AbstractID: 6919 Title: Assessment of Geometrical Accuracy of Magnetic Resonance Images for Radiation Therapy of Lung Cancers

The purpose of this research was to investigate the feasibility of using magnetic resonance (MR) images for planning of radiotherapy of lung cancers. Because a large field-of-view (FOV) must be used for imaging the thorax, MR imaging may be particularly subject to geometrical distortions caused by the magnetic field inhomogeneity and gradient non-linearity. Thus, our first goal was to assess and quantify the geometrical accuracy of the MR images of the thorax. In this study, we constructed a phantom measuring 41 x 35 x 17 cm^3, with air chambers geometrically approximating the upper thorax. Sixteen evenly-spaced vials containing Magnevist^{TM} contrast agent (Gd-DTPA, Berlex Laboratories, Wayne, NJ) were placed in the air cavities. The phantom was imaged with an MR scanner (1.5 T, GE Echo Speed, Milwaukee, WI) and a CT scanner (GE Light Speed Plus Multislice CT) along a plane perpendicular to the axes of the vials. The MR imaging protocol used fast gradient-recalled echo (fGRE) sequences with a 44 x 44 cm^2 FOV, 1.0 cm slice thickness, and an image matrix of 256 x 256 and 512 x 512. The positions of the vials according to their centers of mass were measured from the MR and CT images. Preliminary results of the 512 x 512 images showed that the vial positions in the MR images agreed with the CT images to an average deviation of 1.26 mm, with a maximum deviation of 2.38 mm. Thus, the above mentioned system distortions did not affect identification of the vial locations significantly.