

AbstractID: 7274 Title: Attenuation characteristics and compensation of the Elekta stereotactic body frame (SBF) for use in stereotactic body radiotherapy (SBRT)

Purpose: To measure the attenuation of the Elekta Stereotactic Body Frame (SBF) for use in stereotactic body radiotherapy (SBRT) and compare the values to those predicted by the Eclipse treatment planning system (TPS). Depending on the angles of delivery, treatment beams transverse varying thicknesses and densities of the frame. This leads to differential attenuation depending on beam angles.

Method and Materials: The frame was first tested by measuring attenuation of a 6MV beam delivered over various gantry angles. An ion chamber was positioned in the center of the frame at isocenter. The dose was measured for various gantry angles, which were compared to the anterior beam (gantry 0°). In order to test the ability of Eclipse TPS to properly account for the frame, a solid homogeneous phantom was placed in the frame and then imaged with a CT scanner. Two plans were generated; one with the frame included in the external “Body” contour and one without. The plans were adjusted to deliver the same MUs. The phantom was then treated and the dose was measured at the isocenter. The measured doses were then compared to the two calculated plans.

Results: The attenuation of the frame was found to be a function of the beam entry point and ranged from 4 to 9%. When the frame and phantom were contoured in Eclipse, the calculated MUs for each field agreed to within 2% of the measured dose.

Conclusion: The Elekta SBF attenuates the radiation beam and must be accounted for in planning. This can be accomplished in the Eclipse TPS by including the frame in the “Body” contouring. If the frame is not taken into account, it will result in an underdose of approximately 5% for each lateral and posterior field, ranging from 4 to 9%.