

## AbstractID: 6566 Title: Effect of Respiratory Gating on the Dose Distributions of Dynamic Wedge and IMRT Treatment Fields

**Purpose:** To determine the magnitude of error introduced into treatment delivery due to timing effects between respiratory-gated delivery and dynamic beam delivery (enhanced dynamic wedge (EDW) and step-and-shoot intensity modulated radiation therapy (IMRT)).

**Method and Materials:** EDW and IMRT fields were delivered on a linear accelerator (Trilogy, Varian Medical Systems). Gating of the beam was achieved using a commercial respiratory monitoring system (RPM, Varian Medical Systems), and respiratory motion was simulated using a commercial respiratory motion phantom (RPM phantom, Varian Medical Systems). All fields were delivered with no gating, a 1-mm gating window, and a 2-mm gating window.

Film and ion chamber measurements were made for both EDW and IMRT fields in a water-equivalent IMRT QA phantom, which was stationary during all measurements. Film measurements used EDR-2 film, while ion chamber measurements were made with a 0.04 cc volume pin-point chamber. Leakage current was subtracted from the ion chamber readings.

Wedge fields of 15 and 60 degrees were delivered at a dose rate of 600 MU/min. Results were evaluated for the full IMRT plan and for one of the individual beams, at dose rates of 400 and 600 MU/min.

**Results:** All ion chamber measurements were analyzed as percent difference between the gated (1-mm or 2-mm gating window) and non-gated delivery. All differences were less than 1%. There were no significant differences between 1-mm and 2-mm gated delivery. Film results, as analyzed from isodose curves and the gamma metric, showed no substantial differences between gated and non-gated beam delivery.

**Conclusion:** The use of gated treatment delivery of EDW and step-and-shoot IMRT fields does not introduce clinically significant differences into the resulting dose distributions, as quantified by film and ion chamber measurements.