

Dose Calculation of Photon Beam with Wedge Filter for Radiation Therapy Planning System

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Purpose: Even if the wedge filter is widely used for the radiation therapy to modify the photon beam intensity, the wedged photon beam dose calculation is not so easy. Radiation therapy planning systems (RTPS) have been used the empirical or semi-analytical methods such as attenuation method using wedge filter parameters or wedge filter factor obtained from measurement. However, these methods can cause serious error in penumbra region as well as in edge region. In this study, we propose the dose calculation algorithm for wedged field to minimize the error especially in the outer beam region.

Materials and Method: Modified intensity by wedge filter was calculated using tissue-maximum ratio (TMR) and scatter-maximum ratio (SMR) of wedged field. Profiles of wedged and non-wedged direction was also used. The result of new dose calculation was compared with measurement and the result from attenuation method.

Results: Proposed algorithm showed the good agreement with measurement in the high dose-gradient region as well as in the inner beam region. The error was decreased comparing to attenuation method.

Conclusion: Although necessary beam data for the RTPS commissioning was increased, new algorithm would guarantee the improved dose calculation accuracy for wedged field. In future, this algorithm could be adopted in RTPS.

Keywords: wedged field, radiation therapy planning system