Application number/Title: 34096 - Machine learning of disease incubation signatures

Applicant PI: Dr Bevan Huang

Application Institution: Janssen Research and Development, USA

Keywords provided by the Applicant PI to describe the research project:

biomarkers, classification, genetics, interception, machine-learning

Application Lay Summary:

Identifying and interpreting the earliest signals of disease susceptibility is critical to prevention and interception of disease, and hence to the future of healthcare. For this, we need to characterize individuals prior to clinical manifestation, to construct a signature of disease incubation which may be undetected for years. A first step is to investigate signatures for specific diseases, such as diabetes, rheumatoid arthritis, and Alzheimer's disease, to aid in early diagnosis. Beyond this we will see whether considering multiple diseases simultaneously improves prediction.

Over the next 18 months, this project aims to test and validate machine learning models and computational tools to identify individuals incubating disease. We will utilize the baseline measurements and longitudinal electronic health records to classify individuals into three categories: healthy, incubating, and diseased. We aim to identify signatures both for specific diseases and broader classes of disease such as autoimmune disorders. In addition to the biological knowledge gained through this process about disease development, we will advance our understanding of the potential of machine learning to track disease signals and aid in early detection. The proposed research will inform our understanding of disease interception, which is critical for public health. Earlier diagnosis and treatment can both save lives and reduce burdens on the healthcare system.