For brain tumor treatment planning MR imaging affords desirable attributes of excellent soft tissue contrast and better delineation of pathology than CT. High cost of dual modality acquisitions for combined CT and MR planning and the required image registration step are disadvantages, making MR-only datasets attractive. However, geometric distortions, lack of signal from bone, and missing electron density information are negative aspects of using MR without a corresponding CT dataset.

We have proposed and developed an automated method to facilitate MR-only treatment planning, whereby CT attributes of bone and electron densities are derived from MR datasets alone. The method uses automated operations for thresholding and morphology to determine a CT-like bone mask that is applied to the original MR dataset. Prior to development, MR image acquisition was thoroughly studied and geometric distortions were observed within clinical tolerances for treatment planning without CT. The new method has been developed and tested on phantom, cadaver and patient databases. Automated segmentation fidelity is clinically acceptable, evaluated by registering the MR-derived bone mask with actual bone from same-subject CT images. Automated MR bone segmentation provides a clinically useful method for including bone in an MR dataset and makes the following operations possible: MR-only treatment planning with boney landmarks using BEV projections, bulk inhomogeneity dose calculations, and treatment verification through comparisons of computed "MR-radiographs-with-bone" with simulator and port films. For brain tumor treatment planning, a CT image is no longer needed.