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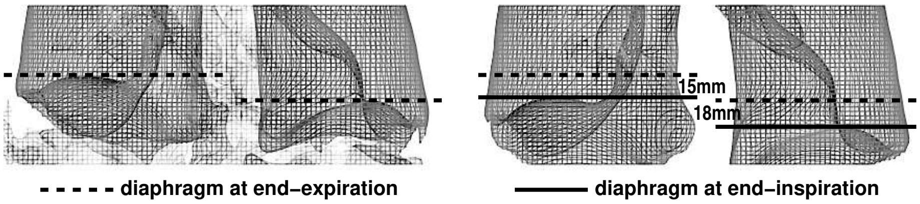
RESPIRATION-COMPENSATED CARDIAC PET ATTENUATION CORRECTION VIA AUTOMATED 4-D SEGMENTATION OF GATED TRANSMISSION IMAGES **BW Reutter, GJ Klein, and RH Huesman. Center for Functional Imaging, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA.**

To investigate the feasibility of performing respiration-compensated cardiac PET attenuation correction, we acquired and automatically segmented respiratory-gated transmission data for a normally breathing human.

Transmission data were acquired for a total of 20 minutes on a CTI/Siemens ECAT EXACT HR (47-slice) scanner. Seven respiratory gates were obtained using a respiratory signal from a pneumatic bellows placed around the subject's chest. Thus, on average each gate contained less than 3 minutes of data.

Using a differential 4-D edge detection algorithm that imposes spatial and temporal continuity constraints, reasonably accurate time-varying torso and lung surface models were constructed automatically from the relatively noisy gated transmission images. Anterior views of the lung surface models (shown below) demonstrate that the right and left domes of the diaphragm had superior-inferior excursions of 15 mm and 18 mm, respectively. This was consistent with respiratory motion that has been observed using cardiac MRI (Frederickson et al., Radiol 1995, 195:169-175; Wang et al., Magn Reson Med 1995, 33:713-719; Budinger et al., JNM 1996, 37(5):130P-131P).



Our results suggest that segmented respiration-compensated attenuation correction is feasible using respiratory-gated transmission data containing about 3 minutes of data per gate and 4-D continuity constraints. The observed motion of the diaphragm and heart suggests that this compensation is necessary for accurate quantitation of high-resolution respiratory-gated cardiac PET data.

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