

**Purpose:** In this study we attempt to evaluate the accuracy of the dose calculation algorithm available in the DosimetryCheck quality control system used for patient specific IMRT QA.

**Methods:** Slab geometries including inhomogeneities and ten (n=10) lung and head and neck patients' plans from Pinnacle3 (ver. 9.0) and Eclipse (ver. 10.0) treatment planning systems (TPS) were evaluated. Fluence measurements acquired using an Varian aSi1000 electronic portal imaging device (EPID). The measurements consisted of open fields of various size and photon energy for the slab geometry plans and of integrated images for each patient. The EPID images were imported in the Dosimetry Check software. The corresponding plans including CT images, structures and doses were exported to the Dosimetry Check software. The software then used the imported measured fluence of each field to calculate the dose to the patient. The same fluence was also used in Pinnacle3 and Eclipse to calculate the dose to the patient.

**Results:** Discrepancies were observed between the Dosimetry Check and the TPS EPID based calculation for the slab geometry tests with inhomogeneities. The highest discrepancies were observed, as expected, for small fields of high energy. The gamma index values between the TPS fluence based calculations and the Dosimetry Check ranged from 85-98% for the patient cases. Point dose differences of 2-15% were observed for both lung and head and neck plans.

**Conclusions:** Fluence based dose reconstruction using patient geometry is an invaluable tool. However, it is known that the pencil beam algorithm is not able to predict the dose accurately in the presence of inhomogeneities as in the case of head neck and lung and users are advised to use caution when evaluating IMRT QA plans with inhomogeneities. On the other hand, the effect of inhomogeneities is much less profound for pelvic, abdominal and brain cases.