AbstractID: 12979 Title: Maximum Intensity Projection (MIP) imaging using multi-slice cine MRI

Purpose: To propose a novel method of acquiring Maximum Intensity Projection (MIP) images using multi-slice cine MRI, termed as MRI-MIP, and to evaluate its feasibility in quantifying motion magnitude.

Materials and Methods: MRI-MIP images are acquired using a modified multi-slice cine MR sequence in which each axial slice was imaged repeatedly throughout the duration of the respiratory cycle. A maximum intensity image was then constructed for each slice using all acquired images. For this study, we used a 1.5T clinical whole body MRI scanner (Signa, GE Healthcare, WI) and a sequence of fast imaging employed steady state acquisition (FIESTA) with a six channel phased array flexible coil to acquire 15 images in 6 seconds for each slice (flip angle= 50°, matrix= 192×128, FOV= 300x300mm, slice thickness= 0.5mm, TR/TE= 3.2/1.0ms). To test feasibility, MRI-MIP, CT-MIP, and single slice sagittal cine-MR images were acquired of a 66 cm^3 polygonal phantom placed on an MR compatible motion platform with Superior-Inferior motion consisting of 2 analytical (peak-to-peak amplitude = 2.8cm, period = 5s) and 3 patient motion trajectories from Varian RPM. We also acquired MRI-MIP and single slice sagittal cine-MRI images for 3 healthy volunteers and compared the areas of interest.

Results: Phantom volume from MRI-MIP was well correlated with CT-MIP, with the mean (± standard deviation) difference from CT MIP being 0.1%±2.9% and a max difference of -4.2%. For the analytical trajectories, area from MRI-MIP matched cine-MRI to within ±0.3%. For patient motion trajectories, the difference in phantom area between MRI-MIP and cine-MRI was -10.4%, -7.4%, and -6.6%. For patient images, the difference in contoured areas was -5.5%, 2.3%, and 4.8%.

Conclusion: Preliminary results on phantom and healthy volunteers suggest using multi-slice cine MRI to generate MIP is feasible. Motion information obtained from this technique is comparable to that from 4DCT-MIP.