

**Purpose:** In-vivo prostate brachytherapy absorbed dosimetry detector using scintillating fibers.

**Method and Materials:** Five pairs of  $85.5 \pm 0.05$  cm long blue shifted scintillating fibers (model BCF-10) with  $1 \text{ mm}^2$  cross sectional area were placed in a mixture of gelatin ( $368.6 \pm 0.5$  grams) and water ( $3.78 \pm 0.025$  liters) to measure the absorbed dose delivered by a 12 Ci  $^{192}\text{Ir}$  HDR source. The fibers were held by a  $7 \times 7 \text{ cm}^2$  template grid and optically connected to a 16-channel multianode photomultiplier tube (Hamamatsu, model H6568). Each pair consisted of one fiber 4 mm shorter than the other one to extract the dose by the subtraction method. A dose atlas was used for radiation delivered to the phantom. The plans followed delivered 5 and 7 Gy to a point located 2.0 centimeters away from the central dwelling positions. A total of 32 data points were acquired in a plan to assess the linearity and reproducibility of the measurements.

**Results:** Reproducibility of the data was found to be within 5% and the overall accuracy of the system estimated to be  $\pm 5.5\%$ . The linearity of the data for all 7 measured dose values (ranging from 0.6 to 7 Gy), gives a slope of 312 counts/Gy with a 1.4% relative deviation.

**Conclusion:** This work indicates the possibility of measuring in real-time the dose effectively delivered to a biological system during prostate brachytherapy treatments. The availability of commercially thin ( $150 \mu\text{m}$ ) scintillating fibers opens the capability of using such system during clinical treatments (by embedding the fibers within the catheters) with the advantage of performing real-time adjustment of the dose delivery.