

## New <sup>125</sup>I Brachytherapy Source Dosimetric Characteristics

Because prostate brachytherapy implants are growing in popularity, there is a market for new seeds. The dosimetric characteristics (anisotropy function, radial dose function, and dose rate constant) of a new <sup>125</sup>I seed have been determined experimentally according to the AAPM Task Group 43 recommendations and were related to the 1999 NIST calibration assigned to this source [ $S_{k,99std}$ ]. Phantoms made of solid water were machined to accommodate the LiF thermoluminescent dosimeters that were used to perform the measurements. Two sizes of chips were used with dimensions  $3.1 \times 3.1 \times 0.8 \text{ mm}^3$  and  $1.0 \times 1.0 \times 1.0 \text{ mm}^3$ . The TLD chips were surrounded by at least 10 cm of Solid Water<sup>TM</sup> phantom material to provide full scattering conditions. MD-55\* radiochromic film and BANG gel were also used to take measurements. The anisotropy function,  $F(r,\theta)$ , of the new <sup>125</sup>I source was measured at distances of 2 cm, 3 cm, 5 cm, and 7 cm from the source center. These data compared favorably with those from the 6711 and 6702 sources. The radial dose function,  $g(r)$ , of the new <sup>125</sup>I source was measured at distances ranging from 0.2 cm to 10 cm. The results indicated a dose rate constant,  $\Lambda$ , of  $1.06 \pm 4\% \text{ cGy}\cdot\text{h}^{-1}\cdot\text{U}^{-1}$  for the new <sup>125</sup>I source as compared to  $0.98 \text{ cGy}\cdot\text{h}^{-1}\cdot\text{U}^{-1}$  and  $1.04 \text{ cGy}\cdot\text{h}^{-1}\cdot\text{U}^{-1}$  for the 6711 and 6702 seeds, respectively. Complete dosimetric data are described in this manuscript. Research supported by a contract with Imagyn Medical Technologies Inc.