UC San Diego
MOORES CANCER CENTER

2020 Cancer Control Program Pilot Project Award

Improved Diagnostic Accuracy of Cardiovascular Screening in Childhood Cancer Survivors Using Global Longitudinal Strain

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Scientific Abstract:

Due to the combination of rapid progression of anthracycline-related cardiac dysfunction and relative infrequency of cardiac monitoring in childhood cancer survivors, accurate cardiac function screening methods are critical. However, left ventricular ejection fraction (LVEF) derived from both 2D and 3D echocardiography (echo), the standard screening measures, have suboptimal sensitivities to detect cardiac dysfunction in comparison to LVEF by cardiac magnetic resonance imaging (MRI), the gold standard method. Global longitudinal strain (GLS) is a new and promising echocardiographic measure that may improve diagnostic accuracy, though its role in survivorship monitoring has not been defined. We propose to study the role of GLS in conjunction with conventional measures in the diagnosis of cancer therapy-related cardiac dysfunction in childhood cancer survivors.
Our Aims are 1) to determine the utility of GLS in conjunction with 2D echo-LVEF in the diagnosis of cardiac dysfunction by MRI, using new analyses of images from a previously completed study at the City of Hope (Duarte, CA) and 2) to explore the strength of correlations of GLS and 3D echo-LVEF with MRI-LVEF, in a new prospective pilot cohort at Rady Children's Hospital San Diego (San Diego, CA). Our interdisciplinary study team includes local and regional experts in pediatric cardiology and survivorship oncology with the past experience and preliminary data to demonstrate feasibility of study completion. The results of this study have the potential to immediately impact survivorship care. Moreover, we will leverage the data generated through this study to develop and submit a competitive resubmission proposal for K-series funding.

Lay Abstract:

Due to high survival rates and long-life expectancy after a childhood cancer diagnosis, there is a large and growing population of nearly 500,000 childhood cancer survivors in the United States, a majority of whom were exposed to anthracycline chemotherapy. Although highly effective at treating cancer, anthracyclines damage the heart and result in high rates of heart dysfunction and heart failure in survivors. Childhood cancer survivors are periodically screened for the development of heart dysfunction. However, standard ultrasound-based heart function screening measurements are inaccurate and may fail to correctly diagnose a substantial percentage of affected individuals; more accurate screening methods are needed. We propose to study the role of global longitudinal strain, a more sensitive ultrasound-based measure of heart function, in the diagnosis of heart dysfunction in childhood cancer survivors. Using a comparison to heart function measured by magnetic resonance imaging (the most accurate method available), we will

determine whether global longitudinal strain can aid in screening procedures in survivors. In the short-term, our study has the potential to improve detection rates of heart dysfunction, allowing earlier intervention to help prevent progression to heart failure in childhood cancer survivors. In the long-term, we intend to build upon these results in future studies that combine the most accurate ultrasound-based methods to further improve screening accuracy and detection rates, in order to optimize the cardiovascular monitoring of cancer survivors.