

AbstractID: 10787 Title: Commissioning of Monaco Monte Carlo IMRT treatment planning system

Purpose: To commission CMS Monaco IMRT treatment planning system for clinical applications using a standard test suite.

Methods and Materials: A system test including IMRT planning and plan delivery was performed for CMS Monaco IMRT treatment planning system, version 1.0.2. Four cases from TG-119 were studied: one head and neck case, one prostate case, and two C shape cases. IMRT plans were generated with the dose goals set by TG-119 and were compared with the plans generated using CMS XiO treatment planning system. Analysis metrics were for dose coverage, number of segments, total MU, MU efficiency, number of segments per beam, and delivery time. The IMRT plans were delivered on an Elekta Synergy linear accelerator with step-and-shoot technique. This linac has 4-mm MLC. IMRT QA was performed with field by field review using a diode array device Mapcheck.

Results: Monaco plans showed similar target dose coverage as XiO plans and improved organ sparing in some cases. The ratios (Monaco/XiO) of number of total segments, total MU, number of segments per beam, and MU efficiency (Dose/MU) were 0.21-0.76, 0.56-0.77, 0.21-0.50, and 1.31-1.86, respectively. The delivery time of a Monaco plan was shorter than the XiO plan having the same number of beams by approximately 33%. IMRT QA pass rates of the Monaco plans were 93.8%-97.6% for the criteria of 3-mm, 3%, and 10% threshold, which in three cases were higher than the XiO plans (93.1%-96.6%).

Conclusion: The IMRT plans from the Monaco treatment planning system showed advantages over XiO plans. These advantages include smaller number of segments, smaller MU, smaller number of segments per beam, and higher MU efficiency. Additionally, the delivery time was shorter. The QA pass rates were similar to or higher than the XiO plans.