Commissioning of a Commercial 3-D Treatment Planning System and Evaluation of a DICOM Based CT/MRI Co-Registration Module, N.R. Roberts, G.S. Dominiak, Department of Radiation Oncology, Mayo Clinic of Scottsdale, Scottsdale, AZ

The Theratronics Theraplan Plus Version 3.0 was recently accepted and commissioned at our institution. The current version of software supports the co-registration of CT-MRI images for external beam planning purposes. This Windows NT based TPS utilizes a pencil beam algorithm for both photon and electron dose computation. The brachytherapy module allowed for a full implementation of the TG-43 protocol. A dual energy Varian 2100-C/D with MLC was modeled, as was a full array of radioisotopes. Measured data was acquired using a 3-D scanning system. Additional scans were taken at extended SSD's, asymmetric field sizes, and oblique incidence for comparison with calculated data. The NT platform of TPS facilitated the export of measured and calculated data to Microsoft Excel Spreadsheet for comparison. All data agreed within the criteria outlined by AAPM Task Group 53. Next, proper network transfer of DICOM formatted MRI and CT images to the planning system was evaluated. CT and MRI images were acquired for a phantom containing fiducial of known orientation. Image orientation, sequence, distortion was analyzed for both CT and MRI. After limits of distortion were measured, co-registration of CT and MRI images was performed. Finally, agreement of fiducial points was compared on co-registered images through the use of a cursor tool. This same method will then be used to compare fixed anatomical landmarks within patient images.