AbstractID: 3834 Title: Initial Experiences with a Dynamic Treatment Simulation System

Purpose: To present our initial experience with an in-house developed dynamic treatment simulation platform, PortSim, and evaluate its performance characteristics in the context of conventional and IMRT simulation.

Method and Materials: PortSim is a software package that interfaces with a conventional simulator that operates in fluoroscopic mode. A frame grabber is used to obtain live images from the image intensifier (II). The patient's treatment plan, including DRRs, beams, contours and MLCs can be imported into the PortSim environment. The distortion corrected fluoroscopic images can be compared against the DDRs and verify beam and isocenter placement. Both static and dynamic MLCs can be superimposed on the fluoroscopic images to verify beam aperture prior to treatment. Volume contours can also be projected to verify target position and coverage. Patient setup and targeting uncertainty can be quantified at the time of the simulation. The complete simulation process can be recorded for later review and analysis.

Results: The PortSim system enabled us to increase our simulation throughput by 30%. It provided a film-less environment for patient simulation and verification. The maximum image distortion correction error is less than 2 mm, making the digital images readily usable for review and planning purposes. Physician subjective error in reviewing films was significantly reduced due to the improved image quality, direct overlay of DRR and contours. The software allows for DICOM import and export to other devices, including printers.

Conclusion: We have developed a comprehensive software package that allows us to improve significantly our film review during the patient's treatment simulation. With features such as direct overlay, side-by-side display on the same screen and improved image quality we can perform simulations more efficiently and more accurately. The simulation process can be recorded and provide valuable information for improving field design and patient immobilization techniques.