



## CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:  
RP140285

Project Title:  
Noninvasive Identification of Prostate Tumor Hypoxia as a Prognostic  
Biomarker of Radiation Response

Award Mechanism:  
Individual Investigator

Principal Investigator:  
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Entity:  
The University of Texas Southwestern Medical Center

### Lay Summary:

There is increasing evidence that hypoxia (lack of oxygen) is associated with more aggressive prostate cancer. Several studies have reported resistance to radiation therapy, increased likelihood of biochemical failure and metastatic spread. Those studies required needle electrodes or biopsy specimens, both approaches being highly invasive and providing representative samples only, which may miss crucial tumor components. At this time there is no convenient method to measure prostate cancer hypoxia non-invasively. We will develop and validate a new imaging biomarker to assess prostate tumor hypoxia and demonstrate its relevance to tumor control and resistance to therapy. Magnetic resonance imaging (MRI) is increasingly applied to diagnose and evaluate human prostate cancer since it avoids invasive biopsies or the radiation exposure associated with X-rays or nuclear medicine. We recently invented a new method, so-called MOXI (MR Oximetry Imaging), which uses a combination of proton MRI measurements (T1, T2, and IVIM) to directly map the distribution of oxygen in tumors, based on the natural water signal itself. Our investigations will be pre-clinical (a variety of tumors in rats), since it is vital to validate the robustness, reproducibility, and validity of measurements before translation to the Radiology clinic. Successful completion of this project will confirm the potential of this new non-invasive biomarker approach to evaluate tumor hypoxia in prostate cancer and lay the foundation for future clinical trials. The goal is to predict tumor aggressiveness and response to therapy, so that patients may elect more reliable active surveillance or choose the most effective therapy option. We focus on prostate cancer, but hypoxia has also been reported to correlate with patient survival in other disease sites, notably, cervix, breast, and head and neck and thus the impact will be far-reaching.