AbstractID: 8906 Title: A study on the use of full-field non-flat beams for IMRT treatment

Purpose: The purpose of this study was to investigate the adequacy of full-field non-flat megavoltage beams for planning and delivery of step-and-shoot Intensity Modulated Radiation Therapy for different body sites.

Method and Materials: IMRT treatment optimization creates non-flat fluence maps to accomplish prescribed treatment objectives. With "Stereotactic" mode available in commercial linacs with the flattening filter removed, non-flat beams are now available that produce dose rates much higher than the flattened beam modes in current clinical use, thus offering the potential of delivering treatments much faster. We have recently installed and commissioned such a photon beam. This beam is currently restricted in its clinical use to $5x5cm^2$. Full field beam data was acquired for this beam in research mode. The full-field stereotactic mode beam data was modeled in Eclipse TPS. IMRT plans previously delivered for different target sizes and complexities ranging from prostate, head and neck and abdomen were re-planned using the same target and normal tissue constraints. Plans comparable to the clinically accepted treatment plans were obtained. These plans were compared using several plan comparison parameters, along with the total number of MU's and segments required to deliver a comparable plan, and correlated to the size of the target.

Results: Our results show that clinically acceptable treatment plans are easily accomplished with the non-flat beams, with comparable MU's for smaller targets, but proportionally larger MU's for larger targets. The number of segments required to deliver comparable plans with the non-flat beam were very similar, but slightly higher.

Conclusion: Our study indicates that treatment delivery with highly modulated fields do not require flattened beams for clinical treatment delivery. The benefit of three times higher dose rates than the flattened beam will make treatment delivery significantly faster for non-flat beams. This benefit will be much more significant for hypofractionated treatments.