Translating Biomaterials for CNS Drug Delivery

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Abstract

For decades, the field of drug delivery has sought to develop a universal nanocarrier that is capable of delivering any drug specifically to a single tissue site with minimal off-target effects. Some drug delivery technologies have gained clinical approval, although a true "magic bullet" nanoparticle has yet to be realized. Drug delivery to the brain and spinal cord remain particularly challenging problems, given the presence of evolutionarily conserved barriers that restrict entry of circulating molecules into the central nervous system (CNS). Peripheral toxicity often limits drug dosing and efficacy, even for CNS targeted nanoparticles. Drug delivery scientists seeking to do translational work in the CNS are faced with urgent questions. What does it take to design nanoparticles for CNS drug delivery that can reach patients within the next decade? What drug delivery problems can we tackle that will directly impact clinical care today? For individuals seeking translational impact, access to clinical resources and renewed attention toward understanding the true clinical problems in niche medical applications will be key. In this talk, Dr. Sirianni will discuss the development of a nanomedicine platform for treatment of CNS disease, focusing on a roadmap for specific translation of polymeric nanoparticles in the field of pediatric neuro-oncology.

Bio Sketch

Dr. Rachael Sirianni earned her undergraduate degree from the Arizona State University Bioengineering Department in 2003. She received her PhD in Biomedical Engineering from Yale University in 2008 and completed a postdoctoral fellowship in Diagnostic Radiology at the Yale School of Medicine in 2011. Following her first faculty appointment at the Barrow Neurological Institute in Phoenix, Dr. Sirianni moved her laboratory to the University of Texas Health Science Center at Houston, where she is now an Associate Professor in the Vivian L. Smith Department of Neurosurgery. Dr. Sirianni’s group is focused on developing new drug delivery clinical trials for better treatment of pediatric brain tumors at the Children’s Memorial Hermann Hospital in the Texas Medical Center. Dr. Sirianni balances preclinical and translational work in close collaboration with clinical and industry partners in oncology and neuroprotection. Her group’s primary academic interests include formulation science, nanoparticle imaging/fate, tissue engineering, and therapeutic development in the central nervous system.