

## AbstractID: 7440 Title: Effect of average CT on quantifying PET images of esophageal cancer

**Purpose:** To quantify the effect of average CT (ACT) on improving the registration of the PET and CT data (Pan et al, JNM 05) in a prospective study of esophageal cancer patients.

**Method and Materials:** We investigated 52 studies of esophageal cancer patients who underwent a routine PET/CT scan followed by a cine CT scan for ACT. The patients were injected with 555-740 MBq of  $^{18}\text{F}$ -FDG and scanned 1 hour after injection. A helical CT (HCT) scan was acquired in 16 s over 90 cm coverage followed by a PET scan of 3 min per bed and a cine CT scan of the thorax for ACT. Patients were free breathing during the HCT and ACT scans, the cine duration was 5.9 s to capture at least one breath cycle. Both HCT and ACT were used for attenuation correction (AC) of PET data. Misalignment between the PET and CT at the level of the diaphragm and the maximum standardized uptake values ( $\text{SUV}_{\text{max}}$ ) of the esophageal tumor were used to assess the difference between the two attenuation correction techniques.

**Results:** 9 patients (17%) showed over 20% increase or decrease in  $\text{SUV}_{\text{max}}$  due to misregistration between the HCT and PET data with one patient showing a 50% increase in  $\text{SUV}_{\text{max}}$ . The misalignment at the diaphragm level with the magnitude of over 1 cm was detected in 32 patients (62%) with an average value of  $15.1 \pm 6.5$  mm. ACT was effective in removing the misalignment in 23 cases (44%). Additional radiation dose was 5-10 mGy with an increase in processing time of 5 min.

**Conclusion:** ACT is effective in improving the registration between the CT and the PET data in PET/CT, and is able to improve AC of PET data in 44% of the esophageal cancer studies.