

AbstractID: 1691 Title: Integration of Free Breathing 4DCT in Treatment Planning Process

We report on initial patient studies to evaluate the performance of the Free Breathing 4DCT (FB-4DCT) and its integration in treatment planning process. The 4DCT is retrospective respiratory gating software that uses the Respiratory Position Monitoring (RPM) system to characterize the lung motion over periodic breathing cycles. The volume imaged by GE multi-scanner is at 4 slices/0.5s in multiple acquisition of 1 cm along the cranial-caudal direction. The scans are continuously acquired for the duration of an average respiratory cycle. The CT images and the respiratory motion data are correlated on the basis of the respiratory phases and saved. The 3D motion of the tumor due to respiration is measured by reviewing images in sagittal, coronal, and axial planes. The FB-4DCT and standard helical CTs from 12 lung cancer patients were used to investigate the adequacy of PTV margin-assignment by physicians. Our standard protocol, prescribes the dose at 92% coverage of the volume delineated by physician. For 4DCT we determine the PTV margins using 0%, end-inspiration, and 50%, end-expiration and the dose calculation was performed on 30%, mid-inspiration, phase with the coverage of 92% PTV volume. The calculations on 30% phase were repeated with the standard beam arrangement plan. Plan comparisons have shown that standard plan does not cover the PTV adequately in 3D and often under dose by 10-15%. We conclude that 4DCT integrates well in treatment planning process and is valuable to quantify respiration motion to eliminate the margin-assignment inadequacy. This research in part was supported by Varian/GE.