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BME 2022 FALL SEMINAR SERIES

The diversity of lipid-coated nanoparticles in biomedical applications

PRESENTED BY

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SCHEDULE

Porter Hall (PH) 100

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(10:15AM-11:15AM)

Lipids are extremely versatile biomolecules capable of encapsulating nanoparticles composed of gas, liquid, or solid. The diversity of lipid-coated nanoparticles that can be produced has enabled the development of innovative approaches to diagnosing and treating life-threatening or debilitating medical conditions. In this talk I will present two nanoparticles that are being explored in the Diverse Engineering Applications Laboratory (D.E.A.L.) at UT Austin. First, I will review the development and utility of pressure-sensitive nanoemulsions (PSNE), which can be vaporized with high amplitude acoustic pulses. Vaporization produces microbubbles that can be driven to collapse energetically, radiating broadband emissions that are rapidly absorbed by surrounding tissue or generating intense stresses capable of fragmenting cells. We have taken advantage of PSNE vaporization with focused ultrasound for thermal and nonthermal ablation of solid tumors. Second, I will discuss the generation and characterization of indocyanine green (ICG) J-aggregates packaged within lipid vesicles. While free ICG can be utilized for near infrared (NIR) imaging of blood vessels, its absorbance spectrum overlaps significantly with hemoglobin. ICG J-aggregates absorb more photons at longer wavelengths than soluble ICG, which is advantageous for in vivo multispectral photoacoustic imaging as well as photothermal therapy. I will discuss potential applications for treating solid tumors as well as monitoring tumor response to drugs. The versatility of lipid-coated nanoparticles makes the technology accessible to scientists and students from various disciplines, which can lead to many fruitful multidisciplinary collaborative projects.

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