

AbstractID: 3936 Title: A new method for improving PET and CT registration in the thorax on PET/CT

Purpose: We propose a new method of acquiring the CT data to improve the registration of the PET and CT data in imaging the thorax on PET/CT.

Methods and Materials: In a conventional PET/CT acquisition, the CT and PET data are acquired at two different breathing states. There is an inherent mismatch of the PET and CT because the temporal resolutions of the PET and CT are not matched. We have proposed a new method of acquiring the average CT (ACT) data from the 4D-CT imaging to provide the CT data consistent with the PET data on temporal resolution. We have applied this approach to one esophagus and seven lung patients. The helical CT data were taken helically at 120 kV, 300 mA, pitch 1.35:1, 8x2.5 mm collimation, and 0.5 s rotation and the patients were instructed to hold a breath at mid-expiration during the HCT of the thorax. The PET acquisition was 3 mins per bed. The 4D-CT data of the thorax were taken right after the PET/CT study at 120 kV, 50 to 150 mA, cine duration of one breathing cycle plus 1 s, 8x2.5 mm collimation, and 0.5 s CT rotation cycle. We compared the registration between the ACT and PET data, and the registration between the HCT and PET data.

Results: The PET and ACT data were all consistent at all tumor locations. The mismatch between the HCT and PET data were significantly improved on 4 out of the 8 patients with the ACT data over the HCT data..

Conclusions: We have proposed the use of the ACT to improve the registration of the PET and CT data, and demonstrated a significant improvement in lesion localization between the PET and ACT data.