

Contrast-Edited T_2 fast spin echo as a novel strategy for magnetic resonance screening

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Positron Emission Tomography (PET) and/or Computed Tomography (CT) are the primary modalities used for whole-body cancer screening and staging. However, due to their limited sensitivity for smaller tumors and increasing concern with ionizing radiation, magnetic resonance imaging (MRI) has been proposed as an alternative modality. While MRI techniques are sensitive for tumor detection, diffusion-weighted echo planar images (DW-EPI) are generally of low resolution and prone to distortion and short-tau inversion recovery (STIR) exhibits confounding tissue signal that needs to be “mentally” edited. This work presents a novel strategy using T_2 -weighted technique that simultaneously suppresses signal from confounding tissues such as fat, blood vessels and long T_2 fluids to improve the conspicuity of tumors with negligible image distortion. An adiabatic spectrally selective inversion pulse was used for fat suppression, a motion-sensitizing driven equilibrium was used for blood vessel suppression and a dual-echo single-shot fast spin echo (FSE) acquisition using image subtraction was used for fluid suppression. Simultaneous suppression of fat, blood vessel and fluid improved tumor conspicuity compared to corresponding fat-suppressed STIR image. Additionally, T_2 -weighted images acquired using FSE approach are undistorted compared to DW-EPI. This contrast-edited T_2 FSE technique generates two complementary image sets from a single scan: one that is equivalent to a STIR image and the other that qualitatively resembles a diffusion-weighted image. This approach results in fast, high spatial resolution and undistorted images with confounding tissue suppression and increased tumor conspicuity than can be potentially used for whole-body cancer screening and staging.

Biography

Ananth J. Madhuranthakam graduated from Mayo Clinic in 2005 with a Ph.D. in Biomedical Engineering. He then joined the MR Research and Development division of GE Healthcare to develop novel imaging techniques to improve the clinical utility of MRI, where he worked closely with various researchers at Harvard Medical School. Currently, Madhuranthakam is an Assistant Professor at UT Southwestern Medical Center, where his laboratory is focused on developing novel MRI techniques to improve sensitivity and specificity for whole-body cancer screening and staging. He has 5 patents, published 20 papers in reputed journals and serves as reviewer for multiple journals.

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