AbstractID: 11632 Title: A Simple Method for Quality Assurance of Proton Compensators

Purpose: Distal dose conformity to a target volume is achieved by choosing proper range of the proton beam and modifying it by custom designed compensator. The voxel of the compensator is milled precisely using a computerized machine.. The, quality assurance of proton compensators that is used for patient treatment is a vital issue in proton therapy that is investigated.
Methods and Materials: Forty one patient specific proton compensators were analyzed that were manufactured using Milltronics VM16 computerized machine. Comparisons were made between the treatment planning system output data file and the voxel depth of the compensator. Point depths were measured by Sheffield Discovery II and were input into OmniPro IMRT software. The spatial distributions and histograms of compensator depth differences were visualized and evaluated. The acceptable depth difference between the measured and specified depth 0.38mm was maintained. The acceptance criterion of the manufactured compensator was 95% data points.

Results:. For 37 of the 41 compensators, all measured points passed the test. The average difference is ±0.04 mm with the max difference depth of 0.28mm. One compensator was rejected as 10.4% of the measured points failed the test. For 3 other compensators, about 2.7% of the measured points failed the test with the maximum difference of 9.8 mm. Spatial distribution of the poor quality points will be evaluated to decide if the compensators should be rejected.

Conclusion: A method for proton compensator quality assurance based on an existing commercial software system is introduced. The QA approach is coupled with visualization and statistical evaluation. Spatial distributions of error points can be identified, which are valuable for further dose distribution analysis.