3406

Dosimetric Evaluation of Helical Tomotherapy for Multi-Target using Scintillation Screen

Sangwook Lim[1,3] Sung Ho Park[2], Seung Do Ahn[2], Young Nam Kang[4], Jung-Kyun Bong[4], Jisun Jang[3], Suk Lee[5], Sam Ju Cho[3], Soo Il Kwon[3], and Tae Sig Jeung[1]

[1] Department of Radiation Oncology, Kosin University Gospel Hospital, [2] Department of Raidation Oncology, Asan Medical Center, [3] Department of Medical Physics, Kyonggi University, [4] Department of Radiation Oncology, the Catholic University of Korea, [5] Department of Radiation Oncology, Korea University Medical Center

medicalphysics@hotmail.com

A cylindrical phantom with a scintillation screen (LANEX Fast Screen, Kodak) was designed to verify the real-time dose distribution of helical tomotherapy. The scintillation screen was placed in the cylindrical water-filled phantom and faced toward the lens of a charge-coupled device (CCD) camera. The CCD camera was used to capture the fluorescent light from the screen through the optical glass window of the phantom during tomotherapy (irradiations of 6 MV) (Hi?Art System®). In order to obtain the correction factors for the dose linearity and the blurring effect, the scintillation screen was calibrated at the reference conditions. Multiple targets were assumed to be in the phantom, which were planned and treated. Each frame was integrated and dose was calculated in pixel by pixel. Point dose was measured with an ion chamber in the phantom to convert the relative dose to absolute one. Dose distributions obtained from the scintillation screen were compared with those calculated from the treatment planning system (TPS). During irradiation, the fluorescent light captured by the CCD camera (30 frames per second) was transferred to the computer to be analyzed and displayed. Comparison between the dose distributions from the fluorescent images with the calculated dose distribution from the TPS showed a good agreement at over 80% of isodose lines. Two-dimensional (2D) dose distributions of various slices in the phantom could be evaluated by moving the scintillation screen in a longitudinal direction. Real-time 2D dosimetry using the scintillation screen and the CCD camera is respected to be useful to verify the dose distribution of helical tomotherapy.

Keywords : Tomotherapy, Scintillation Screen, CCD Camera