2017 Research Update

Research backed by the John Taylor Babbitt Foundation continues to make significant strides in elucidating the mechanisms that cause Hypertrophic Cardiomyopathy (HCM), developing clinical predictors of disease severity, and identifying approaches for treatment.

Thanks to the generosity of its supporters and benefactors, the foundation provides a $75,000 grant for basic and clinic research to Dr. M. Roselle Abraham at Johns Hopkins in Baltimore.

Dr. Abraham has been the Director of Research and Co-Director of Hopkins' Hypertrophic Cardiomyopathy Center of Excellence.

HCM is the most common inherited cardiac disease and is estimated to affect up to 1 in 500 individuals. Most cases of HCM are benign; however, some patients will develop serious disease with risk of sudden cardiac death, fibrosis, arrhythmias, stroke, and heart failure.

Due to its high prevalence, HCM remains the most common heart-related cause of sudden death in young athletes. Currently, the causal mutations for HCM are unknown in about 40 percent of patients, and there are no known therapies that can prevent or mitigate the development of cardiac disease in HCM patients generally.

Research in Dr. Abraham's lab is aimed at developing blood and imaging techniques for effective preclinical diagnosis and risk stratification of HCM patients and their family members and at identifying customized therapies to prevent or mitigate disease.

With funding from the Foundation, Dr. Abraham's lab has identified *mutation-specific* differences in cardiac function in two different HCM mouse models during the pre-hypertrophic stage of disease. Further analysis identified different treatment approaches that may be applicable for the different cardiac pathophysiology caused by different mutations.

Work has also focused on investigating differences between the physiology between mouse and human hearts and on developing methods to examine the effects of exercise on cellular cardiac function in mouse models. Exercise-induced effects are of particular interest, said Dr. Abraham, because the most common symptom presented by her patients is chest pain and related difficulties in exercising.

Additional research this year successfully developed a PET (positron emission tomography) biomarker for predicting life-threatening ventricular arrhythmias in HCM patients. This research is the subject of one of three scientific papers that are currently under review or revision for publication in premier peer-reviewed journals. An additional half dozen manuscripts addressing results from the basic and clinical research are currently in preparation.

The collaboration with John Hopkins' Applied Physics Laboratory to use 3-D printer technology to mimic the 3-D architecture of human cardiac tissue is successfully progressing. The end goal is to generate *HCM hearts-in-a-dish* to use to investigate disease mechanisms and to develop and test mutation-specific therapies.

Ventricular arrhythmias are a major cause of death in HCM patients. In collaboration with a computer scientist faculty member at the University of Delaware, a machine learning method was developed for predicting arrhythmias based on a small set of clinical variables.