AbstractID: 5441 Title: The effect of respiratory motion on two breast radiotherapy techniques: A phantom study

Purpose:
Many centers are looking beyond conventional wedged tangential fields for the treatment of breast cancer by using intensity modulation techniques for improvements in the dose distribution, reduced late tissue toxicity, and improved cosmesis. The improvement in dose uniformity may be mitigated in the presence of respiratory motion. We have compared a forward planned intensity modulated technique with a conventional wedged tangent approach for irradiation of the whole breast. The purpose of this study was to compare these techniques under both static and dynamic conditions to simulate the effect of respiratory motion.

Method and Materials:
We planned these two techniques (conventional wedged tangents and forward planned intensity modulated) on a stationary beeswax breast phantom containing a cork lung insert, using a CT acquired 3D dataset. Treatments were performed with the phantom stationary, and mounted on a moving platform having a sinusoidal waveform. The resulting dose distributions were measured using radiographic film in the anterior-posterior (AP) and medial-lateral (ML) directions. The amplitude of motion and angle of tilt of the breast, representing the relative contributions of the cranio-caudal (CC) and AP components of breathing motion, were varied.

Results:
The dose distributions for the conventional and forward planned techniques were not significantly affected by motion in both the CC and ML directions, for 1cm and 2cm amplitude, and tilt angles of 15, 30 or 45 degrees. This can be explained as the majority of dose is delivered through open fields, with only a small modulation component using MLCs for forward planning.

Conclusion:
This study demonstrates negligible differences in dose distribution with conventional and simple forward-planned IMRT techniques. The dosimetric benefits of forward planned 3D compensated breast radiotherapy are not adversely affected by respiratory motion.

Conflict of Interest (only if applicable): NA