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## **The unintentional irradiation of a live human fetus: assessing the likelihood of a radiation-induced abortion**

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**Purpose:** The purpose of this work was to calculate the dose accidentally absorbed by a live fetus during a diagnostic CT procedure to a pregnant patient, and to assess the likelihood that the premature termination of the pregnancy was radiation-induced.

**Methods:** A patient underwent a diagnostic CT procedure as part of her initial clinical work up for stage II cervical cancer. At the time of imaging - and unbeknownst to the staff - the patient was found to be 12 weeks pregnant. Approximately two weeks later, the fetus became non-viable and was surgically removed. Following established institutional procedures, the case was referred to the Physics Department for further dosimetric evaluation to determine what role - if any - the fetal dose played in the premature termination of the pregnancy. The fetal dose was determined using Wagner's CTDI Phantom Dose Reference Model method. 6 A slice thickness of 6 mm and a CTDIvol of 1.13 mGy were used in our calculations, as suggested in the Abdomen Baby manufacturer's protocol. 7 KVp, mAs, and slice thickness corrections were applied to the CTDIvol, as suggested by Wagner.

**Results:** With these parameters, our estimated absorbed dose to the fetus was 19.3 mGy. Further, we estimate that the rotation of the fetus through an approximate 90° angle along the caudo-cephalic axis during imaging had no clinically relevant effect on the calculated absorbed dose.

**Conclusions:** The fetal dose was well below the consensus levels for negligible risk (50–150 mGy), and the “actionable” level of 150 mGy. 8 At the time of exposure, the fetus was developmentally beyond the critically radiosensitive phase of organogenesis. We conclude that the premature termination of this pregnancy is most unlikely to be of radiological etiology.

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