AbstractID: 9487 Title: Dosimetric Evaluation of Plastic Water-Diagnostic-Therapy (PWDT) Phantom Material

High precision radiotherapy planning and quality assurance requires accurate dosimetric and geometric phantom measurements. A comprehensive phantom to perform this task is currently being developed at Princess Margaret Hospital. The phantom design requires materials with both mechanical strength and resilience as well dosimetric properties close to water over the diagnostic and therapy range. Plastic Water Diagnostic Therapy (PWDT)™ is a phantom material manufactured by CIRS Inc. designed for water equivalence in photon beams from 0.04MeV to 100MeV which also has good mechanical properties. This presentation reports the results of CT imaging and dosimetric studies of PWDT™ to determine the material's suitability in constructing a CT and IMRT phantom.

The water equivalence of PWDT™ was characterised in a series of experiments in which basic dosimetric properties were determined over for photon energies of 80kV$_p$, 100kV$_p$, 250kV$_p$, 4MV, 6MV, 10MV and 18MV. Properties measured included the build-up and percentage depth dose curves for several field sizes and relative dose factors as a function of field size. In addition, the PWDT™ phantom was CT scanned at beam qualities ranging from 80 to 140kV$_p$ to determine the water equivalence of the phantom in the diagnostic energy range.

The dosimetric quantities measured with PWDT™ agreed within 1.5% with those determined in water and Solid Water™. CT scans of the phantom where found to generate Hounsfeld numbers within 0.8% of water. These results suggest that Plastic Water Diagnostic Therapy material is suitable for IMRT verification work, and sample IMRT verification results are presented.