Purpose:

To evaluate a dosimetric accuracy of AcurosXB dose calculation algorithm for 4 MV photon beam.

Methods:

Four MV beam (Clinac-6EX) and AAA and AcurosXB algorithms (pre-release version 11.0.03.) were used in this study. The differences of the calculation with AAA (EAAA) and AcurosXB (EAXB) to the measurement were evaluated in the depth doses to 25 cm depth and dose profiles within the water and slab phantoms (water, lung and bone equivalent). In addition, the clinical cases, including three whole breast plans and three head and neck IMRT plans, were evaluated. First the AAA plans were calculated, then AcurosXB plans were recalculated with dose-to-medium with identical beam setup and monitor units as in the AAA plan.

Results:

In the water phantom study, the EAAA and EAXB were up to 2.2% and 1.5% in the depth doses for the open field (field size = 4 - 40cm square), respectively. Under the heterogeneity conditions, the EAAA and EAXB were less than 4.4% and 2.2% in lung region, and less than 12.5% and 6.3% in bone region, respectively. In the re-buildup region after passing through the lung phantom, the AAA overestimated the doses about 10%; however AcurosXB had good agreement with measurement within 3%. Dose profiles with AcurosXB were better agreement with measurement than AAA. In the clinical cases, the dose of the skin surface region with AcurosXB were higher than AAA by at least 10%, and the dose differences over 5% appeared in heterogeneous region. However, DVH shapes of each organ were similar between AAA and AcurosXB within 2%.

Conclusions:

In phantom study, AcurosXB had better agreement to measurement than AAA, especially in heterogeneous region and re-buildup region. In the clinical cases, there were large differences between AcurosXB and AAA in the surface region.

Funding Support, Disclosures, and Conflict of Interest:

Evaluation Agreement of non-clinical versions of Acuros XB with Varian Medical Systems.