AbstractID: 1969 Title: Calculation of dose distribution by means of Monte Carlo and treatment planning system using identical incidence fluence maps for megavoltage photon beams

In order to test dose calculation algorithms it is convenient to separate modeling of input beam data at patient surface and particle transport through patient body. Input beam data at patient surface for traditional semi-empirical dose calculation algorithms (Clarkson, convolution, collapsed cone) are customarily called incidence fluence and they provide information on number of photons passing through each pixel of the radiation field. For some algorithms this information is supplemented with photon energy spectrum varying from pixel to pixel of the radiation field. However, input beam data for semi-empirical algorithms do not specify angular distributions of particles passing through pixels of radiation field. In particular, this deficiency of specification of initial beam data characterizes intensity profiles for IMRT treatments. In case of semi-empirical calculations the deficiency of initial beam data specifications are accommodated by semi-empirical algorithms so that matching of calculated and measured doses in homogenous phantoms is achieved. However, when Monte Carlo based algorithms are utilized in dose calculations the incomplete input of beam data may lead to different results in comparison to semi-empirical algorithms. This presentation is devoted to comparisons of Monte Carlo and semi-empirical calculations when both start with identical treatment planning system beam input. Our results for homogeneous phantom calculations show good matching for isodoses for higher dose level and show a difference (up to 10%) for lower dose level isolines. Observed discrepancies indicate that Monte Carlo methods and standard dose algorithms diverge under the simplified fan ray fluence maps used for standard convolution based techniques.