

BANGTM gel (MGS Research, Inc., Guilford, CT) has been evaluated for use in measuring intensity modulated radiation therapy (IMRT) dose distributions. Treatment plans to a target dose of 1500 cGy were generated by the Peacock IMRT system (NOMOS Corp., Sewickley, PA) using test target volumes. The gels were enclosed in 13 cm diameter cylindrical glass vessels. Dose calibration was conducted using seven smaller (5 cm diameter) cylindrical glass vessels irradiated to 0 through 1800 cGy in 300 cGy steps. Three-dimensional maps of the relaxation time R_2 were obtained using 1.5T Vision system (Siemens Medical Systems, Erlangen, Germany) and correlated with dose. A Hahn spin echo sequence was used with TR = 3 s, TE = 20 ms and 100 ms, NEX =1, using $1 \times 1 \times 3 \text{ mm}^3$ voxels. MRI measurements were repeated weekly to identify the gel aging characteristics. Ion chamber, TLD and film dosimetry measurements of the IMRT dose distributions were obtained to compare against the gel results. The R_2 values of the large vessels did not precisely track the smaller vessels, so the ionization chamber measurements were used to normalize the gel dose distributions. The point-to-point standard deviation of the gel dose measurements was 3%, with 1% standard deviation when compared against the ionization chamber measurements (averaged over the chamber volume). Spatial localization was better than 2 mm, and the dose was accurately determined by the gel both within and outside the target.