Currently, patients with brain neoplasm's must undergo both computed tomography (CT) and magnetic resonance (MR) imaging to take advantage of CT's density information and MR's soft tissue imaging capabilities. Although significant progress has been made in image fusion, it is not always practical to subject patients to seemly redundant imaging procedures for the sole purpose of obtaining density information. We have developed and implemented a procedure that allows virtual simulation, digitally reconstructed radiographs (DRRs), and 3-D treatment planing to be generated using only one T1-weighted MR data set.

T1- and T2- weighted gadolinium enhanced 5 mm thick contiguous axial slices are acquired in a General Electric Signa 1.5T MR unit using a standard head coil for protocol patients. These image sets are imported into the ADAC Pinnacle$^3$ for three-dimensional conformal external beam treatment planning and virtual simulation. Once treatment planning and virtual simulation are complete, laser printouts of anterior and lateral MR based DRRs are generated. Because the image quality of these DRRs is comparable to CT based DRRs, a side-by-side comparison with film is possible. During verification simulation, the anterior and lateral MR based DRRs are used in conjunction with fluoroscopy and simulation films to position the treatment isocenter in the correct location. In addition, the MR based DRRs are compared with port films throughout the treatment sequence to verify that the correct volume is treated. MR based DRRs provide an acceptable alternative to CT based DRRs for many patients, thus eliminating the need for redundant imaging procedures.