

Use of an ionization chamber in an anthropomorphic pelvic phantom to verify monitor unit calculation accuracy of a three-dimensional radiation treatment planning system.

To verify the accuracy of monitor unit calculations of the three-dimensional radiation treatment planning system (3DRTPS) used at our facility¹, comparisons were made with doses measured in a novel anthropomorphic pelvic phantom². Doses were measured using a micro-ionization chamber³. The dose calculations were based on a three-dimensional image set of the pelvic phantom obtained using spiral computed tomography. Doses were calculated and measured for 6 fields, two beam energies, and 3 wedges to give a total of 14 permutations.

A hand calculation procedure using tissue phantom ratios was also developed for photon beams incident on a flat water phantom. Comparisons were made between the hand and 3DRTPS calculated monitor unit values.

The average 3DRTPS calculated dose rate agreed with the measured value to within $\pm 1\%$ and the maximum difference was 2%. The average hand calculated dose rate agreed with the 3DRTPS value to within $\pm 1\%$ of the 3DRTPS value and the maximum difference was 3%. It was concluded that the 3DRTPS accurately calculated monitor unit values for the pelvic phantom and a hand calculation could be used as a quality assurance check of 3DRTPS monitor unit values.

¹PINNACLE³, ADAC Laboratories, Milpitas, CA

²RSVP Pelvic Phantom, The Phantom Laboratory, Salem, New York

³A 14 Microchamber, Exradin Instrument Co., Springfield, IL.