

AbstractID: 2772 Title: Reconstructing dose distributions from portal images with a backprojection dosimetric algorithm

Purpose: To develop a backprojection dosimetric algorithm for dosimetric verification. The algorithm reconstructs a three dimensional dose distribution from the treatment beams' portal images and the CT images for a patient/phantom.

Method and Materials: The reconstruction process covers four steps: (a) To acquire a portal image with an electronic portal imaging device (EPID) and convert it into a transmission dose distribution on EPID plane. (b) To reconstruct the incident primary dose distribution from the transmission dose distribution. (c) To calculate the primary dose distribution in the phantom using the phantom's CT image set. (d) To calculate the scatter dose distribution by superposing the scatter kernels in the patient/phantom; then to make the summation of the primary and the scatter dose distribution to get the total dose distribution in the patient/phantom. The dosimetric algorithm was implemented in a C program and applied to five phantoms, which were homogeneous, inhomogeneous, regular or irregular, irradiated by a regular-shaped, irregular-shaped or intensity-modulated beam. The calculated dose distributions were compared with the measured ones.

Results: For all the experiments, the agreement between the calculated and measured dose distribution was within 5% in the field areas with low dose gradients. Large deviation happened to the field edge in the lung, which had a low density.

Conclusion: The accuracy of the developed backprojection dosimetric algorithm can meet the requirement of clinical dosimetric verification. But the algorithm should be improved furthering in order to calculate the dose in the region of electronic disequilibrium accurately.