## AbstractID: 10868 Title: Evaluation of Tomo Quality Assurance<sup>™</sup> (TQA<sup>™</sup>) Performance for Daily Quality Assurance

Purpose: To investigate and evaluate the utility of TomoTherapy Incorporated's Hi-Art® treatment system Tomo Quality Assurance<sup>TM</sup> (TQA<sup>TM</sup>) software application for daily quality assurance. Method and Materials: Data collected over a 5-month period utilized the TQA<sup>TM</sup> predefined application modules, 'Basic Dosimetry', 'Step Wedge Static', and 'System Monitor'. Each module contained multiple tests. 'Basic Dosimetry' provided rotational and dosimetric information. The 'Step Wedge Static' module measures IEC-xyz coordinate offsets, and its transmission characteristics. The 'System Monitor' module records environmental and mechanical values. Tests modules are initiated by selecting preprogrammed routines located on the operator's console. The data is collect by the TQATM software that compares the data with acceptance parameters. Results: Review of the data revealed results that provided useful information with one exception. TQA<sup>TM</sup> results revealed IEC-z offset variations from -4.62 to +5.24 mm, with an average of 0.68 mm and  $\sigma = 2.79$  mm. Tolerance for the IEC-z offset is  $\pm 3$  mm. The failing IEC-z offset data could not be collaborated with checks of the z-plane laser accuracy. Further investigation found that the step wedge phantom rested on the lateral (IECx) adjustment bar located at the head of the couch. The bar is elevated about 2-3 mm higher than the couch creating an alignment problem with the z-plane laser. Incidental target failure necessitated a retrospective review of the data revealing abrupt changes in dosimetry prior to the failure. Conclusion: This investigation indicates that the TQATM software is a functional tool with the exception that the IEC-z offset is not a reliable indicator of actual conditions. It is believed that the presence of the lateral adjustment bar may create a problem with the test algorithm. Dosimetric data revealed some early indicators of the target failure. This could lead to preemptive replacement of the target to avoid treatment interruptions.