FutureFocus

Research & Training Update

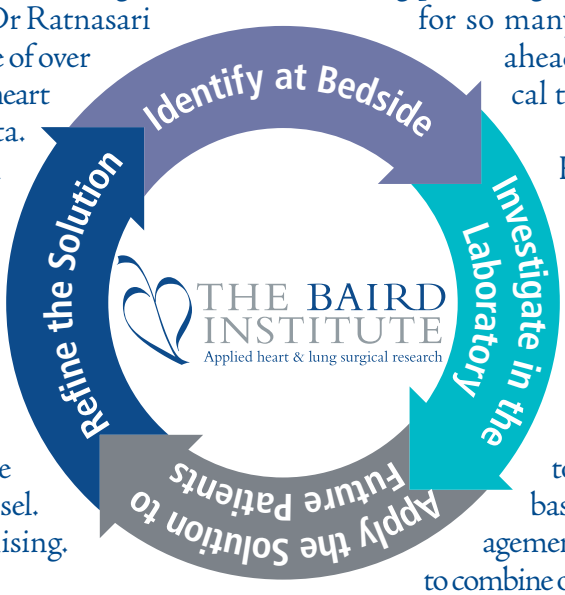
Douglas Baird AM 1940 – 1995
Cardiothoracic Surgeon

March 2013, Issue 2

From The Chairman

It gives me great pleasure to introduce our first edition of Future Focus for 2013. 2012 was an exciting year with further expansion in the number of our researchers and research projects. All five areas of our research have branched into new lines of investigation.

Our Aortic Valve Disease Group has strengthened ties with The Centenary Institute. Dr Ratnasari Pedang has developed a database of over 200 families born with abnormal heart valves or enlargement of the aorta. Sari is using this information to determine how these killer conditions are inherited, as well as to determine when to intervene to avoid catastrophe.



The Biomaterials Group is following two new lines of investigation in its bid to produce a biocompatible functional off-the-shelf blood vessel. The initial results are very promising.

The Cancer/Mesothelioma Group continues with its evidence-based approach with more than a dozen publications in the last twelve months. We contribute to a worldwide database on thoracic mesothelioma and manage an international peritoneal or abdominal mesothelioma registry.

The Innovative Heart Surgery Group with Dr James Edelman has focussed on how to decrease the risk of stroke during cardiac surgery and the effects of the heart/lung machine. James now collaborates with the University of Queensland as well as John Hunter Hospital. He has also produced multiple publications looking at the evidence for coronary surgery versus coronary stenting.

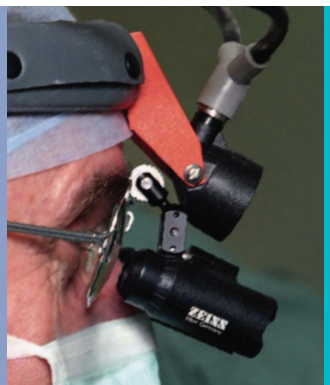
The Clinical Evidence Research Group, with Lisa Turner and Cath Powell, has been incredibly hard-working providing the infrastructure and the basis for so many other research projects to go ahead as well as running several clinical trials at any one time.

Finally, our colleague Associate Professor Tristan Yan has begun the Annals of Cardiothoracic Surgery, the first fully online open access heart and lung surgery journal.

To conclude, The Baird Institute continues to look for opportunities to improve patient outcomes from basic science through to clinical management at the bedside. Our approach is to combine our data with data from around the world, to determine best practice and develop guidelines for others to follow.

Thank you for all your support and interest during 2012 and we look forward to another successful year of research in 2013.

Professor Paul Bannon
Chairman



Research Focus

The Baird Institute is focussed upon achieving better patient outcomes in cardiothoracic and cardiovascular surgery through translational research. Work in the laboratory combined with a rigorous exploration of clinical practice, allows research to drive improvements in patient care and investigate new methods of surgery.

This research is being undertaken under the supervision of cardiothoracic surgeons, physicians and scientists and in association with The Baird Institute. In 2012, the research team include six PhD students, one Masters student, two Honours students, six Medical Degree students and eight researchers.

Translational research is being conducting in the following five areas:

Aortic Valve Disease

Thoracic aortic aneurysm disease is rapidly becoming one of the most common but silent killers in western society. Our research is aimed at determining the precise genetic basis of thoracic aortic aneurysms, the mechanisms leading to the changes in the aorta, and developing peripheral tests to detect any enlargement of the aorta to imminent aortic rupture. Our goal is to determine the optimal timing of surgical intervention.

Biomaterials

Many different devices are now being implanted surgically to repair and improve the function of the heart. Our research aims to produce biocompatible devices by electromagnetically coating foreign surfaces with recombinant synthetic human elastin and fibronectin. As biocompatibility is demonstrated, the technology and knowledge gained may be used to produce other biocompatible devices.

Professor Paul Bannon presenting at The Baird Institute Research Update Meeting, 23 August 2012

Cancer/Mesothelioma

Our research aims to improve patient outcomes of those patients with lung cancer, particularly mesothelioma, through early detection, advancements in surgical management and total patient care.

Clinical Evidence Research

Hospital and university based research is supported by clinical data from surgical procedures undertaken over many decades, to develop guidelines for surgical management and produce outlines for future research.

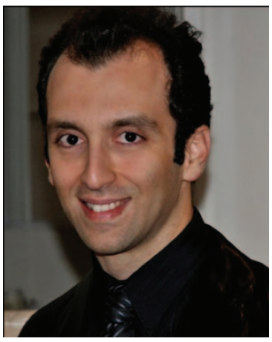
Innovative Heart Surgery

Heart surgery in our aging population presents us with unique difficulties, challenges and opportunities. Our research aims improve the survival and quality of life of the higher risk cardiac patient through the development of novel surgical techniques, laboratory investigation and meta-analysis.

Below: Members of The Baird Institute Research Team, 23 August 2012 - Christopher Cao, Reece Davies, Sari Padang, Ben Robinson, Hamid Mollahajian, Su Ang, Steve Wise, Paul Bannon, Kei Woldendorp, Sarah Andvik, James Edelman, Mohammad Azari, Matthew Bayfield, Michael Vallely (left to right).

PhD Students 2012

DOCTOR HAMID MOLLAHAJIAN
MBBS | PhD Candidate



Doctor Hamid Mollahajian is the current **St Jude Medical Fellowship** holder (2010-2013). His PhD is continuing the research of biocompatibility of vascular grafts, initially undertaken by Dr Byrom. Dr Mollahajian has been accepted into the vascular surgery training program in 2011. He will start this training after completion of his PhD in 2013.

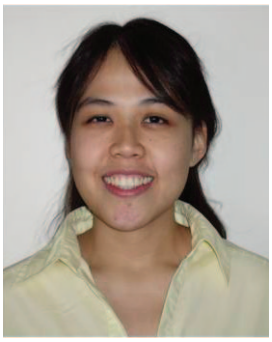
DOCTOR MICHAEL BYROM
BHB | MBChB | GradDipSurg | PhD Candidate

Doctor Michael Byrom is a senior trainee in cardiothoracic surgery and a PhD student. He was a **St Jude Medical Fellowship** holder (2007-2010). Through Dr Byrom's PhD research, the initial development of new artificial blood vessels for use in vascular bypass surgery such as coronary artery bypass was undertaken. To date this research has resulted in the development of two entirely new types of blood vessel prosthesis.

DOCTOR CHRISTOPHER CAO
BSc (Med) | MBBS (1st Hons) | PhD Candidate

In 2010, **Doctor Cao** commenced his PhD which focuses on the surgical management of mesothelioma and non-small cell lung cancer. He has authored or co-authored more than 35 articles in international scientific journals as well as being a co-principal investigator in three international registries.

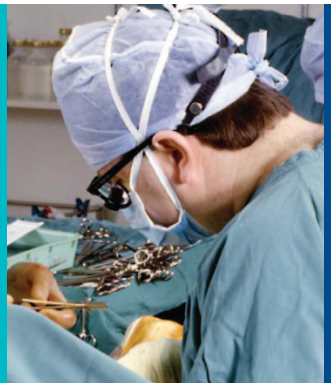
DOCTOR RATNASARI PADANG
BSc (Med) MBBS (Hons 1) | FRACP | PhD Candidate



Doctor Ratnasari (Sari) Pedang is a cardiologist (2011) who commenced her PhD in 2011. This work investigates the clinicopathological correlation and the genetic basis of familial and sporadic bicuspid aortic valve disease, which to date remains elusive.

DOCTOR VIKRANT DHURANDHAR
MBBS | PhD Candidate

Dr Dhurandhar commenced a PhD in Surgery in 2012. He is researching the different aspects of surgical techniques in high-risk cardiac surgery, specifically coronary artery bypass grafting and mitral valve surgery.



Featuring Dr James Edelman

Doctor James Edelman is the recipient of the **Medtronic Australia Baird Institute Heart Research Fellowship** (2010-2012). Dr Edelman's PhD project is titled *Inflammation, Tissue Injury and Thrombosis in Off-pump Coronary Artery Bypass Grafting*. The aim is to better understand thrombotic complications after cardiac surgery, and the processes linking injury with inflammation and coagulation.

Off-pump coronary artery bypass grafting (OPCAB) is performed to avoid tissue injury associated with the systemic inflammatory response syndrome (SIRS) and manipulation of the ascending aorta.

The project, split into 4 discrete sections, aimed to address some of the key mechanisms that may explain the benefit of OPCAB for high-risk patients:

a) the role of aortic manipulation in stroke
b) a profile of coagulation and fibrinolysis after OPCAB and coronary artery bypass graft (CABG)
c) the role of neutrophils after OPCAB surgery and
d) mitochondrial DNA in CABG, OPCAB and trauma.

The project has investigated the influence of OPCAB on inflammation, tissue injury and thrombosis. It has found a number of benefits to patients including; OPCAB has a lower risk of stroke than CABG; and OPCAB is less pro-thrombotic in the early post-operative period than CABG. Patients with pre-operative myocardial infarction are especially pro-thrombotic after surgery, and may require extra anticoagulation.

The project has also improved our understanding of the mechanisms of the systemic inflammatory response syndrome. It has demonstrated that surgery, not cardiopulmonary bypass is responsible for neutrophil impairment. It was also established that mitochondrial DNA, a likely key in the link between injury and inflammation, is elevated after both CABG and OPCAB.

In summary, Dr Edelman's PhD documents the mechanisms of coagulation, fibrinolysis, neutrophils and mitochondrial DNA when performing OPCAB surgery. This knowledge ensures surgeons are able to maximise the potential benefits of this surgery in high risk patients.

Dr Edelman is due to complete his PhD in early 2013. The Baird Institute and Dr Edelman gratefully acknowledge the support provided by Medtronic Australia, in conducting this research.

Stop Press: **Associate Professor Michael Vallely** has just been appointed Clinical Professor, Macquarie University. Michael already holds a clinical associate professorship at Sydney University and is the Director of our Innovative Heart Surgery Group.

With sincere thanks to the following research partners

Biaggio Signorelli Foundation
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Applied heart & lung surgical research

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