MRI of polymer gel dosimeters has been used for 3D dosimetry of conformal radiation therapy[1]. In these gels, radiation-induced polymerization creates permanent 3D image of dose distributions, which can be imaged using either MRI or optical CT scanning[2].

Here we report a new observation that the irradiated polymer gel dosimeters also exhibit both ultrasound and diagnostic x-ray contrast.

We irradiated BANG® polymer gels[3] using single narrowly collimated megavoltage x-ray beams at a maximum dose of 10Gy. The irradiated gels were imaged using clinical diagnostic CT scanner operating at voltages between 80 keV and 140 keV. The CT numbers varied between 13 for nonirradiated areas of the gel and 26 for irradiated regions.

Using ATL Ultramark 9 HDI clinical ultrasound scanner with a 5-MHz linear array we obtained B-scans across the gels, clearly showing the polymerized regions as high-intensity bands against dark background of the non-irradiated gel.

These preliminary results demonstrate that polymerized regions can be imaged using multiple modalities, such as MRI, diagnostic x-rays and ultrasound. This may be useful in 3D radiation therapy dosimetry and QA. Another application of this property may be for making image correlation test objects for diagnostic radiology.

References

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