



TEXAS A&M UNIVERSITY

Department of Electrical
& Computer Engineering

Friday, Oct. 16, 2020 | 4:15 – 5:05 p.m. CST

Bio-Group Seminar | Meeting ID: 514 754 727 | <https://tamu.zoom.us/j/514754727>

Engineering the Stem Cell and Immune Microenvironment in Metastatic Cancers

Abstract

Tissue microenvironments are diverse in cellular, architectural, mechanical, and material cues and play an important role in stem cell differentiation – be it during tissue regeneration or in cancer.

In cancer, the microenvironment engineering can be utilized to create 3D *in vitro* tumor models for drug screening, and to study cancer biology. An example of engineering the stem cell environment in cancer includes creating a non-adherent hanging drop array system, where 3D spheroids can be generated from primary patient-derived cancer stem cells. In suspension culture, cancer stem cells differentiate to mirror primary tumors, and can faithfully mimic patient response to platinum chemotherapy *in vitro*. Tissue-resident adult stem cells have the potent ability to regenerate given the right cues, to repair and restore organ function. Similarly, stem cells can also remain quiescent, and repopulate a tumor, when under attack from chemotherapy. Engineering stem cell niches can answer broad ranging questions from cancer recurrence and escape from chemotherapy to how they suppress immunity and harness the body's regenerative ability to support their own malignant cause.

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Dr. Raghavan is a biomedical engineer, with a strong interest in using tissue engineering and regenerative medicine principles to study stem cell/immune interactions. Her lab utilizes engineering approaches to construct cancer microenvironments that include a variety of cellular and biomechanical cues. Research directions include building metastatic cancer environments to develop better therapies, and understand how cancers fundamentally harness the body's regenerative mechanisms for their own insidious growth. The lab uses a combination of biomaterial, tissue engineering, cell and molecular biology, and translational strategies to ask these questions. Dr. Raghavan's research has been supported by the NIH and by the Kaplan Gynecologic Cancer Fund.