One Health Research Project Abstract

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Title: Health Interrelation of Humans and Environment in Southern Arizona (HI-HESA): *Focus on Hispanics from El Banco por Salud.*

Research Abstract:
Aim: To examine interactions between social determinants of health and genetic variants contributing to cardiometabolic disease.

Background and Significance: Cardiometabolic diseases such as type 2 diabetes mellitus (T2DM) and obesity in humans can produce drastic individual and environmental health effects. The interrelation between the health of mammals (humans and animals) and our shared environment is unquestionably relevant (PMID: 32439765). Factors that are part of this complex relationship include the social determinants of health (SDOH), known for influencing human disease(s). Such as cardiometabolic diseases, which disproportionally burden Hispanic populations. In turn, the University of Arizona's Center for Disparities in Diabetes, Obesity, and Metabolism (CDDOM) created El Banco por Salud (Wellness Bank). A biorepository of Southern Arizona Hispanic adults (N=1,631, 18-75 years) that either have or are at high risk for T2DM and obesity. All participants have taken an extensive 231-question survey assessing general health, personal health perceptions, detailed health history, health behaviors, demographics, SDOH questions, and quality of life (PMID: 35504695). Also, biospecimen samples were collected from the participants, who have given their consent to use in future studies, as described here.

Genetic contributions to cardiometabolic diseases, such as T2DM and obesity, are wellknown from large-scale genome-wide association studies (GWAS). However, there are limited large-scale studies examining the interactions between genetics and SDOH factors in cardiometabolic diseases. SDOH factors collected as part of El Banco por Salud questionnaire include food insecurity, community/social context, education, neighborhood/physical environment, and others. Work from our group showed that 45% of participants were food insecure as of March 2020 (Results presented at the NIH: Food Insecurity, Neighborhood Food Environment, and Nutrition Health Disparities: State of the Sciences Workshop). Also, we show several SDOH factors have been associated with their health outcomes (PMID: 35565734). However, our work to date is minimal, and additional analyses are warranted. The proposed study will test the hypothesis that genetic contributions will be modulated by social factors in cardiometabolic diseases such as T2DM and obesity.

Plan of Research: The graduate research assistant, myself, will be conducting this research under the advisement of Dr. Dawn Coletta, and El Banco por Salud's data analyst, Dr. Yann Klimentidis. I will examine a sample of El Banco por Salud adult's genetic data (n = 972) generated using the Illumina Infinium OmniExpressExome-8 kit. The data will be analyzed using PLINK and R software to conduct a GWAS to identify genetic variants associated with cardiometabolic disease phenotypes. Also, data in El Banco por Salud on SDOH factors (including food insecurity, community/social context, education, neighborhood/physical environment, and others) from the questionnaire, geocoding, and census data will be examined using R software. Lastly, I will perform a two-way interaction model

between the genetic variants and SDOH factors data using R software. This will identify associations between genetic variants and SDOH factors impacting cardiometabolic phenotypes in this Hispanic sample.

Execution of this research, to my knowledge, will be one of the first gene-environment interaction studies for cardiometabolic health performed on Hispanics residing in the Southwest. We will communicate this new data to One Health investigators, El Banco por Salud collaborators, including those involved in government (policy), research, and local medical healthcare providers in El Banco por Salud qualified health centers. We will also share our findings with broader government/research audiences reached through the intended local and national conference presentations and manuscripts developed based on this data. Positively influencing health outcomes of local Hispanic populations and environmental health/exposures will help improve the health interrelation between humans and the environment in southern Arizona.