AbstractID: 10192 Title: Influence of Anatomical and Physical Aspects of Treatment Planning on Prostate and H&N IMRT Plan QA Results

Purpose: To study the influence of combinations of Linear Accelerators and treatment planning-systems, anatomical site and PTV volumes on MUs, and the magnitude and direction of deviation of prostate and H&N IMRT plan QA dose from plan-dose. **Method and Materials**: IMRT plans were generated using Pinnacle^3 or Eclipse treatment planning-systems for treatment with Elekta or Varian Linacs, respectively. There were 29 H&N plans for Varian, and 59 and 33 prostate plans for Varian and Elekta, respectively. Dose at a point in the MED-TEC phantom was measured with MT-ERI-A12 ion chamber. QA results were calculated as percentage deviation between measured and calculated doses in the phantom. A deviation of ±5% was acceptable. The magnitude and direction of deviation of QA results vs. PTV volumes, treatment site, Linac and planning system combinations were studied. PTV volumes vs. MUs was also analyzed. Linear regression analysis was used to study the relationship between paired variables. **Results:** The direction and magnitude of QA result deviation was Linac dependent. For Elekta prostate cases, QA measured dose deviated to negative direction (-2.49±0.93, -0.5 to –5%). For Varian cases, QA measured dose for prostate (1.67±0.91, -0.1 to 4.9%) and H&N cases (3.58±1.80, 0.2-6.4%) deviated to positive side. These results suggest that the delivered dose could vary between Linacs and might result in under- or over-dosing. Prostate QA result deviation was independent of PTV volumes ($P>0.1$), but MUs increased with increase in PTV volumes ($P<0.001$). For H&N cases, MUs and the deviation between measured and planed-dose increased with increase in PTV volumes (84–691 cm^3, $P<0.001$). **Conclusions**: This type of analysis would help to evaluate the influence of Linac and/or planning systems, anatomical site and PTV volumes on the magnitude and direction of deviation between planned and delivered dose and to develop correction strategies to minimize radiation delivery variations.