AbstractID: 11479 Title: Implementation and Characterization of a 320-slice Volumetric CT scanner for Simulation in Radiation Oncology

Purpose: A novel volumetric CT scanner (Aquilion One, Toshiba) has been installed at the Princess Margaret Hospital for implementation into routine CT simulation. This technology offers great advantages for anatomical and functional imaging in both scan speed and coverage. This work aims to evaluate the logistics and integration of the system in our radiotherapy department, the imaging performance and quality.

Method and Materials: The Aquilion One uses a wide-area design and can acquire a volume of 160 mm in 350msec. It can also be used as a 64-slice scanner and perform spiral acquisitions. Room shielding was adjusted from the conventional CT simulators due to the extra scatter generated from the wider X-ray cone angle in the 320-slice scanner. CT dose measurements were done with the CTDI "body" and "neck" phantom using additional build-up material for more realistic scatter conditions. Electron density measurements were done at 120 and 135kVp and HU consistency checked across the scan volume. Image quality and noise and spatial integrity were assessed with the CATPhan phantom and large-are water-equivalent phantoms.

Results: At 1m from the isocentre the scatter could be as much as 6 times the dose from a 16-slice CT (μGy/mAs). CTDI measurements were consistent with those published in the literature. Electron density curves are comparable to existing HU calibration data from our other CT-simulators. In volumetric mode the HU variation across the volume is less than 10% for materials with a density less than or equal to water. Image quality and noise were deemed acceptable.

Conclusion: A novel 320-slice CT scanner has been successfully commissioned for routine radiotherapy simulation. Initial evaluation shows good performance and stability of volumetric scanning at isocentre. In-field variations in HU calibration are present for higher density materials but within the range that could arise from using different tube potentials.