



CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP160847

Project Title:
A Body Coil for MR Imaging and Spectroscopy of Cancer at 7 Tesla

Award Mechanism:
High Impact/High Risk

Principal Investigator:
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Entity:
Texas A&M Engineering Experiment Station

Lay Summary:

Virtually all clinical MRI uses 3 Tesla (3T) or 1.5T magnets. There are approximately 45 MRI scanners in the world with magnetic field strengths of 7T and above, one in Texas. The high magnetic field strength of the 7T magnet provides superior resolution and image quality in many studies, such as the brain and breast. Potentially far more important for cancer, 7T MRI greatly enhances the ability to measure different chemical components with magnetic resonance spectroscopy. 7T MR spectroscopy is being used to study in-vivo metabolism in ways never before possible. Unfortunately, 7T MRI systems are not available with a "body" coil, the apparatus that transmits and receives the radiofrequency signals used by MRI into the body. The reason is very simple- the higher frequency radio waves do not penetrate the body uniformly, and a conventional body coil such as used at 3T does not work. A few research sites have installed complex systems that eight or more independent RF transmitters to improve the RF uniformity. This approach is expensive- the manufacturer of the 7T at UTSW is reporting a price of \$2 million dollars, when it becomes available. Thus, the 7T at UTSW, and indeed at all but a few centers worldwide, cannot do effective MRI of the body, preventing or severely limiting the use of these unique and expensive instruments for studies of cancer in the prostate, liver, kidneys, lungs, pancreas, and spine. We proposes a novel, inexpensive infrastructure upgrade to the 7T MRI scanner at the Advanced Imaging Research Center (AIRC) at UTSW, providing an eight element transmit, 24 channel receive body coil array while using only the existing two channel transmitter at UTSW. Three key technologies will be used, one developed in the PIs lab with CPRIT funding and another recently developed by GE Healthcare, provided by GE specifically for this project. If successful, this coil will significantly expand the numbers of cancers accessible to the 7T MRI at UTSW.