AbstractID: 5627 Title: A Graphical and Quantitative Procedure for Amplitude-Gated treatment Planned Using Phase-Based 4DCT using the Varian RPM System

Purpose: A graphical and quantitative procedure for amplitude-gated treatment planned using phase based 4DCT of free breathing patients using the Varian RPM gating system has been developed as a part of the study of phase and amplitude based imaging and treatment. There are several phase-based CT scanning systems that produce phase-based images for gated treatments, but for free breathing phase may not be a reliable predictor of tumor location. Good correlation has been shown between abdomen height and diaphragm position, making it a promising treatment modality.

Method and Materials: A phase-based retrospective CT scan from a Philips large bore 16 slice CT scanner is obtained and the phase markers are adjusted to delineate actual breaths. A gating window that is a subset of the whole CT scan is set and a visual representation of gated motion called a MIP(maximum intensity projection) is created to visualize any anatomical excursions. The Varian RPM data is then compared with the scan data to quantify the actual marker block motion(or chest height) during the gating window as well as for an entire phase. The scan data is then presented not only as a percentage of an average breath, but as a chest height range within the total. This information is checked on treatment days and adjusted if necessary. The gating signal and fluoroscopy are compared to a 4D DRR generated from the MIP to check for geographic as well as systematic misses. Before treatment a gated port film (gated over several breaths and dose limited) can be captured to verify gating of the treatment beam.

Results: For phantom based studies of regular breathing the method is robust. The model converts phase to amplitude of abdomen height.

Conclusion: This method can validate a gated treatment using different imaging modalities.

Conflict of Interest (only if applicable):