

## AbstractID: 7632 Title: Analysis of 1200 Delivery QA Measurements and Patient Plan Parameters in Helical Tomotherapy

**Purpose:** We have treated over 1200 patients on different anatomic sites using available beams widths. Every patient plan was verified with a delivery QA plan on a cylindrical water-equivalent phantom. This study analyzes the variations of the delivery QA results and attempts to find some correlations with the patient plan parameters.

**Method and Materials:** Following approval of an IMRT plan, a dose verification plan was generated for delivery on a Cheese phantom. An EDR2 film was placed in the central coronal plane of the phantom. An AISL ion chamber was placed 5 mm below the film for simultaneous point dose measurement. After appropriate setup and irradiation of the phantom with the delivery QA plan, the recorded charge was converted to dose and the film processed for dose distribution analysis. The films were scanned with a Vidar scanner and transferred to the Tomotherapy planning station for comparison of the delivered and planned dose distribution. Altogether 903 patient plans have been analyzed of which 11 are on 1 cm beam, 196 are on 2.5 cm beam and 696 are on 5 cm beam.

**Results:** The difference between measured and calculated doses for all beam widths correlates ( $R^2 = 0.87$ ) with a normal distribution ( $\mu = 0.6$ ,  $\sigma = 3.152$ ). The 2.5 cm and 5.0 cm beams independently are ( $\mu, \sigma, R^2$ ) 2.15, 2.93, 0.85 and 0.338, 2.92, 0.87, respectively. The 1.0 cm beam measurements had  $\mu = -0.9$ ,  $\sigma = 3.8$ . No treatment planning parameters (pitch, treatment time, modulation factor) were found to correlate with the percent difference.

**Conclusions:** The results are randomly distributed and planning parameters do not appear to affect the delivery QA results. The random nature indicates variation in machine output, phantom positioning, and position within the treatment field.