AbstractID: 5443 Title: Measured versus calculated dynamic wedge dose distribution using Anisotropic Analytic Algorithm (AAA) and Pencil Beam Convolution (PBC) algorithms

Purpose: The purpose of this work is to compare measured and calculated 2D EDW dose distributions using AAA and PBC calculations algorithms.

Method and Materials: A 6MV photon beam from a Clinac 2300C/D Linac equipped with 7 EDW was used. Dose distributions were calculated for square symmetric fields by a Varian Eclipse v7.3.1 3DTPS with AAA and PBC algorithms. EDW were commissioning in the TPS. Dose distributions were measured using Kodak EDR2 films in a perpendicular configuration at 5cm depth in a solid water phantom for 4x4, 10x10, 15x15 and 20x20 cm field size settings. TPS calculations were performed for the same conditions as measurements, using a phantom with the same geometry. Calculation grid was 2.5x2.5 mm for PBC and 1x1 mm for AAA. Dose distributions were compared using RIT v4.3 software with gamma evaluation using 3% dose variation and 3mm DTA criteria.

Results: Measured versus calculated percentage depth doses and wedge factors agree within 1%. Profiles in the non wedged direction, exhibit variations lower than 2% of dose or 2 mm DTA. In wedged direction both algorithms reproduces the measured profiles with deviations smaller than 2% of the normalization dose except in the penumbra region. AAA algorithm models better the penumbra region. EDW with angle lower than 45º, both algorithms model the distributions within the acceptance criteria. Some differences could be seen in the corners of the beams. For EDW with 60º angle, the percentage of pixels that not passes the acceptance criteria using AAA is acceptable, but using the PBC algorithm the percentage must be considered (reaching 28.5% of the distribution), representing regions of disagreement that may be of clinical interest.

Conclusions: AAA algorithm models EDW dose distributions better than PBC. Differences between both algorithms increase with field size.