

TITLE: Spatially focused heat and drug delivery using nanotechnology

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RESEARCH PROJECT DESCRIPTION (brief overview of background, hypothesis, methods, role of medical student, funding and relevant publications -- SHOULD NOT EXCEED ~ 250 WORDS)

Systemic chemotherapy typically has poor therapeutic ratio and toxic side effects, motivating research into nanoparticles to deliver drugs passively or in response to local stimuli. Despite successes, these approaches still suffer off-target accumulation and toxicity. The use of external stimuli to spatially and temporally control delivery would revolutionize chemotherapy. Achieving therapeutically relevant drug release in tumors while maintaining non-targeted organs below toxicity levels would result in more effective treatments. My lab is developing nanoparticles to enable externally-triggered, spatially-focused drug delivery and heat treatment, through the application of alternating magnetic fields that cause heat dissipation by magnetic nanoparticles. The role of the medical student in this project will be to assist in nanoparticle formulation and characterization, and in vitro and in vivo testing. We aim to demonstrate the potential for spatially-focused combination treatment and evaluate synergy between heat and drug therapy using anti-cancer agents relevant for breast cancer. This project is supported in part by the National Science Foundation and the UF Health Cancer Center.