

Purpose:

To develop a procedure for conducting **true** 3D treatment planning and evaluation using a novel 3D display device integrated with a conventional treatment planning system for a multi-institutional planning study.

Method and Materials:

The 3D display device, Perspecta, includes 3D cursor and beam placement tools and renders auto-stereoscopic images with a resolution of about 100 million voxels. Treatment planning calculations occur within Pinnacle and scripts are used to transfer all plan information bidirectionally between Pinnacle and Perspecta. Perspecta includes software (PerspectaRad) to integrate information for displaying and planning. The procedure includes: 1) Transfer of contour information from Pinnacle to Perspecta; 2) Determining or refining beam orientations utilizing Perspecta; 3) Transferring the plan back to Pinnacle for dose calculation; 4) Transferring the dose distribution to Perspecta for evaluation in 3D.

Results:

By using this procedure, true 3D treatment planning and evaluation has been conducted for the first 11 cases in a multi-institutional study. Beam placement was readily accomplished on the 3D device. Geometric relationships of beams and target volumes were reproducible and consistent after transfer between the devices. All relevant target volumes and doses were visualized on both devices and evaluated on both 3D and conventional devices.

Conclusions:

We have successfully established reliable, bi-directional integration of a true 3D display with a treatment planning system that calculates dose in 3D. We believe that this results in enhanced understanding of anatomic, dosimetric, and geometric relationships which can in turn be used to more readily improve and/or optimize DVH and isodose distributions beyond what can be done with multiplanar 2D and pseudo 3D displays on flat CRT screens. We are in the process of confirming this impression with a prospective, multi-institutional study designed to test this issue.

Conflict of Interest: Actuality Systems Inc. provided the 3D display Perspecta used in this study.