# AbstractID: 11489 Title: Analytic technique to calculate the out-of-field dose from IMRT therapy

**Purpose:**
IMRT has become a standard technique for the treatment of many tumors. It is often important to know the out-of-field dose associated with such treatments, such as for fetal dose evaluation, or estimating organ doses during epidemiologic study of second cancer risk. While evaluating such doses is routine for conventional therapies (e.g., Task Group 36 data), no simple technique is available to estimate doses from IMRT treatments. This work develops and evaluates such a technique.

**Method and Materials:**
A simple equation was developed to calculate the out-of-field dose (Dimrt) from an IMRT treatment based on treatment parameters and the out-of-field dose from conventional therapy (Dconv) with the same jaw setting (which is readily estimated from such sources as TG-36). The accuracy of this equation was tested by comparing out-of-field doses calculated with the developed equation to those calculated for IMRT treatments using Monte Carlo.

**Results:**
The following equation was developed to estimate the out-of-field dose from IMRT: $Dimrt=Dcon[P\times CF + (L+C)\times MF]$, where P, L, and C are the fraction of the out-of-field dose originating from patient scatter, head leakage, and collimator scatter respectively, CF is the fraction of the open field covered by the CIAO field (continuous irradiated area opening), and MF is the IMRT MU modulation factor. These values are tabulated for typical treatments.
Compared to the out-of-field dose from IMRT, doses calculated with this equation generally agreed within 25%. Larger variations were sometimes observed, particularly within 5cm of the edge of the treatment field where large variations in the out-of-field dose are expected due to its dependence on the particular treatment plan and planning objectives.

**Conclusion:**
A simple and suitably accurate equation was derived to calculate the out-of-field dose from IMRT treatments. This technique represents a viable approach for estimating the out-of-field dose for clinical or epidemiological applications.