AbstractID: 8593 Title: A Multi-institutional Retrospective Study on Clinical IMRT Treatment Delivery Efficiency

Purpose:
To better understand IMRT delivery efficiency in daily clinical operation we conducted a five-institution retrospective study on clinical IMRT treatment delivery time and IMRT MUs as functions of a number of variables - the number of fields per IMRT treatment, treatment site, total MUs, and total number of segment fields for MLC-IMRT treatment. The goal is to identify major contributing factor(s) for IMRT delivery time for each IMRT approach for improvement.

Method and Materials:
Data from more than 350 patients were extracted from IMPAC/LANTIS R&V system. A 5-day average value was taken for any time data. The IMRT treatment delivery time represents the portion of total patient delivery time that is specific to IMRT delivery technique and is defined as the time elapsed between the beam-ON of the first field/segment and the beam-OFF of the last field/segment in an IMRT treatment. The accelerators studied are Siemens, Varian, and Elekta. Treatment planning systems used are PLanUNC, ADAC Pinnacle, and CMS XiO. The four IMRT delivery approaches studied are: segmental MLC-IMRT on Siemens accelerator, segmental MLC-IMRT on Elekta accelerator, dynamic MLC-IMRT on Varian accelerator, and compensator-IMRT on Siemens accelerators.

Results:
Our initial results show that for MLC-IMRT treatments the IMRT treatment delivery time is closely correlated with the number of segment fields and less correlated with the total number of MUs and treatment site. There is a large variation in IMRT treatment delivery time for IMRT treatment of a given number of fields, depending on the accelerator and IMRT approach used.

Conclusion:
Our five-institution retrospective study on clinical treatment delivery data shows that manual compensator-IMRT treatment is among the fastest of the five IMRT delivery approaches studied. In average all IMRT delivery approaches spent only approximately 20% of the IMRT delivery time (as defined) on actual radiation delivery.