AbstractID: 13435 Title: Considering respiration motion in radiation treatment planning for pancreatic cancers

Purpose: To quantify respiration induced organ motions for pancreatic cancer patients and to explore strategies to account for these motions in the treatment planning using 4DCT.**Method and Materials:** Both 3DCT and 4DCT scans were acquired sequentially for ten pancreatic patients using a CT scanner (LightSpeed, GE). The 4DCT data were sorted into ten respiratory phases. The 3DCTs were fused with 2 sets of 4DCT data at the end of exhale phase (50%) and the end of inhale phase (0%). The target (pancreas) was delineated on the 50%- and 0%-phase CT sets and the organs at risk were drawn on the 3DCT. These contours were populated to the CT sets at other respiratory phases by a software (ABAS, CMS Inc) based on deformable image registration. The ABAS-generated contours were carefully reviewed and manually modified if necessary. Internal target volumes (ITV) were generated by tracing the target contours of all phases (ITV_{10}), three phases of 0%, 20% and 50% (ITV_3) and two phases of 0% and 50% (ITV_2) with a zero margin.

Results: Volume variations of pancreas, kidney and liver were found to be small (<5%) during respiration. The centriod motions of liver, left kidney, right kidney and the target in the superior-inferior direction were 7.9±3.2 mm, 7.1±3.1 mm, 5.7±3.2 mm and 5.6±2.7 mm, respectively. The volume overlap and dice coefficient were 92%±1% and 96%±1% between ITV_{10} and ITV_2 and 95%±1% and 98%±1% between ITV_{10} and ITV_3, respectively. It was found that the positions of the liver and kidneys on the images of 3DCT and 20% of phase are similar.

Conclusion: Respiration motion for target can be accounted for by using ITV generated based on CTs acquired at the ends of exhale and inhale. The 4DCT at mid exhale (20%) may be used for treatment planning as a substitute of 3DCT.