Dissertation Defense - Eric J. Munger, PhD Bioinformatics and Computational Biology
April 23, 2021 11:00 AM- 1:00 PM
VIEW EVENT
All are invited to attend the defense. For more information please contact Graduate Coordinator at kharrism@gmu.edu

Candidate: Eric J. Munger

Program: PhD Bioinformatics and Computational Biology

Date: Friday, April 23, 2021

Time: 11:00 AM

Place: Zoom Meeting Link: https://gmu.zoom.us/j/91447743846?pwd=OGpoSjliUmNIOHcvcWtxbHhwaXlJQT09

Title: MACHINE LEARNING FOR BIOMARKER DISCOVERY AND ANALYSIS

Committee Chair: Dr. Mohsin Saleet Jafri

Committee Members: Dr. Jason M. Kinser, Dr. Nehal N. Mehta, and Dr. Iosif Vaisman

ABSTRACT:
Patients suffering from chronic inflammatory diseases such as psoriasis have a greater non-calcified coronary plaque burden, indicating a worse subclinical cardiovascular disease profile when compared to that of healthy individuals. This, in turn, leads to accelerated atherosclerosis and a high probability of an early cardiovascular event. Characterization of non-calcified coronary plaque via CCTA provides a reliable tool to assess the future risk of these cardiovascular events in patients, even those that have an increased risk of myocardial infarction.

Preventive cardiology hinges upon the ability to accurately assess cardiovascular risk and commit to a diagnosis of prospective major adverse cardiac events. Doing so increases the likelihood of an effective treatment strategy. However, a caregiver's ability to calculate the long-term likelihood of major adverse cardiovascular events depends on the ability to elucidate clear indicators from risk factors for cardiovascular disease when comorbidities often exist. This ability is severely hampered because current statistical models rely on only a few variables to predict complex outcomes and traditional risk scoring methods often depend on factors that don't form a legitimate basis for treatment planning.

Machine learning algorithms offer the opportunity to map these complex data variables to clinical outcomes that are crucial for the advancement of our understanding of cardiovascular disease risk factors. Machine learning is potentially well-equipped to solve this problem given its ability to quantify and rank significant predictors for a major adverse coronary event and present suggestions for new biomarkers, or weighted combinations of previously known biomarkers, that may influence the clinical diagnosis of diseases over time when comorbidities and limited time-series data exists. Furthermore, learned characteristics offered by artificial intelligence may present potential alternative treatment strategies.