



CANCER PREVENTION & RESEARCH
INSTITUTE OF TEXAS

Award ID:
RP110262

Project Title:
Rationally designed magnetic nanoconstructs for the imaging and hyperthermia of tumor cells and neovasculature

Award Mechanism:
Individual Investigator

Principal Investigator:
Decuzzi, Paolo

Entity:
The Methodist Hospital Research Institute

Lay Summary:

The prognosis of brain tumors stays poor primarily because of the low accessibility to the malignant vasculature and tissue, and of the resistance to most cancer cytotoxic agents of brain tumor cells. This proposal will develop nanoconstructs (nCs) for the magnetic resonance imaging and highly localized thermal ablation of brain tumors. The nanoconstructs will consist of porous discoidal silicon particles, with a diameter ranging between 500 and 1000 nm, especially designed to recognize and adhere to the brain tumor microvasculature. Superparamagnetic gadolinium-nanotubes (GNTs) and iron oxide nanoparticles (SPIOs) will be loaded into the nC pores, providing the magnetic capacity. Phage display peptide, specifically targeted to the tumor vasculature and selected *in vivo*, will be coating the nCs providing superior specificity. Handheld probes will be designed and assembled for generating alternating current electromagnetic fields to stimulate nCs and inject high heat dosage in the focused region of interest within the brain. The superior MRI and thermal ablation properties of the proposed nanoconstructs have the potentials to circumvent the obstacles that have limited so far the prognosis of brain tumors.