AbstractID: 8824 Title: Quantification of Radiographic Image Contrast Enhancement Using Gold Nanoparticles

Purpose: To quantify radiologic image contrast enhancement using gold nanoparticles compared to iodinated contrast media (CM) over the entire diagnostic range of x-ray energies. **Method and Materials:** A Perspex phantom with 4mm cylindrical wells was used to simulate small portions of vasculature. Each well was loaded with either gold nanoparticle solution or iodinated CM at equal concentration (0.5077 M radiopaque element). The phantom was imaged under full scatter conditions in computed radiography (CR) (40-80 kVp) and computed tomography (CT) (80-140 kVp). Images obtained at low energies (≈ 40 kVp) were validated using diagnostic type gafchromic film (Gafchromic® XRQA). CdTe detector with MCA was used to obtain transmission spectra after x-ray beam at 130 kVp passed through solutions of gold nanoparticles or iodinated CM. **Results:** CT and CR images were evaluated for contrast enhancement by contrast-to-noise ratio (CNR). Low energy results support previous findings, with gold exhibiting a 60% greater CNR than iodine. Gold nanoparticles also displayed excellent image contrast in CT, producing over two times greater signal than iodinated CM at 140 kVp. Over the x-ray energy range of 70-100 kVp, however, both samples displayed similar contrast values. CdTe attenuation spectra are in accordance with image results where gold nanoparticles show a greater probability of attenuation than iodine for photons below approximately 35 keV and above 80 keV. **Conclusion:** Data indicates that a solution bearing gold nanoparticles would be an effective alternative to iodinated CM diagnostic radiology particularly at lower and higher ends of x-ray energies used in radiology, such as mammography and CT. **Conflict of Interest (only if applicable):** Funding provided by NanoVic (Nanotechnology Victoria, Ltc.)