

AbstractID: 11575 Title: Dosimetric and geometric evaluation of dynamic IMRT delivered with a commercial respiratory gating system

**PURPOSE:** To evaluate the dosimetric and geometric characteristics for treatment delivery with and without respiratory gating during dynamic IMRT.

**METHOD AND MATERIALS:** IMRT treatment was delivered using LINAC Varian 21EX, dynamic MLC, sliding window technique and Varian respiratory gating system. For analysis standard treatment patterns, open field, well and chair, were created with Eclipse TPS. An in house moving phantom was used to simulate respiratory motion, 13 cycles/min.

Dose was measured with Farmer type ion chamber. Geometric evaluation with radiographic film, Kodak EDR2 and analyzed with RIT's software.

Dose was measured for nongated treatment and gated during 32%-67% phase. Fields with 10, 20, 50, 100, 300 and 400MU, and different dose rate, between 100 and 600MU/min were used for treatment delivery.

#### **RESULTS:**

MU-dose measurements for 10MU gated field with 600MU/min shows 3% deviation from linearity.

Dose differences of 1.6% between gated and nongated treatment was detected for 10MU with dose rate of 400 and 600MU/min.

For the 10MU treatment the measured dose varies between -0.5% and 1.2% when dose rate varies. Larger dose differences occurred at higher dose rates.

Geometric results, comparing film obtained gated patterns and TPS distributions showed 3mm – 3% gamma index values within 4% of analyzed pixel data.

Comparisons of dose profiles between gated and nongated, for the open field pattern, show differences up to 2% when analyzed in the leaf movement direction. Profiles in the phantom movement direction showed differences on low dose region within 3%.

#### **CONCLUSIONS:**

Less than 2% dose variation occurs when respiratory gating is used during treatment delivery with 20 MU or more.

Dosimetric differences up to 3% occur when 10 MU are delivered for gated fields at high dose rates.

Geometric and dosimetric differences up to 3% are produced between gated and nongated treatments, in low dose regions,