

**Purpose:** To investigate the impact on delivered target dose of tumor motion inside of the lung. The delivered dose of a moving target was measured and compared among 3D conformal, low-modulated IMRT, VMAT and high-modulated IMRT and VMAT plan.

**Method:** A Dynamic Thorax Phantom (Model 008A) from CIRS Tissue Simulation & Phantom Technology was scanned using Philips CT scanner with both standard and 4D mode. The GTV, the implanted 3 cm target in the left lung of the phantom, was drawn based on both 4D CT MIP and standard CT mode. To simplify the process, PTV is the same as 4D-GTV in this phantom planning study. The prescription is 2 Gy for one fraction and dose normalization is to isocenter, where the chamber (TN31014\_00703 from PTW, Freiburg, Germany) located. Five different plans were generated using Pinnacle treatment planning system version 9.0 for 6 MV photon beams from Elekta Beam Modulator LINAC with MLC leaf width of 4 mm. A measured chamber dose is compared to the calculated dose to the chamber volume. The volume of the target from 4D CT is compared to the volume detected from CBCT.

**Results:** The chamber measurement shows the difference between measured and planned are -0.28%, 0.91%, -0.08%, 4.36% and 1.02% respectively. The volume of GTV from 4DCT is 32.5 cm<sup>3</sup>, 11.5 cm<sup>3</sup> from standard and 23.7 cm<sup>3</sup> from CBCT.

**Conclusions:** An increased difference between measured and planned is observed with increasing modulation of the IMRT and VMAT plan. The difference in volume detected by daily CBCT and by 4DCT needs to be followed up and a guideline in daily IGRT needs to be worked out. More detailed studies with film dosimetry to address the effect in 2D dose distribution is underway.