AbstractID: 4677 Title: Consequence of CT Couch Sag in Radiation Therapy

Purpose:
To characterize couch sag on a CT scanner and determine the impact on patient treatments. A CT couch sags as it enters the gantry, and the amount depends on couch design, material, patient weight and distribution.

Method and Materials:
Four individuals were placed on a CT scanner couch (GE Discovery Lightspeed). A dial indicator was fixed to the bore of the CT scanner to measure couch deflection at the scanning plane when the couch was extended to various lengths. A second experiment was performed to measure sag at various positions for a fixed couch extension. A steel I-beam with the dial indicator mounted on a rail was placed underneath the CT and tomotherapy couches. Two uniform loads were placed on the couch for three couch extensions and measurements were recorded at discrete locations.

Results:
Two forms of couch sag relevant to radiotherapy were observed: absolute and intra-target sag. Absolute sag was shown to be 8.0±0.5 mm. Intra-target sag depended on the S-I length of the target and could be 2.3±0.5 mm. Both CT and tomotherapy couches displayed similar sag patterns. Differences in sag between the couches were more pronounced at short cantilevered distances with a maximum difference of 1 mm.

Conclusion:
A significant amount of sag occurs at the scanning plane resulting in a shearing of the images used for treatment planning. Absolute sag may be corrected by a couch height adjustment but intra-target sag is a concern for elongated targets. The impact of sag on tomotherapy treatments is minimal since the relative difference in sag patterns between CT and tomotherapy couches is small. However, differences between CT and tomotherapy couch sag have become a concern for facilities treating total marrow irradiation (TMI) fields with tomotherapy.

Conflict of Interest (only if applicable):
Mackie has a financial interest in TomoTherapyInc.