



Comprehensive Research Experience for Medical Students
Summer Research Program 2019

Supervisor/Project Information Form

Due February 20 2019 by email to crems.programs@utoronto.ca

Supervisor Name: Maral Ouzounian, MD PhD FRCSC

Project Title:

Structural valve deterioration: Mechanisms and predictors of bioprosthetic aortic valve failure

Hospital/Research Institution: Toronto General Hospital

Email: Maral.Ouzounian@uhn.ca

Field of Research (2 keywords): Cardiac surgery, aortic valve

Department: Surgery

School of Graduate Studies Appointment (IMS, LMP, IHPME etc)? Yes/No: Yes

If YES, please name: IMS

Brief Project Description (< 300 words):

Globally, more than 200,000 aortic valves are replaced surgically per year. Over the past two decades, there has been a considerable increase in the use of bioprosthetic valves compared to mechanical prostheses, at least partly driven by the desire to avoid long-term anticoagulation. However, bioprosthetic valves are prone to structural valve deterioration (SVD), which may lead to reintervention and excess mortality, particularly in young patients. Given the increasing use of bioprosthetic valves across all age groups, valve durability is a critical and yet understudied area of cardiovascular research. In fact, there are currently no studies that report data from human patients on the mechanisms and pathological findings of SVD on explanted bioprosthetic aortic valves.

The aim of this project is to use clinical, histopathological, and imaging findings of explanted aortic bioprotheses to systematically describe SVD and propose predictors and mechanisms of bioprosthetic valve failure in the aortic position. Specific pathological attributes examined will include morphological changes such as valve thickening, calcification, flail/torn leaflets, endocarditis, or pannus formation. Mobility changes will include reduced or avulsed valve leaflets. Pre-explant echocardiograms will be used to supplement histopathological findings to evaluate valve functioning prior to reoperation. A total of 410 explanted bioprosthetic aortic valves are available for review and will be included in the study.

Evidence from this first large-scale study of valve explants is expected to inform clinicians and researchers to create a universal definition for SVD. Accordingly, physicians managing patients with failing bioprosthetic valves will have a better understanding of valve structure and dynamics, which can prompt further imaging testing, closer follow-up and communication with patients regarding reintervention. The significant increase in the use of aortic bioprotheses in recent times is such that data from this study will have considerable impact on the assessment and management of patients with failing biological valves.