AbstractID: 7635 Title: Effect of headscatter for IMRT fields

Purpose The purpose of this study is to determine the effect of headscatter for IMRT fields.

Methods and material In air measurements were made for two types of fields. For the first type of fields, a series of offset fields with field sizes ranging between 10 and 21.5cm were used. The offset changed between 0 and 10cm depending on the field size. The detector was always placed on the central axis (CAX). For the second type of fields, headscatter factors were measured for a series of $10x10cm^2$ fields composed of slits 0.3, 0.4, 0.6, 0.8 and 1.0cm in width. In-air output ratio, S_c, for a series of clinical IMRT fields was also measured. S_c is defined as dose per MU measured in a water-equivalent miniphantom between IMRT field and a $10x10\ cm^2$ open field. The measurements are compared with calculation using a two-source headscatter model[1].

Results S_c on CAX for the same open beam with different offset changed by up to 4% for the Siemens accelerators. For stop-and-shoot method, S_c for $10x10cm^2$ fields composed of slit fields of different widths changes with the slit width to within 8% and 6.4% for 6 and 15MV, respectively. The 8% uncertainty is completely due to delivery error and does not seem to correlate with the slit width. The two-source model predicts S_c for all cases including IMRT fields to within 1%.

Conclusion In-air output ratio changes with field shaping by up to 4%, even when the point of measurement is within the radiation field. Thus, it is important to model the headscatter in order to predict S_c for IMRT fields. Our two-source model can accurately predict the headscatter for points within radiation field.

Ref 1: Med. Phys. 31:2480-90 (2003)