



CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP100625

Project Title:
TAMU-UT Southwestern Partnership for Cancer Imaging and Spectroscopy
at 7 Tesla

Award Mechanism:
Individual Investigator

Principal Investigator:
Malloy, Craig

Entity:
The University of Texas Southwestern Medical Center

Lay Summary:

Our ability to image malignancies has changed radically in the past two decades. This progress was achieved by multidisciplinary efforts involving basic scientists, engineers and physicians. Unfortunately, methods to detect and monitor the response of a tumor to therapy and to predict outcomes remain limited. Newer classes of diagnostic studies have become available that capitalize on high field magnetic resonance methods. The Advanced Imaging Research Center at UTSW has established an active research program in metabolic imaging and spectroscopy of cancer centered around a 7T human MR scanner, but progress is limited severely by commercially-available radiofrequency coil technology. For this reason, a partnership has been established between engineers at Texas A&M University and clinicians at UT Southwestern to develop state-of-the-art radiofrequency (r.f.) coils and multi-transmit r.f. technology on the only available 7 Tesla MR system in Texas. This combined effort will allow unprecedented improvements in the use of magnetic resonance imaging (MRI) and spectroscopy (MRS) to identify specific metabolic biomarkers in breast cancer and malignancies of the brain. The 7T system is currently equipped for single channel 1H imaging and for 1H, 13C and 31P MRS, but the available r.f. coils are inadequate for cancer studies. Four r.f. coils will be designed and constructed at TAMU: 1) breast coil optimized for detecting 13C in fats and other metabolites, 2) breast coil optimized for detecting 31P in ATP and other biological phosphates such as phosphorylcholine, 3) breast coil optimized for 1H imaging and spectroscopy, and 4) a head coil optimized for 1H imaging and spectroscopy. We expect that coil designs will be revised and coils will be rebuilt depending on results from studies in healthy volunteers at UT Southwestern. These coils will enable the evaluation of metabolic biomarkers of predisposition to cancer, detection of cancer, and measuring response to therapy in the breast and brain.