

To further validate the Monte Carlo dose-calculation method reported previously, we have conducted several representative experimental measurements for dose verification in various inhomogeneous phantoms, including an anthropomorphic phantom (Alderson Rando Phantom). First, to examine the variation of dose in a phantom consisting of a water-like low-density (cork) inhomogeneity, dose calculation with Monte Carlo method was compared to that of measurements using film dosimetry. Furthermore, the dose perturbation at the interface of two different media was studied using a Wellhöfer scanner system, in which a block of bone-equivalent material was suspended in the water phantom. The ion chamber in the water phantom scanned the doses adjacent to the bone block transversely and longitudinally. The measured data were compared to the Monte Carlo calculations for the same geometrical configurations. Good agreements (3%) between these two methods are achieved. We further conducted measurement in a Rando phantom using TLD chips and films. Dose distribution and dose values at several interest points within the “nasopharynx” region were checked against with those of Monte Carlo calculation, in which a CT scan of the Rando phantom was used to define the calculation geometry and to locate the interest points. It was found that the calculated and measured dose values at the chosen points agreed to within 4%. This work validates the Monte Carlo method as a benchmark tool to other approximate dose calculation algorithms used in clinical treatment planning.