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Title of project: Target discovery using machine learning approaches in cardiometabolic disease

ABSTRACT

Cardiometabolic diseases are multifactorial progressive disorders with a strong heritable genetic predisposition. Understanding predispositions and treatment responses in cardiometabolic diseases presents a promising opportunity to improve therapies. Current methods in genomics employ association testing of single genetic variants in large cohorts. This poses a limitation by not accounting for the complex interactions that exist in biology across cells, tissues and organs nor environmental factors such as life style or medication. As the diseases are progressive, it is important to understand individual predisposition in light of environmental changes happening in combination with the genetic background predisposition. Data on cardiometabolic diseases are now available in large volumes from multi-omics data, imaging, genetic data and clinical characteristics. Exploitation of these types of data to advance findings of novel biomarkers for cardiometabolic disease requires integrative data methodologies and use of machine learning (ML) techniques.

The project will utilize ML approaches for target discovery in cardiometabolic traits across longitudinal and deeply phenotyped data. The ML approaches will be applied on three different datasets that all contain longitudinal data from multi-omics, imaging and clinical characteristics data as well as genome-wide genotype data from human cellular models of metabolic disease to patient data. Applying artificial intelligence models hold great promise for identifying novel pharmaceutical targets by investigating the most predictive features at a global and individual level. Additionally, as artificial intelligence models provide individual level predictions this allows characterization of patient-subgroup response for discovery of precision targets for prevention or treatment of cardiometabolic disease.