AbstractID: 11526 Title: Calculation time analysis of combinations of 3D algorithms and calculation grid sizes for a commercial treatment planning system

Purpose: To correlate calculation time to a planning metric numerical analysis of the various combinations of dose calculation algorithms (convolution, fast-superposition, superposition) and grid spacing (5, 4, 3, 2 mm) available in the Xio treatment planning system (Computerized Medical Solutions, Saint Louis, MO). **Methods and Materials:** The treatment plans for 5 patients treated for prostate cancer using intensity modulated radiation therapy (IMRT) were used for this analysis. Dose metrics derived from dose volume histograms (DVH) were recorded along with dose calculation time for all combinations of algorithm and calculation grid size. These metrics include the minimum, maximum and mean dose for the planning target volume (PTV) and the rectum, as well as the percentage of PTV receiving at least the prescription dose of 75.6 Gy and the percentage of rectum receiving at least 70 Gy. For each patient, the plan using the superposition algorithm and a 2-mm grid spacing was used as a benchmark, to which all metrics were normalized. The metric ratios were then averaged over all patients and standard deviations were calculated. **Results:** Preliminary results show very good correlation (average=1.00, standard deviation=0.01) between the variant plan and benchmark plan for the following combinations: convolution at 2 mm, fast-superpostion at 3 and 2 mm, and superposition at 3mm grid spacing. Corresponding ratios of variant to benchmark calculation times are as follows: 0.13, 0.10, 0.38, and 0.22, respectively. **Conclusions:** Without sacrificing calculation accuracy, significant reductions in calculation time can be made by choosing variant combinations of algorithm and grid size. Once a particular combination is chosen as an alternative to the benchmark, a more in-depth, qualitative analysis should be run. In future developments, this analysis will be extended to other disease sites such as lung, breast, and head and neck.