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Verification of 3D Dose Distributions of a Beta-Emitting Radionuclide Using PRESAGE® Dosimeters MANDI CROWDER, Abilene Christian University, RYAN GRANT, GEOFF IBBOTT, RICHARD WENDT, UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER TEAM — Liquid Brachytherapy involves the direct administration of a beta-emitting radioactive solution into the selected tissue. The solution does not migrate from the injection point and uses the limited range of beta particles to produce a three-dimensional dose distribution. We simulated distributions by beta-dose kernels and validated those estimates by irradiating PRESAGE® polyurethane dosimeters that measure the three-dimensional dose distributions by a change in optical density that is proportional to dose. The dosimeters were injected with internal beta-emitting radionuclide yttrium-90, exposed for 5.75 days, imaged with optical tomography, and analyzed with radiotherapy software. Dosimeters irradiated with an electron beam to 2 or 3 Gy were used for calibration. The shapes and dose distributions in the PRESAGE® dosimeters were consistent with the predicted dose kernels. Our experiments have laid the groundwork for future application to individualized patient therapy by ultimately designing a treatment plan that conforms to the shape of any appropriate tumor.

Mandi Crowder
Abilene Christian University

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