Clinical Implementation of Simple Intensity Modulation without Inverse Treatment Planning Software

Although intensity modulated radiotherapy (IMRT) promises to improve tumor coverage while sparing normal tissue, IMRT treatment programs generally require inverse treatment planning software. Unfortunately, most 3D treatment-planning systems do not have clinical releases of their inverse planning software. A technique has been clinically implemented that allows step-and-shoot IMRT treatments to be generated using the ADAC Pinnacle[3] treatment planning system without special inverse planning software.

Dose distributions for a conformal plan with blocks are calculated first, and an optimization plane perpendicular to the beam axis is chosen. Isodose lines in the optimization plane, such as the <80%, 80-90%, 90-95%, 95-100%, 100-105% and >105% lines, are then contoured. The first segment in the IMRT plan is the non-optimized 3D conformal field. This segment is irradiated until the maximum contoured isodose (*i.e.* >105%) has received 100% of the prescribed dose. In the next segment, this area is blocked and the next isodose contour continues receiving dose until it reaches the prescribed dose. This process is repeated until all isodose contours are irradiated to the prescribed dose, which results in a uniform dose distribution in the optimization plane.

IMRT plan dosimetry was verified for each patient using a linear diode array and an ionization chamber. The measured and predicted doses agree within ±3% at all points except for high gradient regions. These results indicate that clinical IMRT treatment plans can be generated and clinically implemented without the use of inverse planning software.