AbstractID: 8007 Title: Aspects of Commissioning the Pinnacle³ Treatment Planning System for High-Precision Conformal Radiotherapy

The ADAC Pinnacle^3 treatment planning system has been commissioned for high-precision conformal radiotherapy, predominantly for benign childhood brain tumors, treated at our institution with multiple noncoplanar conformal beams. Our compact blocking system provides greater reproducibility and access for noncoplanar beams compared to tray-mounted blocks. Small-field machine data mimicking this system was modeled on Pinnacle^3 for field sizes 2-12 cm based on a Monte Carlo generated spectrum. Measurements with ionization chambers, diode and film were used to design and validate the model. Dose distributions computed using collapsed cone convolution agree with measurements within (and in most cases significantly better than) the AAPM TG53 acceptability criteria. Isodose lines in computed planar dose distributions for individual blocked fields are generally within 1 mm of film measurements. In order to export blocks to the HEK blockcutter, software was written to extract the block shape from the Pinnacle^3 export file and add the necessary shapes (central locating hole and outer fixing wings) to fit the in-house holder. This process is shown to introduce no additional uncertainty. Since Pinnacle^3 does not currently provide DICOM DRR export, a method has been devised to import Pinnacle^3-generated DRRs of these beams into the Theraview portal imaging system as reference images, without introducing any errors. Errors arising from planning, block production and beam delivery will be discussed. The model and export functions produce clinically acceptable results. The system is in routine clinical use and has facilitated and improved our treatment planning. However, further improvements through more Pinnacle^3 functionality are desirable. Research partly supported by Philips Medical Systems.