People

Michael R. King

Associate Professor

Department of Biomedical Engineering

Dr. King's primary research interest involves the study of adhesive interactions of flowing cells with reactive surfaces. Such phenomena are important in leukocyte recruitment during inflammation, platelet deposition during thrombosis and hemostasis, and engraftment of transplanted stem cells and circulating cancer cells. Most adhesive interactions of blood cells are mediated by cell surface receptors that recognize specific counter-receptors on the blood vessel wall or on other circulating cells. These adhesion receptors can have rapid, force-dependent binding kinetics, causing stochastic transitions between free stream flow, transient "rolling" adhesion, and firm arrest. Several temporally-varying physical parameters combine to control the state of cell adhesion under flow, such as the site density and spatial distribution of receptor molecules, the level of cell activation, and the local fluid flow environment. These mechanisms combine in a complex and nonlinear manner, making a complete theoretical model necessary for accurate prediction of cell behavior. Over the past six years, the King Laboratory has used a combination of state-of-the-art numerical simulations, in vitro flow chamber experiments with human cells, and collaborative animal experiments to elucidate the dynamics of multicellular adhesion phenomena. The King Lab has been able to exploit this knowledge of physiological blood cell trafficking to develop new applications for the manipulation and isolation of rare populations of stem and cancer cells, and have begun to commercialize a range of products for research and clinical use.

Dr. King joined Cornell University in 2008 after six years on the faculties of Biomedical Engineering and Chemical Engineering at the University of Rochester. He was an NIH/NRSA postdoctoral fellow in Bioengineering at the University of Pennsylvania. King is a former Whitaker Investigator, a James D. Watson Investigator of NY State, an NSF CAREER Award recipient, and the scientific founder of CellTraffix, Inc. King received the 2008 ICNMM Outstanding Researcher Award from the American Society of Mechanical Engineers, and was the 2007-2008 Professor of the Year in Engineering at the University of Rochester.

Education

- Ph.D., 1999, University of Notre Dame, Chemical Engineering

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