AbstractID: 10141 Title: Intensity Modulated Proton Planning for Ocular Tumor using Human Anatomy Dose Algorithm and Preliminary Comparison with IMRT Planning

Purpose:
We aim to provide accurate dose calculations for ocular tumor and adjacent critical organs using intensity modulated proton therapy (IMPT) using a human anatomy-based Monte Carlo model. Dose is simulated using the Monte Carlo code MCNPX and compared to standard photon IMRT planning using Pinnacle3® TPS.

Method and Materials:
The human anatomy model was adapted from the Visible Human Project from the National Library in Medicine. Sectioned images were assigned physical properties. Two independent trials were developed using IMRT and IMPT, respectively. Isodose lines and dose profiles for each transverse, sagittal and coronal view of the VHP model were provided for planning evaluation. Dose volume histogram in eyes, optic nerves, brain, chiasm, lacrimal, pituitary, lens, and PTV were compared between IMRT and IMPT.

Results:
The ocular tumor was well covered by 95% in IMRT and 70% isodose in IMPT. Comparing the IMRT and IMPT, the mean dose was 4508 cGy and 3762 cGy-Eq for PTV, 2770 cGy and 1524 cGy-Eq for the eye, 3300 cGy and 1192 cGy-Eq for lens, 794 cGy and 162 cGy-Eq for optic nerve, 193 cGy and 20 cGy-Eq for lacrimal, 26 cGy and 0.0 cGy-Eq for brain, 120 cGy and 0.0 cGy-Eq for chiasm, 272 cGy and 0.00 cGy-Eq for pituitary and, respectively.

Conclusion:
IMPT provided conformal dose to the ocular tumor and significantly spared dose to the surrounding critical organs compared to IMRT. Human-anatomy based Monte Carlo dose potentially provides more accurate dose calculations when accounting for the tissue component in the eyes.