Image Guided Cancer Therapy: Developing a Process for Quantitative Organ Imaging *by*

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In developing new nanoparticle-based image guided drug delivery systems it is important to measure the drug's bio-distribution, the percent of injected drug that reaches target and non-target tissues over time and the drug's plasma clearance. The main technique used to measure drug concentration in tissue or plasma requires extracting the drug (or fluorescent dye in the case of an imaging agent) from the tissue, but can be avoided by directly imaging the drug in the tissue or blood. However, the fluorescence signal obtained directly from the organ is reduced by scatter and absorption. Instead of imaging whole organs, the tissue is sectioned. A calibration curve is required to convert fluorescence intensity to drug concentration. This calibration curve will be able to quantitatively predict the concentration of drug based on fluorescence levels from nanoparticles loaded with IR-820 dye and drug. The calibration curve was created by synthesizing phantoms using sodium chloride, TRIS buffer, sodium azide, porcine gelatin, hemoglobin and IR-820. Different concentrations of IR-820 (4?M, 2?M, 1?M, 0.5?M, 0.25?M, and a control) were added to the phantoms. Precise and accurate slices of the molds at thicknesses of 5?m, 10?m, 15?m, and 20?m were achieved using a cryostat. Their fluorescence was imaged and measured using the Odyssey CLX. It is assumed that the IR-820 is uniformly distributed in all samples. The results of the experiment demonstrated that there is a linear relationship between the thickness of the phantoms and the fluorescence signal it emits. The relationship between the concentrations and the signal isn't as a direct and doesn't demonstrate such a linear trend. Further analysis is being performed to see the effects of the Porcine hemoglobin in the samples as well as the mixing of the IR-820 with the gelatin for the stock solutions.