. If the fetal dosimeter approaches either the monthly or gestational limits, the work duties of the DPW may require adjustments to avoid further radiation exposure.

Currently some institutions are utilizing electronic dosimeters that provide rapid or instantaneous dose data readings. These dosimeters should be worn in the same fashion but can be rapidly read for real-time dose without having to wait until the end of the month.

It is imperative for all DPW and RSO to ensure that work safety and regulatory limits are being met. Standard dose reduction practice should be implemented at all times but especially during pregnancy. Some of these measures include utilizing patient-dose reduction techniques, using protective shielding, wearing dosimeters properly and consistently, and monitoring dose to the inside badge worn under the apron. Additional safe practices include positioning in low-scatter area, reducing fluoroscopy time, using collimation and reducing usage of magnification during procedures. If necessary, retrospective estimation of radiation dose to surface of abdomen or uterus during first postconception weeks can be estimated by using information about patient doses, worker’s position during fluoroscopy-guided procedures and positioning of C-arm during the case. There is currently no data that suggests pregnant radiation workers should not participate in fluoroscopy-guided procedures.

Important takeaways

- Your fetal dose will not be monitored until you officially declare your pregnancy, in writing.
 - Your occupational fetal dose limit of 5 mSv total and 0.5mSv/month starts when you declare, not when you conceive.
 - When declaring a pregnancy, only the RSO needs to know. This information is kept confidential from your supervisor and colleagues until you decide to announce the pregnancy to a wider audience.
 - Fetal dosimeter should be worn at your waist under your lead at all times.
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Resources

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