

## AbstractID: 2057 Title: Phantom Dosimetry of Contrast-Enhanced Radiotherapy (CERT)

Photoelectric interactions of kilovoltage x-rays with heavy elements can significantly increase the absorbed dose in tissues containing contrast agents. Yet, these effects are difficult to measure with routine clinical instruments because of the rapid fall off of the effect. We have developed a radiochromic film (ISP Corp.) phantom to simultaneously measure the surface dose, dose enhancement in a target containing a homogeneous concentration of contrast at depth, and attenuation as the beam penetrates the solution of contrast agent. At 4.8-cm depth in tissue-equivalent acrylic, solutions containing 0, 0.5, 6 and 12% iodine (Ultravist 370, Berlex, Inc.) resulted in maximum dose enhancements of 1x, 1.4x, 4.4x and 6.6x and target to surface dose ratios of 0.3, 0.4, 1.3, and 2.0 respectively. Higher concentrations of contrast yielded higher dose enhancements and target to surface dose ratios, but caused more rapid attenuation of the beam as it traversed the target. However, the dose across the entire target could be improved by employing multiple beams. The maximum concentration of contrast achievable in a tumor by systemic administration (~0.5% w/v) did not result in a particularly favorable dose enhancement or target to surface dose ratio. The results with the higher concentrations of contrast achievable by direct injection support the potential for contrast-enhanced kilovoltage x-ray delivery to targets at depth with favorable therapeutic ratios.

Supported by Sirius Medicine, LLC.