

HVL Measure As An Rapid Energy QA Check for TomoTherapy

Helical Tomotherapy is a special application of intensity modulated radiation therapy based on a geometry similar to computed tomography (CT) imaging. A radiation source is mounted in a CT-like ring gantry and complex three dimensional dose distributions can be achieved by modulating the intensity of the radiation as the source rotates about the gantry and the couch moves. Besides, there is a set of xenon detectors opposites the source, that produces MV-CT images for adaptive radiation therapy. Taking advantage of these characteristics, it was designed a rapid qa procedure for the energy check by half value layer (hvl) measures. Using the central xenon MV-CT-detector for measuring the transmission of the radiation of a central 6mmx6mm field through an aluminum wedge device with 5 steps of 2cm thickness, it was obtained 6 measure points with the couch moving. Even though, there is no "good geometry" for this measuring, because there is an array of xenon detector, instead of a single detector, it is still a good, practical and fast method to check the energy stability. Besides, the energy check by aluminium hvl has 7.2%/MeV¹ sensitivity, while by TMR quality index has 3.8%² sensitivity.

¹ Nath, R. and Schulz, R.J. On the choice of material for half-value-layer measurements for megavoltage x rays. Med. Phys. 4(2): 132-3, 1977.

² Zefkili, S., Kappas, C., Rosenwald, J-C. On-axis and off-axis primary dose component in high energy photon beams. Med. Phys. 21(6): 799-808, 1994.