

AbstractID: 4862 Title: An IMRT planning technique for head-and-neck cancers that utilizes Direct Aperture Optimization

Purpose: IMRT can play an important role in the irradiation of head and neck tumors traditionally treated by lateral fields matched with an anterior supraclavicular field. However, due to the complex PTV geometry, these IMRT plans result in large numbers of segments leading to inefficient deliveries. We have developed an alternative IMRT planning technique utilizing Direct Aperture Optimization (DAO) to streamline the planning process and provide significant efficiency gains.

Method and Materials: The process begins with the placement of traditional 3D conformal fields (laterals and anterior supraclavicular). Next, the dose is calculated with this beam arrangement. The 90% isodose line is converted into a PTV with surrounding critical structures (e.g. spinal cord, parotid glands, posterior medial neck region) excluded from the PTV definition. The resulting PTV serves as the target for IMRT planning.

For our planning technique, we have used the DAO algorithm in the Prowess Panther planning system. DAO plans generally result in significantly fewer segments as compared with those generated by traditional IMRT planning techniques. This is of critical importance since traditional IMRT plans for these cases have excessively long treatment times. Using DAO allows practical treatment times without sacrificing plan quality.

Results: Fifteen patients were planned and treated with this technique. Seven equispaced beams were used in each. The objectives were PTV dose conformity and low dose to any avoidance regions. The spinal cord limit was 40Gy. For the DAO plans, treatment times ranged from 9 to 17 minutes on an Elekta SL20 accelerator. For corresponding plans produced using Pinnacle³, treatment times ranged from 30 to 45 minutes.

Conclusions: An IMRT treatment technique for head and neck cancer has been devised. This technique removes field matching and allows the initial 50Gy to be delivered with a single plan. Using DAO provides significant reductions in treatment times.