It was on a wet stormy afternoon on 12 Nov 2011, National University Heart Centre, Singapore (NUHCS) hosted its inaugural public Chinese symposium, “健康心脏,健康生活” at the new auditorium of the National University Health System (NUHS) Tower Block. The 300 tickets catered were long sold out before the event but it did not stop another 80 people from braving the rain in turning up. They had to be housed in an adjacent room to the auditorium with live audio and video feed.

The audience were certainly not disappointed as they were treated to a lively presentation of current cardiovascular topics of “Women and Heart Disease”, “Palpitation – Harbinger of Sudden Cardiac Death?”, “Coronary Stenting – Past, Present and Future” and “Coronary Artery Bypass and Valve Surgery Update”. All 4 speakers, Dr Raymond Wong, Dr Lim Toon Wei, Dr Jimmy Hon and Assoc Professor Tan Huay Cheem were able to fully engage the audience with their fluent Mandarin and multimedia presentation.

The event was also supported by the Singapore Heart Foundation which conducted cardiopulmonary resuscitation (CPR) demonstration and provided CPR training kits and educational pamphlets to the attendees.

Assoc Prof Tan Huay Cheem, Director of NUHCS, also launched his Chinese book, “临床心得” or “Clinical Vignettes”, which contains all the articles that he had published in his regular column in the local Chinese newspaper of LianHe ZaoBao for the last 4 years. All 300 copies of his book were sold out with Assoc Prof Tan autographing for many at the end of the symposium.

At the end of the afternoon, a total sum of about $5000 was raised and donated to the NUH Patientcare Charity Fund.
A total sum of about $5000 was raised and donated to the NUH Patientcare Charity Fund.
Cardiovascular disease remains the leading cause of death globally. It has no geographic, gender or socio-economic boundaries. Every year, cardiovascular diseases cause as many deaths as HIV/AIDS, tuberculosis, malaria and diabetes plus all forms of cancer and chronic respiratory disease combined. Data from the WHO indicate that an estimated 17.1 million people died from cardiovascular disease in 2004, representing 29% of all global deaths and occurring almost equally in men and women. Of these deaths, an estimated 7.2 million were due to coronary heart disease and 5.7 million were due to stroke. The Singapore Heart Foundation estimate that every day in Singapore, an average of 15 people die from cardiovascular disease. In 2009, cardiovascular disease accounted for 32% of all deaths in Singapore.
Fortunately modern and available treatments for heart and vascular disease have resulted in improved survival and quality of life. Great leaps in open cardiovascular surgery and cardiovascular interventions have been made in parallel over the last 50 years. These include open heart surgery with cardiopulmonary bypass, heart valve replacement, coronary stenting, drug eluting stents and endovascular aortic aneurysm repair. Some of these areas will be covered further in this issue.

Recently there has been convergence of these interventions towards hybrid procedures that afford a minimally invasive approach by a combination of surgical operations with precise imaging and endovascular techniques. Some examples are in the evolution of hybrid coronary revascularization, trans-catheter aortic valve implantation, endovascular aortic surgery and endovascular intervention for limb salvage. Several factors driving this convergence are an aging patient population, improved device technology and better imaging. Patients with cardiovascular disease requiring treatment are increasingly elderly and consequently have significant morbidities and therefore tolerate these less invasive operations much better. Moreover the proportion of emergency and complex cases that can be treated by a hybrid approach are increasing. Device technology and imaging continue to evolve rapidly. Endovascular devices can now be customized for disease specific anatomy and delivered in smaller systems. The need for precision through better imaging will be paramount. These patients are now best served by a minimally invasive procedure in a safe and sterile environment with full anaesthetic support and monitoring. A “Hybrid” operating room combines all the features of a standard operating room with state of the art imaging. It’s a glimpse into the future of surgery and sets a new standard of care for patients with cardiovascular disease.

Multidisciplinary teams have also evolved to perform these procedures in a hybrid Operating Theatre (OT) environment with excellent angiographic imaging with digital subtraction and 3-D imaging for planning and navigation. At NUHCS these complex procedures are performed by multidisciplinary teams comprising cardiac and vascular surgeons, interventional cardiologists and radiologists as well as anaesthetists. The ideal hybrid OT should be configured for flexible and ample working space with a fixed imaging system, a floating radiolucent OT table, laminar airflow environment for sterility and full anaesthetic support with heart lung bypass capability.

The newly built hybrid cardiovascular OT at NUHCS features a state of the art Siemens Artis Zeego angiographic system. The Siemens Artis Zeego, is a multi-axis system based on robotic technology that can be positioned any way the operator wants and provides cross-sectional, large volume 3D imaging comparable to that of a traditional CT scanner. The Artis Zeego’s robotic C-arm “senses” the location of the operating table, giving surgeons extraordinary flexibility to manoeuvre the imaging system at almost every angle without moving the patient. As a result, internal organs and vessels can be seen from a “fly around” perspective in three dimensions, in great detail. This enables the surgeon to perform precise imaging in 2-D or 3-D on any part of the body in real time during surgery with optimal safety. The angiographic system is fully integrated with other imaging systems at NUHCS, so that the patients CT and MRI scans as well as live ultrasound imaging of the heart or great vessels can be viewed on the large High Definition LED operating screen. “CT like imaging” and intravascular ultrasound imaging can all be done in the same room while complex surgery is being performed. This improves the precision and safety in which these operations can be done and allows us to combine procedures that previously had to be done in a staged manner in two places. Without ever leaving the operating theatre, the surgical team can use ultrasound, CT and angiography technologies during a stent graft surgery to treat a patient’s leaking abdominal aortic aneurysm. The Hybrid OT now brings into the operating theatre many imaging technologies previously only available in imaging suites outside the OT. This will benefit many patients who can have imaging and treatment in one setting, where multiple trips were required in the past. Patients who require a coronary stent and then heart valve repair, for example, previously needed to have the stent inserted in the Cardiac Catheritization Lab and valve repair subsequently in the OT. Patients with disease in the coronary arteries, heart valves, aorta as the peripheral blood vessels may now benefit from minimally invasive procedures in this hybrid OT suite. The Hybrid OT also opens up doors to new procedures, such as branched endografts for thoracoabdominal aneurysms and percutaneous heart valve repair, for which imaging
The “Hybrid” operating theatre at NUHCS combines all the features of a standard operating room with state of the art imaging. It’s a glimpse into the future of surgery and sets a new standard of care for patients with cardiovascular disease.

HYBRID CORONARY REVASCULARIZATION (Minimally invasive CABG and coronary artery stent placement)

The minimally invasive CABG procedure uses robotic-assisted techniques that allow surgery to be performed using small incisions between the ribs rather than through a midline incision dividing the sternum. The hybrid CABG involves a LIMA graft to LAD performed robotically by a surgeon followed by stenting of the other coronary arteries by an interventional cardiologist. Recovery from robotic assisted CABG is shorter and may be associated with fewer complications. Most patients are able to leave the hospital within three to four days and return to full activity, including work, in two to three weeks, rather than the two-month recovery generally required following traditional CABG. While traditional CABG remains the first-line treatment for multiple, severe coronary blockages, the hybrid procedure is appropriate for patients with LAD disease and one or two other blockages that can be treated with stents. Hybrid coronary revascularization has been shown to be a durable, safe and effective option for carefully selected patients, but more data are needed to assess long-term outcomes and determine which patients are most appropriate for the procedure.

AORTIC DISEASE

Endovascular aortic aneurysm repair (EVAR) involves the placement of a covered stent within the enlarged aortic aneurysm sac to exclude blood flow and prevent fatal rupture. Unlike standard open surgery, in which a large incision is made, endovascular aortic repair can be done percutaneously. Newer adaptations of standard EVAR are the Hybrid EVAR, fenestrated or branched
EVAR and Chimney EVAR. A hybrid procedure aims to combine endovascular procedures with limited open surgery. The stent graft deployment is performed in combination with an open operation to revascularise selected arteries that will be “covered” by the stent graft i.e. deprived of arterial inflow. In this method more extensive EVAR devices can be deployed to treat the primary lesion while preserving arterial flow to critical arteries.

Thoraco-abdominal aneurysms (TAA) typically involve such vessels and deployment of the EVAR device will cover important arteries e.g. visceral or renal arteries, resulting in end organ ischaemia which may be critical. The open operation component aims to bring a bypass graft from an artery outside the stent graft coverage to vital arteries within the coverage region. This component adds to the EVAR procedure in time and risk but is usually judged to be a lesser risk than the traditional open thoracoabdominal operation. Another common example is revascularisation of the left common carotid artery and/or the left subclavian artery from the innominate artery or the right common carotid artery to allow treatment of a distal arch thoracic aneurysm. Continued design improvement in stent graft including branched endografts will reduce but not eliminate this type of surgery.

“Chimney stents” into the carotid artery with TEVAR into the proximal aortic arch have recently been described. All such hybrid procedures aim to reduce the morbidity and mortality of treating aortic disease in a patient population that is increasingly older and less fit than when major open repairs were developed and popularised. Even then, significant risks were accepted in the understanding that the large open operation was the only option. Now with hybrid EVAR performed in hybrid OTs, these complex procedures can be done with much lower risks. The trade off being that durability and problems such as ‘endoleaks’ require careful surveillance.

The Hybrid OR also promises to improve care in life-threatening emergencies such as aortic dissection or transection.

**TRANSCATHETER (APICAL / FEMORAL) AORTIC VALVE IMPLANTATION**

The transcatheter aortic heart valve integrates balloon-expandable stent technology with a replacement tissue heart valve. NUHCS is one of the few centres in Asia to perform percutaneous transcatheter aortic valve replacement. During the procedure, a catheter is advanced to the aortic valve, either through the femoral artery or through a small chest incision and through the left ventricle. Once the catheter is in place, a tissue valve with a metal stent scaffolding is positioned and deployed. Flouroscopic guidance provides real time visualization. The force of the expanding stent anchors the new valve in place, completely avoiding the need for sutures, cardiopulmonary bypass, open surgery—and their associated effects.

**ENDOVASCULAR LIMB SALVAGE**

Rest pain, tissue loss, and gangrene are manifestations of critical limb ischemia caused by peripheral arterial disease and define a patient subgroup at highest risk for major limb amputation. The diagnosis of critical limb ischemia mandates prompt medical and surgical management to achieve the best chance of limb salvage. Surgical intervention has evolved from primary amputation to open bypass to the present era of endovascular therapy. The goals of surgical bypass and endovascular therapy are to improve perfusion sufficiently to permit healing. Endovascular therapy has been shown in multiple retrospective studies to achieve limb salvage similar to open bypass. AT NUHCS, we are able to achieve a 75% twelve month amputation free survival using an endovascular first approach in patients presenting with critical limb ischaemia. Close clinical surveillance and serial monitoring of limb perfusion by means of noninvasive arterial studies are needed to determine the need for further vascular intervention. Limb salvage patients suffer from multiple comorbidities and benefit from a minimally invasive and multidisciplinary, team approach to care.

Combining traditional operations with angiographic imaging technology in the same suite promises to transform the care of patients, with improved safety and outcomes, while stimulating innovation. What previously involved two separate procedures can now be done in one. When the best approach for a patient involves a combination of coronary artery bypass and stenting, by performing both at the same time, we can reduce the stress of surgery and improve recovery time. The imaging technology can also be used after a standard bypass to ensure the bypass graft is providing adequate blood flow to the heart. Published research has shown that this approach can reduce the number of complications.

All of these imaging technologies are coordinated and presented to the surgeon through a state of the art large display LED monitor—an 8Megapixel high definition screen that displays patient medical information along with reference and live images in the OT. The system also allows for videoconferencing in the hospital and permits broadcast of live video for teaching purposes.

In conclusion, the potential is for improved patient outcomes and safety is huge, its utilization synergistic and its reach multidisciplinary. The “Hybrid” operating theatre at NUHCS combines all the features of a standard operating room with state of the art imaging. It’s a glimpse into the future of surgery and sets a new standard of care for patients with cardiovascular disease.
Time goes by very fast and in the blink of an eye, five years have passed since I joined the National University of Singapore (NUS) and the National University Heart Centre, Singapore (NUHCS). A few passions of mine were combined through the opportunity to move to Singapore: search for knowledge, exposure to multicultural environments, and personal development. Also, another reason motivated me to join the team that would start-up a basic research laboratory under the mentorship of A/Professor Theodoros Kofidis at the NUHCS’ Department of Cardiothoracic and Vascular Surgery (CTVS). And this reason was my wish to take my career up to the next level.

As a Colombian medical doctor, I had accomplished research post-doctoral trainings at Stanford University (USA) and Hannover Medical School (Germany), moving to Singapore has been quite a fascinating and enriching experience. Besides, this has definitely been a good move for my scientific career as the country is a vibrant research hub in biomedical sciences, with plenty of opportunities to acquire funding and interact with other scientists and clinicians from various disciplines and institutions. I have also been fortunate to always count on the support from my boss, Professor Lee Chuen Neng, Head of Dept of CTVS, who has provided me with the trust, and independence I needed as a young researcher. Thanks to this support, I also had the exceptional opportunity to pursue a PhD degree at NUS concomitantly to my work as a Research Fellow.

Starting-up a new lab was not easy, but the learning experience was invaluable. A/Prof Kofidis’ Myocardial Restoration Lab was up and running by mid-2007, and soon after, I got the chance to obtain my own funds through an NMRC/New Investigator Grant Award in 2008. This provided me a great foundation to further develop independent scientific reasoning.

In the past five years, my research has been focused on the development of pre-clinical projects with translational potential aiming at enhancing the angiogenic potential of tissue-engineered grafts towards improvement of cardiac performance following myocardial ischemia. Since July 2011, I have been fortunate to have a joint appointment with the Cardiovascular Research Institute (CVRI) under the direction of Professor Mark Richards.

The NUHCS/CVRI is constituted by a multidisciplinary research team aimed at pursuing translational cardiovascular research, and offers me the possibility to work in an environment that facilitates the development of my full potential as a scientist. My future research goals within NUHCS/CTVS-CVRI involve the development of novel therapies for heart failure through post-ischemic acellular regenerative strategies that will involve modulation of paracrine signaling to promote angiogenesis and attenuate fibrosis after myocardial injury. I am interested in approaches with realistic clinical application that can be delivered to the patient with least morbidity and surgical complications. Furthermore, I am expanding my research scope at CVRI by getting involved in projects aimed at a better understanding of neuroendocrine pathways and their possible modulation through novel therapeutic compounds.

It definitely requires dedication to perform as a young scientist abroad. Yet, my professional growth thus far would have not been possible without the infrastructure and opportunities provided by NUHCS, and the support from my mentors, colleagues, students and collaborators. I am very much looking forward to my upcoming years in NUHCS, in the hope that all our combined efforts will produce science with high clinical impact.
Since its inception 25 years ago, percutaneous coronary intervention (PCI) has gained widespread acceptance, and coronary stent implantation has become the standard revascularization therapy for most patients with obstructive coronary artery disease. Yet, instant restenosis and stent thrombosis are two major complications limiting the benefits of PCI. Although the emergence of drug-eluting stents has remarkably reduced the occurrence of instant restenosis, stent thrombosis—which is associated with high incidences of fatal and non-fatal myocardial infarction—remains an unsolved problem. In fact, late stent thrombosis occurs more frequently following drug-eluting stent than bare metal stent implantation. Moreover, the use of drug-eluting stents in increasingly complex lesions and multivessel coronary artery disease implies that these complications are likely to persist and effective preventive strategy is warranted.

Stand-alone X-ray angiography is the traditional imaging method guiding PCI, and is still used in majority of the procedures nowadays. Coronary angiography depicts vessel images that are relatively simple to comprehend, making PCI procedures easy to perform. However, stand-alone angiographic guidance has some inherent inadequacies and limitations, which, if one fails to recognize, may result in suboptimal procedural outcomes, as well as acute and long-term complications. Among others, angiography merely produces a planar silhouette of the contrast-filled lumen. The severity of the lesion can vary widely with different X-ray projection angles. In fact, visual interpretation of angiography exhibits significant inter-observer variability and correlates poorly with post-mortem examination. In addition, coronary angiography is essentially a luminography, which provides no insight to the amount, tissue composition, distribution of coronary plaque, as well as coronary remodeling pattern. After coronary stent implantation, angiography has limited ability to assess the adequacy of stent expansion and stent strut apposition. Therefore, intravascular imaging technology has been widely accepted as an essential tool in complex PCI.

Until recently, intravascular ultrasound (IVUS) is the only intravascular imaging technology available. There are several potential utilizations of IVUS when a coronary stenosis is detected by angiography. As a baseline evaluation tool, IVUS provides quantitative measurement on the extent of artery lumen obstruction, enabling the operator to determine if the patient would benefit from revascularization therapy. Once committed for PCI, IVUS also assists in procedural strategy and device selection. In a single center study, the original revascularization strategy planned was changed after preintervention IVUS imaging of the target lesions. Following stent implantation, IVUS plays a crucial role in optimizing the procedural outcomes, which in turn determines the risk of future complications. IVUS optimizes outcomes through assessment on adequacy of stent expansion, completeness of stent strut apposition and presence of unrecognized dissection or residual stenosis.

Optical Coherence Tomography (OCT) has emerged as the intravascular imaging technology. OCT is an imaging modality that is analogous to ultrasound imaging, but uses light instead of sound. Cross-sectional images are generated by measuring the echo time delay and intensity of light that is reflected or back-scattered from internal structures in tissue. Preliminary experiences with OCT images acquisition show the technique to be safe. OCT imaging technique has gained considerable adoption in many centres across Europe and Japan, and various centres have presented large series of patients imaged by OCT without major complications. Compared with conventional IVUS, OCT offers several advantages. The resolution of OCT (10 μm) is 10 times better than that of IVUS (100-150 μm). This enables the detection of procedural complications such as stent edge dissection with higher accuracy. In addition, tissue coverage of the drug-eluting stent struts, which has been proposed as a parameter predicting late stent thrombosis, can be assessed reliably by OCT. Acquisition of the images by OCT is much faster than that of IVUS (20 seconds versus 2-3 minutes). Last but not least, OCT is the only technology which can accurately measure coronary plaque fibrous cap thickness, which is one of the most important characteristics underlying a vulnerable plaque. With all these advancements, OCT is perceived to the overtake IVUS as the predominant intravascular imaging technology in modern cardiac catheterization laboratory.

In order for the interventional cardiology team to acquire the necessary skills and knowledge in this new technology, we were granted the Academic Medicine Development Award (AMDA) for short-term training in 2 overseas centers. I have spent four weeks at the Massachusetts General Hospital, Harvard Medical School under Professor IK Jang, Mr. Anand Kalesam and Miss JY Lee (medical technologists) have each spent 2 weeks at the Thoraxcenter, The Netherlands under Dr. Evelyn Regar. Our OCT program has started since 4 months ago and a few cases of OCT imaging procedures have been performed. It is anticipated that OCT will become the intravascular imaging technology of choice in our catheterization laboratory.
“It takes a whole village to do limb salvage”

A/Prof Peter Robless
We had the pleasure and privilege of hosting Professor Bauer E Sumpio from Yale University School of Medicine as the 2011 MOH Overseas Expert in Vascular Surgery from the 29th Aug to 2nd Sept 2011. Professor Bauer Sumpio is a world renowned expert and key opinion leader in this field of lower limb preservation, having developed a multidisciplinary lower limb preservation program at the Centre for Vascular Disease and Diabetic Limb Preservation, Yale University School of Medicine. He has published widely in this field and has numerous publications and grants on basic science and clinical trial research in limb preservation.

Professor Sumpio is currently the Associate Director, Graduate Medical Education and previously the Program director of the General Surgery Residency program at Yale University School of Medicine. He holds joint appointments in Vascular surgery and Radiology and is Chief of the Section for Vascular Surgery at Yale Medical School. Prof Sumpio is a key opinion leader in the field of diabetic limb salvage. He has experience in starting one of the first multidisciplinary programs for limb salvage in an academic medical centre. He is a regular keynote speaker at international meetings on diabetic limb salvage and has numerous publications in this field including national guidelines for standards of care and practice. He has an excellent track record for academic teaching having run a successful research laboratory and training residents and fellows for the last 22 years.

During his visit to NUHS, we arranged for him to speak to our residents in general surgery and the University Surgical Cluster on the development of the Yale Residency training program. He also gave a talk on the multidisciplinary limb preservation service specifically protocol driven clinical pathway development and key performance indicators to the Dept of Medicine at NUHS and at the Hospital Grand Round at Jurong General Hospital.

He has expertise in running a successful multidisciplinary team for limb salvage. I had the opportunity to visit his centre in Yale during a team HMDP funded visit to the US in 2009 for vascular medicine. We have since adapted some of the practices at Yale into our own program which is in its early stages at NUHCS. During his visit he did a multidisciplinary ward round at NUH. His inputs were invaluable in the assessment and management of the patient with diabetic foot disease.

He also visited SGH and JGH to meet with the vascular surgeons and interventional radiologists looking after limb salvage. An evening dinner and talk on “Aggressive Multidisciplinary Strategies To Salvage A Functional Foot” was open to all the hospitals and allied healthcare.

The visit was rounded off by a grand round at NUH on how “It takes a whole village to do limb salvage”. This was well attended and well received. The team here learnt a lot and forged new acquaintances during his memorable visit to Singapore.
Cardiac Family Day has been an annual event when everyone in the department spends a day out for a get together. Music, games, fun and food have been the tradition during the event. It was held at the Resorts World Sentosa on a Saturday afternoon, 10th September 2011. With the theme of “the sun, the sand and the beach”, it was set out to be a fun and relaxing event.

Our nurses and clinic staff started coming in the late morning in preparation for their dance and song rehearsals with much enthusiasm, looking forward to putting up a good show for everyone. Pre-event activities started around noon time as the crowds started to form. The grown-ups were queuing up for their shrink caricature while the children waited for their share of the balloon sculpture and to jump on the bouncer specially rented for the afternoon. Everyone around was engaged in some activity and the cocktails started to flow in.

With the arrival of our director of the NUHCS, A/Prof Tan Huay Cheem and our head of Cardiac Department, A/Prof Yeo Tiong Cheng, we formally started the event. We also had the honour of having Mr Noel Cheah, the COO of the NUHS join us in our Cardiac Family Day this year. Our host was Chubby from Showbiz Production who started the event with the familiar tune of the Hawaii 5 O and got everyone up from their seats. The sumptuous international buffet lunch started shortly after.

As the crowd settled into desserts, we started our programme for the afternoon with mass games. The childhood game of scissors, paper, stone which every adult was familiar with but it was the children who won the game in the end. We also had the game of passing the parcel (with a twist) and a dancing competition. A dancing competition with the dancers blindfolded, from which we discovered talented dancing queens and kings amongst us. After that, we had our talented staff from the CCU, heart clinics, ward 56 and 63 who displayed their musicality with song and dance items. And of course, our registrars and residents who surprised us with their skit of X-men reunited and together with Prof Ronald Lee, they saved Professor X from an acute coronary event. : )

Following that was the magic show by Kiki Tay, a well-known Singaporean magician, which wowed both kids and adults. Near the end of the event was a pageant in which we found beautiful ladies.
and handsome men from among our colleagues. And then was the
mass dance to the tune of YMCA which really had everyone in
the crowd joined in dancing, including babies. The event came to
an end with our annual Cardiac Family photo taking and a lucky
draw with more than attractive prizes.

On behalf of the department, I would like to thank our
director, A/Prof Tan Huay Cheem and our head of department,
A/Prof Yeo Tiong Cheng for being really supportive throughout
the organisation of this event. And our ladies in the organising
committee, Christina, Mullai, Sze Hwee and Wendy, a big thank
you for all the effort that you have put in, without which the event
would not have been possible.

It was the sincere wish of our organising committee that
everyone present would have an enjoyable and memorable day
when we started planning the event. Hope you all had a memorable
Cardiac Family Day 2011!
It was NUHCS’ inaugural GP Symposium for Cardiology on the 8th of October 2011. Hosted at the NUHS Tower Block Auditorium, the symposium brought together three of our distinguished cardiologists speakers.

The afternoon started with a scrumptious buffet lunch catered specially for our GP partners. During lunch, our cardiologists mingled and interacted with the GPs present. As 2pm drew near, the GPs proceeded to the auditorium and waited for the speakers to begin.

Chaired by A/Prof Poh Kian Keong, 3 of our cardiologists spoke about the following topics:

• A/Prof James Yip – Diagnosis of Heart Disease with Multislice CT: Which patients should I send for CT coronary angiography?

• A/Prof Adrian Low – Medical Management of Chronic Ischemic Heart Disease

• A/Prof Tan Huay Cheem – Acute Coronary Syndrome Management: What a GP should know.

The GPs were listening intently and taking notes throughout the symposium. They posed several questions during the Q&A session, which was engaging and in-depth. Our cardiologist were very well-received, and were given excellent feedback.

It was a successful event, and we look forward to bringing more symposiums for our GP Partners.

Thank you!
Bioabsorbable Stent:

A New Breakthrough in Stent Technology

A/Prof Tan Huay Cheem

On 17 Feb 2011, NUHCS carried out Singapore’s first implantation of a bioabsorbable stent as part of an international multicentre study. Since then, another 2 patients have received successful implantations of the same stent. All three patients are well at 6 months of follow up. NUHCS has been identified as a Centre of Excellence for the launch of the bioabsorbable stent and will be among the first centre in Asia to use it on a commercial basis for her patients before the end of 2011.

What is the bioabsorbable stent and why is there a need for it? The coronary stent is now the default device in modern day percutaneous coronary intervention. Unlike in conventional balloon angioplasty, the coronary stent provides a mechanical scaffolding effect to overcome early recoil and late vascular remodeling (vasoconstriction) of a treated coronary vessel. The current state-of-the-art drug-eluting stents (DES) are highly efficacious in reducing restenosis rates and the need for repeat intervention. Stent thrombosis, with its disastrous consequences, however, remains a major limitation of DES. It may be somewhat controlled with dual antiplatelet therapy, which is usually given for at least a year after the procedure. But the presence of metallic material embedded in the vessel wall may still cause chronic inflammation and result in very late stent thrombosis (occurring beyond a year). There is no advantage for a stent to be permanently present in the artery after it has served its initial function of scaffolding, while allowing for vascular healing and re-endothelialization to take place. In fact, the metallic stent prevents the artery from late favorable remodeling (lumen expansion) and vessel reactivity at the stented site.

The motivation for the development of bioabsorbable stents was driven by the need to solve the limitations of metallic stents, such as stent thrombosis, which requires prolonged antiplatelet therapy. The goal was to design a stent, which once bioabsorbed would leave behind only the healed natural vessel, and allowing for restoration of vasoreactivity with the potential for vessel remodeling. The concept is particularly attractive to young patients who suffer from coronary artery disease but are now given the opportunity to have their arteries restored to their original state after treatment. Late stent thrombosis is unlikely since the stent is gone, and prolonged antiplatelet therapy would not be required. These stents can also be used for delivery of drugs that can prevent neointimal hyperplasia. Bioabsorbable stents are compatible with MRI and MSCT imaging.

The development of the bioabsorbable stent is a challenging one. The ideal polymer, degradation time and degradation rate to allow vessel support healing and prevention of acute recoil and late vessel remodeling have to be found. Many bioabsorbable stents have been developed but failed to go beyond initial first-in-man evaluation phase. The only one to make it to commercial utilization and thus far, approved by European CE regulatory body is the Bioresorbable Vascular Scaffold (BVS Abbott Vascular, Santa Clara, California). Made of thick strut poly-L-lactide, with another lactide acting as a controlled release polymer coating, the stent elutes an antiproliferative drug, everolimus, to prevent smooth muscle cell proliferation. The stent has gone into a second iteration (BVS1.1) with the improved version providing better scaffold design and performance. The angiographic late loss, a parameter of vascular biologic response, amounted to 0.27+/-0.32mm, which is comparable with current best DESs.

The bioabsorbable stent represents another breakthrough in the technological evolution of the coronary stent, and a potential game changer in the industry of stent design and materials. We are proud to provide this technology to our suitable patients.
As I pen down my experiences as an interventional fellow at NUHCS, my mind is filled with fond memories of the time I spent here.

It all started in early 2010 when I met Prof Tan to discuss the possibility of my joining the fellowship in Interventional Cardiology at NUHCS. He was kind enough to accept me as a fellow and so I landed in Singapore in August 2010, to start my one year fellowship.

The first few days without family were difficult. I missed my doting daughters and the dramatic silence of my hand phone— which was used to constant buzzing when I was in India— gave me a strange feeling of uneasiness. But soon all my co-fellows, staff and consultants of the cath lab made me feel comfortable and from then on it became a very enriching journey for me.

Though the days had long working hours and we had more than a few rough nights managing emergency cases, the intense training helped me develop and nurture my skills in interventional cardiology. I was exposed to almost every hardware one can use in intervention cardiology including IVUS, FFR, Rotablator, OCT and various protection devices in SVG interventions. The unrestricted exposure to various hardware was combined by meticulous training about their clinical utility and judicious use in specific situations.

The entire team at the department was extremely dedicated and I learned from them not only the science of angioplasty but also the art of comprehensive patient management. The nurses and the technical staff of the cath lab were caring and always ready to go an extra mile whenever they realized that you were stressed or over burdened by work.

I had come to Singapore with a professional objective in mind-to train myself well in interventional cardiology. But by the time I left, I had much more to be thankful for.

I would forever remain grateful to Prof Tan for giving this opportunity to learn at NUHCS and also for ensuring that I had some great time off work during my stay here. His warm and ever inspiring presence infused a positive energy in all the fellows. I am also indebted to Dr Adrian, who was my supervisor, for guiding me through the year and ensuring that my training objectives were more than met. Though I cannot name everyone individually but I wish to thank all the consultants and registrars of the department for extending their friendship to me during this year.

As I move ahead in life I will always cherish the time I spent here. Someone once said that if your plane is landing in a city and your heart is filled with joy, like a child coming back home, then it means that you really love the place.

I will probably feel the same when next time my plane touches down at Singapore…
I recently attended my first major overseas conference – the European Society of Cardiology Congress 2011 held in Paris, France from 27th to 31st August. Incidentally, this was the largest ESC Congress ever, with more than 30,000 attendees. It was truly an eye-opener to experience a world-class conference brimming with the latest developments from every conceivable aspect of Cardiology.

Undoubtedly, the hottest topic during the Congress was that of atrial fibrillation and the new anticoagulants, in particular the results of the ARISTOTLE trial which showed that Apixaban was superior to the old warrior warfarin in stroke prevention as well as decreased adverse effects. Not forgetting the PRODIGY trial that demonstrated that 6 months of dual antiplatelet therapy following stent implantation was actually equivalent to 2 years with less bleeding risk.

NUHCS was certainly well represented throughout the Congress. Dr Carolyn Lam was one of the presenters for the symposium on her pet topic, pathophysiology of heart failure with preserved ejection fraction. Her talk on vascular remodeling and pulmonary hypertension certainly made the department proud! In addition, several abstracts were also accepted for the Congress – namely from Drs Shi Hongyu (former clinical fellow), Saket Junagade (my fellow Registrar who also attended the Congress), Glenn Lee (current house officer with a keen interest in Cardiology) and Joshua Loh (Associate Consultant) – well done to all!

With the multitude of symposiums running concurrently, most people were certainly left spoilt for choice when it came to choosing the sessions to attend. Of course, selected sessions like the launch of the new ESC 2011 guidelines were packed to the brim and the organizers had to scramble to direct those who were straining to listen in from the outside to a separate area, which promptly filled up as well. On a personal note, being an avid runner, I found myself drawn to sessions involving sports, marathon running and their effects on the heart.

On a closing note, I would like to thank the Singapore Cardiac Society for allowing me to utilize my remuneration from the SCS ASM 2011 Young Investigator Award for this trip. Additionally, I was nominated to attend the Congress under the “ESC Cardiologists of Tomorrow” program where those below 35 years old who are completely new to the ESC received a full waiver of registration. For fellow colleagues and juniors keen to make their virgin voyage to the ESC Congress, this scheme is highly desirable and is definitely encouraged!

To be able to attend an international congress in one of the most beautiful cities in the world deserves many more superlatives that I can ever come up with. It was an unforgettable and undeniably inspiring time, and I await my next opportunity with great anticipation.
The National University Heart Centre, Singapore, together with the Duke Cardiovascular Research Institute, USA, hosted Singapore’s first Antithrombotic Pharmacotherapeutics Symposium from the 24th to 25th September 2011 at the new National University Health System campus. International and local experts updated more than 250 doctors, nurses, pharmacists and industry delegates on key clinical perspectives on the pharmacological treatment of venous and arterial thrombosis.

Antithrombotic therapy, comprising oral and injectable antiplatelet and anticoagulant agents, is the most widely prescribed class of medications in clinical practice. The last 12 months have also seen a bumper crop of new drugs targeting the human platelet and coagulation system that have begun an exciting new era of treatment options for thrombotic disorders.

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The second group of drugs belong to a class of drugs called P2Y12 inhibitors. This class of drugs reduce the stickiness of platelets and prevent clogging of blood vessels after stent implantation for a heart condition. For more than a decade, patients had only one option in this drug class, clopidogrel. However, not all patients respond well to this drug and a failure to respond to this drug can result in a rare but dreaded complication called stent thrombosis in which a recently-implanted heart blood vessel stent clots suddenly and causes a major heart attack, frequently resulting in death. One reason for this poor response is the presence of a genetic abnormality in the CYP2C19 system that converts clopidogrel to the active form.

Patients with one or more abnormal forms of this gene cannot generate the active compound as quickly as normal individuals. As such, their platelets remain more sticky and more prone to clogging up stents implanted in blood vessels supplying the heart.

In a local study conducted on 400 patients seeking treatment at the National University Hospital Dr Chan and colleagues show that this abnormal gene is present in more than 40% of Indian patients and close of 60% of Chinese and Malay patients. These findings were presented at the International Society of Thrombosis and Haemostasis meeting in Kyoto, Japan this July.
The new P2Y12 – inhibiting drugs, Ticagrelor (Brillianta, Astrat Zeneca) and Prasugrel (Effient, Eli-Lilly) reduce platelet stickiness more effectively and consistently in part because they bypass the CYP2C19 system of drug activation. Not only are these new drugs more expensive than clopidogrel, which is presently generic, they can cause increased bleeding, so they may not be suitable for every patient.

One possibility to do genetic testing to determine which patients may require the newer P2Y12 drugs. However, genetic testing itself can be expensive. Moreover, there are many other determinants of response to clopidogrel, including age, body weight, renal function and diabetes. There is also the question of whether measuring the actual stickiness of the platelet itself, called platelet reactivity testing, is a better alternative.

One of the symposium highlights was a hands-on platelet function testing workshop in which participants were trained in the performance and interpretation of genetic tests and platelet reactivity tests.

The APS meeting will be held every two years at different locations in South-east Asia. Through these meetings, Drs Chan and Chee hope to highlight and address some of the uncertainties in the use of these antithrombotic medications drugs and also equip healthcare providers with practical yet thoughtful strategies for treating patients with venous and arterial thrombotic disorders.
**Thoracic Surgery** is a specialty dedicated to the surgical management of diseases of the lung, pleura, mediastinum, diaphragm, and chest wall. There are a wide spectrum of diseases involving these important structures, including malignancies such as lung cancer and mediastinal tumors, and benign conditions such as empyema or hemo-pneumothorax. These conditions usually require urgent surgical attention for diagnosis and treatment. Patients seeking thoracic surgical care is on the rise in Singapore and internationally, driven by an aging population and increasing demand for sophisticated medical care.

The care of the thoracic surgical patient requires a multi-disciplinary approach, integrating specialists in thoracic surgery, respiratory medicine, medical oncology, radiation oncology, critical care medicine, radiology, and pathology. This core cluster of specialists is discipline-specific and is distinctive to thoracic surgery as compared to other specialties. We have formed a very cohesive group of specialist colleagues within the lung tumor group to ensure our patients receive the best care.

Thoracic surgery is increasingly recognized as a distinct specialty in clinical practice, with a strong focus on thoracic surgical oncology as well as benign diseases within the thorax. Technical and technological advances also bring the advent of minimally invasive approaches using Video-Assisted Thoracic Surgery (VATS), which leads to further specialization in this field. VATS offers many advantages to patients including fast recovery and less pain, and is very popular among patients who are seeking thoracic consultation. In our current practice, more than 80% of our surgeries are performed using VATS.

The Division of Thoracic Surgery is established to bring our services to the next peak of excellence. This development is made possible by the strong support of Professor Lee Chuen Neng, Chief of the Department of Cardiac, Thoracic, and Vascular Surgery; A/Professor Tan Huay Cheem, director of NUHCS; senior management including CMB A/Professor Aymeric Lim and CEO Mr Joe Sim; and all our colleagues within NUH.

We aim to create a center of excellence in Thoracic Surgery serving patients in Singapore and beyond. The formation of this Division forges a strong identity of thoracic surgery within NUH and affirms its status as a mature and distinct specialty. We strive to improve outcomes, create innovations, and streamline processes. This allows strong integration and synergy of the tripartite mission of service, innovation, and education.

I am honored and humbled to be appointed as the Head of the Division of Thoracic Surgery. Our division also comprised of Dr Agasthian Thirugnanam, who recently joined us and brings with him extensive knowledge and experiences in thoracic surgery; and Dr Atasha Asmat, who will soon be completing her fellowships in New York and Liverpool and will return with new skills and technologies. Prof CN Lee, Adj A/P Michael Caleb, A/P Theodoros Kofidis, Dr Christie Tan, Dr Kristine Teoh, Dr Ooi Oon Cheong, Dr Jimmy Hon, and Dr Winn Maung Aye also provide thoracic surgery service. We are assisted by many capable housestaff and support staff, including our case management officer Dr Vijaya Kumar, research assistant Mr Lim Kee Siang, and many friendly office staff within the department.

We have recently started a new Singapore Medical Council approved clinical fellowship program in Thoracic Surgery, and will help to develop the next generation of thoracic surgeons from around the world. We are also organizing an international VATS workshop in November 2011, and will be hosting international faculty speakers and participants to promote advanced minimally invasive thoracic surgery.

Everyone within the Division of Thoracic Surgery is committed to deliver excellent patient care and to collectively propel this specialty to new heights through the process of discovery and innovation. This is truly an exciting time for thoracic surgery in Singapore.
MO dinner 24 Oct 2012

Cardiac Family Day 2011 24 September 2011

Cardiac Family Day 2012 10 Aug 2012


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1. Reliability of Using Ultrasound Duplex for Screening of Dysfunctional Hemodialysis Access

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2. Growth Differentiation Factor 15, ST2 and Natriuretic Peptides in Heart Failure with Preserved Versus Reduced Ejection Fraction. Santhanakrishnan R, Chong J, Richards AM, Lam SP.

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1. Suboptimal left ventricular vertical formation and fluid propagation in mitral valve stenosis. Loh JP, Yeo TC, Poh KK.
congrats!

Dr Soo Wern Miin
Registrar to Associate Consultant

A/Prof Carolyn Lam
Promoted to Associate Professor

new doctors on board

Dr Julian Wong Chi Leung
Senior Consultant, Department of CTVS

Dr Chester Drum
Associate Consultant, Cardiac Department

Dr Pipin Kojodjojo
Consultant, Cardiac Department

Dr William Kong
Associate Consultant, Cardiac Department

Dr Tan Li Ling
Registrar, Cardiac Department

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