

# ASP-AMERICAN HEART ASSOCIATION CAREER DEVELOPMENT AWARD IN GERIATRIC CARDIOLOGY



## AWARD RECIPIENT

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## PROJECT

“RISK STRATIFICATION WITH CARDIOVASCULAR MAGNETIC RESONANCE”

## MENTORSHIP TEAM

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Optimal risk stratification for patients with structural heart disease remains challenging, but is critically important in the era of implantable cardiac defibrillators (ICD). A series of smaller studies show several cardiac magnetic resonance (CMR) based parameters to be stronger predictors of adverse outcomes than ejection fraction (EF), which is ideally measured by CMR (high temporal/spatial resolution without use of geometric assumptions). Since each of these CMR parameters individually surpasses the “prognostic benchmark” that EF represents, CMR might introduce a new era of refining risk stratification for patients with heart disease.

This proposal aims to develop a novel, user-friendly prediction tool which summarizes CMR parameters and the risk of adverse outcomes in a single metric based on data gathered from an unselected older population. The prognostic relevant CMR parameters include: myocardial infarction (MI) size, clinically unrecognized MI, the arrhythmogenic peri-infarct border zone size, and the myocardial scar in nonischemic cardiomyopathy. These parameters are available in the ICELAND MI study (a sub-study of the Age, Gene/Environment Susceptibility-Reykjavik Study) which completed CMR assessment for chronic MI in a random community sample of 715 older persons (67 years and older) with an additional over sampling of 290 diabetic individuals. One novel CMR parameter unavailable in ICELAND MI is the partition coefficient for gadolinium contrast that may reflect the degree of diffuse interstitial fibrosis and the extent of subclinical adverse myocardial electrical and mechanical remodeling.

To develop the CMR based prediction tool, we will employ modern contemporary semi-parametric and nonparametric survival analysis methods (Cox regression and classification and regression trees). Specific aims for this proposal are to:

1. Determine if a novel CMR-based prediction model derived from the ICELAND MI cohort improves prediction of mortality and either sudden cardiac death or ICD shock, compared to usual clinical indices.
2. Determine if the novel CMR based prediction model(s) developed above will generalize to our local University of Pittsburgh (validation) cohort.
3. Determine if novel CMR measures of diffuse interstitial fibrosis and adverse cardiac remodeling (i.e., the gadolinium partition coefficient, lambda) will further improve the CMR prediction model.

Overall, this proposal strives to develop useful prognostic tools based upon rigorous myocardial characterization by CMR. The generous support of the ASP–American Heart Association Career Development Award in Geriatric Cardiology provides strong support for the execution of this project. With career development support and encouragement from my diverse and distinguished mentorship team, I will successfully transition to an independent investigator in geriatric cardiology. Through scientific contributions that exploit the unique abilities of CMR and contemporary statistical methods, I wish to advance our understanding of cardiovascular disease and improve the care provided to patients with cardiovascular disease that disproportionately afflicts older individuals.