

## AbstractID: 13474 Title: A Neutron Measurement Comparison of Varian and Elekta 10&18 MV Photon Beams

**Purpose:** Photo-neutron production from high energy ( $\geq 10\text{MV}$ ) linear accelerators is a concern for increasing the risk of secondary cancers in patients. Many studies have been conducted to characterize neutron properties for Varian accelerators. The purpose of this study was to investigate and compare the neutron dose equivalents (H) as measured in the gamma/neutron mixed field from Varian IX and Elekta Precise accelerators.

**Method and Materials:** A neutron REM meter (Model-5085, Far West Technology Inc, CA) was used and set to discriminate gamma rays for all measurements. The neutron dose equivalents were measured for both 10 and 18MV photons. We delivered 200 MU at 100MU/min for measurements at various locations. The neutron dose equivalents (H) were measured as a function of square field size (FS) and gantry angle.

**Results:** For the Varian accelerator, H as a function of FS (0, 10, 20, 30, 40 cm) at 180°, H (mrem) were 1.48, 1.51, 1.50, 1.43, and 1.35 respectively for 18MV photons; and 1.11, 0.684, 0.415, 0.367, 0.338 for 10MV photons. As a function of gantry angle (0°, 90°, 180°, 270°), H (mrem) was 1.40, 1.48, 1.51 and 1.51 respectively for 18MV; and 1.15, 1.18, 1.15, 1.09 for 10MV. For the Elekta machine, H (mrem) as a function of FS (0, 10, 20, 30, 40 cm) at 180°, H were 0.727, 0.720, 0.689, 0.634, 0.578 respectively for 18MV photons; and 0.682, 0.489, 0.305, 0.265, 0.240 for 10MV photons. As a function of gantry angle (0°, 90°, 180°, 270°), H (mrem) were 0.729, 0.749, 0.723, 0.707 respectively for 18MV; and 0.722, 0.645, 0.635, 0.614 for 10MV.

**Conclusion:** The neutron dose equivalents measured for the Elekta photons were significantly lower than those for the Varian linear accelerators, especially for 18MV photons. This is likely due to differences in beam-line design.