

AbstractID: 10626 Title: Dosimetric verification of dynamic IMRT plans using I'mRT MatriXX

Purpose: To optimize the dosimetric data acquisition parameters of 2D array ion-chamber matrix (I'mRT-MatriXX) and further to improve the dosimetry verification technique of patient specific quality assurance test.

Method and materials:

Radiation beam sweeping field of 2 mm slit opening at isocentre of dynamic MLC dose delivery was used for the determination of lateral response of a single ionization chamber of I'mRT-MatriXX. This lateral response was reconstructed from the single snap dose maps, acquired in movie mode for different single snap times from 100 ms to 300 ms in a step of 50 ms. Pattern analysis of lateral response was done to obtain an optimum acquisition times.

Results:

The signal sampling time of 200 ms was selected from the analysis of the dose linearity and spatial frequency of this lateral response. A 2D profile was made using merge and shuffle of matrices elements of the 2D profiles, acquired at four positions by shifting the whole detector array parallel and perpendicular to MLC leaves half of the centre-to-centre distance of two adjacent ion chambers. The gamma evaluation between TPS and processed 2D profile showed that 97.85 % of the pixel population passed tolerance limits of 3 % dose tolerance and 3 mm distance to dose agreement as compared to 92.98 % for TPS verses unprocessed 2D dose profile. IMRT verification of the cases which require a large area can be done with limited size of 24×24 cm². TPS profiles, convolved with a gaussian function, reconstructed from the lateral response was compared with measured profiles in OmniPro-IMRT software of Scandetronix Wellhofer, Germany and found the improvement of IMRT dose verification significantly upto 99.87 % agreement from 92.87 %.

Conclusion:

The improvement in dosimetric verification techniques of I'mRT-MatriXX can be done by using MATLAB program and multiple data acquisition technique with optimum parameters.