Use of BANG® polymer gel in an anthropomorphic pelvic phantom for verification of a 3DRTP system.

To verify the accuracy of dose calculations generated by the three-dimensional radiation treatment planning system (3DRTPS) used at our facility[1], comparisons were made with dose distributions measured in an anthropomorphic pelvic phantom[2], in which the tumor vessel was filled with BANG® polymer gel[3]. The dose calculations were based on a three dimensional image set of the pelvic phantom obtained using spiral computed tomography. In the first of two experiments, a tumor vessel was irradiated using four oblique fields with cerrobend blocking. In the second experiment, an identical tumor vessel was irradiated using lateral "flying" wedge arcs with cerrobend blocking. Eight vials filled with BANG® gel were also irradiated to graded doses for calibration. Irradiated tumor vessels and calibration vials were scanned using MRI. Dose maps were calculated based on R2 maps and the R2(D) calibration. Comparisons between the 3DRTPS predictions and the measured isodoses in the transverse, coronal, and sagittal planes indicated good agreement. It was concluded that the 3DRTPS accurately calculated dose distributions for the pelvic phantom, and that the BANG® polymer gel can be used for quality assurance of 3DRTPS. Other potential applications including verification of dose distributions produced by intensity modulated radiotherapy may be anticipated.

[1]PINNACLE[3], ADAC Laboratories, Milpitas, CA

[2]RSVP Pelvic Phantom, The Phantom Laboratory, Salem, NY

[3]MGS Research, Inc., Guilford, CT.

Readout of the BANG gels was carried out by MGS Research, Inc., Guilford, CT