

AbstractID: 1406 Title: On the choice of measured depth dose data for the Monte Carlo modeling of the 18 MV photon beam: shifted vs. unshifted

Many researchers have reported difficulty in matching Monte Carlo (MC)-calculated depth dose (DD) data with measured data, especially in the dose buildup region for the 18 MV photon beam. While no clear solution to this intriguing question is yet available, some recent studies suggested that the agreement between measured and MC-calculated DD data for higher energy photon beams could be improved by shifting the measured DD data to the effective point of measurement. The current investigation systematically tested the validity of this suggestion for the 18 MV photon beam from a Varian 2100 series accelerator. When MC data were compared with shifted DD data, the overall agreement, except for an extreme case (i.e., a 40 x 40 cm<sup>2</sup> field size), was improved remarkably, producing an almost perfect match for the field sizes investigated. However, the agreement within 1 mm over the dose buildup region could not be achieved for the extreme case, even when shifted DD data were used for comparison. This observation prompted further attempts to find more optimal MC transport parameters that could improve the agreement for the extreme case while maintaining the acceptable agreement for smaller field sizes. Although an acceptable match for the extreme case was still not achieved even after the adjustment of the MC parameters, the use of shifted DD data was certainly beneficial for finding more optimal and physically valid MC transport parameters.

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