AbstractID: 10476 Title: Measurements of Delivered Dose in Tissue Inhomogeneity Using a MOSFET Detector for an Anthropomorphic Phantom

Purpose: An accurate estimate of the radiation dose is important for verifying that the expected dose of radiation has been delivered to the patient. To verify delivered dose in tissue inhomogeneity, in-vivo dosimetry by a metal oxide-silicon field effect transistor (MOSFET) detector as a pinpoint dosimeter was performed for an anthropomorphic phantom. **Method and Materials:** The RANDO anthropomorphic phantom was used in this study. The MOSFET detectors were placed within cavities in the phantom. In-vivo dosimetry using the MOSFET detector for simple square field sizes of 10×10, 5×5, 3×3 cm^2 with a 6 MV photon beam was measured in various tissue inhomogeneities such as the abdominal, thoracic, and head and neck regions. On the other hand, doses for them were calculated using the superposition (SP) algorithm with inhomogeneity correction in the XiO radiotherapy treatment planning system. Three-dimensional dose distributions were calculated using 0.2 cm resolution. In addition, dose calculation on megavoltage cone-beam CT (MVCBCT) was demonstrated to improve the precision of the in-vivo dosimetry, because the MVCBCT can monitor the dosimetric affect of changes in anatomy or position compared with the reference CT by applying the initial treatment plan to the MVCBCT images. **Results:** The results of the SP algorithm for the abdominal, thoracic, and head and neck regions agreed with the doses measured by the MOSFET detector to within 3%. **Conclusion:** We performed in-vivo dosimetry using the MOSFET detector in the abdominal, thoracic, and head and neck regions of the anthropomorphic phantom. The doses measured by the MOSFET detector agreed well with the dose calculations by the SP algorithm to within 3%. The MOSFET detector was useful for pinpoint absolute dosimetry even in inhomogeneous media.