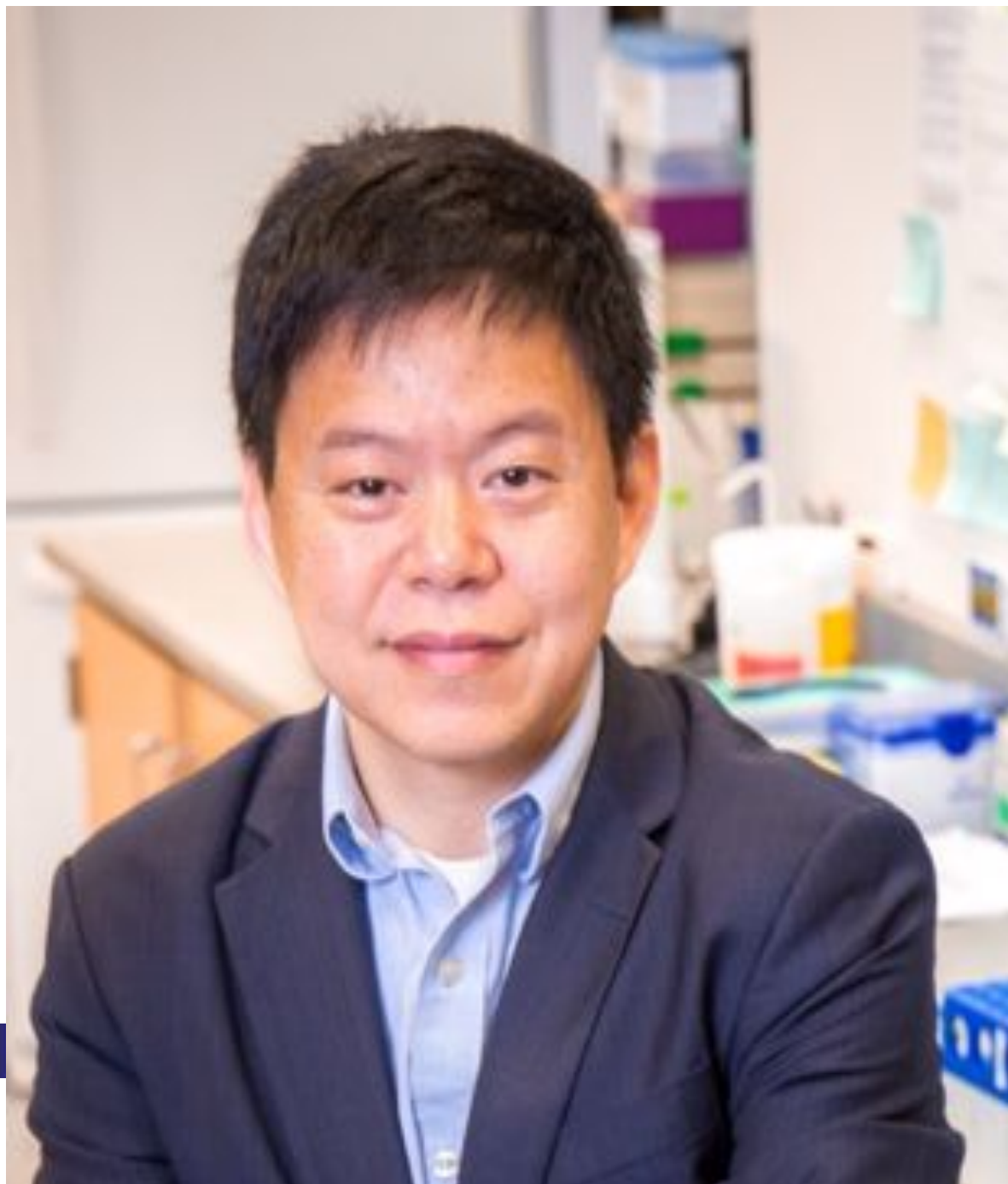


2022 – 2023 Seminar Series

Remote Control of Cancer Immunotherapy



Yingxiao Wang

Professor

Department of Bioengineering
University of California, San Diego
San Diego, CA

Cell-based cancer immunotherapy is quickly emerging as a promising therapeutic intervention for cancer treatment. However, non-specific killing against healthy tissues (e.g. on-target/off-tumor effect) is a major hurdle for solid tumor treatment. Here we show that the genetics and cellular functions of chimaeric antigen receptor T cells (CAR-T cells) within tumors can be remotely controlled by focused ultrasound (FUS) via a CAR cassette under a controllable promoter. In mice with subcutaneous tumors, locally injected T cells with the inducible CAR and activated via FUS guided by magnetic resonance imaging (MRI) mitigated on-target off-tumor activity and enhanced the suppression of tumor growth, compared with the performance of standard constitutive CAR-T cells. We have also developed controllable on-switch gene cassettes to reprogram the target cancer cell by FUS. Viral vectors were used to deliver the gene cassettes into the tumor cells, which will be activated by FUS and then targeted by CAR T for cancer immunotherapy. We applied this system to successfully treat prostate cancer cells whose locally metastasized tumors are confined in space but intermingled with vessels and nerves, with surgery or radiation therapy targeting the whole prostate gland potentially having adverse urinary and sexual effects on the patients. This local activation of engineered cells by FUS should allow a high precision and safety in eradicating tumors. Hence, this approach for immunotherapy should open new opportunities to integrate engineering physics with genetic medicine and lead to successful translation from fundamental science and engineering to cancer therapy and clinical applications.

Wednesday, September 21st @ 11:45AM

[Zoom](#)



Stony Brook University

Faculty Host: Donghui Zhu