Purpose: 4000 pregnant women are irradiated every year. Research has reported the dose to the fetus for static fields, but not for dynamic fields. Dose to the fetus was measured for a series of sites for IMRT and VMAT.

Methods: It was assumed that a woman would be treated during the first and second trimester only. A RANDO® phantom was used as is to simulate the first trimester. A prosthetic abdomen was attached to simulate the second trimester. Kodak PPL-2® film was placed in an axial plane of RANDO®, representing the uterine fundus, moving superiorly for the second trimester. A full course, i.e., typical prescription dose, was delivered for each site. IMRT was planned for esophagus, left breast, head & neck and right upper lung/mediastinum. VMAT was planned for esophagus, left upper lung SRT and brain. OmniPro-I’mRT® was used to scan and analyze the films. A calibration curve was created with a film of known dose deposition.

Results: Dose to the fundus ranged from 0.01%-0.10% of the prescription dose (0.6cGyâ€“4.6cGy) in the first trimester and 0.3%-0.16% (1.2cGyâ€“8.8cGy) in the second trimester. Treatment of the breast and lung (IMRT) resulted in the highest absolute dose as well as the highest percentage of total dose in both trimesters. Absolute dose and percent of total dose delivered was greater in the second trimester.

Conclusions: Fetal dose with IMRT and VMAT as a percentage of total dose is similar to previously reported results for static fields. TG-36 suggests that reducing the dose to the fetus to a value below 5cGy substantially reduces the risks associated with irradiating a fetus. In most of the treatment sites, the dose to the fetus fell below this value. In terms of fetal dose, there appears to be no significant detriment to using either IMRT or VMAT.