Fine, Nowell (Department of Cardiac Sciences, University of Calgary)
Risk estimation following infarction non-invasive evaluation-implantable cardioverter-defibrillator (REFINE-ICD) imaging sub-study
Mentor: Exner, Derek V.
Co-Mentor: White, James A.
Network Affiliation: Cardiac Arrhythmia Network of Canada

a) Statement of the health problem or issue

Sudden, unexpected death after a heart attack is a major problem in Canada, resulting in the premature deaths of over 40,000 people each year. These deaths are thought to result from short circuits in the hearts electrical system, causing the heart going into electrical spasm; a cardiac arrest. Without immediate treatment a cardiac arrest results in death. The only effective treatment for a cardiac arrest is to reset the heart's activity with an electrical shock. This can be done with an external defibrillator or AED, but requires that a person trained in its' use be present (i.e., be in the right place at the right time). Unfortunately, this rarely happens and fewer than 1 in 20 people who suffer a cardiac arrest survive. An alternative to this is an implantable internal defibrillator or ICD, which is a pacemaker-like device that automatically detects a cardiac arrest and delivers a shock the heart within seconds. At present, only patients with severely reduced heart function after a heart attack are candidates for an ICD. Yet, more than 75% of people who suffer a cardiac arrest after a heart attack do not have severely reduced heart function. We have embarked on a large international study to determine if a method we developed in an earlier Heart and Stroke Foundation grant (REFINE) can be used to save lives after a heart attack. The proposed study will be part of an ongoing, large international trial (REFINE-ICD).

b) Objective of your program

This study will examine the value of adding heart ultrasound or echo data to better predict which patients with a prior heart attack will have a cardiac arrest. Heart attacks lead to damaged tissue or "scar" in the heart. We plan to measure this amount, location and type of scar tissue to better predict the risk of a cardiac arrest after a heart attack. We hope that this will translate in to better identifying those patients at highest risk, allowing us to target ICD therapy and save lives.

c) How will you undertake your work?

This study will be a sub-study of the REFINE-ICD trial, which was the result of our earlier Heart and Stroke Foundation funded REFINE study. The echo data from patients enrolled in REFINE-ICD will be collected and analyzed using a new and advanced method (strain imaging). We will also collect both echo and heart magnetic resonance imaging or MRI data in a smaller number of patients so that we can determine if the echo data provides similar information to the more expensive and less available MRI test. We are doing this because MRI is considered the very best test (i.e., the gold standard) to detect the presence of scar in the heart.

d) What is unique/innovative about your program?

This will be the largest research study to examine the value of specialized echo imaging for predicting cardiac arrest after a heart attack. It will involve patients from across Canada and

around the world. This study focuses on patients with relatively good heart function after a heart attack, a group that is not well studied, but in whom most of the cardiac arrests occur after a heart attack. In addition, we will be the only study to compare echo and MRI data. An early analysis of the data we have collected so far shows that innovative echo information compares well with the MRI and electrical patient data that we have collected. This echo information may be able to predict a cardiac arrest for patients with a prior heart attack as well or better than other tests that are more expensive or less available.

e) How is the proposed research directly relevant to heart disease and/or stroke?

A cardiac arrest is one of the gravest complications of a heart attack. Unless a patient has an ICD or is fortunate enough to be in the right place at the right time fewer than 1 in 20 will survive. Heart attacks remain one of the most common forms of heart disease, so a great many people are at risk for a cardiac arrest. Most patients who have a heart attack will undergo an echo, and there is great opportunity to better use that information to determine which patients are at risk of a cardiac arrest, so that ICD therapy can be better targeted and lives can be saved.

f) What is the impact of the proposed research to heart disease and/or stroke (e.g. to the health and quality of life of people with these conditions)?

We hope that through this research, we will improve our ability to identify patients at highest risk of a cardiac arrest, allowing us to better target ICD therapy and save lives. The ultimate goal of this study is to help patients who have survived an initial heart attack to live longer and have the best quality of life.