Dosimetry is a well recognized challenge in endovascular brachytherapy, primarily because of very steep dose gradients near the source. Conventional methods of dosimetry are both impractical and lack the spatial resolution necessary to fully characterize these microscopic dose distributions within a reasonable time. Recently, BANG™ polymer gel dosimetry was applied to measuring 3D dose distributions using MRI microimaging [1]. In the BANG™ gel, radiation-induced polymerization creates a fine dispersion of polymer microparticles that are trapped in the gel and whose spatial density faithfully represents the dose distribution. In the polymerized regions of the gel, both the water proton NMR relaxation rates and the optical absorbance increase linearly with the absorbed radiation dose. Although preliminary results have been very encouraging, the need to use expensive and rarely used high-field microscopic MRI systems renders this technique all but impractical. An alternative to MRI is optical laser CT scanning of the gel [2]. We have developed a microscopic scanning system using a He-Ne laser with beam compression, operating in a translate-rotate geometry and capable of producing stacks of planar dose distributions with pixel size and slice thickness on the order of 100 microns. Microimages of test objects and dose distributions from real sources will be presented. The performance, current limitations and further improvements of this new technique will be discussed.

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References

1. Maryanski et al., Med. Phys. **24** (6), 995, 1997.
2. Maryanski et al., Med. Phys. **23** (6), 1069, 1996.