

Nurturing Minds, Touching Lives

Post graduate studies in the Department of Medicine



A heart to heart – with the cardiac expert!

“One of the reasons why I chose to come to Singapore is because of the great resources available for research here. Singapore has made a strong commitment in building up the life sciences sector and there are many opportunities for doing great research work. I spend approximately a quarter of my time at the University of Otago in New Zealand and the rest in Singapore. Through my dual appointments, I hope to be able to encourage closer research collaborations between our two countries,” said Prof Mark Richards.

This heart clinician and scientist has an appointment with the NUS Department of Medicine and is also leading the Cardiovascular Research Institute at NUHS. Prof Richards is internationally-recognised for having led the group which first developed the use of BNP (B-type natriuretic peptide) as diagnostic and prognostic markers in heart failure. This measurement has become a routine part of the assessment and treatment of patients with suspected heart disease. Now in Singapore, Prof Richards is actively looking for PhD students to join and contribute towards his research teams. These teams will collaborate with other researchers and doctors, working in a number of different research projects that have a common goal - to find better ways of preventing and treating heart disease.

“My interest in the area of cardiovascular research was awakened in 1983, when I was fortunate enough to be part of the team that was doing pioneering work in the area of circulating biomarkers. It was a crucial time of discovery and we had some early successes. I look forward to working with my colleagues here in Singapore, to supervise the next generation of clinician scientists and researchers, with a unique interest in cardiovascular research,” shared Prof Richards.

PhD students in the Dept will have the opportunity to work under Prof Richard’s supervision. Here, they can participate in the process that leads to the design of new and improved blood tests and subsequently, carry out experiments (biochemistry, physiology and molecular biology) that will allow a better understanding of the regulation and function of the biomarkers identified in human health and disease.

Boosting the quality of life for patients with heart failure

The flagship research project is the Singapore Heart Failure Outcome and Phenotype Study (SHOP), which will bring together doctors from six hospitals in Singapore, and run in parallel with similar studies occurring in four hospitals throughout New Zealand. For the Singapore component of this study, some 1,250 patients with heart failure will be recruited over the next two years. They will be characterised according to having normal or low heart ejection fractions, which is the percentage of blood pumped from the heart into the regular blood circulation. Normal ejection fractions are between 55-70% and low measurements (typically under 40%) may indicate heart failure.

“Previous heart failure treatments have focused on patients with low ejection fractions. However, heart failure can also occur in patients whose hearts have preserved relatively normal ejection fractions. It is not known whether these patients do better or worse, or whether conventional treatments will work equally well. We aim to examine patients with both types of heart failure and look at ultrasound images, blood tests and DNA tests, to see if we can distinguish between the two types of heart failure patients,” explained Prof Richards. “Through this research we hope to be able to improve the treatment for heart failure, leading to an increase in survival rates and better quality of life for patients.”

Better diagnosis saves lives

Prof Richards coordinated a successful application for a S\$6million grant from the National Medical Research Council, to support the SHOP project together with several other heart disease studies. One such study examines acute cardiovascular disease states. Prof Richards and his research team will work with the NUH Emergency Department to identify patients experiencing two types of problems - the onset of acute breathlessness, which could be due to heart failure, and onset of chest pain or other symptoms suggesting possible acute coronary syndrome.

While breathlessness and chest pains are common symptoms at a hospital’s emergency department, not all patients with these symptoms will be experiencing heart failure or a heart attack. Nevertheless, hospital resources are required to check all patients showing these symptoms and to distinguish those that are in danger of acute heart failure. More rapid and accurate diagnosis will lead to faster treatments and improved survival rates for heart failure patients. At the same time, they will reduce unnecessary hospital stays for those individuals with non-threatening causes for their symptoms.

“Currently, cardiovascular biomarkers, such as BNP, are used to diagnose heart disease. However, this test has imperfections, for example it is less accurate in older patients, or those that have kidney or inflammatory problems. We will be recruiting 500 patients with acute breathlessness and another 500 patients with acute coronary syndrome. The aim is to develop new biomarkers which can improve upon or replace the existing tests available,” said Prof Richards.

Another one of Prof Richards’ research projects targets patients that may require heart valve surgery. Here the focus is upon biomarkers (blood tests), which may assist in finding the optimal time to repair or replace diseased valves. Patient recruitment for this study has already commenced. And a final element in the research programme is an animal study, which is exploring better ways to treat heart failure, by using hydrogels seeded with cells and growth factors that support the structure of the heart and promote healing after a heart attack.

Through his research, Prof Richards and his team will continue to play a key role in improving the quality of cardiac patient care in Singapore and around the world.

To know more about the graduate programme, click [Here](#)