AbstractID: 10929 Title: Effect of motion on high contrast vessel-like objects for volumetric DCE-CT

Purpose: This study aims to assess the impact of motion on high-contrast vessel-like objects in volumetric CT scans as a step towards volumetric DCE-CT on a 320-slice CT scanner. **Material and Methods:** An acrylic cylindrical phantom was constructed to investigate influence of motion on contrast-enhanced cylindrical structures (capsules) mimicking contrast-bearing blood vessels. The phantom consists of 12 Teflon capsules of varying diameters (1, 2, 5 and 10 mm) embedded at predefined positions and in different orientations (longitudinal, diagonal and axial). A motor-driven platform provided uniform phantom motion speeds of 0, 0.5, 1.0 and 2.0 cm/s along the longitudinal axis of the scanner. Gantry rotation speeds T_G was varied between 0.35 and 3 s. All scans were acquired on a Toshiba Aquilion ONE CT scanner with a field-of-view of 16 cm in one rotation. **Results:** For a given phantom motion speed, HU decreased with increasing T_G. Increasing the phantom motion speed from 0 to 2.0 cm/s reduced the HU by 9% for T_G = 0.35 s and by 21% for T_G = 3 s. Measured HU values also decreased with increasing T_G for the other capsule orientations, however, it was least pronounced for the longitudinal orientation. The discrepancy between longitudinal and axial orientation is 2% for T_G = 0.35 s and 9% for T_G = 3 s. These differences are more pronounced for smaller capsules. **Conclusions:** A systematic study was performed to quantify the impact of motion on dynamic contrast-enhanced CT measurements. It was found that contrast in vessel-like objects is affected by orientation and motion. However, for fast gantry rotations (< 0.5 s) motion affects the contrast measurement by generally less than 10% for different phantom speeds and less than 2% for different vessel orientations. With this phantom, optimization of different scan parameters is possible.