AbstractID: 3899 Title: Quantification of Normal Organ Motion due to the Respiratory and Cardiac Cycles

Quantification of Normal Organ Motion due to the Respiratory and Cardiac Cycles

Purpose:

To quantify the degree of normal organ motion due to the respiratory and cardiac cycles. Better definition of such motion may be useful in defining field margins and in assessing the utility of gating technologies.

Method and Materials:

Four healthy volunteers were serially scanned in the supine position with a GE 1.5T MRI scanner. T1-weighted sagittal and coronal localization scans were first performed to define the regions to be studied. Axial images through the heart, liver and pancreas were continuously scanned with fast cine MRI scans at three different gating settings: a). without either respiratory or cardiac gating, b). with respiratory gating but without cardiac gating, and c). with both respiratory and cardiac gating. The motions of heart, liver and pancreas were calculated at the organ edges with the maximum motions along the direction that is perpendicular to the edge.

Results:

For the scans without either respiratory or cardiac gating, the detected organ motions on the axial slices were 1.4 cm for heart, 1.1 cm for liver, and 1.0 cm for pancreas. For the scans with respiratory gating but without cardiac gating, the motions were 0.7 cm for heart, 0.5 cm for liver, and 0.4 cm for pancreas. For the scans with both respiratory and cardiac

gating, all the motions were <0.2 cm. The AVI movie files were also created and showed significant differences in organ motions for three different gating settings.

Conclusion:

With respiratory gating only, significant organ motion is still present in heart, liver and pancreas. In some clinical settings, the application of both cardiac and respiratory gating may be therapeutically advantageous. Additional study is warranted to better understand this issue.

Conflict of Interest:

Authors received grant support from Varian Medical Systems.