

AbstractID: 13750 Title: Measurement of Dynamic Contrast Enhancement in Rat Heart using Gated Computed Tomography

Purpose:

Measurement of 5-dimensional (namely, 3D, time and cardiac phase) kinetic contrast enhancement in rat cardiac regions was investigated using fast retrospectively gating micro computed tomography (micro-CT).

Method and Materials:

A rat was scanned using the GE eXplore Locus Ultra Pre-Clinical CT Scanner. A baseline dynamic scan was performed with technique factors of 60 kVp, 60 mA, 1s scan for 60 scans, 0.45 mm thick slice, 420 projections per rotation and a longitudinal coverage of 4 cm covering the abdominal region of the animal. The animal was connected to a respiratory and cardiac monitoring system. A contrast enhanced series was subsequently done with injection of 0.5 ml of visipaque diluted with 0.5 ml of heparinized saline over the first 10 seconds during the scan. The projection images of the two scan series were retrospectively sorted for different cardiac phase during expiration only. Net contrast enhancement projection images were generated by contrast enhanced and the corresponding baseline images. The net projection data were reconstructed with a previously reported algorithm in which every reconstructed voxel is assumed to act as a single compartment - for extraction of temporal contrast enhancement for different regions in the heart.

Results:

Dynamic 3D contrast enhancements were reconstructed with the net contrast enhanced projection images from different cardiac time point. The dimension of reconstructed voxel was 0.2mm, 0.2mm, and 0.6mm. The contrast enhancement curves for blood pool and myocardial region were obtained. Initial contrast uptake speeds of blood pool and septum were 49.4 and 17.1HU/s respectively.

Conclusion:

A retrospectively gating dynamic contrast enhanced micro-CT method with high spatial and temporal resolution was developed. This method was tested by the rat's model, and the results showed that this method is able to estimate the contrast wash in and wash out behavior in cardiac blood pool and myocardial perfusion.