

HOUNSFIELD NUMBERS EVALUATION FOR IGRT TREATMENT TABLE IN VARIAN ACCELERATORS

Lulzime Daci¹, Partizan Malkaj²

¹Nordlandssykehuset Hospital Norway, Email: lulzime.daci@nordlandssykehuset.no

² Faculty of Mathematics Engineering and Physics Engineering,
Email: malkaj_p@hotmail.com

Abstract

There are many dose uncertainties which contribute to radiotherapy delivery and which might result in poorer outcome. Only when dose errors add to significant levels, there is a chance to see some clinical effects. In this study an evaluation on the Hounsfield Number (HU) for patient treatment tables of two Varian accelerator was carried out. The incorrect number of HU might introduce some uncertainties in dose calculation. The treatment tables are designed to have three different thickness (thin, medium and thick). The default HU values inserted for by the vendor in the treatment planning system (TPS Eclipse) are -300 inside and -1000 at the surface. The study consisted on verification, comparison and correction of these default values. The treatment couch could be modeled in TPS by changing the HU for each part of the treatment couch. For low and high photon energies the attenuation of the treatment couch was measured at a Clinac IX and True Beam and in the TPS the attenuation of the treatment couch model was determined for different sets of HU values. Attenuation of the treatment couch measurements were done using ionization chamber and portal dosimetry for three positions of the tables. The measurements were done for all photon beam energies 6 MV, 15 MV, 10 MV flatterer filter free (FFF) and 6 MV FFFF. Standard fields of 10cm x10cm for different gantry angles that would influence the patient dosimetry as passes through the table were measured delivering 100 MU. Multiple measurements were done to reduce the uncertainty. A set of analysis were realized for all the cases studied comparing the values measured and calculated by the TPS for both methods. It was found that the set of HU that fits the best to the TPS were the ones that reduced the mean differences between measured and planned in all the cases. Minimum aberration between the calculated and measured attenuation of treatment couch were found for the HU values of -770 HU for the carbon plate, -995 HU for the filling of the carbon plate. Varian IGRT Treatment Couch the HU values should be adjusted to -750 HU for the carbon plate, -995 HU for the filling of the carbon plate. The same HU set can be used for low and high photon energies. With the correct set of HU values the treatment couch is modeled correctly in the TPS Eclipse.

Keywords: *Treatment planning System, radiotherapy, dosimetry, Hounsfield Number*