AbstractID: 7576 Title: Generation of an ITV from a 4DCT Dataset with Automatic Rigid Image Registration.

Purpose:
To assess the accuracy of generating an internal target volume (ITV) for lung tumors from a four-dimensional computed tomography (4DCT) dataset by automatically propagating a manually-contoured gross tumor volume (GTV) on one respiratory phase to the remaining nine phases on the basis of rigid body image registration.

Method and Materials:
For 23 non-small-cell lung cancer (NSCLC) patients a physician contoured the GTV on each of the ten phases that constituted a 4DCT dataset. The GTV contours were merged to form the manual ITV (mITV) (our definition does not include expansion for microscopic disease). The manually-contoured GTV at end expiration was propagated to the remaining phases with an in-house image registration tool based on rigid-body image registration to form the propagated ITV (pITV). The metric of success for the pITV was the *matching index*, or the intersection of mITV and pITV divided by the union of mITV and pITV. To estimate the uncertainty of physician contouring we defined the *uncertainty index* as the volume of the mITV contracted uniformly by 1 mm divided by the volume of mITV. The normalized matching index (NMI) is defined as the matching index divided by the uncertainty index.

Results:
The mITV volumes for all but 4 patients was less than 100 cc. The NMI for all patients is 1.01±0.08. For the 11 patients with tumor excursion greater than 0.5 cm, the NMI is 1.01±0.05.

Conclusion:
Generating an ITV on the basis of rigid image registration is a viable alternative to manually contouring the GTV on all phases of a 4DCT dataset.

Conflict of Interest (only if applicable):
SRA with Philips Medical Systems.