AbstractID: 8725 Title: Accuracy of the finite size pencil beam without the flattening filter

Accuracy of the finite size pencil beam algorithm without a flattening filter

**Purpose:** The aim of this study is to investigate the accuracy of IMRT treatment plans developed without a flattening filter (FF) using the finite size pencil beam which is a commonly used algorithm for IMRT treatment planning . Compared to flattened beams, the profiles of unflattened beams vary to a greater extent with depth. Since the FSPB uses off axis ratios at one depth for dose calculation, the question arises if the variation in dose profile with depth is large enough to manifest as dosimetric errors in a clinical treatment plan.

**Method and Materials:** The FF for the Varian 600C was removed and a treatment unit in Corvus 6.3 was commissioned using measured data with off axis data measured at 10 cm depth. Calculated profiles at various depths, depth doses, output factors for various field sizes were compared against measured data. Several IMRT patient plans without the flattening filter were also created at depth of 5 cm and 7 cm. These plans were recalculated and delivered on a homogeneous phantom equipped with film and ion chamber slots. The measured dose distribution was compared with the calculated dose distribution using the RITT software (Ver. 5).

**Results:** The profiles, depth doses and output factors calculated by the FSPB were within ± 2%/ mm of measured data. The measurement of the phantom plans were within ± 3%/ mm of calculated values.

**Conclusion**: The removal of the FF reduces treatment delivery time without affecting the plan quality. This is especially beneficial when large doses per fraction (SRS or SBRT) are employed to achieve the desired dose. The FSPB is capable of accurately calculating the dose distribution for an unflattened beam.

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