AbstractID: 1440 Title: A PC-based MU Calculation Program for IMRT fields

A composite IMRT field contains low and high doses regions. The dose per MU (D/MU) in the low dose region of an IMRT field often differs significantly from calculation. We have developed an MU calculation program to improve the accuracy of D/MU by accounting the contribution of head-scatter, phantom scattering and off-axis beam softening. The monitor unit was defined such that the total fractional MU is 1.0 for the entire field. The D/MU at any points in the IMRT field is calculated using a summation of dose from each segment with the known fractional MU. This program is able to calculate a point outside of beam collimation, taking into account the head-scatter off-axis (HOA), phantom scattering, and beam penumbra. The phantom scattering for IMRT field is calculated using an explicit two-dimensional integration of the differential phantom scatter factor. In addition, the off-axis beam softening is calculated using a polynomial function to determine the lateral variation of attenuation coefficient. The largest effect is caused by the phantom scattering, which if calculated incorrectly will cause 10% error at 10 cm depth for 6MV beam. Off-axis beam hardening introduced 2% and 3% error at 10 cm depth but increased to 6% and 8% at 30 cm depth for 6 and 15 MV photons, respectively. The effect of head-scatter produces 4% and 7% errors between calculation and measurement at low dose gradient region. We can accurately calculate D/MU to within 3% along the entire IMRT gradient with inclusion of all the effects.