BIOENGINEERING SEMINAR

“Engineering Cellular and Molecular Immunity in Cancer”

Thursday – April 3, 2014 – 9:30 a.m.
EPFL – room SV1717a

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host: Prof. M. Swartz

Abstract

The immune system is a unique physiological system charged with protecting us from external and internal challenges, and plays a crucial role in innumerable diseases and maintaining healthy homeostasis. Its structure and function require a complex, decentralized network composed of a multitude of decision-making processes that span spatiotemporal scales, from molecules to cells to tissues to the entire organism. Engineering principles can help improve our understanding of how immune decision-making works by 1) enabling new mechanistic understanding by identifying critical components and dynamics that maintain health or drive disease and 2) providing more rational ways to modulate immune decision-making, thus improving the design and efficacy of immune-based therapeutic intervention.

In this seminar, I will describe how engineering principles and technologies can be used to conceptualize a more structured framework for researching mechanisms and modulation strategies in immune decision-making. Two current examples from my research program will be presented with applications focused on cancer immunosuppression: 1) a biomaterials-based approach to ask and answer novel mechanistic questions about the role of the aryl hydrocarbon receptor in early tumor establishment and control of tumor-immune interactions in the tumor microenvironment and 2) the development of an integrated process using engineering platforms and technologies (specifically a microfluidics device and a molecularly engineered, cell membrane-anchoring stimulus) to create a more efficient, bedside cell-based vaccine using B cells as antigen presenting cells.

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