Department of
Biomedical Engineering
UNIVERSITY OF WISCONSIN-MADISON

Spring 2018 Seminar Series

Engineering Human CNS Morphogenesis In Vitro

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Human pluripotent stem cells (hPSCs) possess the emergent properties necessary to recapitulate developmental processes ex vivo and give rise to organotypic cultures and tissues. If harnessed, these properties could enable scalable manufacture of brain and spinal cord tissue models that closely mimic human neural anatomy and physiology, thereby permitting novel insights into human neurological disorders and even forming the basis for potential neural tissue transplants.

In this presentation, I will describe my lab's successes in melding hPSC culture with engineering culture systems to reproducibly instruct the earliest stages of CNS morphogenesis. Applications of this technology to develop regenerative cell therapies high-throughput screening platforms for neurotoxins, and novel neurological disease screening assays will also be discussed.

Randolph S. Ashton received his B.S. from Hampton University (Hampton, Virginia, 2002) and Ph.D. from Rensselaer Polytechnic Institute (Troy, NY, 2007) in Chemical Engineering. During graduate studies under Prof. Ravi Kane, he researched how engineering biomaterials at the nanoscale could regulate the fate of adult neural stem cells. He continued to pursue his interest in stems cells and tissue engineering as a California Institute for Regenerative Medicine and a NIH postdoctoral fellow at the University of California Berkeley's Stem Cell Center in the lab of Prof. David Schaffer.

In 2011, he was appointed to a faculty position in the Wisconsin Institute for Discovery at the University of Wisconsin–Madison as an Assistant Professor of Biomedical Engineering. The goal of Dr. Ashton's research is to provide novel regenerative therapies to treat CNS diseases and injury. His lab is currently developing scalable protocols to generate central nervous system tissues from human pluripotent stem cells (hPSCs). They also meld state of the art biomaterial approaches with hPSC-derived neural stem cells to engineer brain and spinal cord tissue models in vitro. Among his awards and honors, Dr. Ashton was named a 2017 NSF CAREER Awardee, the 2016 Young Faculty Investigator Awardee by the Regenerative Medicine Workshop at Hilton Head, a 2015 Emerging Investigator by Chemical Communications, and a 2013 Rising Star by the Biomedical Engineering Society's Cellular and Molecular Bioengineering Special Interest Group. Also, he has been awarded an Equity & Diversity Award by the UW-Madison College of Engineering for scientific outreach activities, a Burroughs Wellcome Fund Innovation in Regulatory Science Award, a Draper Technology Innovation Award from the Wisconsin Alumni Research Foundation, and a Basic Research Award from the UW Institute for Clinical & Translational Research. His research has also been supported by grants from the NIH, the EPA, and Thermo Fisher Scientific.

ABOUT the SPEAKER

Monday, April 30, 2018
12 PM in Tong Auditorium (1003 Engineering Centers)