



BIOENGINEERING

UNIVERSITY of WASHINGTON

A Department of the College of Engineering & School of Medicine

BIOEN 509 – DEPARTMENTAL SEMINAR SERIES

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12:30-1:20 PM

Foege Bioengineering Building N130A

Delineating Molecular Signatures of Disease with Novel Molecular Imaging Probes

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The study of human health and disease at the molecular level has led to the identification of an array of diagnostic and prognostic biomarkers. It is now possible to distinguish between healthy and diseased states by patterns of gene expression, levels of enzymatic activity, and the structural makeup of tissue. Our group is interested in exploiting this knowledge to aid in the design of non-invasive imaging probes that are capable of sensitively and specifically detecting altered molecular profiles in vivo. I will discuss the design and application of three new types of molecular probes that we recently developed for the in vivo detection of molecular signatures of disease. First, I will describe an oligonucleotide-based optical probe, termed 'Quantitative Molecular Beacons' (QMBs), that allow for the absolute quantification of RNA in single living cells. Next, I will describe how genetically engineered bioluminescent proteins can be used to monitor oxidative stress in living subjects. Finally, I will discuss some of the strategies we are developing to specifically and efficiently identify pathological states in living subjects with magnetic resonance contrast agents. We hope that the tools we are currently developing will one day allow clinicians to make more accurate diagnoses and will lead to more personalized patient care.

Andrew Tsourkas completed his B.S. in ME from Cornell University in 1997. He received his Ph.D. in Biomedical Engineering from the Georgia Tech./Emory University joint program in 2002. He then went on to conduct a postdoctoral fellowship at the Center for Molecular Imaging Research in the Department of Radiology at Harvard Medical School from 2002–2004. In 2004, Dr. Tsourkas joined the Department of Bioengineering at the UPenn. He holds a secondary appointment in Radiology and is a member of the Institute of Medicine and Engineering (IME) and the Institute for Translational Medicine and Therapeutics (ITMAT). He is currently the Assistant Director of the program in Targeted Therapeutics in ITMAT. Dr. Tsourkas is the co-founder and scientific advisory board member of the start-up company Vivonetics. His research interests are focused on developing novel molecular probes that allow for the real-time imaging of vital intracellular processes such as gene regulation, mRNA localization, and protein expression. In particular, his expertise lies in the design and the development of molecular probes for optical and magnetic resonance imaging platforms. Applications range from studying complex intracellular dynamics of individual cells to the early detection of disease in a clinical setting.



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