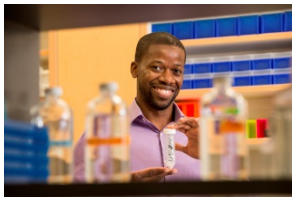

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Pre-Clinical Development of a Biomaterial-based Microparticle Vaccine for Type 1 Diabetes Attenuation

Friday, April 24
312 Ell Hall
11:45am – 1:00pm

Refreshments will be served

ABSTRACT Current paradigms for diabetes treatment are inadequate at responding accurately to short term homeostatic imbalances and cannot prevent chronic diabetes-related complications. Predictably, novel approaches to re-establish homeostatic conditions in patients afflicted by type 1 diabetes (T1D) are now under intense investigation. Notably, the *ex vivo* generation and injection of tolerance-promoting dendritic cells (DCs) is being pursued in clinical trials for applications in T1D. While instructive, exogenously-conditioned cellular-based vaccines for T1D treatment have numerous limitations. Dissemination of exogenously delivered DCs is inefficient, and treatment involves a personalized medicine approach involving the generation of cultured DCs, which amounts to high production and treatment costs that prohibit widespread application. To circumvent these limitations, we are developing a multifunctional, synthetic microparticle-encapsulating vaccine that can be easily administered with simultaneous and continuous delivery using controlled-release materials (poly lactide-co-glycolide) for the *in vivo* conditioning of DCs and amelioration of T1D. Moreover, these microparticle-based vaccines are engineered to target DCs, and provide both intracellular and extracellular delivery of immunomodulatory agents as well as antigen. Our ultimate goal is to develop a microparticle-based (MP) vaccine capable of reversal of T1D in humans. To date, we have demonstrated (i) the ability of targeted MPs to improve *in vivo* DC uptake and translocation, (ii) the effect of our non-targeted MP vaccine on bone marrow-derived DC phenotype and downstream effects on allogenic T cells, and (iii) the efficacy of the non-targeted MP vaccine to prevent diabetes onset in NOD mice. Current investigative work is focused on exposing the cellular mechanisms behind the observed prevention in NOD mice, reversal of type 1 diabetes and, evaluating the safety of this biomaterial formulation in rodent models (at OneVax, LLC), with an eye on full translation of this technology.

BIOGRAPHY Jamal Lewis is a Senior Scientist at OneVax, LLC and a Post Doctoral Associate in the J. Crayton Pruitt Family Department of Biomedical Engineering at the University of Florida (UF). Dr. Lewis received his B.S. in Chemical Engineering from Florida A&M University in 2004, M.S. in Biomedical Engineering in 2007 from North Carolina State University and Ph.D. in Biomedical Engineering from the University of Florida in 2012. His Ph.D. and post doctoral work focused on the development and characterization of immuno-modulatory biomaterials. His research, educational and entrepreneurial efforts have been supported by NSF, NIH, and the Juvenille Diabetes Research Foundation. He is the recipient numerous awards including the UF College of Engineering Diversity Fellowship and the Society for Biomaterials STAR Award. His current research interests include immuno-modulatory biomaterials, stimuli-responsive biomaterials and opto-genetic engineering.

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