The Long and Winding Road to Organ-on-Chip

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Advances in tissue engineering and therapeutics development are critically dependent on the development of widely available in vitro microfluidic based models of tissue processes or "tissue on chip". Such models (devices) have a large number of applications including in studies of cellular behavior and microcirculatory dysfunction, drug particle adhesion and transport, drug discovery, leukocyte/particle adhesion, and tumor cell metastasis. Generally, the development of such *in vitro* models requires academic-industry partnerships to allow for development, validation, and marketing of these devices. Over the past 20+ years, we have developed and utilized these enabling technologies that have applied this promising technology to the development of several novel therapies for understanding inflammatory disease ranging from modeling the enhanced permeability & retention (EPR) effect in tumors to identifying phenotypes in sepsis patients. These novel systems allow for not only a better understating of the inflammatory disease in normal tissue and tumors but also development and rapid screening of novel therapies.

Dr. Mohammad F. Kiani is a professor in the Department of Mechanical Engineering, with joint appointments in the Department of Bioengineering and Department of Radiation Oncology, at Temple University. He served as the chair of Department of Mechanical Engineering at Temple University (2004-2014) and Department of Biomedical Engineering at the University of Tennessee Health Science Center (2003-2004). He received a B.S. in electrical engineering from the University of Oklahoma and M.S. and Ph.D. in biomedical engineering from Louisiana Tech University. He was an NIH postdoctoral fellow at the University of Rochester from 1990 to 1993. The current focus of his research is the development of organoids and microphysiological systems for rapid drug development and screening and targeted drug delivery. Dr. Kiani has received a number of scholarly research and teaching awards including the prestigious Established Investigator Award from the American Heart Association and his research has been funded by a number of government agencies and private foundations. He has published more than 80 peer reviewed scientific articles and has made more than 250 presentations at scientific meetings. Dr. Kiani is a fellow of the American Heart Association, a senior member of IEEE and several other scientific and engineering organizations and serves as a reviewer for several funding agencies and a number of scientific and engineering journals. He is also the co-founder and past president of Engineering World Health which is a major nonprofit organization delivering healthcare infrastructure and engineering support to a number of hospitals in Africa, Central America and Asia.