AbstractID: 7691 Title: Determination of a chamber independent profile

Purpose: Calculation of the inherent beam profile and its accuracy are highly important in the dosimetric precision of treatment planning. However, perturbations are incorporated into the profile due to finite detector size and non-water equivalency. We investigate a potential method for extracting the unperturbed beam profile from that of the measured profile using ion chambers for the purpose of performing de-convolution of the detector response functions.

Method and Materials: Beam profiles were obtained using a 0.04 cm^3 ion chamber orientated orthogonally to the beam direction. Scans were made at 10 cm depth and the SSD varied between 86 and 120 cm. The Data were extrapolated to a distance such that perturbation effects would be negligible, and then geometrically scaled to 90 SSD. The resulting profile was compared to penumbra measurements using diodes.

Results: A linear relationship was observed between off axis dose location and increasing SSD i.e. the location of the 50% increased linearly along the off axis profile with changing SSD. The extrapolated and scaled profile demonstrated improved penumbra 0.74 cm to 0.5 cm for the 80-20 % region compared to the raw profile and was comparable with that obtained from diode measurements.

Conclusion: We have demonstrated a potential method for obtaining the unperturbed beam profile from a megavoltage LINAC. The linearity of profile data with SSD has been exploited to remove chamber effects such as volume averaging that commonly degrade the penumbra in order to obtain the inherent beam profile.

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