

AbstractID: 9684 Title: The Impact of Organ Motion on Dose Distributions

Organ motion during radiotherapy can lead to a degradation of the planned dose distribution. We have used 4DCT data (5-10 complete CT volumes at different breathing phases) of moving tumors to study the impact of motion on target dose coverage during respiration. Initially, the GTV is defined on a light respiration planning scan, expanded to generate a CTV, and expanded again to generate a PTV that includes respiratory motion and setup error. Treatment plans based on these targets were optimized for conformal treatment, IMRT, and proton beam therapy. These beams were then applied to the 4DCT datasets, and dose calculations redone on each respiration specific phase. Dose coverage of the moving CTV (CTV_m) was assessed by phase specific DVHs. In a sample case involving a moving lung tumor with 1 cm PTV margins, 97% of the CTV_m at exhale is covered by the prescription isodose, while at inhale, 99% of the CTV_m is covered. The dose coverage analysis is highly specific to a given tumor trajectory. Other analyses include patients selected from over 14 4DCT scans of abdominal and lung tumors. In future analyses, treatment planning will be based on the composite CTV derived from the different respiratory phases to eliminate geometric artifacts in the light breathing CT-scan.