

## AbstractID: 3528 Title: Unusually large fluctuation of Monitor Unit (MU) Efficiency in large-field IMRT plans using sliding-window technique

**Purpose:** To examine the Monitor Unit (MU) efficiency (prescription dose in cGy as a percentage of the total MU) of large-field IMRT using sliding-window and step-and-shoot techniques and their implication to patient whole-body dose.

**Method and Materials:** Seven large-field IMRT plans for pelvic/abdominal cancers were generated on the Eclipse treatment planning system using 18 MV photon beams. The MU efficiency of each plan was calculated for both the sliding window and the step-and-shoot (with 15 intensity levels) techniques for a 120-leaf multileaf collimator on a Varian 2100CD linear accelerator. The impact on patient whole-body dose resulted from accelerator leakage was estimated from the ratio of total treatment MUs of the two techniques.

**Results:** The MU efficiency for large-field IMRT using either sliding-window or step-and-shoot technique ( $< 20\%$ ) is lower than that of medium-field-size prostate plans ( $\sim 30\%$ ). As expected, the MU efficiency of step-and-shoot technique is better than that of sliding window for all seven plans. However, unusually large fluctuation of MU efficiency (to as low as 5.5%) was observed among the plans using sliding-window technique. In the extreme case, the use of step-and-shoot resulted in a 130% increase in MU efficiency over sliding-window as opposed to the typical increase of 10 – 30%. The implication on patient whole-body dose is enormous as the total MU needed to deliver 70 Gy would be 127,000 for sliding-window and only about 55,000 for step-and-shoot. In this case, the whole-body dose due to leakage x-ray and neutrons is reduced by a factor of 2.3 using step-and-shoot technique instead of sliding-window.

**Conclusion:** The MU efficiency for large-field IMRT is low and large MU is usually required to deliver a given prescription dose. Since step-and-shoot technique yields consistently better MU efficiency than that of sliding-window, it should be used for large-field IMRT delivery.