AbstractID: 13759 Title: Analysis of Artifacts in Four-Dimensional CT Images of phantoms with regular motions

Purpose: The aims of this study were to clarify the factors causes imaging artifacts and investigate the impact of partial volume and truncation artifacts on volume determination. **Method and Materials**: Moving cylindrical phantoms with 2cm of diameter with different heights, 0.3cm, 0.5cm, 1cm, 2cm, 3cm, and 10cm were scanned (scan range 2cm/6cm0 by GE (General Electric Healthcare) LightSpeed. GE Advantage. 4D software was used to create 4D-CT data sets. The artifacts were then visually and quantitatively analyzed. Scan. The target volume was determined by manual contouring and automatic volume detection using a cutoff value of 250 HU (Hounsfield Unit). The conformity index of the target volume was defined as the ratio of the manually contoured volume to the volume defined by HU cutoff. The ratio of volume from static CT to real volume was calculated in order to investigate the partial volume effect and truncation artifacts. The volumes measured in 10 phases of 4D CT images were also compared with true volume. **Results:** The ratio of static cylinder volume in CT images scanned 2cm length to the real volume was maximally twice by partial volume effect. The correlation between the velocity and target volume was not consistent potentially due to complicate interplay of different artifacts;,partial volume effect, truncation artifact and miss or different matching between adjacent beds . **Conclusions**: The static CT data volume can be quite different from true volume even in static CT images. If a lesion size is not enough to overcome the impact of the partial effects, significantly larger volume will be presented on static and 4DCT images. Any strong correlation between the velocity and the volume was not found.. The 4DCT images still presents partial volume and truncation artifact that requires the further improvement of imaging technology.