

## AbstractID: 8567 Title: Analysis of imaging doses for optimal management of 4D-IGRT treatments

**Purpose:** Introducing 4D-IGRT potentially increases an accumulated dose to patients from imaging and verification processes compared to conventional practice. It is therefore essential to investigate the level of imaging dose to patients when 4D-IGRT devices are installed. We monitored the imaging dose level and compared with that of pre-IGRT practice. **Method and Materials:** A 4D-CT (GE, Ultra Light Speed 16), a simulator (Varian Acuity), and a linear accelerator (Varian IX) equipped with kVp (OBI) and MVp (aSi 1000) imaging devices were installed for 4D-IGRT. The surface doses to a RANDO phantom were measured with newly installed devices and with pre-existing devices; single slice CT (GE, Light Speed), a simulator (Varian Ximatron) and L-gram with a Varian 2100CLinac. The surface doses were measured using TLDs (HASHOW, Model T-100) at 8 different sites of the phantom; the brain, eye, thyroid, chest, abdomen, ovary, prostate, pelvis. **Results:** Compared to the imaging with single slice non-gated CT, the gated MDCT imaging increased the dose to the chest and abdomen more than tenfold ( $1.74 \pm 0.34$  vs  $23.23 \pm 3.67$  cGy). But the imaging doses with Acuity at all measured sites were smaller than those with Ximatron due to a function that reduced irradiation time for fluoroscopy, which were  $0.91 \pm 0.89$  vs  $6.77 \pm 3.56$  cGy, respectively. The portal imaging doses with MVp EPID were about the half of the dose with conventional L-gram ( $1.83 \pm 0.36$  vs  $3.80 \pm 1.67$  cGy). The dose from OBI was  $0.97 \pm 0.34$  cGy for fluoroscopy mode. **Conclusion:** Gated CT is the major source of increasing the imaging dose to patients. OBI imaging dose was small, but the accumulated dose associated with everyday verification for accurate treatments needs to be taken into account