

AbstractID: 13980 Title: Tool for Automated Monthly Quality Assurance on Tomotherapy using Film

**Purpose:** To efficiently and accurately perform routine monthly quality assurance (QA) tests on a Helical Tomotherapy unit using an in-house developed phantom and software

**Method and Materials:** Helical Tomotherapy is an image guided intensity modulated radiation therapy delivery system. The system uses a dynamic delivery in which the gantry, treatment couch and multileaf collimator leaves are all in motion during treatment. The dynamic nature of helical tomotherapy requires QA that is different from a conventional linear accelerator. According to the AAPM Task Group report 148 (QA for Helical Tomotherapy) and previous guidelines, one needs to check longitudinal and transverse profiles along with field widths as part of the monthly QA. To perform this task we had to set up the tomotherapy water tank and use the tomotherapy electrometer measurement system (TEMS) for data collection and analysis. To simplify and expedite this process a film phantom was designed and MATLAB developed software was used for analyzing the irradiated film. One could simultaneously obtain several parameters like the longitudinal and transverse profiles, field widths, couch linearity and relative output factors for all the field widths from the film. A Kodak EDR2 film is placed in the phantom and exposed on the tomotherapy system to obtain all the field widths along with a step wedge for calibration on the same film. The irradiated film is then analyzed using the in-house developed software and a report is printed out.

**Results and Conclusion:** Using the phantom we could check the longitudinal and transverse profiles, field widths, couch linearity and relative output factors for all the field widths on the system. When compared to the couple of hours it would take for beam scanning, the film phantom and software have enabled us to cut down and quicken part of our monthly QA process to <30 min.