AbstractID: 2511 Title: Problems and Techniques in Gamma Camera Imaging of Yttrium-90 Labeled Radiopharmaceuticals

Purpose: This study was to identify problems and investigate camera parameters that would create effective biodistribution images for treatment planning and dosimetry in patients receiving Y-90 radionuclide therapy. **Method and Materials:** Y-90 energy spectra under different interacting conditions were recorded from MCA, uptake probe and gamma camera. Y-90 (17.6 MBq) was added to an Anthropomorphic Torso Phantom, with or without water in its tank, with following distribution: liver, 70% with water; right lung, 15% with water; left lung, 15% without water. Imaging was performed on a Siemens eCam, dual head camera with HEGP/MEGP collimators at various energy settings. Y-90 patient imaging was performed with retained activities of 1.52 GBq and 6.7 kBq Y-90 labeled microspheres and with 3.7 GBq Y-90 labeled Zevalin. At 30 minutes post Zevalin injection, a whole body scan was performed using a 194 cm bed length (5 cm/min, total 48 min), 256 x 1024 x 16 matrix without zooming. **Results**: Y-90 spectra indicated a characteristic X-ray peak (Pb. K-alpha) at 75 keV along with characteristic Bremsstrahlung distribution. Phantom tests found an energy window of 75 keV/50% to produce practical images. Significant uptake in the right lung of the phantom versus other structures was identified. Patient's lungs could not be easily visualized. **Conclusions**: An energy window (75keV/50%) is adequate for characteristic X-ray and Bremsstrahlung imaging. Y-90 imaging depends on scatter characteristic of tissue and does not provide direct biodistribution of Yttrium-90. Further investigations of imaging technique are needed to assess effective Y-90 patient imaging.