

AbstractID: 2784 Title: Introduction to 3-D image-based treatment planning for complex brachytherapy of soft tissue sarcoma

Purpose: To introduce CT-based treatment planning for brachytherapy of soft tissue sarcoma utilizing 3-D graphics, and to examine resulting improvements in dosimetry and efficiency for complex cases.

Method and Materials: This procedure begins with a CT scan (Picker PQ 5000) following surgical catheter placement. CT data is transferred to the treatment planning workstation and imported into BrachyVision 6.5 (Varian) software. The catheters are defined as applicators utilizing the combination of 2-D transverse, coronal, and sagittal CT views and 3-D image reconstruction. This type of applicator definition creates automatic seed placement and spacing along the catheter. Ir-192 seeds (Best Industries, Inc.) with TG-43 data are used for dose calculation. Dosimetry is optimized using 3-D dose visualization. This planning procedure has been performed and analyzed on seven LDR and two HDR clinical cases. Two LDR cases were planned with both the previous 2-D method of orthogonal films and the new 3-D CT-based method. The two methods were compared on 3-D versus 2-D (volume versus planar), dosimetry optimization, and clinical feasibility.

Results: There are significant benefits of using CT-based 3-D planning for sarcoma brachytherapy. CT plane views allow accurate catheter definition and seed placement. 3-D visualization permits an assessment of catheter distribution in more than one plane, and enhances dose optimization for tumor bed dose, hot/cold spots, and normal tissue doses. The process is no more time consuming, and gives more confidence in source placement, more choices in source activity, and improved displays of isodose distributions.

Conclusion: 3-D compatible planning software with CT imaging has allowed this clinic to improve visualization and dosimetry optimization while reducing uncertainty in seed positioning for complex cases of sarcoma brachytherapy. Use of CT additionally creates the potential of combining dose distributions from external beam treatment and brachytherapy to produce composite dose evaluation.