

**Purpose:** The potential application of “in beam” anterior shields were examined from fetal dose reduction and image quality perspectives.

**Methods:** Dose reduction afforded by commercially available bismuth impregnated synthetic rubber fabricated as 12.5 and 25 cm wide anterior shields was measured. Thermoluminescent dosimeters (TLDs) irradiated in a Rando phantom were used to estimate fetal dose. Average fetal position at 0 and 18 weeks post conception were determined based on ultrasound data of fetal position by gestational age. The latter stage of pregnancy (18 weeks) was simulated by adding tissue equivalent bolus material over the anterior surface of the phantom. To assess the impact of anterior shielding on image quality, an RMI 461A body phantom with low contrast resolution phantom insert was employed. The minimum size of low contrast resolution target visualize was recorded with no shielding, 12.5 cm wide shielding and 25 cm wide shielding.

**Results:** At 120kVp, the 12.5 cm wide bismuth impregnated synthetic rubber shield was shown to reduce fetal dose 14% and 17% at 0 and 18 weeks post conception while the 25 cm shield reduced fetal dose 22% and 38% at 0 weeks and 18 weeks post conception. These shields produce only minor artifacts and do not adversely impact low contrast resolution. It should be noted that the use of these shields in automatic tube current modulation mode may not reduce fetal dose.

**Conclusions:** These shields may prove to be useful for clinical fetal dose reduction early in pregnancy. It should be noted that similar results may also be achieved by tube current modulation to reduce the anterior dose contribution.