3445

The Effect of the CT Number for Each CT on Photon Dose Calculation

Kwang Hwan Cho[1,2] Dongho Shin[3], Sam Ju Cho[2], Jisun Jang[2], Sang Hoon Lee[2], Yong Ho Kim[1], Doo Ho Choi[1], Eun Seog Kim[1], and Soo Il Kwon[2]

[1] Department of Radiation Oncology, College of Medicine, Soonchunhyang University, Bucheon, Korea, [2] Department of Medical Physics, Kyonggi University, Suwon, Korea, [3] Center for Proton Therapy, National Cancer Center, Ilsan, Korea

medphy@schbc.ac.kr

The CT numbers obtained from computed tomography (CT) are potentially useful for inhomogeneity correction in CT based treatment planning. The purpose of this study is to evaluate the variation of CT number from each scanner and the effect of this variation on photon dose calculations. Five kinds of CT scanners were used to obtain images of electron density calibration phantom (Gammex RMI 467). The images were transferred to treatment planning system (Pinnacle, USA) and drawing contour of each materials for obtaining the CT number. We obtained relationship between the CT numbers and electron densities from each CT scanner. In order to investigate the influence of CT number to dose calcu-lation, patients' thoracic CT images were used. Difference of dose was evaluated with organ (Heart, Esophagus, Tumor, Lung, Liver, Vertebra body). The differences between CT numbers for each scanner were ±2% in homogeneous medium and 9.5% in high density medium. The maximum dose differ-ence was 0.48% for each organ. It acquired the phantom im-ages inserted high density material in the water phantom. Comparing the doses calculated with CT images from each CT scanner, the maximum dose difference was 2.1% in 20 cm. There was not significant difference of CT number and dose in general condition but it was different in high density medium. The exact density to CT number conversion according to CT scanner is required to minimize the uncertainty of dose de-pends on CT number. Especially the each hospital with various CT scanners has to discriminate CT numbers for each CT scanner. Moreover a periodic quality assurance is required for reproducibility of CT number.

Keywords : Electron Density, CT Number, Dose Calculation