Biography

In his role as vice provost for research, Dr. Wirtz focuses on the current and future health of the university’s research enterprise, including institutional research compliance, research administration and development, and cross-divisional research initiatives, such as the Bloomberg Distinguished Professorships, the Johns Hopkins Catalyst and Discovery Awards, and the President’s Frontier Awards. A Johns Hopkins faculty member since 1994, Wirtz studies the biophysical properties of healthy and diseased cells, including interactions between adjacent cells and the role of cellular architecture on nuclear shape and gene expression. He holds the T.H. Smoot Professorship in the Whiting School of Engineering with secondary appointments in the School of Medicine. He has authored more than 200 peer-reviewed articles, and his research has been cited more than 14,000 times.

Abstract

“Cancer cell biology in 3D “

Two-dimensional (2D) in vitro culture systems have for a number of years provided a controlled and versatile environment for mechanistic studies of cell adhesion, polarization, and migration, three interrelated cell functions critical to cancer metastasis. However, the organization and functions of focal adhesion proteins, protrusion machinery, and microtubule-based polarization in cells embedded in physiologically more relevant 3D extracellular matrices is qualitatively different from their organization and functions on conventional 2D planar substrates. This talk will describe the implications of the dependence of focal adhesion protein-based cell migration on micro-environmental dimensionality (1D vs. 2D vs. 3D), how cell micromechanics plays a critical role in promoting local cell invasion, and associated validation in mouse models. We will also discuss the molecular and biophysical mechanisms used by cancer cells to negotiate different matrix microstructures. Finally, we will discuss the implications of this work in metastatic cancer.