AbstractID: 10641 Title: Development of a Deformable Lung Phantom for the Evaluation of Deformable Registration

Purpose: The deformable lung phantom prototype was developed to account for the patient breathing motion, and to evaluate for a deformable image registration algorithm. **Method and Materials:** The phantom consisted of an acryl cylinder filled with water and a latex balloon located in the inner space of the cylinder. A silicon membrane was attached to the inferior end of the phantom. The silicon membrane was designed to simulate a real lung diaphragm and to reduce motor workload. This specific design was able to reduce the metal use which may prevent infrared sensing of the real position management (RPM) gating system on 4D CT image acquisition. Verification of intensity based 3D 'demon' deformable registration was based on peak exhale and peak inhale breathing phases. **Results:** The registration differences ranged from 0.85 mm to 1.47 mm, and accuracy was determined according to inner target deformation. **Conclusions:** This phantom was able to simulate the features and deformation of real human lung and has the potential for wide application in 4D radiation treatment planning.

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