

BIOEN 509 – DEPARTMENTAL SEMINAR SERIES

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Foege Bioengineering Building N130A

Motivations for Engineering the Dynamic Complexity and Influences of the Tumor Micro-environment

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A major recognized impediment to more effective cancer treatment is the ability of tumors to acquire resistance to cytotoxic and cytostatic agents. Drug resistance contributes to treatment failures that exceed 90% in patients with metastatic carcinomas. However, the finding that ex vivo assays of chemotherapy sensitivity poorly predict tumor responses in vivo indicate that tumor microenvironments (TME) also contributes substantially to cellular viability following toxic insults. For example, tumor cell adhesion to matrix molecules or to supporting mesenchymal cells can impact life/death decisions in response to cell stress. Further, the spatial organization of tumor cells relative to vasculature establishes gradients of drug concentration, oxygenation, acidity, and states of cell proliferation, each of which may profoundly influence cell survival and subsequent tumor repopulation kinetics. I will describe the complexities of the TME, present results demonstrating how modulating the dynamics of reciprocal cell signaling in the TME modifies treatment responses, and emphasize the opportunities for engineering a TME for the analyses of cancer therapeutics.

Dr. Nelson received his Bachelors degrees in Chemistry, Biochemistry, Biology and his MD from the University of Kansas. Following a Biotechnology Fellowship at the NCI, he received training in Medical Oncology at the University of Washington and the Fred Hutchinson Cancer Research Center (FHCRC). He joined Leroy Hood's group in the Department of Molecular Biotechnology in 1994 and subsequently was appointed as a faculty member at the FHCRC where he is currently a Full Member, as well as a Professor in the University of Washington's Department of Medicine with adjunct appointments Genome Sciences, Pathology and Urology. Dr. Nelson is the recipient of a Damon Runyon Scholar Award, and is currently the Director of the Pacific Northwest NCI SPORE in Prostate Cancer, co-head of the UW/FHCRC Cancer Consortium Program in Prostate Cancer Research, and co-leader of the NCI Tumor Microenvironment Network.

