Designing IMRT Plans for Head and Neck Cancers

Conventional 3D Conformal radiotherapy (3DCRT) of head and neck cancers results in fairly good local control, but significant complications are observed. Normal tissue toxicity limits the dose to the tumor and nodes. In addition, 3D conformal treatments are complex and prone to mistakes. Intensity Modulated Radiotherapy (IMRT) has the ability to spare critical organs around the tumor to a greater extent and allow escalation of tumor dose. An IMRT optimization program developed at our institution is interfaced to a commercial 3D treatment planning system. The program can be used with either dose- or dose-volume-based objective functions. In this study, we applied the program to a group of H&N patients with tumors of various shapes, sizes and locations. The IMRT plans were compared with conventional plans with the aid of isodose distributions on orthogonal planes and dose-volume histograms. Beam configurations and optimization parameters were adjusted to accommodate the unique requirements of each case. It was found that IMRT plans offer improved target dose conformity and critical structure sparing. The planning and delivery of IMRT plans is, in principle, simpler than the 3DCRT plans. In IMRT plans, it is possible to treat multiple targets and elective nodes with different levels of prescription doses simultaneously in a single plan, thus eliminating field matching problems of conventional treatments. In addition, the use of electrons can be avoided for many cases. IMRT treatments designed in this way may also be biologically advantageous.