AbstractID: 11596 Title: Deoxyglucose Labeled Gold Nanoparticles as X-ray Computed Tomography Contrast Agents for Cancer Imaging

Purpose: To study the feasibility of using 2-Deoxy-D-Glucose (2-DG) labeled gold nanoparticle (AuNP-DG) as a metabolic functional CT contrast agent through *in vitro* experiments. **Method and Materials:** The gold nanoparticles (AuNP) were fabricated using a citrate acid reduction method. The size of the AuNP was determined from Transmission Electron Microscopy images to be 4 nm in diameter. The conjugation of the 2-DG with the AuNP core was accomplished using mercapto group in the 2-carbon position by condensation reaction of 2-amino-deoxyglucose with mercaptosuccinic acid. The human alveolar epithelial cancer cell line, A-549, was chosen for the *in vitro* cellular uptake assay. Two groups of cell samples (~1×10^5 cells per sample) were incubated with the AuNP-DG and the unlabeled AuNP, respectively, for 30 minutes (37ºC, 7% CO_2). Following the incubation, the cells were washed with sterile PBS six times to remove the excess gold nanoparticles. The cells were then spun to cell pellets using a centrifuge. The cell pellets were imaged using a microCT scanner immediately after the centrifuging (75 kVp, 135 μA, 1184 × 1120 matrix size, 360 views, averaging 5 frames per view). The reconstructed CT images were analyzed using a commercial software package. **Results:** Significant contrast enhancement in the cell samples incubated with the AuNP-DG with respect to the cell samples incubated with the unlabeled AuNP was observed in multiple CT slices. Quantitative analysis of the image data showed that (45.6 ± 14.2)% of the cells that were incubated with the AuNP-DG exhibit enhanced contrast compared to the cells in the control group (incubated with AuNP). **Conclusion:** Results from these experiments strongly suggest enhanced uptake of the AuNP-DG over the unlabeled AuNP by the highly glycolytic cancer cells *in vitro* and indicate that AuNP-DG could served as a metabolic functional CT contrast agent with tumor-specific targeting capability.