AbstractID: 4764 Title: Clinical significance based IMRT QA approach

Purpose:
Patient-specific IMRT treatment quality assurance procedure often consists of the measurement of 2-dimensional intensity map and absolute dose. The data is compared with the computed results from TPS using a standard pass-or-fail criterion. However, the same dose discrepancy may not have the same clinical significance depending on its location. For instance, the consequence of a hot-spot in PTV is different than in spinal cord. In this project, we intend to develop a method that considers the locations of the dose discrepancy into the IMRT QA pass-or-fail decision-making.

Method and Materials:
Compensator-based IMRT treatments and PLUNC were used in this study. The 2-dimensional dose distribution was acquired with the EDR2 film and Mapcheck. The measured point dose was back-projected to compute the derived intensity map of the IMRT field. Using the measurement-derived maps the patient dose is recomputed on the planning CT image. The dose discrepancy points between the original and measured plan were visualized by subtracting two dose grids. The QA test was performed in the 3-dimentional space with the exclusion of 5% hot-spots in PTV and cold-spots in the critical structure.

Results:
The method was applied on two simulated clinical cases:(1) a 5-field H&N IMRT with one defective compensator;(2) a 5-field prostate IMRT plan with intentionally modified QA maps of three fields. In each case, the dose discrepancy points were computed and displayed in the patient CT. The QA passing rate is computed using both conventional 2D and revised 3D method.

Conclusions:
We reconstruct the 3D dose distribution in patient planning CT from the intensity maps obtained from the 2D IMRT QA measurement. A QA statistics method is proposed to include the location of dose discrepancy points. This approach promises a new IMRT QA pass-or-fail standard that considers the clinical significance of dose discrepancy measured in IMRT QA.