

Therapy: A Comparative Treatment Planning Study for Head and Neck Cancer

Compared to conventional 3-D treatments, intensity modulated x-ray therapy (IMXT) improves target coverage and sparing of critical structures. The purpose of the present work is to demonstrate that the use of mixed-beam therapy (MBT), i.e., electron and x-ray beams, may further improve target coverage and/or sparing of critical structures in the treatment of head and neck cancers. MBT treatment plans were designed by adding static 16-MeV electron beams to existing IMXT plans for a paranasal sinus case and a parotid case. The original IMXT plan constraints and beam directions were maintained while the original prescription was divided between electron and x-ray dose components. For the paranasal sinus case, the electron beam was set to deliver two-thirds of the prescription dose; the optimizer was allowed to set the weight of the electron beam for the parotid case. The electron fields were intentionally designed to cover a region smaller than the target volume, which allowed the IMXT optimizer to fill in the rest of the target dose using x-rays. The results showed that target coverage was maintained, while reductions were observed in doses to critical structures distal to the target along the electron beam direction. Thus, MBT shows promise for further improving dose conformality and normal tissue sparing in head and neck treatment planning and may be of benefit to these patients.

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