UNIVERSITY OF LOUISVILLE

COLLEGE OF ARTS & SCIENCES

**Department of Chemistry**

Brown and Williamson Series
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## Light-Triggered Drug Release from Cell-Conveyed Phototherapeutics


**ABSTRACT:**

Light-responsive therapeutics offer the promise of targeted therapy, whose benefits include (a) prolonged action at the target site, (b) reduced dosage due to enhanced therapeutic efficiency, (c) reduced systemic concentration as a consequence of direct action on target, (d) reduced adverse effects as a result of selective enhancement, (e) and localized delivery of multiple agents resulting in targeted combination therapy. Although photo-activatable pro-drugs have received considerable attention, these species are dependent upon short wavelengths (<450 nm) for activation. However, maximal tissue penetrance by light occurs within the "optical window of tissue" (650 – 900 nm), well beyond the wavelength range of most photo-cleavable functional groups. We've developed a technology that (a) uses light within the optical window to control drug delivery, (b) provides the means to assign distinct wavelengths to the photodelivery of different drugs, (c) employs circulating lipid bilayer-containing carriers (e.g., RBCs, liposomes) as the drug transporters, and (d) is applicable to therapeutic agents that range in size from small molecules to proteins. The application of this technology to cancer, autoimmune diseases, and thromboembolic disorders will be discussed.


**BIO:**

I was born in New York City, but I grew up in southern California. I started out as a math major in college but switched over to biology (B.S. UC Irvine). To add further to the confusion, I performed undergraduate research with Hal Moore, in the field of organic synthesis. After graduating from UCI, I moved onto UCLA for my graduate work, where I joined the lab of Bob Stevens. Bob a great total synthesis chemist, but he unfortunately died at a very young age. I was subsequently an NIH postdoctoral fellow at the Rockefeller University in New York City with Tom Kaiser, one of the founders of what we now call "Chemical Biology". I started my independent career in the Department of Chemistry at SUNY Buffalo, where my interests focused on self-assembly and the chemical biology of cell signaling. After 10 snowy years in Buffalo, I moved back to the city of my birth to join the Department of Biochemistry at the Albert Einstein College of Medicine. The world class scientific setting at Einstein provided the environment needed to dramatically expand our efforts in cell signaling. Nonetheless, after 10 years, I decided that I missed my chemistry roots and UNC made me an offer I could not refuse. At UNC, our research program includes efforts in chemical cytometry, optogenetics, signal transduction, and light-activated drugs. Finally, in the area of education, I've developed virtual reality experiences to introduce first year graduate students to key concepts in laboratory safety.