

## AbstractID: 6699 Title: An Independent Delivery Quality Assurance Calculation for the Tomotherapy linac

**Purpose:** To develop an independent dose calculation method as a QA tool for Helical treatment delivery.

**Method and Materials:** The Tomotherapy linac delivers radiation using a helical delivery method where the gantry rotates around the patient while the couch advances continuously. The MLC consists of 64 leaf pairs, with each opening for a specified duration for each of 51 gantry positions, or 'projections'. The specification for the MLC leaf patterns for the whole treatment constitutes a 'sinogram'. The Tomotherapy system provides a Delivery QA (DQA) method whereby the sinogram for the approved treatment plan is used to deliver radiation to a phantom. An ion chamber can be inserted and the measured dose is compared to the calculated value in the DQA plan. The current project is aimed at developing an independent dose calculation method to verify the ion chamber calculated dose shown on the DQA plan, as well as providing a second check of the dose calculation algorithm. The proposed method extracts the DQA plan sinogram as well as other necessary plan information to calculate an expected ion chamber dose.

**Results:** Parameters for a Tomotherapy plan have been extracted and preliminary calculation using a homogeneous cylindrical phantom has been performed, using only the primary beam. Further comparison with the Tomo DQA plan will be presented.

**Conclusion:** Delivery QA is a crucial step for the Tomotherapy linac, where, unlike conventional step-and-shoot IMRT plans, MLC field shapes of individual segments cannot be verified relatively easily. The standard DQA procedure requires access to the machine, and for rush plans often poses a problem. The current project provides an independent check as well as an alternate means to verify the integrity of the sinogram before treatment begins, possibly allowing the standard DQA measurement to be scheduled more efficiently.