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RACP Foundation Research Awards

FINAL REPORT

Project / Program Title		Establishing the Intrinsic Regenerative Capacity of the Adult Human Heart in Health and Disease and the use of Recombinant Cellular Growth Factors to Reverse Heart Failure in vitro
Name		Dr Sean Lal
Award Received		2015 RACP NHMRC Woolcock Scholarship
Report Date		1 February 2017
Chief Investigator / Supervisor		Professor Cris dos Remedios
Administering Institution		The University of Sydney
Funding Period	Start Date:	1 June 2015
	Finish Date:	31 August 2018

PROJECT SUMMARY

Heart failure is a major cause of morbidity and mortality in Australia. We hope to change this bleak outlook by showing that the human heart can regenerate, thereby challenging the long-held dogma that our heart cannot regrow.

Using human heart samples we will measure the intrinsic capability of these cells to regenerate following a myocardial infarction (heart attack).

In doing so, we aim to one day improve the quality of life and survival of patients living with heart failure.

PROJECT AIMS / OBJECTIVES

1. To assess surgical revascularisation as a non-cell based treatment for adult heart failure.
2. To establish the means by which animal models of heart failure can be translated to humans.
3. To develop human cellular models of cardiac regeneration to study therapies to reverse heart failure.

SIGNIFICANCE AND OUTCOMES

1. We showed that CABG could significantly improve the left ventricular ejection fraction and the quality of life in patients with severe heart failure.

2. We created novel tissue microarrays that allow for highthroughput protein screening of both failing and donor human hearts. In a proof of concept study using this technique, we demonstrated that the protein four and a half LIM domain-2 is significantly decreased in heart failure.

3. We demonstrated that cardiac cells have the potential to regenerate following myocardial infarction. This is the first time this has been shown in human hearts.

PUBLICATIONS / PRESENTATIONS

1. Sean Lal, Lisa Turner, Catherine Powell, Michael Wilson and Paul Bannon. Improvements in Left Ventricular Ejection Fraction and Quality of Life in Patients with Heart Failure who undergo Coronary Artery Bypass Surgery. (2016) International Journal of Cardiology Volume 222 (1), Pages

671–673

2. Sean Lal, Lisa Nguyen, Rhenan Tezone, Fredrik Ponten, Jacob Odeberg, Amy Li and Cristobal dos Remedios. Tissue MicroArray (TMA) Profiling in Human Heart Failure. (2016) Proteomics September 16(17): 2319-26.

3. Study still in progress. Aiming to publish by the end of 2017