

**Purpose:** To study the reproducibility of the reconstructed dose distributions from optical CT scanning of polymer gel dosimeters with variation of time between irradiation and scanning using phantoms of the same and different geometry.

**Method and Materials:** The commercial BANG<sup>®</sup>3 polymer gels from the same batch were housed in cylindrical phantoms of 3 types: a) PET bottles of 15 cm diameter and 20 cm height; b) Barex cylinders of 17 cm diameter and 15 cm height; c) Acrylic cylinders of 25 cm diameter and 25 cm height. Four PET and Acrylic gel phantoms were irradiated with a 5 field IMRT and a 3DCRT once each. Six Barex cylinders were irradiated with the same IMRT and 3DCRT plans three times each. One additional Barex gel phantom was irradiated with a 6 cm x 6cm, 12 MeV electron field for calibration purpose.

The gel phantoms were scanned using the OCTOPUS<sup>™</sup> optical scanner one day after irradiation. One Barex phantom irradiated with IMRT fields was scanned 1 and 8 weeks later. All reconstructed images were calibrated using the dose response curve from the electron field irradiation. Root mean square of the pixel dose differences in a cylindrical region of 10 cm diameter and 10 cm height were compared for each pair of phantoms irradiated with the same plan.

**Results:** The reconstructed dose distributions from scanning the same IMRT gel phantom 8 weeks apart change less than 1%. The root mean square dose difference among the 3 different kinds of phantoms irradiated with the IMRT and 3DCRT plans are all less than 3%.

**Conclusion:** The optical CT-based polymer gel dosimetry is reproducible within the experimental uncertainty (3%) when different gel phantoms are irradiated and scanned at different time after irradiation.

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