AbstractID: 12983 Title: Accurate Modeling of Calypso kVue Couch for Pinnacle SmartArc based Elekta VMAT Prostate Treatments

Purpose: To accurately model the attenuation effect of Calypso kVue couch insert for Pinnacle SmartArc based Elekta VMAT treatments

Method and Materials: A Calypso kVue couch insert set was provided by the manufacturer. The set includes a Calypso kVue couch top and two underneath support rails. On our Philips Brilliance Big Bore CT scanner, the couch set was positioned to duplicate the typical treatment configuration where two support rails were expanded at their widest separation under the couch top. The couch set was CT scanned and DICOM exported to Pinnacle 8.0m TPS. In Pinnacle, two regions of interests (ROI) were carefully created – one for the couch top and one for the two support bars. The couch top ROI is assigned with a physical density of 0.16 g/cm^3 and the support rails density of 1.17 g/cm^3, based on manufacture specification and actual CT numbers. Then the two ROIs were saved as 2D meshes in Pinnacle organ library. In volumetric modulated radiotherapy (VMAT) planning, the above couch model is loaded from the Pinnacle organ library and moved to proper position under patient CT image in order to take the actual couch attenuation effect into consideration. Ion chamber and 2D diode arrays were used to measure and compare with Pinnacle computed point doses to evaluate the accuracy of the couch model.

Results and conclusion: This in-house developed model for Calypso couch insert was proven to work well in our routine VMAT planning and QA practice. The attenuation effect of the Calypso couch is found to be around 1% for prostate PTV mean dose for typical prostate VMAT cases.