

Purpose:

To compare treatment plans using multi-field non-coplanar conformal radiotherapy with those using intensity-modulated beams obtained with the Peacock system, on the basis of Normal Tissue Complication Probability (NTCP) and Tumor Control Probability (TCP), calculated for representative test cases.

Methods and Materials:

Five intracranial patient cases were selected to cover a range of treatment planning situations. Target and normal brain volumes were contoured on CT transverse slices for each case. Plans were developed using the two treatment delivery techniques for each case, with the objective of encompassing the target as closely as possible with a prescription isodose line, and minimizing dose to normal tissue, within the constraints of current clinical practice. Dose Volume Histograms (DVH's) were calculated for the target and for normal brain, and these histograms were used to calculate NTCP and TCP values for each plan. The dose prescription for each plan was adjusted to give a TCP value of 0.5 which allowed an unbiased comparison on the basis of the NTCP values.

Results and Conclusions:

In general for each case the plans based on the Peacock system produced lower NTCP values than did those using conformal multi-field radiotherapy. The advantage of using biological indices such as NTCP is that an unequivocal comparison is easier to make than with DVH's which are difficult to interpret when the histograms crossover each other.