

AbstractID: 7027 Title: Quality Assurance Protocol of the HiArt Tomotherapy MLC: Design and Implementation

Purpose: To develop a comprehensive protocol and software tool for the quality assurance of the HiArt Tomotherapy MLC system.

Method and Materials: Seven MLC test patterns were designed and an in-house software called “Tomo MLC QA” was developed to generate the sinogram for the test patterns and analyzed the test results. The seven test patterns are: box in box, modified checkerboard, leakage test, IEC-Xgra dient, IEC-Y gradient, complex field A, and complex field B. Kodak EDR2 ReadyPak films were used for all the measurements with our test patterns.

Results: The films from the measurements were analyzed with the “Tomo MLC QA” tool. Pass and Fail criteria were specified for each test according to published QA data. Most tests passed the set criteria, although some failures were detected and corrected.

Conclusion: In this study, seven test patterns were designed as part of a QA toolkit for the MLC of a helical tomotherapy unit. A software platform called “Tomo MLC QA” was developed to facilitate the analysis of the seven tomotherapy MLC QA tests. The software can be easily adapted to any treatment center with a helical tomotherapy unit to perform customized tomotherapy MLC QA or to standardize testing. Additional test patterns can be developed based on the “Tomo MLC QA” platform. The seven designed test patterns for tomotherapy MLC QA are not aimed to test all characteristics of the tomotherapy MLC. However, the patterns allow the users to test some of the mechanical and dosimetric properties of the tomotherapy MLC. The analysis results based on the seven test patterns from our institution were reported. All tests passed at the in-house set criteria, indicating that our unit’s MLC is operating according to specifications. The analysis revealed some minor problems regarding beam angle position that require further investigation.