

# MURMURS®

A quarterly publication of  
National Heart Centre  
Singapore



NHCS STAFF SHINE  
BRIGHT, SCORE HIGH  
AT SHQSA 2017



“SILENT” GENE MUTATIONS  
MAY CAUSE HEART FAILURE  
IN HEALTHY PEOPLE



RESEARCHERS TO  
DEVELOP NEW PROTOCOL  
FOR EXERCISE MAGNETIC  
RESONANCE IMAGING TEST  
FOR ENLARGED HEARTS



## FEWER VISITS TO ARRIVE AT DIAGNOSIS

FOR POLYCLINIC REFERRALS



National Heart  
Centre Singapore

SingHealth



## FEWER VISITS TO ARRIVE AT DIAGNOSIS FOR POLYCLINIC REFERRALS

NHCS partners with SingHealth Polyclinics to reduce one visit for referred patients and allow Polyclinic doctors to directly order cardiac diagnostic tests

National Heart Centre Singapore (NHCS) sees about 5,000 referrals from SingHealth Polyclinics (SHPs) every year and chest pain is the top indication for the referrals, which accounted for about 30% of all referrals. Analysis into these new cases referrals however, revealed that 70% of the referrals had no significant cardiac abnormalities.

Previously, patients referred by polyclinics will visit NHCS for initial assessment and undergo cardiac diagnostic test during the second visit, before finally getting their test results and possible diagnosis at the third visit. The whole process may take several months. With the streamlined procedures, the whole process is shortened to just slightly over a month for the referred patients.

### FRONT LOADING INITIATIVE REDUCES CONSULTATION VISIT

Front loading initiative leverages on a team of NHCS nursing and medical staff to review referral letters and electrocardiograms (ECGs) of the targeted group of patients before ordering diagnostic tests to be done prior to patients' first consultation visit at NHCS. With the diagnostic tests front loaded, referred patients can then discuss and receive their diagnosis at the first visit with the specialist. The front loading initiative has since been rolled out to all nine SHPs.

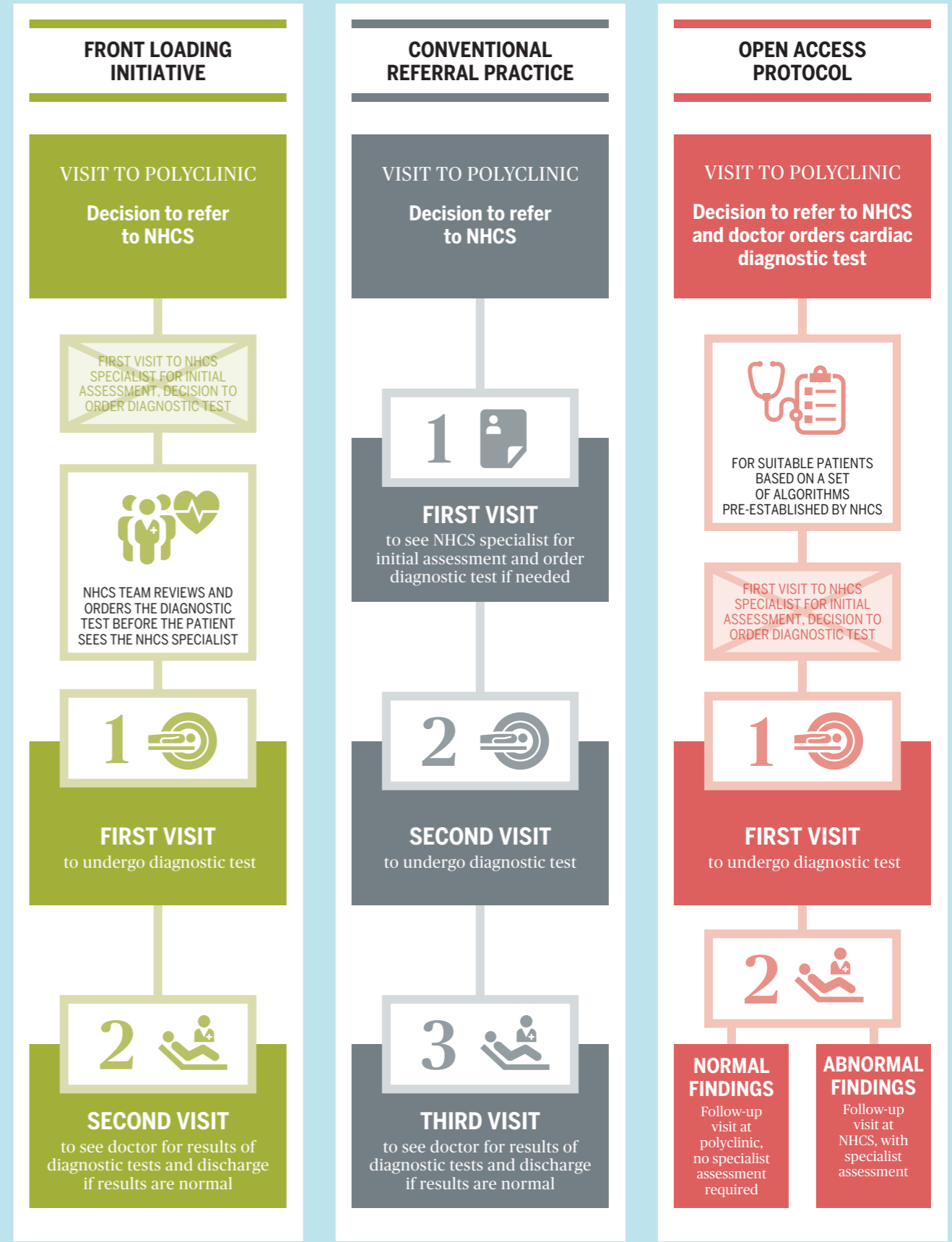
### OPEN ACCESS PROTOCOL ALLOWS DIRECT ORDER OF CARDIAC TESTS

In a similar pilot scheme, an open access protocol is being progressively implemented across the polyclinics to allow doctors to order cardiac diagnostic tests directly at NHCS. Diagnostic tests will be ordered for suitable patients based on a set of algorithms pre-established by NHCS. The open access protocol has since been carried out across four SHPs – Outram, Bukit Merah, Marine Parade and Sengkang, and there are plans to extend the scheme to more polyclinics.

### REDUCES CONSULTATION VISIT FASTER DIAGNOSIS SAVES TIME AND MONEY

Compared to the conventional referral process, both the front loading initiative and open access protocol not only help patients reduce one consultation visit and receive faster diagnosis, patients with normal test results can even be discharged sooner, and transferred to their primary physician for follow-up. Patients with normal test results under the open access protocol will be followed up directly at the polyclinics, without needing to go through the specialist consultation. These streamlined processes ultimately free up valuable consultation slots for chronic or more severe cases, optimising resources, offering patients a smoother and hassle-free experience, promoting right site of care.

## CONVENTIONAL REFERRAL PRACTICE VERSUS FRONT LOADING INITIATIVE / OPEN ACCESS PROTOCOL



## EMPOWER WOMEN TO FIGHT AGAINST HEART DISEASE

NHCS officially opened its Women's Heart Clinic to lead women in the fight against cardiovascular disease (heart disease & stroke) – the number one killer among Singaporean women



Research found that heart disease is deadlier in women, often undiagnosed or undertreated. Women tend to also be much older and have a higher risk of dying than men, when they suffer heart attacks.

**ONE** dies of cardiovascular disease (heart disease and stroke) in Singapore, claiming more lives than breast cancer.

**IN THREE**

**WOMEN**

Yet, most Singaporean women are not aware that it is the leading cause of death, according to a survey done by Singapore Heart Foundation last year.

The Women's Heart Clinic at National Heart Centre Singapore (NHCS) aims to empower women to take charge of their heart health through greater awareness of their risk factors and symptoms. The clinic offers end-to-end services, from prevention to diagnosis, treatment and rehabilitation, customised to the specific needs of women. It will also serve as a knowledge centre, providing specialised training for medical students and doctors in Singapore and the region. The end goal is for patients to be identified early and receive appropriate treatment, and to prevent disease in others at risk, thus ensuring better outcomes for all women with, or at risk of, cardiovascular disease.

**“We wanted to cater to the biological, physiological and psychological needs of our women patients which are different from men. Women are more likely to ignore symptoms, inaccurately assess their own personal risks of heart disease and delay seeking medical treatment. Knowing all of this, we have chosen to put women's needs at the 'heart' of our services and empower more women to take charge of their own heart health. Our clinic will guide and reassure them on their health journey,”** said Professor Carolyn Lam, Senior Consultant, Department of Cardiology, NHCS, also currently the cardiologist running the clinic.



Guest-of-honour, Prof Ivy Ng, Group CEO, SingHealth (left), with Prof Carolyn Lam, Senior Consultant, NHCS (right), at the opening ceremony of NHCS's Women's Heart Clinic on 21 September 2016.



### GENDER MATTERS

Heart disease affects both men and women but some unique factors and symptoms will explain why gender differences matter and how women are more susceptible to poor outcomes following heart attacks.



### SYMPTOMS

While both men and women share most of the common symptoms of heart disease, women are more likely to exhibit atypical symptoms such as shortness of breath; nausea and vomiting; back, neck or jaw pain; and fatigue. These symptoms tend to be ignored or excused by women, leading to delayed diagnosis and treatment.



### MECHANISMS

Heart attacks are caused by interruption of blood supply to the heart muscle. This is usually caused by obstruction of the main blood vessels (coronary arteries) of the heart by fatty deposits (atheroma) or blood clots. However, women may still suffer heart attacks even without obstructions in their main coronary arteries, because of disease in the smaller arteries (microvascular disease) or lining of the arterial wall (endothelial dysfunction, coronary dissection).



### OTHER TYPES OF HEART DISEASE AFFECTING WOMEN

Women are uniquely predisposed to certain types of heart disease such as heart failure with preserved ejection fraction (also called diastolic heart failure), stress-induced cardiomyopathy (popularly known as 'broken heart syndrome') and pregnancy-related heart failure. Specialised tests may be needed to make these diagnoses.



### PREVENTION IS STILL THE KEY

Prevention is still better than cure and keeping a healthy lifestyle cuts risks of getting a heart attack.

#### Some tips for a healthy heart:

- Don't smoke.
- Exercise for at least 30 minutes, five times a week, at moderate levels.
- Check your blood pressure, cholesterol and sugar levels yearly. If you have high blood pressure, high cholesterol or diabetes, take your medications and keep these conditions under control.
- Eat healthily by aiming for a more plant-based rather than an animal-based diet. Cut down on refined sugars, salt and saturated fat.
- Pick up relaxation techniques (e.g. meditation, breathing exercises and yoga).
- Think positively to support a healthy mind.



National Heart  
Centre Singapore  
SingHealth

## CONTACT US

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EMAIL [nhcs@nhcs.com.sg](mailto:nhcs@nhcs.com.sg)

### WOMEN'S HEART CLINIC

The Women's Heart Clinic aims to empower women to take charge of their heart health through greater awareness of their risk factors and symptoms. The clinic offers end-to-end services, from prevention to diagnosis, treatment and rehabilitation, customised to the specific needs of women.

### WOMEN'S HEART CLINIC SPECIALIST

Prof Carolyn Lam Su Ping *Senior Consultant*

### FEMALE CARDIOLOGISTS

Assoc Prof Ding Zee Pin	<i>Senior Consultant, Echocardiography</i>
Adj Assoc Prof Ewe See Hooi	<i>Senior Consultant, Non-invasive Multi-modular Cardiovascular Imaging</i>
Adj Asst Prof Ho Kah Leng	<i>Senior Consultant, Electrophysiology &amp; Pacing</i>
Adj Asst Prof Tan Ju Le	<i>Senior Consultant, Adult Congenital Heart Disease, Pulmonary Hypertension, and Cardiac Disease and Pregnancy</i>
Prof Carolyn Lam Su Ping	<i>Senior Consultant, Heart Failure</i>
Asst Prof Angela Koh Su-Mei	<i>Consultant, Cardiac Imaging</i>
Dr Nadira Binte Hamid	<i>Consultant, Echocardiography</i>
Dr Laura Chan Lihua	<i>Associate Consultant, Heart Failure</i>
Dr Go Yun Yun	<i>Associate Consultant, Echocardiography and Cardiac Magnetic Resonance Imaging</i>
Dr Ho Jien Sze	<i>Associate Consultant, Cardiovascular Rehabilitation and Preventive Cardiology</i>
Dr Ruan Wen	<i>Associate Consultant, Echocardiography and Pulmonary Hypertension</i>

FOR THE FULL LIST OF NHCS SERVICES AND SPECIALISTS, PLEASE VISIT [www.nhcs.com.sg](http://www.nhcs.com.sg).



NHCS 197 award winners at the SHQSA 2017 ceremony, graced by guest-of-honour, Minister of State for Health, Mr Chee Hong Tat.

## NHCS STAFF SHINE BRIGHT, SCORE HIGH AT SHQSA 2017

Two superstar winners and a total of 197 staff recognised for their exemplary service

The Singapore Health Quality Service Awards (SHQSA) 2017 ceremony took place on 17 January 2017 at University Cultural Centre and saw 3,585 winners from across 26 public and private healthcare institutions, community hospitals and agencies bagging home the coveted service quality awards. SHQSA was organised by the SingHealth Duke-NUS Academic Medical Centre since 2011, to honour healthcare professionals who have delivered exemplary quality care and service to patients.

National Heart Centre Singapore (NHCS) walked away with 197 award winners in the Star, Gold and Silver categories this year. For the first time in history, NHCS produced two Superstar winners, and on top of that a Special Mention Award presented to the multi-disciplinary HEARTS team, who had introduced a new bandage removal process that is painless for the patients. Heartiest congratulations to the winners!

### SUPERSTAR AWARD WINNERS



SEN Kamimah Binti Hussien, Ward 56, NHCS - Superstar Award recipient for the Nursing Category.

**“ Try to put yourself in the shoes of the patient. There is always a reason behind every action.”**

– SEN KAMIMAH BINTI HUSSIEN

**“She is a person to confide your problems with. Kamimah displays motherhood love and shower you with care. Her love shown to patients is remarkable! I am grateful to her.”**

– IVAN LIM (PATIENT) ON KAMIMAH



SPSO Norzana Bte Ayub, Cardiac Clinic, NHCS - Superstar Award recipient for the Ancillary Category.

**“ I always share with my colleagues that we should really learn to listen to our patients. It is important to understand their needs and help as best as we can.”**

– SPSO NORZANA BTE AYUB

**“She is the best counter staff I have come across. Very courteous and very helpful in everything I ask. We need more service staff like her. Thank you.”**

– K. VISWANATHAN (PATIENT) ON NORZANA

## SAY GOODBYE TO PAINFUL ADHESIVE BANDAGE REMOVAL

Hearts Team won the SHQSA Special Mention Award for making the removal of adhesive bandage a painless process

Adhesive bandage dressing is commonly used on patients where pressure is applied to stop bleeding, after cardiac procedures and invasive lines insertion. Due to the strong adhesiveness, however, patients may experience skin tear during the bandage removal, especially for the elderly with delicate skin. As a result, some patients had to put up with pain during the removal and some had to extend their hospital stay to treat the wound caused by the skin tear.

Determined to find a way to make the adhesive bandage removal a less painful process for patients, the Hearts team tried out many different methods, before finding a solution that is painless, easy and of low-cost. The team was surprised that a simple and yet effective solution, that is, using olive oil, was the answer to alleviating the painful adhesive bandage removal experience. They then quickly developed a set of guidelines to remove adhesive bandages with olive oil.

The improved bandage removal process was progressively implemented to the wards and after just one month, the team achieved the remarkable result of reducing the number of patient stays due to serious skin tears to zero. The patients welcomed the improved process and nurses no longer had to face patients' frustrations over the old painful way of bandage removal. The team was delighted by the encouraging feedback but nothing rewards them as much as patients' satisfying experience and the significant improvement to patient care.



The NHCS HEARTS Team (from the top left, clockwise): ANC Koh Hwee Hong, Ward 44; Jacqueline Huo, Operations; SSN Anne Lee, Ward 44; NC Low Hui Ling, Ward 44 (Leader); NC Wirdawati Binte Salimin, CTICU; NC Belinda Wong, Ward 47B (Co-leader); SNM Jasmine Lee, Ward 44 (Facilitator).

**SHQSA 2017 NHCS AWARD WINNERS**

**2** SUPERSTAR Awards

**19** STAR Awards

**53** GOLD Awards

**123** SILVER Awards

**1** SPECIAL MENTION Award

## “SILENT” GENE MUTATIONS MAY CAUSE HEART FAILURE IN HEALTHY PEOPLE

Study revealed that gene mutations in a protein called titin would potentially trigger heart failure in one percent of healthy individuals worldwide

**TITIN, THE BIGGEST GENE AND LARGEST PROTEIN IN THE HUMAN BODY, PLAYS A VERY IMPORTANT ROLE** in dilated cardiomyopathy, one of the most common forms of inherited cardiac conditions, whereby the heart muscle becomes weakened, enlarged and cannot pump blood efficiently.



**THIS CONDITION AFFECTS 1 in 250 PEOPLE GLOBALLY**

The multinational study, led by National Heart Centre Singapore (NHCS) involved over 2,490 dilated cardiomyopathy patients and 1,400 healthy volunteers, discovered that gene mutations previously thought to affect only patients with dilated cardiomyopathy could actually affect the heart function of even the healthy individuals.

In the study, researchers generated two rat models to understand the impact of the titin gene mutations at the molecular level and heart function; conducted cardiac gene sequencing tests on patients with dilated cardiomyopathy; and performed 3D cardiac magnetic resonance imaging (MRI) on healthy volunteers. Results from these tests showed that those carrying the gene mutations were found to have an enlarged heart, in a pattern similar to that seen in heart failure patients. The enlarged heart, although functioning in a compensated state because of the stress caused by the gene mutations, would still be working fine, until it encounters additional stressors that may cause the heart to fail.

Asst Prof Sebastian Schäfer, (left), Senior Research Fellow, NHCS, who is the first author of the paper, together with Prof Stuart Cook (right), Tanoto Foundation Professor of Cardiovascular Medicine at the SingHealth Duke-NUS Academic Medical Centre and co-senior author.

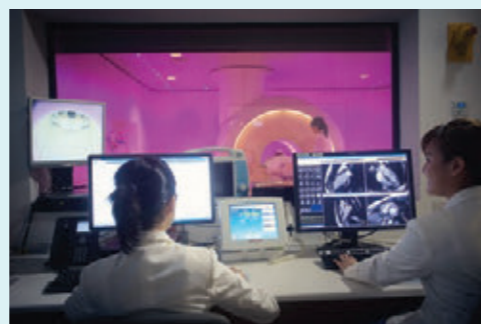


Currently, one percent of the world's population carry these gene mutations and since it is now known that these “silent” gene changes can adversely affect the heart, it is crucial to find out next what these additional stressors are that may put certain people with titin mutations at risk of heart failure. A study on one possible stressor, pregnancy, has already been published; if a woman with the titin gene mutation were to become pregnant, she would be at risk of heart failure.

A gene test, developed by NHCS with Imperial College London, can also now help doctors screen for mutations in genes known to cause inherited cardiac conditions, in a shorter time and at a lower cost. Previously, patients could only screen two to three genes with the old technology, and the process could take up to half a year. The new test can screen 174 genes for 17 inherited heart conditions, diagnose the exact condition and gene, and get tailored treatment. The test would also offer peace of mind to families of patients with the gene mutations, as family members who are tested negative for the mutated genes can now avoid lifelong monitoring, while those who are tested positive can have the doctors to intervene early.

NHCS led the study in collaboration with Duke-NUS Medical School, Medical Research Council Clinical Sciences Centre (UK), Imperial College London (UK) and Max Delbrück Center for Molecular Medicine in the Helmholtz Association (Germany), and the paper “*Titin-truncating variants affect heart function in disease cohorts and the general population*” was published in leading medical journal, Nature Genetics.

The Tanoto Foundation, National Medical Research Council Singapore, SingHealth Duke-NUS Institute of Precision Medicine, Medical Research Council Clinical Sciences Centre UK, NIHR Biomedical Research Unit in Cardiovascular Disease at Royal Brompton & Harefield NHS Foundation Trust, and Imperial College London and British Heart Foundation UK, among others, funded the work.



## RESEARCHERS TO DEVELOP NEW PROTOCOL FOR EXERCISE MAGNETIC RESONANCE IMAGING TEST FOR ENLARGED HEARTS

Study demonstrated the new ExCMR protocol as highly reproducible with a potential for clinical use in physiological studies of the heart and circulation

National Heart Centre Singapore (NHCS) used a supine cycle ergometer to successfully develop a protocol for real-time Exercise Cardiovascular Magnetic Resonance (ExCMR) imaging test. The protocol involved attaching the supine cycle ergometer to the scan table, allowing patients to exercise while in the bore, and capturing the heart images real-time. Compared to the typical Magnetic Resonance Imaging (MRI) diagnostics tests, the new ExCMR imaging test provides additional information on the characteristics of one's heart at peak activity, hence facilitating the diagnosis of potential underlying heart problems.

Researchers at NHCS studied a group of athletes and healthy volunteers using the CMR compatible cycle ergometer and real-time CMR, to evaluate the feasibility and reproducibility of the exercise protocol and examine its potential to differentiate athletes from healthy volunteers. Participants were asked to cycle at an initial workload of 25W (watts) followed by 25W-increment every minute until exhaustion. Free-breathing imaging was performed at the end of every stage during a brief period of stopping exercise. A repeat scan using the same exercise protocol was then performed on some individuals, at least seven days from the first scan, to assess scan-rescan reproducibility.

Results from the ExCMR protocol demonstrated excellent inter-observer and scan-rescan reproducibility. Researchers were also able to characterise exercise physiology at every stage, and observe differences in exercise physiology between athletes and healthy volunteers. Findings of the study were published in the Journal of Cardiovascular Magnetic Resonance in January 2017.

The research team is currently at their next phase of recruiting patients for the ExCMR protocol, to research on heart diseases that are prevalent in Singapore, such as ischaemic heart disease. Interested parties who are keen to volunteer may drop an email to [mrbike@nhcs.com.sg](mailto:mrbike@nhcs.com.sg).



**The greatest advantage of the ExCMR imaging test is that it allows cardiologists to use one imaging modality to study the function of the heart, and its responses to exercise and stress in addition to the characteristics of the heart muscles. Patients no longer have to undergo two tests in order to achieve the same results.**

*NHCS new ExCMR protocol where the supine cycle ergometer is fitted onto the CMR scanner table.*







## JOIN US!

### NHCS HEART CARE SYMPOSIUM — HEART FAILURE

This symposium targets mainly General Practitioners and Doctors with an interest in cardiology. Through this Symposium, participants will be able to understand more about Heart Failure; as well as learn how to manage the co-morbidities in Heart Failure. An update on the pharmacological therapy and use of devices in heart failure would be shared at the Symposium as well.

**Date:** 27 May 2017, Saturday  
**Time:** 1pm – 4.30pm  
**Venue:** Lecture Theatre, Level 7,  
 National Heart Centre Singapore  
 5 Hospital Drive, Singapore 169609

**Free admission.** Limited seating, pre-registration required.  
 Registration closing date: 19 May 2017.

For enquiries, please call **6704 2381/2389** or email  
**nhccme@nhcs.com.sg**.

### 5<sup>TH</sup> CORONARY CARE SYMPOSIUM

Designed for residents, fellows, medical students and nurses, this is a basic course in coronary intensive care covering the management of cardiac patients and basic equipment and modalities used in the CCU. Interactive case discussions/quizzes will cover the crucial topics in a stimulating and fun way while hands-on stations will support in-depth learning of the various tools and techniques essential to the daily CCU work.

**Date:** 9 September 2017, Saturday  
**Venue:** National Heart Centre Singapore  
 5 Hospital Drive, Singapore 169609

**Registration Fees: For Physicians' Track**

- S\$50 for medical students;
- S\$200 for physicians / doctors-in-training

**For Nurses' Track (Nurses / Allied Health Professionals)**

- S\$80 for afternoon programme;
- S\$110 for full day programme

Registration closing date: 25 August 2017.

For enquiries, please call **6704 2389/2382** or email  
**nhccme@nhcs.com.sg**.

## APPOINTMENTS AND PROMOTIONS



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**DR ONG  
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**DR KANG NING**

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