AbstractID: 5210 Title: TMR ratio method to correct for SSD changes in prostate IGRT with IMRT delivery

Purpose:
In IGRT, couch shifts are needed to align the target to account for organ motion. In some rare cases treatment SSD may differ significantly
(up to 1.0 cm) from the plan after these shifts. TMR ratio method is proposed to correct SSD changes so dosimetric accuracy of IGRT with IMRT delivery can be preserved.

Method and Materials:
A prostate patient CT was contoured in Eclipse TPS (Varian Medical Systems, v7.3) as test body. A bolus was added surrounding the body with either 1.0 cm or 2.0 cm thick bolus, (simulating 1.0 cm and 2.0 cm SSD change, respectively). An IMRT prostate clinical plan using 18 MV photons was exported to each of the three test bodies to create verification plans. TMRs were then read from our clinical data table according to different depths in the three test bodies. The TMR ratios were generated based on the non-bolus plan. To apply the TMR ratio to the beams, the prescription percent isodose line in each plan was lowered by the corresponding TMR ratios to increase MUs. By doing this, all other treatment parameters, including dynamic MLC configuration were kept the same. The corrected plans were exported to corresponding bodies and doses were calculated. The DVHs of prostate and critical organs were then compared.

Results:
DVHs for prostate and critical organs were identical for all three scenarios after TMR ratio correction.

Conclusion:
The TMR ratio method was applicable for IMRT plans to correct for small SSD changes in IGRT. For regular IMRT plans, if SSD changes are caused by other reasons like weight loss, this method is still valid assuming PTV does not change. However, if SSD change is larger than 1.0 cm, it is prudent to re-CT scan the patient and re-calculate plan because the PTV might have changed.