THE UNIVERSITY OF RHODE ISLAND
COLLEGE OF ENGINEERING

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The Spring 2022 Seminar Series in Chemical Engineering Presents:
Metabolomics Defines Human Immune Response to Influenza Vaccination

April 14, 2022, 12:45-1:45 pm
Chafee Hall, Room 273, 12:45-1:45 PM Kingston, RI
Zoom: https://uri-edu.zoom.us/j/93044052368

Dr. Drew R. Jones
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Abstract: Influenza represents a major and ongoing public health hazard. Current collaborative efforts are aimed at creating a "universal flu vaccine" with the goal of both improving responses to vaccination and increasing the breadth of protection across multiple strains and clades from a single vaccine. As an intermediate step to these goals, current work is focused on evaluating the systemic host response to vaccination in both normal and high-risk populations, such as in obesity which has been linked to poor responses to vaccination. We therefore employed a metabolomics approach using a time-course (n=5 time points) of response to human vaccination to influenza from before vaccination (pre) to 90 days following vaccination. We analyzed both urine and plasma from a cohort of subjects (n=158) designed to evenly sample across age, sex, BMI, and other demographic factors, stratifying their response to vaccination as "High", "Low", or "None" based on their measured seroconversion by hemagglutination assay (HAI) from plasma samples at day 28 post vaccination. Overall, we putatively identified 20,692 distinct named small molecules structures across the 790 samples analyzed with the aim of finding metabolite correlates of vaccine response, as well as prognostic and diagnostic markers from before and after vaccination respectively. Notably, subjects classified as obese (BMI > 30) "None" responders were unbiasedly differentiated from obese "High" responders in a hierarchical clustering analysis with 321 statistically significantly significant diagnostic markers in urine 3 days post vaccination (n=45). Considering the comparison of predictive, pre-vaccination samples, a metabolic pathway analysis of the differential markers between "High" and "None" subjects indicates a link to Histidine metabolism and Coenzyme Q10 metabolism. Ongoing efforts are aimed at validating these putative markers in a Ferret model of influenza infection as well as in independent cohorts of human seasonal vaccination and human challenge studies with authentic virus.

Bio: **Drew R. Jones** is an Assistant Professor at NYU Grossman School of Medicine for the Department of Biochemistry and Molecular Pharmacology and the Department of Radiation Oncology. He also serves as the Founding Director of the NYU Metabolomics Core Resource Laboratory. The ongoing theme of his work is the invention or adaptation of advanced chromatography and mass spectrometry technology to tackle challenging analytical problems with a translational potential. Dr. Jones received his PhD in Biochemistry from the University of Arkansas for Medical Sciences. He completed postdoctoral training at the Peng Laboratory at St. Jude Children's Research Hospital where his focus was metabolomics and Alzheimer's disease.

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