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Date Friday, March 7, 2025

Time 10:00 to 11:00 AM

Location CEMO 105

Title: *Mechanometabolism in cancer*

Abstract: During solid tumor progression, cells undergo mechanical and metabolic changes that help to fuel metastasis. To move, cells must utilize ATP to fuel the cellular contractility and forces that sustain migration, however very little is known about how the metabolic state of a cell affects its ability to migrate and vice versa. In this talk, I will describe my lab's efforts to understand the forces driving cell movements in the tumor microenvironment and the energy required for movement. Combining tissue engineering approaches, mouse models, and patient samples, we create and validate in vitro systems to understand how cells navigate the tumor stroma environment to identify novel targets of cancer metastasis. Microfabrication and native biomaterials are used to build mimics of the paths created and taken by cells during metastasis. Using these platforms, we have described a role for a balance between cellular energetics, cell and matrix stiffness, and confinement in determining migration behavior. Moreover, we have extended this work into investigating the intersection of diabetes and the diabetic tissue microenvironment with tumor progression, showing that mechanical changes in the tissue due to diabetes can promote cancer. Overall, our work has demonstrated key mechanical drivers of metastasis within the tissue microenvironment.

Bio: Cynthia Reinhart-King is the John W. Cox Professor and Department Chair in the Department of Bioengineering at Rice University. Prior to joining Rice, she was a University Distinguished Professor in Biomedical Engineering and Cell and Developmental Biology at Vanderbilt University where she also served as Senior Associate Dean for Research in the School of Engineering. She obtained undergraduate degrees in Chemical Engineering and Biology at MIT and her PhD at the University of Pennsylvania in the Department of Bioengineering. Her lab's research interests are in the areas of cell and tissue mechanics and cell migration as it relates to disease progression, particularly in cancer, atherosclerosis, and wound healing. She was awarded the Rita Schaffer Young Investigator Award and the inaugural Mid-Career Award from the Biomedical Engineering Society, an NSF CAREER Award, the Sonny Yau '72 Excellence in Teaching Award, a Cook Award for "contributions towards improving the climate for women at Cornell," the Zellman Warhaft Commitment to Diversity Award from the Cornell College of Engineering, the Vanderbilt Chancellor's Award for Research and the Edward J. White Service Award from the Vanderbilt University School of Engineering. She is a fellow of the Biomedical Engineering Society, the American Institute for Medical and Biological Engineering (AIMBE), and the International Academy of Medical and Biological Engineering, and she was an inaugural New Voices Fellow of the National Academies of Science, Engineering and Medicine. She served as a standing member of the NIH CMT study section panel, an elected Board Member of AIMBE, Secretary and Elected Board member of BMES, and Chair of the Diversity and Inclusion Committee of AIMBE. She is also the current Past-President of the Biomedical Engineering Society.