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National Heart
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MANAGEMENT OF
HEART FAILURE



WHAT YOU EAT CAN
AFFECT YOUR
MEDICATION



CARDIOPULMONARY
EXERCISE TESTING



SPONTANEOUS
CORONARY ARTERY
DISSECTION:

CAN PREGNANCY CAUSE A HEART ATTACK?

SPONTANEOUS CORONARY
ARTERY DISSECTION:

CAN PREGNANCY CAUSE A HEART ATTACK?

By Dr Chua Yi Yi, Senior Resident, Department of Cardiology and
Assoc Prof Chin Chee Tang, Senior Consultant, Department of
Cardiology, Director of Coronary Intervention Service

Spontaneous coronary artery dissection is an emergency condition that arises from a spontaneous tear in the coronary arteries and can result in a heart attack or sudden death. Previously thought to be a very rare condition, it is now increasingly recognised as an important cause of heart attack, accounting for 1 to 4% of heart attacks¹⁻⁵ associating with pregnancy.

Our coronary arteries are blood vessels that supply oxygen-rich blood to the heart, and allow the heart to pump blood to the rest of the body. The arterial walls are made up of thin layers of tissue and consist of three layers. When the innermost layer tears, blood can be trapped between the layers. Separation of the arterial wall layers can also occur due to bleeding from spontaneous rupture of the small vessels that supply the arterial wall. In either case, the build-up of blood between the layers of the arterial wall limits blood flow to the coronary artery which can lead to a heart attack.

Alina experienced the classic symptoms of spontaneous coronary artery dissection (SCAD) a week after giving birth in 2015, when she had the feeling of pressure building up in her chest, and into her jaws and upper arms. The symptoms went away in a couple of minutes. However, the exact symptoms returned a week later. This time, the symptoms were more severe, and she felt breathless and unwell. She immediately knew that something was wrong and called an ambulance. She was only 32 years then.

Alina was brought by the ambulance to NHCS, and rushed to the Catheterisation Laboratory (Cath Lab) for a percutaneous coronary intervention (PCI) procedure, to restore the blood flow to her heart.

Assoc Prof Chin Chee Tang was the doctor on duty at the Cath Lab when Alina was wheeled in urgently. "I knew that this would not be one of our usual heart attack cases as she was so young. And knowing that she had a baby at home made it even more stressful," he remembered. Together with Assoc Prof Lim Soo Teik, Senior Consultant, Department of Cardiology, Director of Cardiac Catheterisation Laboratory, NHCS, they started the PCI procedure. Alina recalled being told by Assoc Prof Chin that her condition was serious but they would do everything they could to help her.

In the four-hour procedure, the team of medical staff successfully restored the blood flow in Alina's heart by placing three stents in the left coronary artery systems to repair the torn blood vessels. Following the procedure, she was cared for by the Coronary Care Unit team led by Assoc Prof Yeo Khung Keong, Deputy Chief Executive Officer (Data Science and Innovation) and Senior Consultant, Department of Cardiology, NHCS. She was prescribed with blood thinners, beta blockers, statins and heart failure medications. As her heart function (ejection fraction) was significantly reduced, she had to wear a life vest - a wearable defibrillator to automatically deliver treatment shock in case of any detection of abnormal rapid heart rhythm.

Coping with SCAD

Prior to having SCAD, Alina had been leading a healthy and active life. She was eating healthily, and exercising regularly up to two to three times a week such as swimming, jogging, yoga and fitness training. She had no history of heart disease in her family and had never smoked.

Alina was told SCAD mostly happens to women and the risk of SCAD is highest in the last weeks of a pregnancy and the first six weeks after. It was likely due to the hormonal fluctuations that the body



Alina's first and only visit of her baby while in the hospital, a week after her SCAD episode.

went through during pregnancy and the postpartum period. “It is very important for every woman to be aware of her body, and that SCAD can happen to anyone regardless of age and risk factors,” expressed Alina.

The road to recovery had been challenging for Alina, as she was a new first-time mom when the SCAD episode happened. “I was dealing with two traumas – one from having SCAD, and the other was not being able to fulfil my role as a mother,” shared Alina, recounting how she was not able to perform simple tasks like taking her baby out for a walk, or carrying him when he was crying.

The Road to Recovery



Alina with her husband and baby – three months after her recovery.

Alina signed up for the Cardiovascular Rehabilitation and Preventive Cardiology programme at NHCS a few weeks after her discharge, which taught her gradual restorative exercises to regain her strength and confidence in her body. After about three months, her heart function improved, and she no longer needed to wear the life vest, which was a big milestone in her recovery.

Alina also researched about SCAD online, and found an online support group with mostly young women around the world who also experienced SCAD. She found that connecting and discussing with others who had the condition helped her a lot in her recovery.

“After a journey of two years, I can say that I felt better - both physically and mentally. I have accepted my limits and learned to live with the new parameters. I always say that I lost my old self forever, but I regained a new kind of normal,” shared Alina, who successfully managed to have another child post-SCAD, after further considerations and discussions with doctors.

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FOR THE PHYSICIANS

Diagnosing and Managing SCAD

Patients with SCAD may present with symptoms typical of a heart attack such as chest pain or discomfort that radiates to the neck, jaw or arm, breathlessness, nausea, dizziness, or sweating. They may also present with ventricular arrhythmias and sudden cardiac arrest.

Patients often have elevated troponin levels, and abnormalities in their electrocardiogram including ST segment changes, which is the interval between ventricular depolarisation and ventricular repolarisation. Definitive diagnosis requires invasive coronary angiogram and may require the use of adjunctive imaging such as intravascular ultrasound or optical coherence tomography.

Observational data suggests that a conservative management with medications alone is safe for most patients, and hence preferred, if applicable. Long-term medical therapy frequently includes aspirin and beta-blocker⁴. However, patients with high-risk features such as ongoing ischaemia, left main dissection, ventricular arrhythmias, or haemodynamic instability may require coronary revascularisation with PCI or coronary artery bypass surgery. Cardiac rehabilitation and psychosocial support are also important aspects of treatment⁵. Blood pressure should be well-controlled and high-intensity exercise and sports should be avoided. Overall, long-term prognosis is excellent, though cardiovascular events such as recurrent heart attacks, ventricular arrhythmia, cardiogenic shock, or unplanned revascularisation may occur following index presentation⁴.

SCAD: Most common cause of heart attack associated with pregnancy

SCAD likely occurs because of a complex interplay between predisposing conditions and precipitants. It most commonly affects young women without classical cardiovascular risk factors. Over 90% of patients with SCAD are women. SCAD is strongly associated with fibromuscular dysplasia, a non-atherosclerotic, non-inflammatory form of angiopathy that can affect any arterial bed to cause stenosis, occlusion, aneurysm, or dissection^{6,7}.

Pregnancy and the postpartum period are also well-established risk factors. Though pregnancy-associated SCAD encompasses a relative small proportion of SCAD cases, it is the most common cause of myocardial infarction amongst patients who are pregnant or post-partum⁸. Other predisposing factors include other forms of arteriopathies or connective tissue disorders, use of exogenous hormones, systemic inflammatory disease, or migraine. Precipitating factors include intense exercise, retching or vomiting, severe hypertension, intense emotional stress, and recreational drugs². While pregnancy is not recommended following an episode of SCAD, patients should consult with their doctors to further discuss on this.



FOR THE PHYSICIANS

MANAGEMENT OF HEART FAILURE

By Dr Alex Tan, Associate Consultant, Department of Cardiology

Heat failure is a complex clinical syndrome resulting from a structural and/or functional abnormality of the heart causing elevated intracardiac pressures and/or insufficient cardiac output. This presents with symptoms such as breathlessness, ankle swelling and fatigue. When a physical examination is performed by medical professionals, signs of heart failure including elevated jugular venous pressure, pulmonary crackles and peripheral oedema may be present.

If there are clinical features of heart failure as highlighted above, further investigations should be pursued. A resting electrocardiogram, biomarkers such as NT-proBNP and chest X-Ray can be ordered. Specialists consultation and further imaging (eg. echocardiogram) should be considered.

Epidemiology of Heart Failure

The reported prevalence of heart failure is 1 to 2% of adult population, though this is likely underestimated. The prevalence of heart failure also increases with age from 1% in those aged 55 years and below to more than 10% in those aged 70 years or over. With an ageing population, the prevalence of heart failure will likely increase in the future.

Southeast Asian patients tend to present with heart failure at a younger age than those in the Western population (54 years versus 75 years)¹. Furthermore, they tend to have a more severe condition requiring intensive care, longer length of stay, and a higher hospital mortality rate. Amongst various ethnic groups, the hospitalisation rates are shown to be higher in Malays and Indians (35% higher) than Chinese. Mortality is also 3.5 times higher in Malay population as compared to Indians and Chinese.

Latest Guidelines on Heart failure

In recent years, there have been new guidelines² for heart failure from both the European Society of Cardiology (2021) (ESC 2021) and American Heart Association/ American College of Cardiology (2022) (AHA/ACC/HFSA 2022). Heart failure can be classified into the following three groups according to ejection fraction.

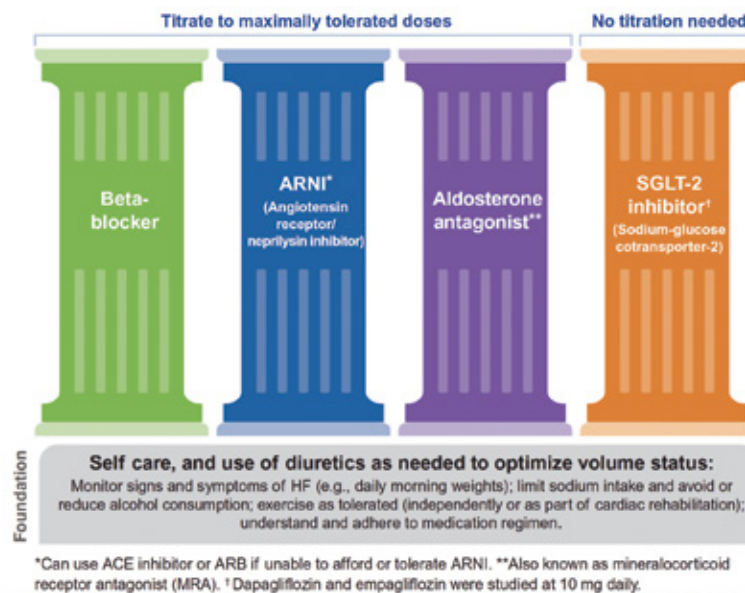
- (i) Heart Failure with reduced ejection fraction (HFrEF): LVEF \leq 40%
- (ii) Heart Failure with mildly reduced ejection fraction (HFmrEF): LVEF 41-49%
- (iii) Heart Failure with preserved ejection fraction (HFpEF): LVEF \geq 50%

Left ventricular ejection fraction (LVEF) is a measurement of how much blood is pumped out of the heart per cardiac cycle. The assessment of heart function can be performed using a transthoracic echocardiogram or cardiac magnetic resonance imaging. This classification based on LVEF will help guide management and treatment strategies. Patients with HFrEF have higher risk of mortality than patients with HFpEF.

Apart from diagnosing and classifying heart failure, one should also consider the underlying cause of heart failure which needs to be treated to. This can range from coronary artery disease, hypertensive heart disease, valvular heart disease, abnormal heart rhythms, etc.

Medical therapy for heart failure has evolved leaps and bounds over the decades. Gone are the days of just isosorbide dinitrate/ hydralazine, ACE-inhibitors and digoxin. With the latest guidelines from ESC 2021 and AHA/ACC/HFSA 2022 for the management of HFrEF, there are four groups of medications that are strongly recommended. Angiotensin-receptor-neprilysin inhibitor (ARNI), Beta-blockers, Mineralocorticoid receptor antagonist (MRA) and Sodium-Glucose Cotransporter-2 Inhibitors (SGLT2i). The goal of treatment in patients with HFrEF is to initiate them on these four pillars of therapy early and concurrently, but bearing in mind that each patient is different and hence the initiation, up-titration and combination of these medications may vary.

With appropriate management and medical therapy, patients with HFrEF may see an improvement in their LVEF over time. This group of patients can be classified as HF with improved EF (HFimpEF) where previous LVEF was \leq 40% and a follow up measurement of LVEF $>$ 40%. It is important to recognise this group of patients and



Credits: Alosahealth.org

continue their guideline-directed medical therapy and not stop medications as it may increase the risk of heart failure relapse.

Previously, HFpEF was a recognised entity with limited treatment options with the aim of treating comorbidities such as hypertension, diabetes as well as managing fluid status. This was until the recent ground-breaking trial involving the SGLT2i Empagliflozin, in the EMPEROR-Preserved study³. Empagliflozin was shown to reduce the combined risk of cardiovascular death or hospitalisation for heart failure in patients with heart failure and LVEF >40%. This is now recommended for use in patients with HFmrEF and HFpEF.

Heart failure is associated with a chronic inflammatory state which can lead to iron deficiency. The role of intravenous iron (Ferric carboxymaltose) has also been shown to improve symptoms and reduce heart failure hospitalisation in patients with iron deficiency and heart failure.

Additionally, regardless of the type of heart failure and LVEF, it is important to manage the fluid balance in patients. This is achieved through a combination of fluid intake restriction, a low-salt diet and the use of diuretics.

Apart from optimal medical therapy, there are adjuncts and devices which can be considered in HFrEF management. The role of an implantable cardioverter defibrillator (ICD) should be considered in patients with LVEF <35% to reduce the risk of sudden cardiac death due to the risk of life threatening arrhythmias.

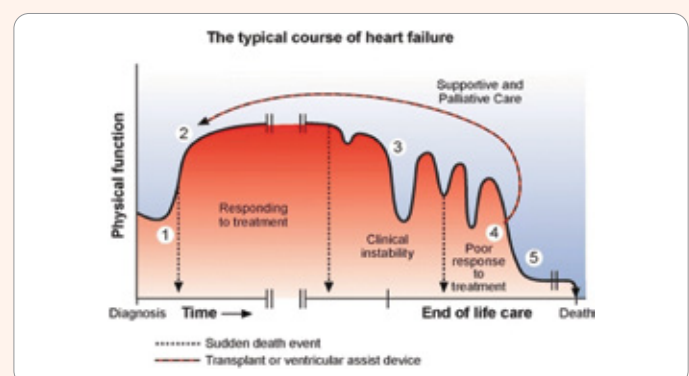
Multi-disciplinary approach

At the National Heart Centre Singapore (NHCS), heart failure management is undertaken by a multi-disciplinary team comprises heart failure cardiologists, trained heart failure nurses, palliative-supportive care specialists, pharmacists, physiotherapists, dietitians, transplant coordinators and medical social workers who work hand in hand to care for our patients.

In advanced heart failure, heart transplantation or mechanical heart pumps such as the Left Ventricular Assist Device (LVAD) can be considered as a permanent or destination therapy, and recommended in selected patients who are repeatedly hospitalised despite being on optimal medical therapy.

The aim of treatment is to alleviate symptoms, reduce frequency of hospitalisation, reduce mortality, and improve quality of life. However, the trajectory of heart failure is complex, as it is typically characterised by intermittent deterioration with subsequent stabilisation, and the condition may worsen in an unpredictable pattern of decline resulting in risk of sudden death.

Advance care planning is important for patients with heart failure to make plans about their future health care, especially when they are not in a position to make or communicate their healthcare choices. Shared decision-making among patients, their families, and the medical team in establishing the goals of care should be initiated early.



Credits: Beattie, J.M., Riley, J.P. (2018). Palliative Care in Heart Failure

As heart failure is becoming increasingly common in the world and in Singapore, early recognition and diagnosis and referral for specialist management is important. The availability of improved medication treatment options may help in the managing of symptoms and reduction in hospitalisation and mortality rates.

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WHAT YOU EAT CAN AFFECT YOUR MEDICATION



For patients with heart conditions, it is not uncommon that they have to consume one or more types of medications. Will the food we eat, be it heart healthy or not, affect the medications we take in the body? Ms Tan Ching Rui, Pharmacist, said that a drug-food interaction may occur when the food we consume interacts with the drugs we take.

Besides food, drinks and herbal remedies may also contribute to such interactions. Certain interactions may reduce the effectiveness of medications, or even accentuate their side effects. Hence, it is paramount for heart patients to have a clear understanding of these interactions can help avoid common pitfalls.

Interactions between Food, Drinks, Herbal Remedies and Common Heart Medications

The following are some common examples:

Statin and Grapefruit



Statin is a commonly used cholesterol medication. Some compounds in grapefruit and grapefruit juice can slow down the breakdown of statin, leading to higher amounts of statin in the body if consumed in large amounts. This can increase the risk of side effects such as muscle aches and liver abnormalities, hence it is advisable to avoid grapefruit and grapefruit juice as much as possible while on statin.

Warfarin and Vitamin K



Vitamin K is crucial for forming blood clots and preventing bleeding. When taken together with warfarin, it can counteract the blood thinning effect of warfarin and prevent warfarin from working well. Therefore, when on warfarin, it is important to maintain a consistent intake of vitamin K in your diet. Avoid drastic changes in diet especially for vitamin K rich food such as broccoli, brussel sprouts, kailan, spinach, soy products, green tea, chrysanthemum tea and herbal tea.

Direct Oral Anticoagulants [DOACs]

(e.g. Rivaroxaban, Apixaban, Dabigatran) and Herbal Remedies



DOACs are blood thinning medications that are commonly used for stroke prevention in patients with irregular heartbeat. While DOAC boasts significantly less drug-food interaction compared to traditional blood thinner warfarin, caution should still be taken when consuming DOACs with herbal remedies such as ginkgo biloba, garlic, ginger tea and ginseng products. Although the amounts typically found in food would not cause significant interaction, the concentrated amount found in herbal supplements may pose substantial bleeding risk and should be used with caution. In addition, use of DOACs with St John's wort should be avoided due to significant reduction in the effectiveness of DOACs.

Angiotensin Converting Enzyme Inhibitors [ACEi]

(e.g. Lisinopril, Enalapril, Perindopril)

or Angiotensin Receptor Blockers [ARB]

(e.g. Losartan, Valsartan)

and Potassium Rich Food



Potassium is a mineral that is involved in heart function, muscle contraction and water balance. It is important to keep the right balance of potassium in the body to avoid harmful effects such as irregular heartbeat and muscle weakness or cramping. Blood pressure medications such as ACEi and ARB raise potassium levels, and when coupled with excessive intake of high potassium food, can contribute to elevated potassium levels in the body. Hence, while on ACEi or ARB, avoid eating large amounts of food high in potassium such as bananas, avocado, mango, kiwi, prunes, broccoli, kailan, spinach, sweet potato, potato and seaweed. Sodium salt substitutes are often high in potassium content and should be avoided as well. You may check with your doctor if you would like to consume these products. It is especially important for you to avoid the excessive intake of high potassium food if you are also given concurrent potassium replacement tablet by your doctor.

The above list is non-exhaustive. Please clarify with your doctor or pharmacist when in doubt.

Supplements with Potential Benefits in Patients with Heart Disease

In the market, there are many supplements that claim to improve heart health. However, unlike prescription medications, evidence surrounding supplements is often sparse. This is further complicated by the fact that not all supplements are made equal. Different brands may contain different amounts of active ingredients, leading to varied safety and effectiveness. Some supplements may even interact with medications. When starting any new supplement, it is always advisable to first speak with your doctor or pharmacist. The following are some supplements that might have potential benefits for the heart:



Omega-3 Fatty Acids

Omega-3 fatty acids, at relatively high doses of 2 to 4 grams per day, have been shown to reduce triglyceride, a type of fat found in the blood. Theoretically, lower triglyceride levels in the body will reduce risk of heart attack, stroke and death due to heart condition. While omega-3 fatty acids appear to be generally safe, it may cause some gastric disturbance and slight increase in bleeding risk. Therefore, if there is no compelling reason to take omega-3 fatty acids supplements, it would be preferable to obtain omega-3 fatty acids from a food source instead. The American Heart Association (AHA) recommends eating fish (particularly fatty fish such as mackerel, sardines, tuna and salmon) at least two times a week.

Coenzyme Q10

Coenzyme Q10 may potentially help to reduce muscle symptoms associated with statin use, as well as improve symptoms of heart failure. However, to date, evidence for use has been conflicting. Although the findings are mixed, given the lack of significant side effects and plausible benefit, trial of Coenzyme Q10 is reasonable if desired.

Red Yeast Rice

Red yeast rice contains an ingredient called monacolins, which helps to lower total cholesterol and bad cholesterol known as LDL. It works in a similar manner as the cholesterol medication statin and thus they should not be taken together. Red yeast rice also causes similar side effects as statin such as muscle pain. Do note that the efficacy and safety differ between products due to varying concentration of monacolins.

CARDIOPULMONARY EXERCISE TESTING

By Dr Koh Choong Hou, Consultant, Department of Cardiology

Exercise Treadmill Test (ETT) - a running test on a stationary treadmill machine, is a common investigation used to evaluate cardiac conditions such as ischaemic heart disease and heart rhythm issues. While ETT is widely known to many, another assessment - Cardiopulmonary Exercise Test, or CPET, is less common. NHCS is one of the few institutions in Singapore that has CPET capability for advanced cardiorespiratory assessment of patients.

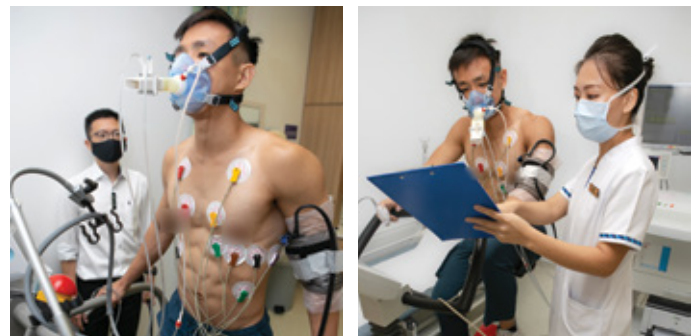
What is Cardiopulmonary Exercise Test (CPET)?

A CPET is conventionally performed like an ETT, with additional components integrated to provide a deeper analysis into the exercise related physiological performance of the heart, lung, circulation and muscle systems of the body. These include:

- (i) resting spirometry, which comprises supervised breathing into a lung function machine to measure basic lung function parameters;
- (ii) exercise phase – either via a treadmill facilitated run, or a stationary bicycle that comes with an attached air tight mask to record inhaled and exhaled gases during physical exertions, and a pulse oximeter probe attached to the finger or ear lobe, to determine oxygen saturation levels during the test.



Similar to a standard ETT set up, electrocardiogram (ECG) and blood pressure monitoring are also simultaneously performed to assess the patient's response to exercise in terms of heart electrical activities, heart rate, and blood pressure rise.

Most individuals who are able to run to a comfortable and adequate level of intensity will be assigned to treadmill CPET, as their response to this modality largely mirrors their normal activities. For those who are unable to run due to significant back or lower limb musculoskeletal issues, or with unsteady gait problems, they will be assigned to bicycle CPET, which is a recent new addition to the current treadmill CPET assessment NHCS offers.



A typical set up for a treadmill CPET (left) compared to a bicycle CPET (right).

For selected group of individuals such as amateur and professional cyclists who are keen to specifically measure their exercise response on bicycle stress or whose exercise workload is critical for clinical decision making, a bicycle CPET will be performed. The new bicycle CPET not only provides clinicians an option to better assess patients, the ease-of use also offers a better patient experience, especially for the senior patients. The key differences between a bicycle CPET versus a treadmill CPET is summarised below.

 Bicycle CPET	 Treadmill CPET
Less movement artefacts hence more accurate ECG and blood pressure measurements	Movement artefacts that may affect ECG and blood pressure measurements
Low risk of falls	Risk of falls
More acceptable to most demographics and patient profiles	May be more intimidating, especially to the sedentary or elderly population
Quieter	Noisier
More controlled measurement of workload	Less controlled measurement of workload
Gradual and smoother increase in exercise stress level during the test	Certain protocols may necessitate a significant jump in stress levels during change in stages

Who needs a CPET?

Many physiological parameters to exercise stress can be derived from a CPET session, such as peak oxygen consumption ($\dot{V}O_{2max}$), anaerobic threshold, exercise capacity, lung function limitations, or potential underlying muscular or circulatory insufficiencies. Hence the value of CPET in evaluating patients with underlying heart, lung, muscle or circulatory conditions can be very useful. In general, the CPET is beneficial for:

- Evaluation for exertional breathlessness
- Objective assessment of cardiorespiratory fitness in athletes
- Tailoring an exercise prescription
- Risk stratification and prognostication in patients with heart failure
- Assessing patients with congenital heart disease for treatment response or pre-surgical intervention
- Determining functional limitations from cardiac valvular or electrical conditions

How is the test conducted in NHCS?

CPET sessions are conducted in a safe and controlled environment within the NHCS Cardiac Rehabilitation Unit, and each session typically involves a CPET trained nurse and a cardiologist. Patients are advised to dress in comfortable and appropriate exercise gear and footwear for the test, and to stay well hydrated on the day of the test. If unwell, patients are advised to postpone the session. A screening questionnaire will be administered before the CPET to screen for contraindications to the test, following which resting spirometry will be performed. Next, there will be fitting of the specialised CPET face mask, attachment of the ECG leads, pulse oximeter and blood pressure cuff. The exercise phase is monitored real-time by the CPET cardiologist and nurse, and entire process is expected to take between 30-45 minutes for each patient.

Conclusion

Cardiopulmonary Exercise Test is a highly useful tool for evaluation of cardiovascular conditions, undifferentiated cardiac symptoms, and assessment of overall cardiorespiratory fitness. Patients who are keen to find out more about their eligibility for the test may speak to their cardiologists.



A resting spirometry can test basic lung functions.

CONTACT US



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CARDIOVASCULAR REHABILITATION AND PREVENTIVE CARDIOLOGY PROGRAMME

Cardiovascular Rehabilitation and Preventive Cardiology Programme is an integral component of cardiac care. Cardiovascular rehabilitation is a life-long process with several therapeutic components to help patients get better after a variety of heart problems, angioplasty, cardiac surgery and cardiac events. At NHCS, our Cardiovascular Rehabilitation and Preventive Cardiology Programme comprises a multidisciplinary team to help heart patients better manage their conditions and get back on their feet.

- Health education
- Dietary and metabolic counselling
- Pharmaceutical counselling
- Psychological counselling
- Cardiovascular risk factor modification
- Exercise testing
- Exercise prescription
- Supervised exercise programmes on an inpatient and outpatient basis

OUR SPECIALISTS

Assoc Prof Tan Swee Yaw	Director and Senior Consultant
Asst Prof Ho Jien Sze	Consultant
Dr Huang Zijuan	Consultant (Sengkang General Hospital)
Dr Koh Choong Hou	Consultant
Dr Chee Fang Yee	Associate Consultant

**For the full list of NHCS services and specialists,
please visit www.nhcs.com.sg.**

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LUNG SURGERY AND NAVIGATIONAL BRONCHOSCOPY

By Asst Prof Soo Ing Xiang, Consultant, Thoracic Surgery, Department of Cardiothoracic Surgery

Navigational bronchoscopy is the newest and latest addition to the Minimally Invasive Thoracic Surgery Programme at NHCS, that allows more accurate surgery of lung nodules.



Asst Prof Soo performing navigational bronchoscopy and VATS for lung cancer.

Between 2013 and 2017, there were close to 8,000 lung cancers diagnosed in Singapore which was about four cases a day¹. Lung cancer has a higher fatality rate as compared to breast or colon cancer; with more than three deaths a day. While smoking is found to be the main risk factor for lung cancer, there has been an increase in lung cancer for non-smokers, especially in the Asian population. Unfortunately in lung cancer, there are generally no symptoms during its early stages, and it is often only picked up

through health screening or body check. Nonetheless, surgery can offer a chance of a cure if treated in its early stages.

VATS for Lung Cancer

Keyhole lung surgery, or also known as Video-Assisted Thoracoscopic Surgery (VATS) is a less invasive technique for lung surgery, and has become the standard of care at NHCS, as it helps to reduce post-surgery pain and aid in faster recovery.

NHCS performs about 600 cases of VATS annually with majority for lung cancer. Traditionally, lobectomy (surgery to remove one of the lobes of the lung) or major resection of the lung is needed for treatment of lung cancer. However, recent research²⁻³ suggests a lesser resection for smaller lung cancer could result in equivalent cure rates and increase preservation of lung function.

In traditional bronchoscopy, a small light and camera are mounted on a thin, flexible fibre-optic cable to check the airways of the lungs through the patient's nose or mouth. The procedure provides direct visuals of the throat and airways.

In navigation bronchoscopy, a special cable is used with the combination of real-time electromagnetic navigation (GPS-like technology) and computed tomography (CT) images, to locate even the smallest lung nodules, and allow more accurate localisation of the cancer. During a surgery, doctors will use navigational bronchoscopy to virtually map out the patient's airway, and plan a pathway to the cancer. Once they 'navigate' their way precisely to the lung cancer, they will mark it with a special fluorescent dye to locate the exact site of the cancer. Through this, doctors are able to make precise resections of the lung and avoid cutting excessive lung tissue to remove the cancer, thus preserving more lung for the patient.



Barely visible wound (arrow) after VATS.

Besides the precision and accuracy offered by the technology, navigational bronchoscopy also helps to save time. The localisation and removal of multiple cancers can be done in one setting, compared to conventional localisation where

it may take more than one procedure. This reduces time and costs needed for repeat procedures.

In summary:

- If detected in the early stage, surgery can offer a chance of a cure for lung cancer
- VATS together with lung preservation techniques, help patients regain functional capacity after surgery, leading to better patient outcomes
- Navigational bronchoscopy can be used for precise lung resection in the same setting to further preserve lung function



Navigational Bronchoscopy: a virtual roadmap (purple) to the cancerous nodule (green ball).

¹ Singapore ICA Report on Registration of Births and Deaths 2019

² Saji H, Okada M, Tsuboi M, Nakajima R, Suzuki K, Aokage K, Aoki T, Okami J, Yoshino I, Ito H, Okumura N, Yamaguchi M, Ikeda N, Wakabayashi M, Nakamura K, Fukuda H, Nakamura S, Mitsudomi T, Watanabe SI, Asamura H. Segmentectomy versus lobectomy in small-sized peripheral non-small-cell lung cancer (JCOG0802/WJOG4607L): a multicentre, open-label, phase 3, randomised, controlled, non-inferiority trial. *Lancet*. 2022 Apr 23; 399(10335):1607-1617

³ National Comprehensive Cancer Network Guidelines for Non-Small Cell Lung Cancer 2021



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January – April 2022

JANUARY 2022

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Sudden Cardiac Arrest – What can I do to prevent it?

(For Public)

Sudden cardiac arrest occurs when there is an abrupt loss of heart function. What makes sudden cardiac arrest a silent killer is unlike a heart attack, which has the typical symptoms of chest pains and breathlessness. A cardiac arrest has no warning signs and symptoms. Join us as we share more on who is at higher risk and what can be done to prevent sudden cardiac arrest.

Date: 20 August 2022, Saturday

Time: 11am – 12pm

Understanding Heart Surgery - Is it really to be feared?

(For Public)

Heart disease is one of the leading causes of death in Singapore and globally. Treatment therapies commonly involve medications and day procedures, to open-heart surgeries. A heart surgery is a major operation. Understandably, there may be misconceptions amongst many even with rich resources online. Join us as we share the most up-to-date and relevant knowledge on heart surgery, including innovative methods such as the keyhole approach.

Date: 12 November 2022, Saturday

Time: 11am – 12pm

APPOINTMENTS & PROMOTIONS



Assoc Prof Aaron Wong Sung Lung
Deputy CEO,
(Cardiac Care Network)



Assoc Prof Yeo Khung Keong
Deputy CEO,
(Data Science & Innovation)



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Head,
Department of Cardiology



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