



Detection and Visualization of Inflammatory Breast Lesions

Using Dynamic Contrast Enhanced MRI Volumes

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Purpose: To evaluate whether Dynamic Contrast Enhanced MRI (DCE-MRI), the acquisition of serial MRI images before, during, and after the administration of an MR contrast agent is useful when used in conjunction with an interactive computerized visualization system designed to detect and distinguish malignancies, including inflammatory breast disease.

Material & Methods: For 3/251 cases scanned, unusual DCE-MRI curve characteristics were produced. In these three cases, using five volume DCE-MRI image datasets for women suspected to have indeterminate breast disease, our computerized visualization system computed a confidence measure for each voxel in DCE-MRI volume that represented the dynamic probability that the voxel was inflammatory tumor or not, using a rough goodness-of-fit for the shape of the intensity-time curves. In this system, dynamic curve characteristics, i.e., criteria shapes, were interactively manipulable. We used 3D texture mapping hardware to produce both 2D and 3D visualizations of the segmented MRI volumes, displaying segmented malignancy within normal breast parenchyma, in near real-time, three dimensionally. To aid in staging and possible treatment courses, we produced statistical boundaries of the signal-time curves, rendering the probability of malignancy in color shades.

Results: Using MRI-DCE with this computerized system we were able to visualize accurately in 3D, *inflammatory* tumor, including location, shape, size, volume, and distribution confirmed by biopsy and H & E, pre-post chemotherapy.

Findings: Computerization aided in exhaustively identifying, visualizing, and quantifying inflammatory breast lesions using five DCE-MRI volumes. Analyzing the entire volume of breast, temporally for goodness-of-fit, both pre- and post- chemotherapy, we segmented inflammatory tumor. Using “one-click” measurement of volume estimation of inflammatory malignancy, we quantified changes, apparent reductions, in inflammatory malignancy within breast parenchyma, using DCE-MRI, supporting the conclusion that computer analysis of DCE-MRI is useful in inflammatory breast cancer management.

Key words: MRI, DCE-MRI, inflammatory, breast cancer, confidence measure, texture mapping, volume rendering, invasive, discrimination, detection.

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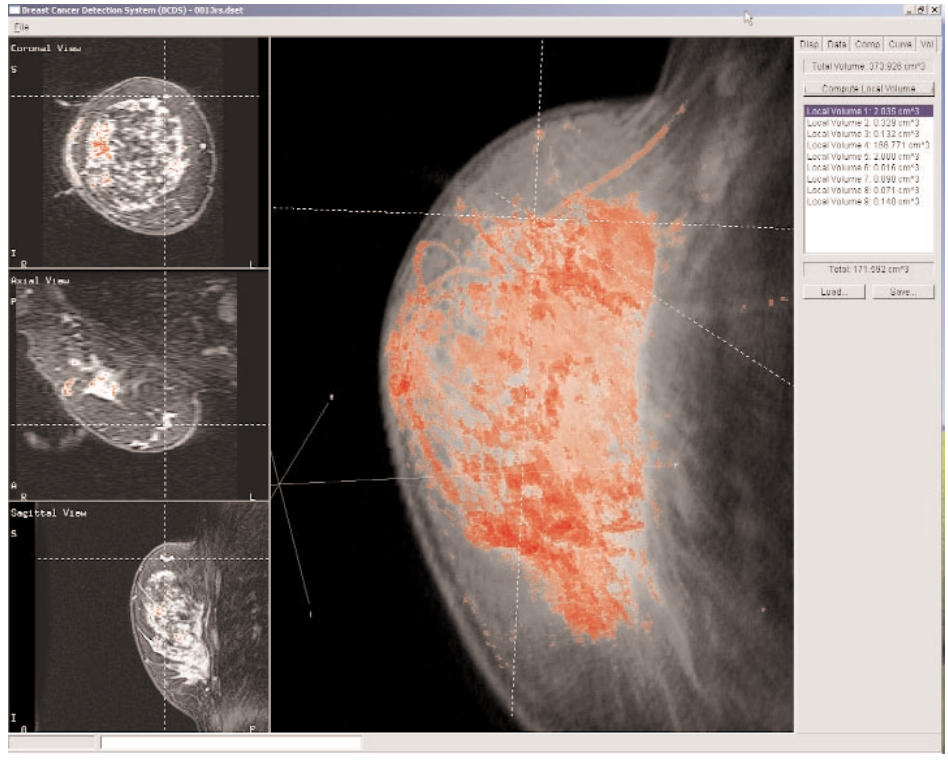


Figure 1. above, Inflammatory Breast disease Pre-chemotherapy
 Figure 2. below, Inflammatory Breast disease Post-chemotherapy

