Department of Biomedical Engineering
UNIVERSITY OF WISCONSIN–MADISON

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Seminar Series

Interstitial fluid flow in the brain tumor microenvironment

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Fluid flow in the brain is an emerging area of research with implications in Alzheimer's, aging, brain homeostasis, development, and cancer. In cancers, fluid flow is increased as pressure builds as tumors grow. In my laboratory, we study the role of interstitial fluid flow, or the fluid flow within the spaces of tissues, on cellular behaviors. We have developed an array of techniques and tools to measure, model, and manipulate fluid flow in the brain. In glioblastoma, the deadliest form of brain cancer, cellular invasion is a defining factor of its resistance to therapeutic intervention and poor patient prognosis. Invasion in the brain follows distinctive routes that correlate with interstitial and bulk flow pathways. To examine how interstitial fluid flow interacts with this specific invasive microenvironment, we have developed tissue engineered models of the brain that recapitulate patient tissue. We have found that interstitial flow can enhance invasion of brain cancer cells, mediated simultaneously by chemical and mechanical mechanisms. In order to better understand the nature of interstitial flow and its potential for prognosis and therapeutic intervention, we have developed MR imaging methods and analyses to map fluid flow routes in and around brain tumors. In this talk, I will discuss the nature and implications of interstitial fluid flow in the brain, identifying both tissue-level and cellular-level mechanisms and how our lab uses diverse approaches (in vitro, in vivo, ex vivo, in silico) to study this phenomenon.

ABOUT the SPEAKER

Dr. Munson is an Associate Professor at the Fralin Biomedical Research Institute and in the Department of Biomedical Engineering & Mechanics at Virginia Tech. She received her B.S. in Chemical Engineering and Neuroscience from Tulane University. She received her Ph.D. in Bioengineering from Georgia institute of Technology and completed her postdoctoral training at the Swiss Federal Institute of Technology in Lausanne (EPFL). During her training, she was supported by the National Science Foundation, the Fulbright Program, and the Whitaker Foundation. Her laboratory studies the role of fluid flow in tissue homeostasis and disease with a specific focus on cancer and neurological disorders. Dr. Munson has received funding from the NCI, NINDS, NIA, NIBIB, Coulter Foundation, and the American Cancer Society. Dr. Munson has been awarded the Rita Schaffer Young Investigator Award from the Biomedical Engineering Society, the Cellular and Molecular Bioengineering Young Innovator Award, and the Emerging Leader Award by the Ivy Foundation. She is also the Associate Director of the Pre-Clinical Imaging Center at Virginia Tech and forms part of the leadership team for the Virginia Tech Cancer Research Alliance.

Monday, September 19 at noon
1003 Engineering Centers (Tong Auditorium)