

**NUS Graduate School for Integrative Sciences and Engineering
Research Project Write-up**

Title of Project : Modelling cardiac ischemia and reperfusion

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Short Description

Ischemic heart disease is the leading cause of death in the developed world. Short term ischemia is reversible but an extended period of ischemia results in cell death and a loss of function. It has been found that unblocking the artery or bypassing the blockage in a timely fashion greatly increases the chances of tissue recovery. Unfortunately the restoration of normal blood flow has been found to cause significant damage to the ischemic muscle and to generate life threatening alterations in heart rhythm. Our goal is to develop a sophisticated model of this cellular system that can quantitatively reproduce what has been observed experimentally, and can be readily modified to uncover the downstream mechanisms by which therapeutic compounds may act. Ultimately we aim to perform an in-depth analysis of the electrical/energetic system to identify the weakest links in the causal chain, and what compounds would be most effective at exploiting these weaknesses.