

Clinical implementation of intensity-modulated radiotherapy using a dynamic multi-leaf collimator

Intensity-modulated radiotherapy (IMRT) was implemented in our clinic using commercial treatment planning software (Corvus 2.0¹), a record and verify system for dynamic dose delivery (VARiS 1.4d²) and a Varian linear accelerator (2100CD). The intensity-modulated (IM) fields were delivered using the “step-and-shoot” technique and an 80-leaf MLC. The number of fields varied from 5 – 9, but the number of intensity levels was always 10. In some cases, non-coaxial fields were used. In all cases, IM plans had isodose distributions superior to those obtained using conventional 3D techniques. Before patient treatment, IM plans were verified using an ion chamber in a cubic, tissue-equivalent phantom provided by the vendor¹. Calculated and measured dose to the ion chamber always agreed to within $\pm 1\%$. During phantom irradiation, we simultaneously verified the intensity map of each IM field using film taped to the collimator face. On the first day of treatment, AP and lateral radiographs were used to verify the patient’s setup before irradiation. On all other treatment days, live video subtraction was used to correct patient setups online in 1 – 2 minutes, before radiation was delivered. Treatment time (including patient setup) typically did not exceed 15 minutes, for single fractions of 150 – 200 cGy. Our experience demonstrates that IMRT is a clinically achievable means of significantly improving dose distributions in patients. Data on setup accuracy, organ motion, organ sparing through inverse planning and our quality assurance procedures will be presented.

¹Nomos Corporation

²Varian Oncology Systems