AbstractID: 1343 Title: Regional Counts From PET-CT Images Of A Phantom On Ge Discovery St At High Activity

Objective: Evaluate regional counts of PET-CT (GE Discovery ST) images of a modified PET/SPECT phantom at high activity concentrations with and without radioactive background.
Method: Four spheres (ID: 2.96, 2.00, 1.45 and 0.91 cm) were installed to the phantom with three inserts: hot lesions, uniformity linearity, cold lesions and cold spheres. 666 MBq of F-18 was in tank with all inserts and the spheres. Two large spheres contained 26 MBq leading to a hot lesion to background ratio of 13.2, and two small ones were empty as cold lesions. Three beds of 15 cm AFoV (slice thickness 3.75 mm) each were scanned for a total of 9 minutes. Images were acquired at 30 min interval for the first two hours and then 60 min for the last three scans. OS-EM algorithm was employed for reconstruction. RoI and VoI of the images from the two spheres were defined manually.
Result: Severe artifacts appeared on PET-AC and PET-CT images of the hot spheres and the inserts for 4 data sets (0, 30, 60 and 90 min respectively) when the total activity was from 666 to 370 MBq. When the total activity dropped from 370 to 147 MBq, images started to appear normal (PET-AC images and PET-CT as well). **Conclusion:** The VoI counts of the hot spheres decreased linearly with decay of the activity over the seven scans. This suggested that the PET-AC images can still yield accurate VoI counts under the high random and scattering counts from high activity in the background.