AbstractID: 6647 Title: A simplified framework for CT simulation of left breast patients using deep inspiration breath-hold (DIBH)

Purpose: We presented a simplified framework for deep inspiration breath hold (DIBH) in AAPM 2006. This study presents the implementation of the framework for patient simulation using AcQSim CT simulator.

Materials and methods: An aqua-plastic mask band of 1.0-1.5in was made before simulation while the patient was instructed in DIBH for 30s or longer. The mask band was set near the umbilicus and the RPM marker box was set ~1cm superior or inferior to the mask. The DIBH signal was also displayed on a monitor set close to patient, which was a duplicate display of patient's signal in the RPM computer. The patient can physically achieve DIBH by the mask band. She can also visually guide herself for stable breathing amplitude. The CT images were acquired in spiral rather than in gated axial mode such that much faster scanning can be made. The RPM system was simply used to monitor the breathing and in case patients cannot hold her breath, the spiral scanning can be manually terminated and then resumed for the next breath hold. For each patient, two sets of CT were acquired, one in DIBH and the other in free breathing. Patient tattoo was made while the patient was in DIBH.

Results: The framework was successfully applied for the simulation of three left breast patients. During the simulation, two patients can hold their breath for ~60s or longer with very stable amplitudes, such that CT scanning can be made in spiral rather than in the gated axial mode in just one breath hold. The DIBH CT images have less motion artifacts compared to the free breathing CT images.

Conclusion: The system can be reliably applied for the simulation of left breast patients with DIBH. A modern multislice CT simulator can be more efficient to make the DIBH scanning.