

## AbstractID: 7085 Title: Monte Carlo based dose verification for serial tomotherapy

**Purpose:** To develop a Monte Carlo model to verify the final dose distributions and monitor units for serial tomotherapy plans developed and delivered using the Peacock system (Corvus Treatment Planning System and MIMiC collimator, Nomos Corp., Sewickley, PA).

**Materials and methods:** The Peacock system delivers the dose to the patient using arc therapy. The treatment plan is created in Corvus where sinograms are created for each arc in order to dictate the state of each of the MIMiC leaves at different locations along the arc. In-house functions were written in Matlab (Mathworks Inc., Natick, MA) to decode these sinograms. A simple three-field plan (three gantry positions), as well as full patient treatment plans were simulated using our Monte Carlo model and the same plans were delivered using the Peacock system in solid water. Films were placed in the solid water phantom in order to measure the dose distribution for comparison against the Monte Carlo calculations. Matlab functions were written to convert the Monte Carlo output into a format RIT113 (RIT Inc., Colorado Springs, CO) could read. This allowed us to co-register the calculated dose maps and the measured ones in order to compare the two.

**Results:** The Monte Carlo calculated dose distribution from the complete arc therapy in solid water phantom was compared against film measurements. The agreement was within 2%. The comparison between Monte Carlo results and Corvus calculated dose distribution revealed that Corvus would fail to accurately compute the dose in the region where inhomogeneities were present.

**Conclusions:** Based on the agreement between Monte Carlo and measurements we can use the Monte Carlo system as an independent quality assurance tool in order to verify dose distributions and MUs per arc computed by the Corvus.