A technique for optimizing dose distributions for treatment of brain tumors is described. The method uses 4 or more non-coplanar fields, and inverse planning is not utilized. Instead, the planning process is broken into three steps: First, field directions are determined with BEV display. Second, missing tissue compensation is applied to each field. This step uses standard software available on many treatment planning systems. Third, non-coplanar 3D fields are separated into two or more 2D plans and traditional wedge arrangements are employed to obtain dose homogeneity. The 2D plans are added to produce the final 3D plan. When planning is complete, dose delivery is accomplished as a two-step process: First, the intensity patterns that would be produced by placing a physical wedge and a compensator in each field are combined. Second, this intensity pattern is used to determine MLC leaf positions for "segmented" intensity modulation of the beam. The effectiveness of the planning part of the technique is determined by comparing dose-volume histograms resulting from the method described here to those produced by senior dosimetrists using a 3D planning system. For the five cases investigated, the dose-volume histograms produced by the treatment planning method described here were equivalent to those produced by the dosimetrists. The software developed to combine intensity patterns and to define multileaf segments for dose delivery will be described.