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N M R C MISSION STATEMENT

TO PROMOTE **EXCELLENCE** IN
TRANSLATIONAL AND CLINICAL
RESEARCH, NURTURE A
VIBRANT RESEARCH
COMMUNITY OF
CLINICIANS AND
SCIENTISTS IN
SINGAPORE, AND
ENHANCE
KNOWLEDGE
TRANSLATION
FOR HEALTH
AND ECONOMIC
OUTCOMES.

EXECUTIVE CHAIRMAN'S MESSAGE

GROWING THE CAPABILITY
AND QUALITY OF THE
TRANSLATIONAL AND CLINICAL
RESEARCH INFRASTRUCTURE IN
SINGAPORE WILL LEAD TO
IMPROVED HEALTHCARE,
BOTH LOCALLY AND
GLOBALLY, AND A
GREATER
ECONOMIC
RETURN TO
SINGAPORE
FOR ITS
INVESTMENT
IN BMS.



As an international centre for translational and clinical research, Singapore has come a long way from the starting point of the Biomedical Sciences (BMS) Initiative in 2000. Together with A*STAR's Biomedical Research Council, the emerging academic medical centres at Kent Ridge and Outram, and the Economic Development Board's Biomedical Sciences Group, NMRC has been one of the pillars supporting the development of modern research infrastructure, basic science resources, and translational and clinical research capabilities. With 2010 marking the end of BMS Phase II, it is a good time to set our sights on the future and what we hope to achieve over the next five years.

GROWING THE CLINICAL RESEARCH COMMUNITY

A primary objective for NMRC under BMS Phase III (2011–2015) will be to expand the pool of clinician scientists in Singapore, as these individuals are a critical link in the translational and clinical research process. Their unique combination of medical and research backgrounds provides essential insight into how clinical observations and basic science can be used to generate bench-to-bedside healthcare solutions.

There are about 80 clinician scientists in Singapore as of end-2010 and the goal is to double this to 160 by 2015. Achieving this target is an important objective for both basic science and industry collaborators who are increasingly seeking clinician scientists with whom to partner. As the interest in and demand for translational and clinical research has grown, the number of clinician scientists has become a rate-limiting step in the overall BMS agenda. Boosting the number of these investigators to 160 will give Singapore a critical mass of clinician scientists capable of meeting the demand for research collaborators in a broad range of fields.

Through the talent development and grant programmes now available, NMRC offers comprehensive support to clinician scientists at every stage of their career—whether it's sponsoring local or overseas training for someone just starting out in this field, providing salary support and research funding for early and mid-career clinician scientists, or offering prestigious awards to keep Singapore's best and brightest and attract excellent researchers from overseas. The commitment under BMS Phase III to provide the funding and support structure to train, recruit and retain these clinician scientists will cement Singapore's position as a leader in Asia for translational and clinical research.

WORKING HAND IN HAND

Collaboration is another important theme that will shape the overall agenda for BMS Phase III. Whether it's collaboration between basic scientists and clinician scientists or collaboration between the public sector and private sector, our ability to foster strong working relationships will be critical in boosting continued growth and innovation in Singapore's translational and clinical research industry.

Close collaboration between the public sector and private sector has always played a prominent role in translational and clinical research, with the public sector traditionally focusing on areas such as identifying clinical needs, establishing treatment targets and testing the efficacy of medical solutions, and the private sector focusing on the research, design and manufacturing of drugs, devices and diagnostics. Currently there is a sea change taking place within the pharmaceutical industry as the private sector is outsourcing more research rather than investing in highly specialised in-house expertise. Together, this changing industry model and Singapore's investment in boosting local research capabilities are creating potential for even greater synergies to be achieved through increased collaboration.

REAPING THE REWARDS

Growing the capability and quality of the translational and clinical research infrastructure in Singapore will lead to improved healthcare, both locally and globally, and a greater economic return to Singapore for its investment in BMS. Having laid the foundation during BMS Phases I and II for strengthening both basic and translational and clinical research, BMS Phase III will place greater emphasis on building partnerships with the private sector to ensure that Singapore realises a good economic return on its investment in BMS. This may take various forms, such as establishing expanded partnerships with industry, attracting more private-sector investment or monetising intellectual property produced through research.

Moving scientific discoveries from the lab into the clinic requires partnerships with the private sector, which are crucial both for bringing new therapies to our patients and for providing more and better jobs for Singaporeans. By putting together the initiatives launched in BMS Phases I and II and continuing these efforts with new partnerships in Phase III, Singapore has the potential to create a BMS ecosystem that is the envy of all of Asia.

While we have set ambitious goals for what we hope to achieve over the next five years, I am confident that NMRC—with continued support from its various stakeholders—has both the means and the motivation to see them through.

Prof Edward Holmes
Executive Chairman

EXECUTIVE DIRECTOR'S MESSAGE

WITH ALL THAT HAS BEEN
ACHIEVED IN BMS PHASES
I AND II, THE NEXT FIVE YEARS
WILL BE ABOUT REFINING
OUR INITIATIVES, AND
FOCUSING BOTH
INFRASTRUCTURE
AND CAPABILITIES
ON THE
OUTCOMES
THAT WE
WANT AS
A COUNTRY.



NMRC has evolved over time and will continue to do so. With 16 years of experience since NMRC was founded, and the national Biomedical Sciences (BMS) Initiative advancing into Phase III, we have grown beyond simply structuring and administering grants to taking a more active role in strategising and designing the pathways via which translational and clinical research will grow in the years ahead.

Through our grant and talent development programmes, we are able to determine where funds are invested to further the overall development of Singapore's research ecosystem. However, we can do more to encourage collaboration, integration between basic science and translational clinical research, knowledge exchange, and translation to clinical applications and outcomes. If we can successfully develop the right grants and incentives, and build the right enablers to shape the overall system towards our goal, we can start making good progress on this path.

ADJUSTING OUR FOCUS

Traditionally, Singapore's BMS industry has boasted strengths in manufacturing, and today this remains an important component of the country's GDP. Moving forward, NMRC and its stakeholders hope to encourage the positioning of our R&D ecosystem such that the industry will find it increasingly attractive to anchor R&D and other substantial investments in Singapore.

With all that has been achieved in BMS Phases I and II, the next five years will be about refining our initiatives, and focusing both infrastructure and capabilities on the outcomes that we want as a country. These outcomes include developing an increasingly vibrant research landscape through the translation of knowledge, deriving maximum health benefits for patients and reaping economic benefits in return for the substantial national investment in this field.

A substantial portion of our funds will always be available for innovative investigator-initiated research, but there is also an increasing need to define and align with a national research strategy. We must determine the types and burden of diseases facing us as a population today and tomorrow, so that we are ready for the challenges of an aging population, chronic diseases and infectious diseases that are able to cross borders globally. A national strategy would allow us to build the necessary capabilities and infrastructure to address the issues of greatest national importance and impact.

We can then refine and focus our grants towards topics and themes that are relevant both to Singapore's disease burdens as well as Asia's broader needs. This will certainly be of interest to industry too, thereby aligning the interests of internal stakeholders towards reaping public health benefits, and those of industry players keen to work with us on new diagnostics, therapeutics and cures.

FOSTERING A NIMBLE INDUSTRY

Over the next five years, a key challenge will be to create a more nimble industry that can respond rapidly in a coordinated and concerted manner when new opportunities present themselves. To achieve this, we will strive to more closely integrate the basic science and clinical research communities. The foundation that we have built up over the past 10 years will help us accomplish this. In BMS Phase I we built up Singapore's basic science capabilities and infrastructure, while in BMS Phase II we focused on pushing ahead translational and clinical research, kick-starting collaborative efforts through the TCR Flagship Programmes.

Phase III will see us taking this to the next level, getting everyone—scientists in Biopolis, researchers in universities, doctors in hospitals—working in a more integrated fashion. A question raised in one corner or a discovery made in another corner could be quickly shared amongst all of the relevant players within the ecosystem. We're not quite there yet, but once we do achieve this, we'll be able to translate knowledge into healthcare solutions much more quickly, moving insights and developments rapidly from bedside to bench and vice versa.

This process of rapidly developing applications will result in positive health benefits for patients—which must remain our primary goal—as well as positive economic outcomes in the form of licenses, spin-offs, new businesses and the advancement of both public and corporate R&D in Singapore.

Dr Loke Wai Chiong
Executive Director

ABOUT US

The National Medical Research Council, established in 1994, oversees the development and advancement of translational and clinical research in Singapore. It provides competitive research funds to publicly funded healthcare institutions, awards competitive research funds for programmes and projects, provides support for critical infrastructure for clinical research, and is responsible for the development of clinician scientists through awards and fellowships.

In 2006, the Ministry of Health established a new mandate to support translational and clinical research in areas where Singapore has great potential. With this in mind, NMRC's role is ever more important in leading, promoting, coordinating and funding translational and clinical research in Singapore. NMRC-funded research has led to inter-disciplinary partnerships and international collaborations. The Council also evaluates the outcomes of the research projects and facilitates the commercialisation of research findings.

Human capital plays a key role in the success of Singapore's translational and clinical research industry. Having a critical mass of clinician scientists is crucial for providing thought leadership and driving the translation of bench discoveries to bedside applications to improve human health. As such, NMRC actively supports clinician scientists with funding through research grants, human capital awards and talent development programmes. Under Singapore's Biomedical Sciences (BMS) Initiative Phase III (2011–2015), NMRC will step up its efforts to boost the number of clinician scientists in Singapore from around 80 in 2010 to 160 by 2015.

Since its inception, NMRC has built up the translational and clinical research capabilities in Singapore through the funding of more than 1,500 competitive research projects and five Translational and Clinical Research Flagship Programmes. It has also supported over 200 clinicians with scholarships, fellowships and various talent development awards. In addition, NMRC is highly involved in building critical translational and clinical research infrastructure, thereby developing a conducive research environment in hospitals and academic medical centres to facilitate the sector's continued growth.

About NMRC

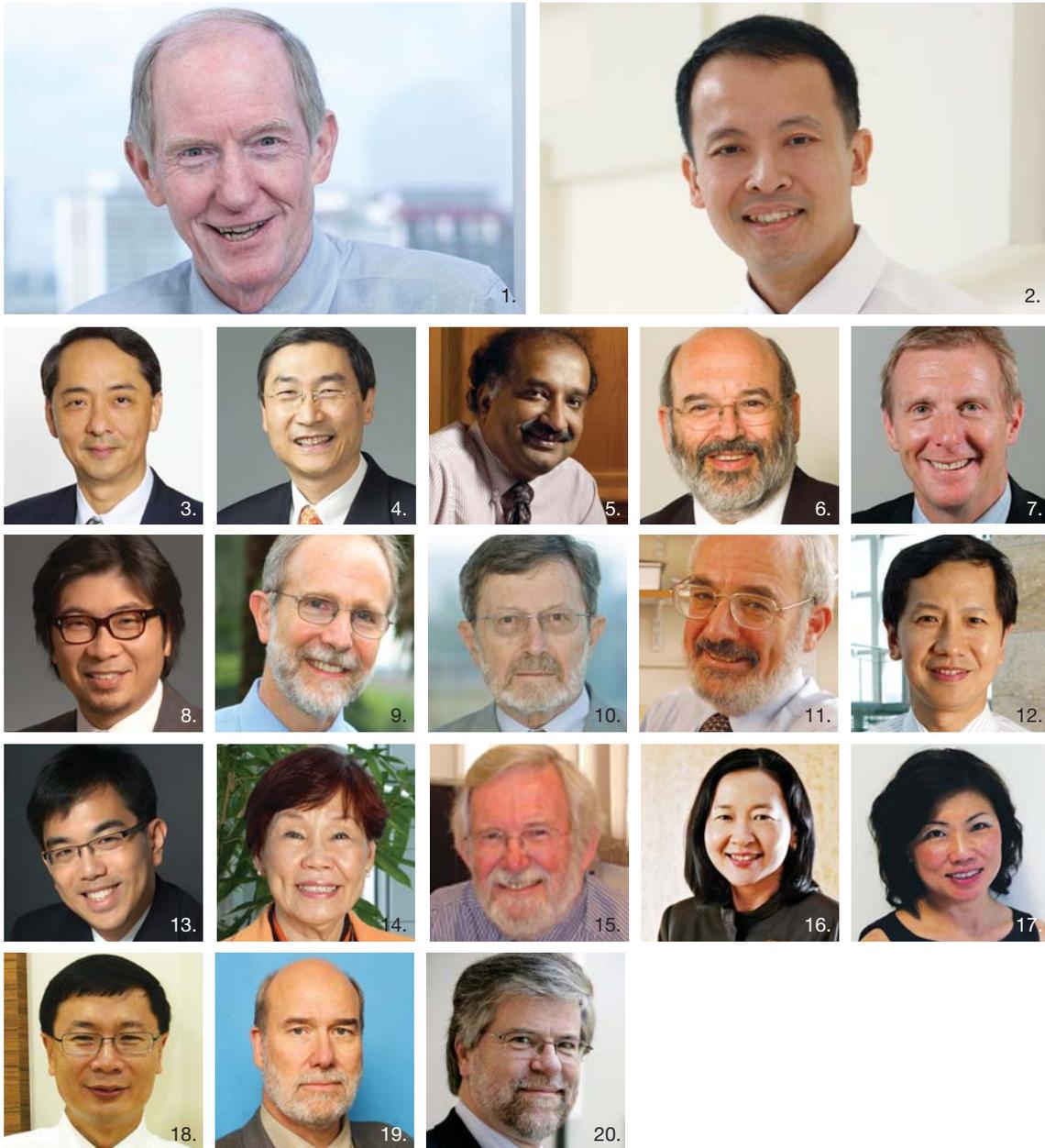


NMRC BOARD

The NMRC Board advises the Council on the formulation of strategies and priorities to promote excellence in translational and clinical research in Singapore with the objective of improving human health. By overseeing the implementation of the research programmes approved by the Ministry of Health (MOH) and the Biomedical Sciences Executive Committee (BMS Exco), the Board ensures that the Council is being effectively managed to meet its mission and key performance targets. The Board also ensures that governance frameworks are in place such that NMRC's budget is appropriately managed and optimally utilised.

After ten years of dedicated service, Professor Edison Liu, Executive Director at the Genome Institute of Singapore, stepped down from the NMRC Board in 2010. One of the Council's longest-serving Board members, Prof Liu played a crucial role in the early development of Singapore's medical research capabilities. Among his many contributions, he provided invaluable guidance on improving review processes and ensuring the optimal allocation of research funding.

NMRC also welcomed two new members who joined the Board in 2010—Professor Sir Peter Gluckman and Professor Stephen Smith. As of end-2010, the NMRC Board consists of 20 members.



1. Prof Edward Holmes
Executive Chairman
National Medical Research Council

2. Dr Loke Wai Chiong
Executive Director
National Medical Research Council

3. Prof Lee Eng Hin
Executive Director,
Biomedical Research Council
A*STAR

4. Prof John Wong
Dean,
Yong Loo Lin School of Medicine
National University of Singapore

5. Prof Ranga Krishna
Dean
Duke-NUS Graduate Medical School

6. Prof Sir Peter Gluckman
Programme Director,
Growth Development and Metabolism
Singapore Institute for Clinical Sciences

7. Prof Stephen K Smith
Pro Rector (Health),
Faculty of Medicine Centre &
Chief Executive of Imperial College
Healthcare NHS Trust
Imperial College London

8. Prof Donald Tan
Director
Singapore National Eye Centre

9. Prof Robert Sanders William
President
J. David Gladstone Institutes

10. Prof Alex Matter
Chief Executive Officer
Experimental Therapeutics Centre

11. Prof Patrick Sissons
Regius Professor of Physics
Cambridge University Hospitals,
NHS Foundation Trust

12. A/Prof Allen Yeoh
Senior Consultant,
Dept of Paediatrics
National University of Singapore

13. Prof Wong Tien Yin
Director
Singapore Eye Research Institute

14. Mrs Carmee Lim
Mentor Principal
MindChamps Holdings Pte Ltd

15. Prof Alastair Campbell
Director,
Centre for Biomedical Ethics,
Yong Loo Lin School of
Medicine
National University of Singapore

16. Prof Ivy Ng
Chief Executive Officer
KK Women's & Children's
Hospital

17. A/Prof Mabel Yap
Director,
Health Services Research &
Evaluation Division
Ministry of Health

18. A/Prof Chong Siow Ann
Vice Chairman,
Medical Board (Research)
Institute of Mental Health

19. Dr John Potter
Senior Vice President and
Director,
Public Health Sciences
Fred Hutchinson Cancer
Research Center

20. Prof Jan Carlstedt-Duke
Director,
Medical School Project
Nanyang Technological
University

NEW BOARD MEMBER SHARES HIS THOUGHTS



PROF SIR PETER GLUCKMAN
*Programme Director,
 Growth Development and Metabolism
 Singapore Institute for Clinical Sciences*

As Programme Director, Growth Development and Metabolism, at the Singapore Institute for Clinical Sciences since 2007, Professor Sir Peter Gluckman is a familiar face in Singapore’s clinical and translational research community. Having joined the NMRC Board in 2010, Prof Gluckman hopes that his diverse professional background will enable him to play a meaningful role in guiding NMRC’s efforts going forward. “I hope that my experiences both in New Zealand and also in Singapore as a medical scientist, research administrator and particularly as one who has focused on the translation of basic medical science to the clinic through both public and private sector routes adds an additional and useful perspective.”

Commenting on the key factors that will enable Singapore’s translational and clinical research sector to progress to the next level, Prof Gluckman says, “Arguably the most important factor is to see a more linked up system. Clinical research and basic biomedical research obviously come from the same base of knowledge, but the skills, challenges and requirements to undertake high-quality clinical and translational research are often not understood by the discovery community and vice versa. There are particular skills needed to cross that divide. Equally, we need to better understand what drives the private sector to want to research in Singapore and ensure we have the systems, infrastructure and skills to meet these challenges. This requires attention to the translational research ecosystem in an integrated form; synergies need to be created and it is exciting to see that Singapore is now giving greater focus to identifying priorities in creating those synergies.”

He adds, “Singapore has a number of competitive advantages to being a leader in translational research—its concentrated clinical services, high-quality medical services, clinical regulators of high integrity and reputation, and its ethnic mix. It has an outstanding life sciences and bioengineering discovery research system. The health profile in Asia offers particular and different priorities than that of North America and Europe. Innovation models are changing and Singapore, being small and nimble and advanced in so many ways, is starting to evolve its medical science system to take best advantage of what it has done to date and the opportunities ahead.”

NMRC PORTFOLIO

RESEARCH GRANTS

NMRC directly supports research initiatives through a series of competitive grants. These grants are defined as either strategic/thematic or investigator-led, allowing NMRC to support specific areas of research as well as promising individual researchers. The grants include:

- **Strategic/Thematic**
 - Translational & Clinical Research Flagship Programme
 - Centre Grant
 - Programme Project Grant
- **Investigator-led**
 - Individual Research Grant (IRG)
 - Exploratory/Developmental Grant (EDG)
 - New Investigator Grant (NIG)



TALENT DEVELOPMENT PROGRAMMES

In order to grow and anchor the pool of clinician scientists in Singapore, NMRC offers a range of human capital awards and talent development programmes aimed at supporting individuals in their research and career progression. These awards and programmes include:

- **Human Capital Awards**
 - Singapore Translational Research (STaR) Investigator Award
 - Clinician Scientist Award (CSA)
- **Talent Development Programmes**
 - Master of Clinical Investigation (MCI)
 - NRF-MOH Healthcare Research Scholarship
 - NMRC Research Training Fellowship



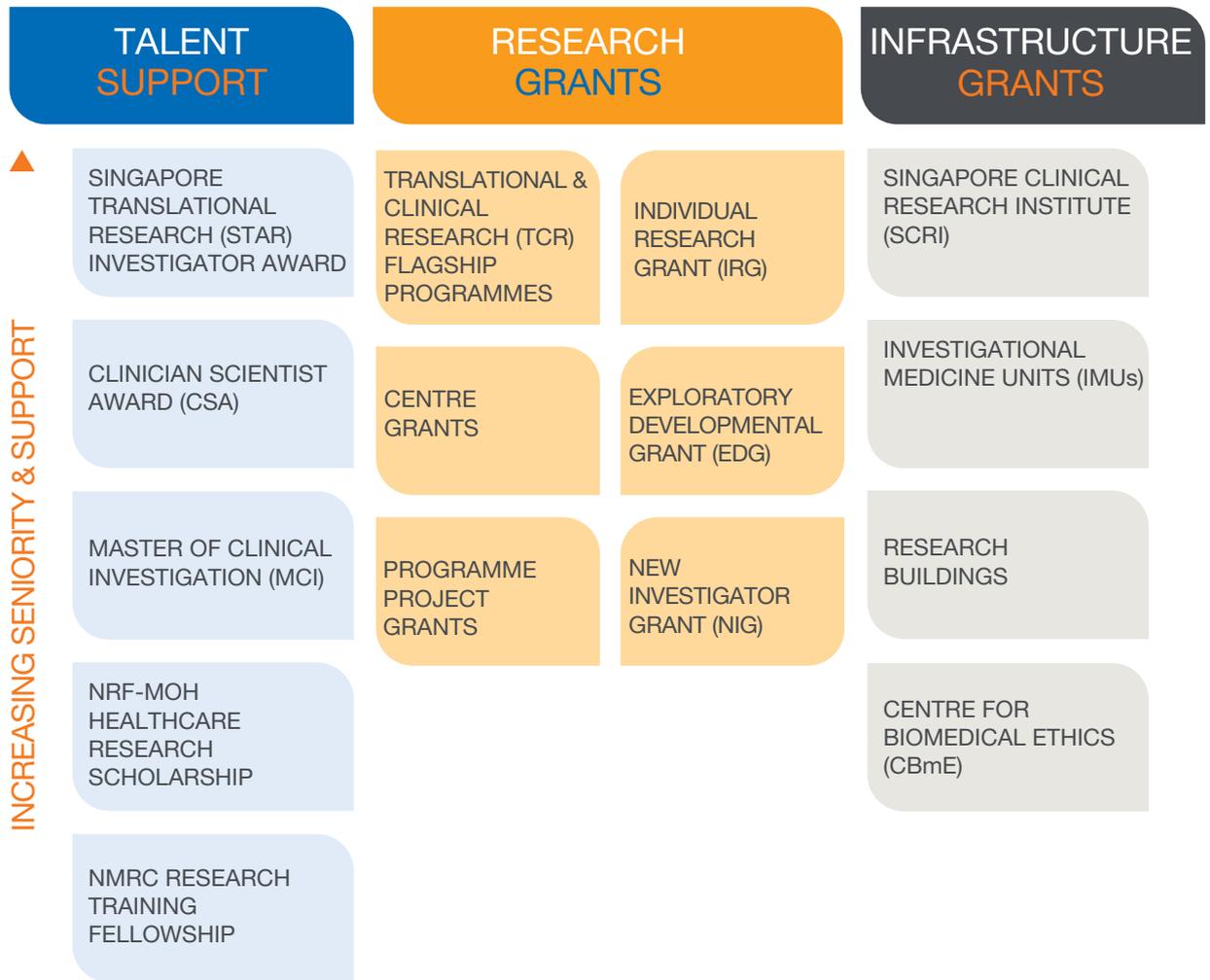
INFRASTRUCTURE GRANTS

To ensure that Singapore has the hard and soft infrastructure needed to support a thriving translational and clinical research sector, NMRC provides grants to develop the institutions that will form the backbone of Singapore's future medical research success. Recipients of these grants include:

- **Singapore Clinical Research Institute (SCRI)**
- **Investigational Medicine Units (IMUs) at SingHealth Services (SHS) and National University Hospital System (NUHS)**
- **Research buildings at Outram and Kent Ridge Campuses**
- **Centre for Biomedical Ethics (CBmE)**



NMRC GRANT SUPPORT FRAMEWORK



NMRC 2010 FUNDING SUMMARY

In 2010 NMRC funded a wide range of research and infrastructure to support and build up the capabilities and capacity of Singapore's translational and clinical research community. In addition to funding for ongoing grants, awards and programmes, this funding included the following new investments in 2010:

\$9.5m for one Singapore Translational Research (STaR) Investigator award

\$20.67m for 10 Clinician Scientist Awards (3 at the Senior Investigator level and 7 at the Investigator level)

\$0.5m for an NRF-MOH Healthcare Research Scholarship (PhD)

\$0.33m for 11 NRF-MOH Healthcare Research Scholarships (MCI)

\$3.0m for six NMRC Research Training Fellowships

\$40.56m for 40 Individual Research Grants

\$5.61m for 31 Exploratory/Developmental Grants

\$5.17m for 30 New Investigator Grants



NURTURING CLINICIAN SCIENTISTS

With biomedical sciences identified as one of the key pillars of Singapore's economy, the development of a critical mass of world-class clinician scientists and researchers is a priority within Singapore's broader biomedical sciences strategy. Under BMS Initiative Phase III (2011–2015), Singapore aims to double the number of clinician scientists from around 80 to 160 by 2015.

Clinician scientists play a crucial role in bench to bedside research. They provide not only the critical intellectual inputs for clinical and translational research programmes, but also the knowledge and innovation to support the academic community, biomedical companies and pharmaceutical research and development programmes. To support clinician scientists at the various stages of their career, NMRC offers a variety of talent development programmes and human capital awards to provide clinician scientists with funding for ongoing learning and recognition for their achievements. These include the following:

- **Human Capital Awards**

- Singapore Translational Research (STaR) Investigator Award
- Clinician Scientist Award (CSA)

- **Talent Development Programmes**

- Master of Clinical Investigation (MCI)
- NRF-MOH Healthcare Research Scholarship
- NMRC Research Training Fellowship

A stylized human figure composed of various shades of blue, positioned on the right side of the page. The figure is composed of several overlapping shapes: a large dark blue circle for the head, a light blue circle for the torso, and various blue shapes for the arms and legs. The figure is facing left.

Human Capital Awards & Talent Development Programmes

SINGAPORE TRANSLATIONAL RESEARCH (STaR) INVESTIGATOR AWARD

The prestigious STaR Investigator Award is designed to recruit and nurture world-class clinician scientists to undertake cutting-edge translational and clinical research in Singapore. STaR Investigators must commit to a full-time appointment in Singapore and their proposed research must be conducted here. The STaR award includes five years of funding for the researcher's salary, an annual budget for research support, and a one-time start-up grant.

One STaR award was given out in 2010, adding to the inaugural batch of four awardees in 2008 and three awardees in 2009.

AREA OF RESEARCH CELL THERAPY OF CANCER

Prof Dario Campana will be joining NUS as Professor in the Dept of Paediatrics. Prior to this, Prof Campana served as Vice Chair for Laboratory Research in the Department of Oncology at St. Jude Children's Research Hospital and Professor in the Department of Pediatrics at the University of Tennessee Health Science Center.

"My wife—Elaine Coustan-Smith, also a research scientist—and I have been visiting Singapore since 2007 because of ongoing collaborations between St. Jude Children's Research Hospital in Memphis, where we worked for 20 years, the Department of Paediatrics at NUS and the Viva Foundation. From our early visits, we began to consider the possibility of moving here. We love the beauty, energy and efficiency of Singapore, and the warmth and enthusiasm of Singaporeans. We enjoy enormously the interaction with the many outstanding physicians and scientists who we have met here. These factors, together with Singapore's commitment to foster biomedical research, convinced us that Singapore was the right place to start a new phase in our lives", says Prof Campana.

His main area of research is cell therapy of cancer. While cure rates for children with leukaemia have improved dramatically, the overall prognosis for some patients remains dismal. Therefore, new therapies are urgently needed. The infusion of natural killer (NK) cells—a subset of immune blood cells—from healthy donors into cancer patients has shown therapeutic promise. Prof Campana's current work relies on new technologies developed in his laboratory that allow the generation of an abundance of NK cells and the introduction of genetic changes that render NK cells more active against cancer cells.

Prof Campana and his team aim to establish these technologies in Singapore and find new ways to maximise the anti-cancer capacity of NK cells through cellular engineering. This will involve finding ways to block signals that suppress NK cell activity and increase signals that stimulate it. Ultimately, this research should not only increase the body of knowledge relate to the biology of NK cells, but also produce new treatments for patients with chemotherapy-resistant disease.

Prof Campana notes, "Receiving the STaR award is a great honour. I am obviously very pleased to be a recipient of such a prestigious award, but I also know that it carries a great responsibility. It is tangible evidence of Singapore's commitment to support translational research, and it will allow me to have a well-equipped and staffed lab that should be functional and competitive in a very short time."



PROF DARIO CAMPANA
Professor, Department Of Paediatrics
National University of Singapore

CLINICIAN SCIENTIST AWARD (CSA)

The CSA is structured to develop local research talent and give clinician scientists valuable protected time to focus on their research. The Senior Investigator (SI) level of the CSA offers funding for up to five years and caters to senior doctors who are already actively involved in highly productive research. The Investigator (Inv) level offers funding for three years and targets younger doctors with the potential to become independent investigators. The CSA provides funding for full salary support, together with a competitive research grant.

In 2010, 10 CSAs (three at the SI level) were awarded, adding to Singapore's growing pool of clinician scientists.

AREA OF RESEARCH LIVER CANCER

Primary liver cancer, also known as hepatocellular carcinoma (HCC), is a significant cancer globally and is particularly prevalent in Asia-Pacific, where 70% to 80% of worldwide cases occur. There are three main forms of treatment that can be considered for HCC: surgery to remove the cancer, a systemic drug called sorafenib, and a therapy called Selective Internal Radiation Therapy (SIRT). However, most patients who are diagnosed with HCC already have the cancer at a stage where it is no longer possible to operate, leaving sorafenib and SIRT as the two available options.

A/Prof Chow and his team will undertake a phase 3 clinical trial to compare the outcomes of sorafenib and SIRT in patients with locally advanced HCC (cancer that has not spread outside the liver). The trial will involve 360 patients across 20 hospitals in the Asia-Pacific region, and will aim to understand which therapy is more beneficial to patients in terms of improved survival, tumour shrinkage and overall quality of life. The hope is that the findings will have a positive impact of the quality of clinical management of HCC worldwide.



A/PROF PIERCE CHOW – CSA-SI
Senior Consultant, Department Of General Surgery, Singapore General Hospital
Associate Professor, Duke-NUS Graduate Medical School



DR GOH BOON CHER – CSA-SI
Adjunct Associate Professor, Department of Haematology-Oncology, National University Cancer Institute, Singapore (NCIS), National University Health System

AREA OF RESEARCH ONCOLOGY

Around the world and in Singapore, cancer is a leading cause of mortality, despite significant advances in surgical and radiation techniques. As part of the effort to discover new and more effective cancer therapies there is a push to understand the biochemical and biological events at the cell level leading to cancer. Building on this work, there are currently a multitude of drugs in development that are able to block crucial pathways, leading to the killing of cancer cells.

Dr Goh will conduct clinical trials to study the action and effect of one of these novel drugs, regorafenib, in patients with colorectal cancer. The focus of this research will be an in-depth analysis of the effects of the drug on the molecular circuitry of the cancer cell. A second part of Dr Goh's research will look at the development of a new class of cancer drugs called histone deacetylase inhibitors. The team will work on developing combinations of these agents with standard anti-cancer drugs to enhance cancer-killing potency.

**AREA OF RESEARCH
INFECTIOUS DISEASES**

The global spread of the dengue virus puts nearly three billion people at risk of potentially life-threatening infection every year. The development of a dengue vaccine is complicated by the presence of four antigenically distinct serotypes. Research has indicated that both antibody specificity and concentration are important determinants of immunity. However, how immune complexes interact with monocytes, whether in neutralising or enhancing quantities of antibody, is poorly understood.

A/Prof Ooi aims to build on his team’s preliminary studies in this area, which have demonstrated that antibody concentration has important effects on Fc receptor (FcR) function. By using a triad of antibodies, virus and monocytes, all of which play key roles in dengue virus infection, A/Prof Ooi hopes to shed new light on dengue immunity and pathogenesis that will boost vaccine development and improve case management.



A/PROF OOI ENG EONG – CSA-SI
Program in Emerging Infectious Diseases,
Duke-NUS Graduate Medical School



DR CAROLYN LAM – CSA-INV
Assistant Professor, Department of Medicine,
NUS Yong Loo Lin School of Medicine
Associate Consultant, National University Heart
Centre, Singapore, National University Health
System

**AREA OF RESEARCH
HEART FAILURE**

Heart failure is a major public health problem around the world and in Singapore, where it accounted for more than 5,300 hospital admissions in 2000 alone. The bulk of research efforts have focused on heart failure with reduced ejection fraction (HFREF), in which the heart fails to pump properly. However, it has been discovered that heart failure with preserved ejection fraction (HFPEF), in which the heart continues to pump but fails to “relax” properly, may be just as common, disabling and deadly as HFREF.

Dr Lam’s research aims to develop a better understanding of heart failure in Singapore and the differences between HFREF and HFPEF in terms of how common each is amongst Singaporeans. This “Singapore Heart Failure Outcomes and Phenotypes” Study (SHOP Study) will provide important information regarding the epidemiology, pathophysiology and outcomes of heart failure in multi-ethnic Singapore, leading to a greater understanding of the heart failure burden in Southeast Asians and the identification of potential therapeutic targets.

**AREA OF RESEARCH
LEUKAEMIA STEM CELLS AND CHRONIC MYELOID
LEUKAEMIA**

The treatment of many leukaemias, such as chronic myeloid leukaemia (CML), has improved tremendously over the past few years since the introduction of targeted drug therapy. However, these “magic bullets” are not effective in eliminating leukaemia stem cells (LSCs), which are known to be highly resistant to drug therapy. The failure to completely eradicate these LSCs may lead to disease recurrence once treatment is discontinued.

Working in collaboration with researchers from Duke-NUS Graduate Medical School and the Cancer Science Institute of Singapore, Dr Chuah’s team will investigate if the combination of both novel and existing targeted drug therapies is effective in killing LSCs. The team hopes to translate the research findings into new treatment strategies for CML that can be moved to the clinics and that the knowledge gained can also be applied to other forms of leukaemia.



DR CHARLES CHUAH – CSA-INV
Senior Consultant, Department of
Haematology, Singapore General Hospital
Assistant Professor, Program in Cancer and
Stem Cell Biology, Duke-NUS Graduate
Medical School

AREA OF RESEARCH INFECTIOUS DISEASES AND ONCOLOGY

The correct selection of drug doses is a critical element of successful drug therapy, particularly in the use of toxic drugs, such as those used to treat cancer and HIV infection. Overdosage can lead to lethal toxicities, while underdosage can cause the therapy to fail or lead to a resistance to the therapy. Finding the correct dosage for a patient can be extremely difficult, especially for a new class of phase 2 enzymes that demonstrate a wide variation of activity between individuals, transcending ethnicity, gender, weight and genetics.

Dr Lee's research is focused on comparing different methods to measure the activity of these phase 2 enzymes. He will use the "probe" approach, in which non-toxic drugs that are cleared by phase 2 enzymes are administered to patients and then measuring the levels of these probe drugs to predict the doses needed for the toxic chemotherapy and anti-HIV drugs. It is hoped that the results will optimise the personalised use of phase 2 enzyme drugs to better treat cancers and infectious diseases.



DR LAWRENCE LEE – CSA-INV
Assistant Professor,
Department of Medicine,
NUS Yong Loo Lin School of Medicine
Academic Consultant,
Department of Infectious Disease,
National Healthcare Group

AREA OF RESEARCH ONCOLOGY

The most common way in which cancer develops is when cells develop faults in particular genes that control normal cell growth. These faulty cells are called oncogenes, and their abnormalities result in their being activated at all times, instead of only when they are needed. It has been discovered that many oncogenes are modified by the attachment of a lipid chain called a prenyl group, and that their cancer-causing effects can be eliminated by blocking this prenyl modification.

Dr Wang and her team have discovered a new class of drugs that can block a specific step of the prenyl modification pathway, leading to an increase in autophagy, a self-digestive process that leads to the death of cancer cells. The aim of Dr Wang's current research is to discover exactly how this new class of drugs regulates this important aspect of cell physiology. A better understanding of autophagy and cancer-cell death will be an important step leading to clinical trials of experimental drugs in this area.



DR MEI WANG – CSA-INV
Assistant Professor, Program in Cancer and
Stem Cell Biology, Duke-NUS Graduate
Medical School

AREA OF RESEARCH PAEDIATRICS AND INFECTION

It is estimated that up to 42% of young children in Singapore suffer from symptoms of persistent rhinitis not related to a cold. This rhinitis, or internal irritation or inflammation of the nose, is often incorrectly diagnosed as allergic rhinitis and therefore treated inappropriately. A/Prof Shek aims to define the phenotypes of early childhood rhinitis and identify risk factors and co-morbidities associated with this common problem.

Using the Singapore-based GUSTO birth cohort, A/Prof Shek will identify subjects with significant problems of rhinitis and carry out detailed surveys, monitoring and analysis to understand the cause of the condition, including evaluating the role of early life viral infections. This will be the first large-scale prospective population-based birth cohort study on the early predictors of persistent rhinitis in young children, and is expected to have a positive impact on its evidence-based management, which is currently lacking.



A/PROF LYNETTE SHEK – CSA-INV
Associate Professor,
Department of Paediatrics,
NUS Yong Loo Lin School of Medicine
Senior Consultant,
Khoo Teck Puat–National University
Children's Medical Institute,
National University Health System

**AREA OF RESEARCH
OPHTHALMOLOGY**

The number of people with glaucoma, the most common cause of irreversible blindness worldwide, is predicted to reach almost 80 million by 2020. Of these 80 million, over 8 million are expected to suffer from bilateral blindness. While glaucoma can be treated through surgery, the post-operative scarring response remains a critical barrier to achieving long-term surgical success. For this reason, a better way to control and inhibit the scarring associated with glaucoma surgery is vital.

Dr Wong aims to investigate the therapeutic ocular delivery of small interfering (si)-RNA by use of sustained-release technology for inhibiting scarring. It is hypothesised that by targeting the action of the cell responsible—the fibroblast—a therapeutically effective approach can be developed to reduce post-operative subconjunctival scarring. Dr Wong will also focus on identifying and developing a sustained delivery system to inhibit scarring *in vivo*, which will have important implications both for the application of (si)RNA therapy and sustained ocular drug delivery in general.



DR TINA WONG – CSA-INV
Consultant Ophthalmologist,
Singapore Eye Research Institute



A/PROF MARCUS ONG – CSA-INV
Adjunct Associate Professor,
Duke-NUS Graduate Medical School
Senior Consultant, Department of Emergency
Medicine, Singapore General Hospital

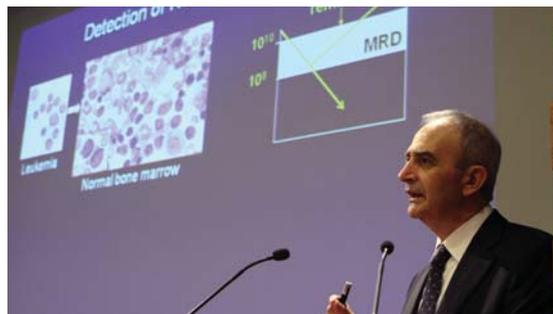
**AREA OF RESEARCH
CARDIOLOGY**

Out-of-hospital cardiac arrest (OHCA) is a global health concern, yet survival rates vary widely. In Singapore, the OHCA survival rate is low at just 2%, while in the US and Europe the survival rate can reach 40%. A/Prof Ong will conduct an international, multi-centre cohort study of OHCA in Singapore and across Asia-Pacific. It will focus on analysing the cost-effectiveness of modifiable factors affecting OHCA survival in Singapore's emergency medical services (EMS) system.

A/Prof Ong's study will compare five competing strategies targeting major systemic and modifiable factors for OHCA survival: increasing bystander cardio-pulmonary resuscitation, public access to defibrillation, decreasing EMS response times, developing advanced EMS life support, and specialised cardiac arrest centres. With a sample size of 13,477 OHCA patients—of which Singapore will contribute 1,000 cases—the study will determine the incremental cost-effectiveness in Singapore of each strategy.

NMRC AWARDS CEREMONY 2010

The NMRC Awards Ceremony was held at the NUHS Tower Block Auditorium to celebrate the recipients of NMRC's awards for 2010. This includes STaR Investigator, CSA, scholarship and fellowship awardees. Hosted by the Permanent Secretary for Health and A*STAR's Chairman, the event is an opportunity for the medical research community in Singapore to come together and recognise its efforts and achievements, as well as reaffirm the importance of clinical research to Singapore's biomedical and healthcare sectors. A total of 29 awards were given out, which consisted of one Singapore Translational Research (STaR) investigator award, 10 Clinician Scientist Awards, 12 NRF-MOH Healthcare Research Scholarships and 6 NMRC Research Training Fellowships.



BUDDING CLINICIAN SCIENTISTS – THE NEXT GENERATION OF LEADERS

Dr Carolyn Lam

In 2005, Dr Carolyn Lam—then a Registrar in the Cardiac Department at National University Hospital (NUH)—left Singapore for the US to undertake a two-year research fellowship at Mayo Clinic in Rochester, Minnesota. Six years and countless life-changing experiences later, she returned to Singapore in July 2010 with an even deeper passion for research in order to rejoin NUH as an Associate Consultant and conduct studies relating to heart failure in Asian populations.

Speaking candidly about what drives her interest in research, Dr Lam says, “I’ve had great mentors and I’ve had fun doing research. I really think that is the key ingredient to driving and sustaining a career in research. It’s really got to be passion because if not, receiving all those rejections every time you submit something, asking everyone to judge you every time you have to ask for a grant, it really feels bad.”

Dr Lam credits the encouragement from Associate Professor Ling Lieng Hsi at the NUH Cardiac Department for guiding her into the research side of medicine and for putting her in touch with the right people at Mayo Clinic. She says, “What can I say—the rest is history. I met Dr Margaret Redfield and Dr Veronique Roger there and they were mentors in every way to me. At NUH, I was the only female

in the cardiac department, I was the first female to join the university’s cardiac department, so it was really lonely. And then suddenly at Mayo I had two female role models and it was amazing because they did exactly what I wanted to do, which was to marry my clinical practice with academic research. And they did it well. And they had their families. So from then I just bit the bullet and called myself an academic cardiologist and did the master’s degree.”

In addition to support from her mentors, Dr Lam also notes that her parents have played an important role in inspiring her chosen career path. “I really should recognise and acknowledge of course their immense input in my life. You could say that I’ve married both their careers into mine. Mum’s a clinician in private practice. Dad’s an academic, a zoologist at NUS.” With a laugh, she adds, “He would be thrilled if I said that I went down this path because of him—he always says that it’s because of him.”

In the US, one opportunity led to another as Dr Lam continued on from her first research fellowship in the Cardiorenal Laboratory at Mayo Clinic to a subsequent heart failure fellowship at Mayo’s Division of Cardiovascular Diseases, followed by advanced cardiology work and a Master of Biomedical Sciences degree. Her final year in the US was spent studying the genetic epidemiology of heart failure at the Framingham Heart Study in Boston. All of these experiences allowed Dr Lam to hone her skills as a clinician scientist and prepared her for taking the next step in her career when the opportunity arose to return to Singapore. Describing that decision, Dr Lam says, “I was at a crossroads. I had finished all the training and the dream chasing, and it was time to become my own.”

“It was a really tough decision. But I’ll just say that it was a combination of a lot of factors and it was serendipitous, because it just so happened that when it was time to apply for my own grant and become a PI, NIH (the National Institutes of Health in the US) was tightening its purse strings and it was a very bad time. At Mayo, the research component was just at a standstill at that time. And at the same time Singapore was opening up its arms and saying, ‘Come here!’, and the opportunities were amazing.”

While it was not an easy decision, once made, Dr Lam fully embraced the exciting prospects awaiting her in Singapore. Since arriving back in her homeland, she has dived into her work with great passion, spending about 80% of her time on research and 20% on clinical work.

At NUH, she is part of the team spearheading the development of the Cardiovascular Research Institute, a new institution under the National University Heart Centre, Singapore (NUHCS) that will carry out wide-ranging cardiovascular research, including laboratory research, clinical trials and epidemiological studies. “I truly believe that we can make something good of this. We’ve got all the ingredients and I think we’ve got the potential to be a worldwide player at some point. Ten years? Maybe to be seen. And then maybe another 10 years to be established. But in terms of clinical research, in terms of being a hub where people want to come to train if they want to study the Asian phenotype, I think there’s tremendous potential. We’ve got the right team and we’ve got the support, so the sky’s the limit.”



Dr Louis Chai

For Dr Louis Chai Yi Ann, finding success and fulfilment as a clinician scientist is about embracing the challenge of research work while never losing sight of positive patient outcomes as the ultimate goal. Explaining how he approaches his work, Dr Chai says, “Every clinician scientist hopes that their work will improve patient care and clinical outcomes. For me, I live on a simple note: as long as I can make a difference to any patient that I am asked to see, and even just to have them smile, that will already be most gratifying.”

While he has been involved in research activities to some extent throughout his career, a stronger focus on translational and clinical research was not always part of Dr Chai’s plan, and taking the first steps in this direction required him to trade a familiar career trajectory for a degree of uncertainty.

“Putting aside clinicals to start afresh on a path less travelled was not easy. At the age of 34 and having just gotten my infectious diseases specialist accreditation, it was tempting to snuggle up in a comfortable niche rather than venture into the realm of the unknown and face the possibility of failure. I am grateful to A/Prof Paul Ananth Tambyah, my mentor, who encouraged me to take the plunge into the unknown. Looking back, I have no regrets regarding this decision,” notes Dr Chai.

He adds, “Research and clinicals are not mutually exclusive. When put in tandem, we can understand a disease process better and in turn enhance clinical management as long as we keep in mind the patient as the eventual beneficiary, and this is what I aim to do.”

Funded by an A*STAR/NMRC International Fellow (MD) Scholarship, Dr Chai spent three years as a Doctoral Fellow in the Department of Internal Medicine at Radboud University Nijmegen Medical Centre in the Netherlands. He returned to Singapore in 2010, armed with a PhD and eager to dive further into research work.

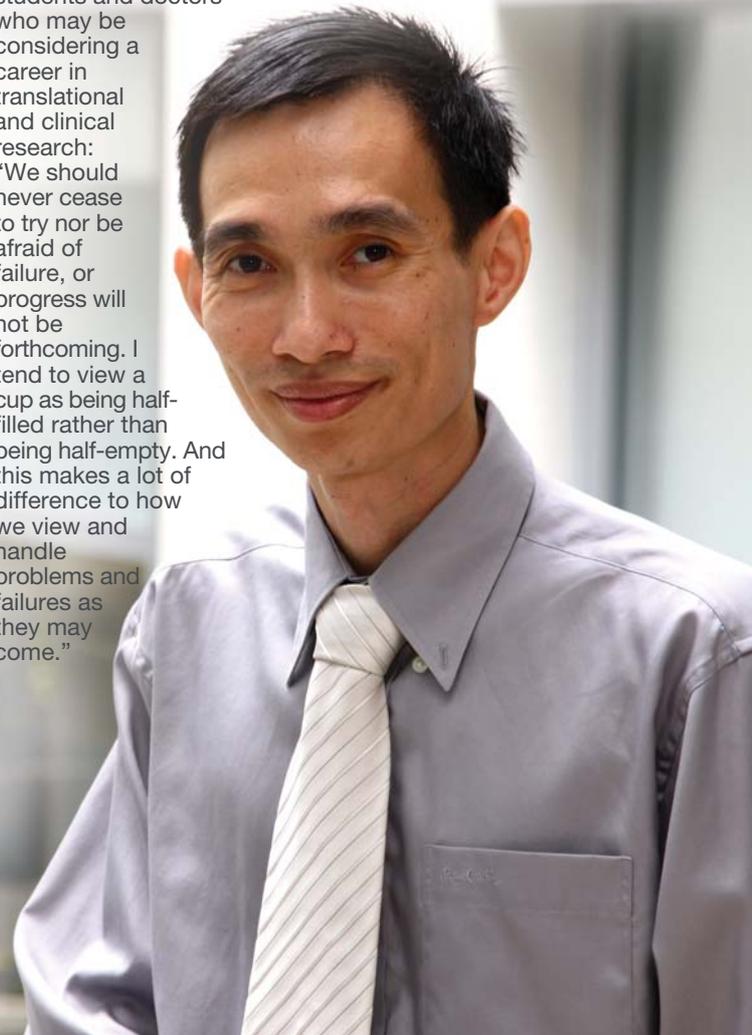
Now a Consultant in the Division of Infectious Diseases at the National University Hospital, Dr Chai acknowledges that juggling his clinical and research responsibilities can be difficult at times, but it is a necessary balancing act. “Managing time and being given protected time for research work will always be a challenge. At the same time, keeping my clinical skills current and sharp and working on the ground is without a doubt very important. To date, my superiors have been very kind to allow me the flexibility to juggle both endeavours with specific monthly blocks for clinical work and the rest to organise research. In reality, there will almost certainly be overlaps, but this is manageable.”

When describing his work, Dr Chai points out that collaboration plays an integral role in carrying out meaningful research. “My interest is in opportunistic infections affecting patients with compromised immune systems, like patients receiving chemotherapy or undergoing transplantation. The management of these infections remains a clinical challenge because of the inability of the host immune system to respond appropriately. By studying the pathogen-host interaction, we will translate the knowledge gained back to the bedside, with the aim to identify the most vulnerable patients and to develop novel therapeutic strategies to optimise outcomes. I cannot emphasise enough that this can only be possible through close collaboration with our colleagues from the departments of haematology, oncology and microbiology.”

He also notes that having a broad medical background is helpful for clinician scientists, as it can provide them with insights across different areas. “I am fortunate to have a well-rounded background beyond my current area of practice, which allows me to cut across disciplines in medicine.”

While a career as a clinician scientist may not be for everyone, Dr Chai has this advice for medical students and doctors

who may be considering a career in translational and clinical research: “We should never cease to try nor be afraid of failure, or progress will not be forthcoming. I tend to view a cup as being half-filled rather than being half-empty. And this makes a lot of difference to how we view and handle problems and failures as they may come.”



Dr Mark Chan

Funded through an NMRC Research Training Fellowship, cardiologist Dr Mark Chan Yan Yee spent two years in the US doing translational clinical research at Duke Clinical Research Institute (DCRI) and subsequently graduated with a Master of Health Science degree from Duke University in 2008. While this experience provided Dr Chan with invaluable training that has allowed him to dive deeper into translational clinical research, his journey into this field began much earlier.

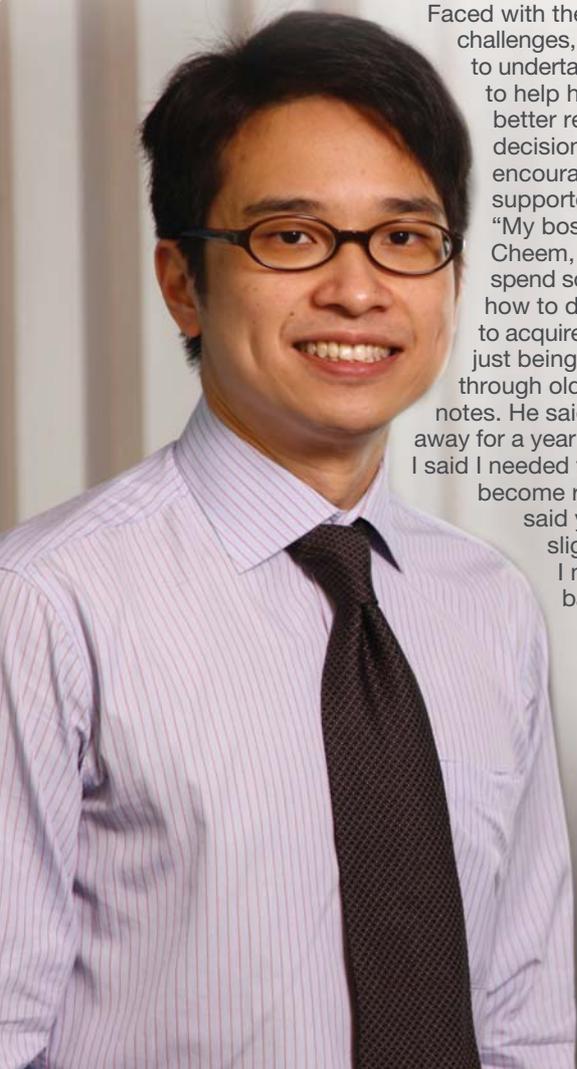
"I first became interested in biostatistics during our fourth year epidemiology and public health project at the Yong Loo Lin School of Medicine at the National University of Singapore. Prior to that, I had never known that the quantitative sciences played such a critical role in our daily medical decision-making, and that medical decisions were based on a probabilistic and not deterministic science. I tried working on a number of retrospective projects as a medical officer and a registrar by digging through old case notes. It was inefficient and not what I envisioned science to be," explains Dr Chan.

Faced with these initial challenges, Dr Chan decided to undertake further studies to help himself become a better researcher—a decision that was encouraged and supported by his boss. "My boss, Dr Tan Huay Cheem, suggested that I spend some time learning how to do research right, to acquire better skills than just being able to look through old archived case notes. He said that I could go away for a year to two years, but I said I needed three years to become really good. He said yes without the slightest hesitation. I never looked back."

Following his stint at DCRI, Dr Chan spent 15 months at the Montreal Heart Institute in Canada doing a combined fellowship in interventional cardiology and platelet biology before returning to Singapore in December 2009. Since then, Dr Chan has been busy splitting his time between the lab, clinic and classroom—he spends about 50% of his time on research, 40% doing clinical work and 10% teaching—at the National University Hospital and National University of Singapore. Dr Chan notes, "My career plans now revolve around establishing my research network as a world-class group of thought leaders in acute coronary syndromes and antithrombotic therapy through papers and grants. Next is to establish local high-end core laboratory capabilities to leverage this network."

For young medical students and doctors who may be considering a career as a clinician scientist, Dr Chan is more than happy to share advice based on his experience developing a career in translational clinical research:

1. Aim to be a triple threat: a superb scientist, an excellent clinician and a top-notch educator. You can only do this by maintaining razor-sharp focus on key areas because we only have 24 hours a day.
2. Don't worry about personal income during your formative years. Take the time to build your professional market value through four key areas:
 - a. Skills acquisition (I would strongly recommend either a Master's or PhD)
 - b. Grant writing (even small grants are useful for an early track record)
 - c. Networking (with like-minded researchers)
 - d. Publications (focus on original research papers, not review papers)
3. Find the right mentor or mentors. The most academically successful senior investigators may not necessarily be the most generous with their time and resources. Look for the best mentor for yourself, even if it means going overseas, and never work with a mentor just because your boss wants you to work with him or her.
4. Never neglect your clinical training. It will strengthen your marketability as a scientist with highly specialised clinical knowledge.
5. Learn what your boss or bosses' goals are and explain how your skills can help them achieve their goals. Good EQ is a critical quality of a successful clinician scientist. Also, get everything down in writing, even if it is by email.



TALENT DEVELOPMENT PROGRAMMES

NMRC RESEARCH TRAINING FELLOWSHIP

The NMRC Research Training Fellowship aims to provide doctors with the training necessary to become clinician scientists. This can include overseas research training or pursuing a graduate degree in research at a local or overseas institution. The award is available to medical doctors and dental surgeons registered with the Singapore Medical Council or Singapore Dental Board. From 2010, the award is also opened to allied health professionals and biostatisticians who support translational and clinical research. Recipients of the fellowship receive salary and tuition fees for local graduate degree programmes, or allowances and other benefits in line with the host institution's policies for overseas research attachments.



NRF-MOH HEALTHCARE RESEARCH SCHOLARSHIP (PhD)

This scholarship provides support to Advanced Specialty Trainee (AST) doctors who wish to enrol in a PhD programme locally or overseas. It is targeted at clinicians intending to pursue a career in research. The scholarship provides a salary, tuition fees, and a maintenance allowance (for overseas PhDs), as well as protected time for research during the clinical training period. Funding for post-doctoral research is also available.

NRF-MOH HEALTHCARE RESEARCH SCHOLARSHIP (MASTER OF CLINICAL INVESTIGATION)

This scholarship aims to encourage more clinicians to pursue advanced clinical research training through the Master of Clinical Investigation (MCI) at the Yong Loo Lin School of Medicine at National University of Singapore. The scholarship covers the tuition and research fees for the MCI programme.



LIST OF AWARDEES AND RECIPIENTS FOR 2010

NMRC RESEARCH TRAINING FELLOWSHIP

A total of six doctors were awarded the NMRC Research Training Fellowship in 2010; one is doing an overseas part-time PhD degree while the other five are doing overseas research attachments not leading to a degree.

NAME	INSTITUTION	AREA OF RESEARCH/PROJECTS
Dr Nattharee Chancharonsook	NUHS <i>PhD (Part-time Overseas)</i> <i>at (i) National Dental Centre, Singapore, and (ii) Radboud University Nijmegen Medical Centre, Netherlands</i>	ORAL AND MAXILLOFACIAL SURGERY "Mandibular reconstruction using polycaprolactone endoprosthesis scaffold: A monkey study"
Dr Hsu Li Yang	NUHS <i>Fellowship (Overseas Attachment)</i> <i>at Addenbrooke's Hospital, UK</i>	INFECTION "The application of whole genome typing to major lineages of methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) in the UK and Singapore"
Dr Daniel Chan Boon Yew	NUHS <i>Fellowship (Overseas Attachment)</i> <i>at Cedars-Sinai Medical Center, USA</i>	CANCER "Identification of genomic changes as lymphoma progresses from low to high grade: An opportunity to discover new therapeutic targets"
Dr Khoo Chin Meng	NUHS <i>Fellowship (Overseas Attachment)</i> <i>at Sarah W. Stedman Nutrition and Metabolism Center, Duke University School of Medicine, USA</i>	METABOLIC DISEASE "Biochemical mechanisms of improved insulin sensitivity in response to weight loss"
Dr Lee Lui Shiong	SGH <i>Fellowship (Overseas Attachment)</i> <i>at Addenbrooke's Hospital, UK</i>	CANCER "Genomic profiling of patients with adenocarcinoma of the prostate with clinical correlation to pathological outcomes and oncological outcomes"
Dr Tan Yung Khan	TTSH <i>Fellowship (Overseas Attachment)</i> <i>at Southwestern Medical Center, USA</i>	UROLOGY "Novel use of paramagnetic iron-oxide nanoparticles to improve the efficiency and effectiveness of endoscopic stone fragment retrieval"

TRAINING COMPLETED IN 2010

A total of seven doctors completed their training under the NMRC Research Training Fellowship in 2010.

NAME	INSTITUTION	AREA OF RESEARCH/PROJECTS
Dr Tan Boon Yew	NHC <i>Fellowship (Overseas Attachment) at Johns Hopkins Medicine, Baltimore, USA</i>	CARDIOLOGY “Molecular genetics and pathogenesis of arrhythmogenic right ventricular dysplasia”
Dr Wong Nan Soon	NCC <i>Fellowship (Overseas Attachment) at Duke University Medical Center, USA</i>	MEDICAL ONCOLOGY–PHASE I CLINICAL TRIAL (BREAST CANCER) “Phase I clinical trial design and implementation/investigational new drug development in oncology”
Dr Richard Quek Hong Hui	NCC <i>Fellowship (Overseas Attachment) at Dana-Faber Cancer Institute, Boston, USA</i>	TRANSLATIONAL THERAPEUTICS (SARCOMA) “Translational therapeutics: application of novel insights from basic molecular and biochemical research to the rationale development of molecularly- targeted anti-cancer therapy”
Dr Yeo Wee Lee	NUH <i>Fellowship (Overseas Attachment) at Brigham and Woman’s Hospital, Harvard, Boston, USA</i>	NASOPHARYNGEAL CANCER “Study of nasopharyngeal cancer tumour specimens for potential predictive and prognostic markers”
Dr Teo Wan Yee	KKH <i>Fellowship (Overseas Attachment) at Texas Children’s Cancer Centre, Baylor College of Medicine, Houston, USA</i>	PAEDIATRIC BRAIN TUMOURS “Molecular taxonomy of paediatric brain tumours based on molecular profiling”
Mr Wei Heming	TTSH <i>PhD (Part-time Overseas) at NHCS</i>	CARDIOLOGY “Stem cell-based cell therapy for post- myocardial infarction myocardial repair and regeneration”
Dr Tiah Ling	CGH <i>MPH (Overseas) at Johns Hopkins University, Bloomberg School of Public Health, USA</i>	PUBLIC HEALTH “An evaluation of the implementation of essential package for hospital services (EPHS) in Afghanistan–A qualitative analysis”

NRF-MOH HEALTHCARE RESEARCH SCHOLARSHIP (PhD)

One doctor was awarded the NRF-MOH Healthcare Research Scholarship (PhD) in 2010.

NAME	INSTITUTION	AREA OF RESEARCH/PROJECTS
Dr Sharon Low Yin Yee	NNI (TTSH) <i>Scholarship (PhD) at NUS</i>	CANCER "Investigating the mechanisms of brain tumour progression"

NRF-MOH HEALTHCARE RESEARCH SCHOLARSHIP (MASTER OF CLINICAL INVESTIGATION)

A total of 11 doctors were awarded the NRF-MOH Healthcare Research Scholarship (Master of Clinical Investigation) in 2010.

NAME	INSTITUTION	AREA OF RESEARCH/PROJECTS
Dr Ang Han Nian, Marcus	SNEC	OPHTHALMOLOGY "Genome-wide association studies on corneal and anterior segment diseases in the Singapore Malay Eye Study (SiMES) and Singapore Indian Eye Study (SINDI)"
Dr Ch'ng Jack Kian	Dept. of General Surgery, SGH	GASTRIC CANCER (To confirm project later into the MCI course)
Dr Goh Jia Jun	Dept. of Neurosurgery, NNI	NEUROLOGY "Brain tissue oxygenation monitoring techniques in acute brain injury"
Dr Ng Chin Hin	Dept. of Haematology-Oncology, NUHS	CANCER, BLOOD "Study of GEP of the chemo- resistance leukemic cells with an attempt to identify the molecular pathways that confer chemo- resistance to different chemotherapy agents"
Dr Ng Yew Poh	Dept. of Neurosurgery, NNI	NEUROLOGY "Evaluating effectiveness and efficiency of conducting systemic reviews and meta-analysis on clinically significant topics (intraventricular hemorrhage, intracerebral hemorrhage, statins and vasospasm) using Cochrane and CERR-N methods"

NRF-MOH
HEALTHCARE RESEARCH
SCHOLARSHIP
(MASTER OF CLINICAL INVESTIGATION)

NAME	INSTITUTION	AREA OF RESEARCH/PROJECTS
Dr Rajinder Singh S/O Pall Singh	Dept. of Neurology, NNI	NEUROLOGY, STROKE “Neuroprotection with minocycline therapy for acute stroke recovery trial”
Dr Sng Ban Leong	Dept. of Women’s Anaesthesia, KKH	NEUROLOGY “Prospective cohort study of the role of pressure pain threshold, hospital anxiety depression scale, pain”
Dr Lynnette Tan Pei Lin	Dept. of Psychological Medicine, TTSH	NEUROLOGY “Incidence of anxiety and depressive symptoms in HIV patients and the associated factors of these symptoms”
Dr Tan Shu Yun	Dept. of Family Medicine and Continuing Care, SGH	METABOLIC DISEASE, DIABETES “Evaluation of effectiveness of green tea on improving metabolic syndrome OR diabetic control. 3 month double-blinded RCT”
Dr Teng Gim Gee	Dept. of Medicine, Div. of Rheumatology, NUHS	GOUT “Validation of English and Chinese Gout Assessment (GAQ2.0) for use in Singapore Asians With Gout”
Dr Andrew Wee Kien Han	SingHealth Polyclinics (Marine Parade)	METABOLIC DISEASE, NEUROLOGY, CARDIOVASCULAR DISEASE “Evaluation of Vitamin B12 deficiency (kiv treatment of) in the Indian population of Singapore (and its subgroups) looking at haematological, neuropsychiatric and cardiovascular morbidity. Correlating with lifestyle and dietary factors and concurrent chronic disease management”

MEDICAL EXCELLENCE AWARDS

The National Medical Excellence Awards (NMEA) are held annually to honour and recognise the efforts of clinicians, clinician scientists and healthcare professionals for their invaluable contributions toward medical excellence in the areas of clinical care, clinical research, clinical quality, training and mentorship in Singapore. The awards also provide the opportunity to celebrate success and hold up role models for the younger generation of clinicians and clinician researchers.

In 2010, the NMEA recognised five outstanding individuals and one four-member team for their efforts as mentors, clinical researchers and scientists, celebrating their work and the example they have set for the rest of the medical community in Singapore.

A new award category, the National Outstanding Clinical Quality Activist Award, was introduced in 2010 to recognise individuals who have made significant contributions to upholding clinical quality and patient safety, and thus improved healthcare outcomes in Singapore. It is the first NMEA award to be open to all healthcare professionals, including nurses, pharmacists and other allied health workers.

National Medical
Excellence Awards
2010



NATIONAL MEDICAL EXCELLENCE AWARDS 2010

The 2010 NMEA winners were:

NATIONAL OUTSTANDING CLINICIAN MENTOR AWARD



Professor Ho Lai Yun

NATIONAL OUTSTANDING CLINICIAN AWARD



Professor Vathsala Anantharaman

NATIONAL OUTSTANDING CLINICIAN SCIENTIST AWARD



Professor Wong Tien Yin

NATIONAL OUTSTANDING CLINICAL QUALITY ACTIVIST AWARD



Associate Professor Tan Kok Hian



Mrs Nellie Yeo

NATIONAL CLINICAL EXCELLENCE TEAM AWARD



Dr Malcolm Mahadevan, Professor Lim Tow Keang, Dr Jason Phua and Dr Irwani Ibrahim

NMEA 2010 AWARD WINNERS

As a committed teacher and mentor, Prof Ho has dedicated a great deal of time and effort over his career to guiding and training young clinicians, preparing the next generation of doctors for the challenges of the medical profession. His efforts have played an important role not only in establishing a number of key institutions in Singapore, but also in developing a community of skilled doctors with a strong regional reputation.

Prof Ho is a pioneer of Singapore's many nationwide perinatal health programmes and the child development programme. His efforts played an important role in establishing neonatology as a subspecialty in paediatrics in Singapore, founding SGH's Neonatal Care Unit in 1986 and heading the unit until 2004. Prof Ho also founded the Child Development Clinic at SGH in 1991 and headed the unit until 2008, by which time it had shifted to become the Department of Child Development at KK Women's & Children's Hospital. Under his leadership, the Department became a leading local and regional referral centre. Prof Ho has also shared his knowledge in child development overseas, acting as a mentor for similar programmes in the region.

In 2003 Prof Ho was conferred the Outstanding Paediatrician in Asia Award for his contributions to education and improvement in child health and development in the region. He was also recently nominated to represent the Asia-Pacific region in the Standing Committee of the International Pediatric Association.



PROFESSOR HO LAI YUN

Senior Consultant

*Department of Neonatal & Developmental Medicine, Singapore General Hospital
Department of Child Development, KK Women's & Children's Hospital*

Clinical Professor and Associate Dean

Yong Loo Lin School of Medicine, National University of Singapore at the Singapore General Hospital campus

Professor

Duke-NUS Graduate Medical School

Prof Vathsala is a globally recognised authority in the field of renal transplantation and her contributions have done much to put Singapore on the world map as a reputable centre for kidney transplant surgery. She is a past president of the Asian Society of Transplantation and an executive committee member of the Declaration of Istanbul Custodian Group.

Under Prof Vathsala's clinical leadership Singapore General Hospital achieved many impressive milestones, including the first spousal kidney transplant in 1991 and the introduction of crossmatch positive deceased donor kidney transplants since 2007. Her efforts also saw SGH develop into the single largest renal transplant programme in Singapore, managing 70 to 80 new kidney transplants annually.

Prof Vathsala took on a new role in 2008 as the head of the Division of Nephrology at National University Hospital, where her leadership has seen the outcomes of renal transplantation in Singapore's public hospitals rise to among the best in the world. In 2008, she also successfully led a rare blood group incompatible and crossmatch positive kidney transplant at NUH.

In addition to her clinical excellence, Prof Vathsala demonstrates a great passion for the care of her patients, working tirelessly to improve their lives. She has been instrumental in improving the effectiveness and affordability of therapies, including securing 50% government co-funding for the cost of immunosuppressants. Much of her research has also focused on optimising the use of immunosuppressants in transplant patients in order to improve outcomes and reduce side effects.



PROFESSOR VATHSALA ANANTHARAMAN

Senior Consultant and Head

Division of Nephrology, National University Hospital

Director

Adult Renal Transplantation Programme, National University Hospital

Professor

Yong Loo Lin School of Medicine, National University of Singapore

NMEA 2010 AWARD WINNERS

Prof Wong is a world-renowned clinician scientist and an accomplished ophthalmologist. His multidisciplinary work—which combines ophthalmology with computer imaging, cardiovascular disease, neurology, diabetes and epidemiology—is recognised worldwide for its revolutionary approach. He is the only ophthalmologist to have received the Sandra Doherty Award from the American Heart Association, and only the second ophthalmologist to receive the Novartis Prize in Diabetes Global Award.

Over the course of his career, Prof Wong has built up a broad-based research programme. His focus has been on developing innovative diagnostic platforms that can assess a patient’s cardiovascular disease and diabetes risk through a simple retinal photograph. This work has significant implications for public health systems in Singapore and overseas, as cardiovascular disease and diabetes are often among the leading causes of death and morbidity.

Prof Wong has published more than 450 peer-reviewed papers, including papers in the New England Journal of Medicine and The Lancet. He is also a recipient of a prestigious Singapore Translational Research Investigator award, which has led to a major multidisciplinary research effort that includes local and overseas research partners as well as industry partners. The research team, led by Prof Wong, is currently working to further translate his research into clinical care and potential commercial applications.



PROFESSOR WONG TIEN YIN

Director
Singapore Eye Research Institute

Senior Consultant
Singapore National Eye Centre and National University Health System

Professor
Department of Ophthalmology, National University of Singapore

Throughout his career, A/Prof Tan has made outstanding contributions to clinical improvement and quality at KK Women’s and Children’s Hospital, particularly in the area of perinatal care. His systematic studies of perinatal mortality since the 1990s have significantly enhanced clinical efficacy and have had a direct impact on better patient outcomes. As a result of the Integrated Perinatal Care Project led by A/Prof Tan, KKH has one of the lowest maternal and perinatal mortality and eclampsia rates in the world for a tertiary hospital.

In 2005, A/Prof Tan chaired the KKH Joint Commission International (JCI) Core Committee and achieved JCI accreditation in the same year. He also led the team that secured renewal of the accreditation in 2008.

A/Prof Tan has championed numerous quality improvement initiatives at KKH, including the Labour Ward Risk Management Programme, which aims to improve the safety and quality of birth delivery. The programme included developing a rapid emergency caesarean section mobilisation system and also a reporting system for near misses in the delivery suite. This latter system has proved instrumental in instilling a culture of reporting and continuous improvement at KKH. The programme won the Asia Hospital Management Award 2004 in the Patient Safety and Risk Management Category.

A/Prof Tan’s efforts have also had a significant impact on the efficiency and cost-effectiveness of KKH’s operations. Led by A/Prof Tan, KKH has implemented a wide range of clinical practice improvement programmes and process improvement projects, leading to a savings of almost \$3 million in the most recent financial year.



ASSOCIATE PROFESSOR TAN KOK HIAN

Chairman
Division of Obstetrics and Gynaecology, KK Women’s and Children’s Hospital

Associate Professor
Duke-NUS Graduate Medical School Yong Loo Lin School of Medicine, National University of Singapore

NMEA 2010 AWARD WINNERS

Mrs Nellie Yeo has been a longstanding champion of clinical and healthcare quality in Singapore across both the public and private sector. Her contributions over the past two decades have resulted in better patient safety and health outcomes. Mrs Yeo's involvement in "train the trainers" programmes and her work as Executive Director of the NHG College ensure that the high standards she has helped to bring about will be carried on in the future.

Mrs Yeo became involved with clinical quality work at Gleneagles Hospital, where she implemented the voluntary reporting of hospital occurrences system and helped Parkway Group's hospitals attain ISO certification in 1994. After a move to the National Healthcare Group, she similarly led National University Hospital to achieve triple ISO status in 2001 and drove quality programmes across NHG's many institutions. Mrs Yeo was instrumental in establishing the Clinical Practice Improvement Programme, Adverse Events Studies and Clinical Review Programme. In addition, her efforts led NUH, NHG Polyclinics and the National Skin Centre to become Singapore's first public hospital, polyclinic group and national centre to attain Joint Commission International accreditation.

Over the years, Mrs Yeo has also been the driving force behind a number of important collaborative efforts with international and local experts. She initiated work with Prof David Bates from Harvard Medical School to roll out a medication safety programme that led to an electronic drug administration system that has helped to reduce harm to patients and improve the quality of care. Locally, Mrs Yeo launched a collaboration between infectious disease doctors and infection control nurses to combat methicillin-resistant *Staphylococcus aureus* (MRSA), which led to a halving of the MRSA infection rate at NUH within just one year.



MRS NELLIE YEO
Chief Quality Officer
National Healthcare Group

Executive Director
National Healthcare Group College

Led by Prof Lim, the team at National University Hospital's Department of Emergency Medicine demonstrated ingenuity and clinical excellence in developing a non-invasive ventilation (NIV) method. They then successfully translated their novel technique into a practical application to help chronic obstructive pulmonary disease (COPD) patients during severe disease exacerbations. Their efforts resulted in improved patient outcomes through the reduction of intensive care utilisation, complications such as nosocomial infections, and length of stay at hospital. This also led to improved survival rates and the reduction of hospitalisation costs.

The use of NIV was pioneered by Prof Lim's team in the 1990s and was extended to the Emergency Department in 2002. With NIV's more effective and safer application, NUH was able to reduce the mortality rate of patients with severe COPD exacerbations by half. NIV has since been adopted in other restructured hospitals in Singapore, and in FY2009 resulted in substantial cost savings of \$4 million.

Building on the experience gained by using NIV for COPD patients, the team of clinicians found further uses for the method, leading to its use for treatment of other emergency conditions, such as bronchiectasis, pneumonia, asthma and cardiogenic pulmonary edema.



PROFESSOR LIM TOW KEANG
DR MALCOLM MAHADEVAN
DR IRWANI IBRAHIM
DR JASON PHUA

*University Medicine Cluster and Department
 of Emergency Medicine, National University
 Hospital*

FUNDING BIOMEDICAL RESEARCH

The funding of translational and clinical research is one of the core pillars of NMRC's mandate. To carry out this function, NMRC offers several grant programmes that support small-scale and large-scale Singapore-based research initiatives covering a broad spectrum of biomedical sciences.

NMRC's grant programmes are divided into two main categories:

1. Strategic/thematic research
2. Investigator-led research

The first category includes the Translational and Clinical Research Flagship Programmes, which provide significant levels of funding to large-scale strategic studies, as well as Centre Grants and Programme Project Grants, which offer two different types of institution/group-based funding. The second category includes Individual Research Grants, Exploratory/Developmental Grants and New Investigator Grants, all three of which provide funding for investigator-led studies, but with different research focuses.

To ensure that its limited funds are put to the best possible use by funding the best science, NMRC awards all of its research grants on a competitive, peer-reviewed basis.

Research Grants



TRANSLATIONAL AND CLINICAL RESEARCH (TCR) FLAGSHIP PROGRAMME

TCR flagship programmes provide significant levels of funding to build up a critical mass of experienced high-level researchers, facilitate a broader research platform, and increase collaboration both locally and internationally. These programmes aim to establish Singapore as a global leader in the study of key strategic medical research fields.

Each TCR flagship programme is awarded \$25 million over five years and is administered by NMRC, with the funding provided by the National Research Foundation. The five key research areas targeted under this programme—cancer, cardiovascular/metabolic disorders, neurosciences, infectious diseases and eye diseases—have been selected for their relevance to Singapore and the existence of strong local expertise.

GASTRIC CANCER TCR FLAGSHIP PROGRAMME

Launched in August 2007, this was the first of NMRC's five TCR flagship programmes. The programme aims to improve the outcomes for gastric cancer—a leading killer in Singapore—via research focused on three key themes:

1. Early detection by screening of high-risk groups
2. Improving biologic understanding of gastric carcinogenesis
3. Improving treatment by molecular profiling of tumours

The detection of 10 cases of early gastric cancer among the first 900 study participants screened has provided proof-of-concept that the screening of high-risk groups in Singapore can lead to successful early-stage detection. The programme has also developed the first *in vivo* Raman endoscopic system that is being used live in endoscopies on human patients. This novel

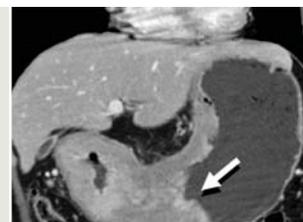
technique is currently being tested in clinical trials to determine whether it can be used to improve early detection of gastric cancer.



PRINCIPAL INVESTIGATOR:
A/Prof Yeoh Khay Guan,
Department of Medicine,
National University of Singapore

Key 2010 highlights:

- The target enrolment of 3,000 people for the gastric cancer screening project (GCEP) was completed; screening of the first 900 people has resulted in 10 early cancers being diagnosed and cured, eight of which were detected at AJCC stage 0 and two at stage 1.
- Development of a new imaging system using near infrared Raman and auto-fluorescence techniques. *In vivo* Raman differentiations have been demonstrated among benign, precancer and cancer in the stomach and esophagus with high diagnostic accuracy.
- The RUNX3 gene has been established as a critical tumour suppressor gene for gastric cancer. It was found to be inactivated in up to 82% of gastric cancer cases.
- Two resources for the genomic exploration of gastric cancer, Gastronomica and GEMINI, have been completed. Gastronomica, comprising 300 gastric tissues profiled on various platforms, currently represents the largest genomic database of primary gastric cancers currently in existence. GEMINI, established to meet the need for experimental reflection of the intrinsic molecular heterogeneity of gastric, represents the largest collection of gastric cancer cell lines available in the academic world. Findings from basic analyses have now been translated into a multi-centre, pharma-sponsored clinical trial (the 3G study).
- A Phase I, first-in-man study was conducted to assess the safety, maximum tolerated dose (MTD), pharmacokinetics, pharmacodynamics and preliminary efficacy of SB939 in patients with advanced solid malignancies.



Large cancer (arrow) involving the lower part of the stomach

EYE DISEASES TCR FLAGSHIP PROGRAMME

Launched in July 2008, this TCR flagship programme encompasses ophthalmic research focused on corneal disorders and glaucoma—two of the main causes of blindness globally, and particularly in Asia. The overall objective is to develop novel solutions to challenges facing medical and surgical therapies for these disorders.

With a strong focus on new therapeutics and technology development, the programme has led to several important discoveries and potential commercialisation opportunities. To date, the eye diseases TCR flagship programme has 13 patents pending at various stages of filing, with some projects demonstrating potential for commercialisation, spin-offs or joint ventures, some of which are highlighted below.

Key 2010 highlights:

- Development of the concept and technique of cryopreserving (freezing in liquid nitrogen) and storing the lenticule of a patient following Refractive Lenticule Extraction (ReLEx) procedures for potential future use; the process was patented in September 2010. This development has strong commercial potential and immediate downstream possibilities, as ReLEx may become a good clinical alternative to conventional LASIK surgery for the treatment of myopia and other refractive errors. The related intellectual property focuses on potential reversibility of the ReLEx procedure—unlike LASIK, which is an irreversible procedure.
- The development of version 2 of the donor insertion device, known as the Tan EndoGlide, for the current form of EK surgery (Descemet's Stripping Endothelial Keratoplasty, or DSAEK), which is the new keyhole, sutureless form of corneal transplantation. The programme's team has patented the device and out-licensed it to Network Medical Products. The EndoGlide is the first and only commercially available disposable DSAEK inserter that has achieved FDA approval, with over 2,000 units sold worldwide. A recent paper in the American Journal of Ophthalmology documented that the device reduces corneal cell damage by more than 50% compared to other methods.
- Development of a novel drug-delivery system utilising advanced nanotechnology and biomaterials that allows timed-release of drugs to treat eye conditions. A pilot trial has shown promising results by reducing scarring after glaucoma filtration surgery. This technology has generated industry interest.
- Further development of the programme's innate immunity antimicrobial project centring on the synthesis of novel defensin molecules represents an innovative approach toward a more diversified antimicrobial pipeline that would on full realisation allow the bioengineering of antimicrobial molecules with long clinical use. To date, this work has generated two patents, a number of papers in leading journals, and considerable commercial interest from pharmaceutical and other companies.



PRINCIPAL INVESTIGATOR:
Prof Donald Tan,
Chairman, Singapore Eye Research Institute
& Medical Director,
Singapore National Eye Centre



NEUROSCIENCE TCR FLAGSHIP PROGRAMME

Launched in July 2008, this TCR flagship programme aims to identify key genetic, biological, cognitive, clinical and social risk factors for psychotic disorders, and to establish the efficacy and safety of a neurocognitive-enhancing agent for patients with schizophrenia. A key objective is to contribute to the basic understanding of the disease process and enable earlier intervention through the development of better means of identifying individuals in imminent danger of developing psychosis.

The programme comprises three projects:

1. A comprehensive genetic study of schizophrenia and its neurocognitive impairments
2. The Longitudinal Youth At-Risk Study (LYRIKS), a public health initiative that aims to identify the biomarkers of disease vulnerability, progression and therapeutic response for psychosis
3. A double-blind randomised clinical trial to evaluate the efficacy and safety of a putative neurocognitive enhancing agent for patients with schizophrenia



PRINCIPAL INVESTIGATOR:
A/Prof Chong Siow Ann,
Research Division,
Institute of Mental Health

Key 2010 highlights:

- 1,012 healthy controls (110% of target) and 726 schizophrenia patients (73% of target) were recruited ahead of the projected timeline for the genetic study of schizophrenia.
- Screening of 1,437 individuals under LYRIKS was completed, which resulted in the identification of 147 individuals at risk of psychosis and 18 individuals who were psychotic but not previously diagnosed and not receiving treatment.
- For the project to evaluate a putative neurocognitive enhancing agent, 77 patients have been screened, 61 patients randomised and 45 patients completed the study out of the target of 120 patients with schizophrenia who meet the study-specific inclusion and exclusion criteria.
- Collaborations have been set up with three international sites, resulting in the pooling of over 1,600 samples on a genetic study of tardive dyskinesia in schizophrenia. The collaborators include Professor Toshiya Inada from Institute of Neuropsychiatry in Japan, Professor Bernard Lerer from Hadassah-Hebrew University Medical Center in Israel and Professor Smita Deshpande from India.
- A collaboration with Dr Zhang Fengyu from the National Institute of Mental Health (NIMH) in the United States on the genetic study of schizophrenia will see NIMH provide 4,000 samples for validation in the study.
- Funded by the Stanley Medical Research Institute and in collaboration with study sponsor ORYGEN Research Centre in Melbourne, Australia, the programme is conducting a multicentre RCT of omega-3 fatty acids and cognitive-behavioural case management for symptomatic patients at ultra-high risk for early progression to schizophrenia and other psychotic disorders.
- Meetings have taken place with several companies that have expressed interest in possible collaborations's.



METABOLIC DISEASES TCR FLAGSHIP PROGRAMME



Launched in June 2009, this TCR flagship programme aims to provide a scientific base from which to design prevention and intervention strategies to reduce the burden of chronic diseases such as diabetes and obesity. There are significant ethnic and individual differences in predisposition to these diseases, and thus one of the objectives of this programme is to examine the causal pathways and, in particular, the developmental factors that contribute to these differences. The programme consists of three main sub-studies:

1. A birth-cohort study named "GUSTO" (Growing Up in Singapore Towards healthy Outcomes)
2. An adult metabolism study named "SAMS" (Singapore Adult Metabolism Study)
3. An animal study named "GRACE" (Growth Regulation in Animals and Cellular Epigenetics)

PRINCIPAL INVESTIGATOR:
A/Prof Chong Yap Seng,
Department of Obstetrics and Gynaecology, Yong
Loo Lin School of Medicine,
National University of Singapore

Key 2010 highlights:

- Recruitment for GUSTO was completed in September 2010 with 1,234 participants (target was 1,200). As of 24 January 2011, 884 babies have been delivered and, of these, 327 week-old babies have undergone neonatal MRI scans. The team has also conducted 1,965 home visits across various time-points in the babies' growth.
- The team has recruited 199 participants for SAMS and gained 165 muscle biopsies as of 24 January 2011. It has also started recruitment for the second exercise intervention trial with a target of 180 men.
- For GRACE, as of 24 January 2011, the first complete Phase I cohort with 31 neonates has been assembled, with the group consisting of 19 IUGR and 12 control animals that will be monitored to maturity.
- Four new industry partnerships were forged in 2010, bringing the total number of industry collaborations to six.
- A/Prof Lynette Shek, an investigator on the programme's research team, won the Clinician Scientist Award in May 2010 for her research titled "Clinical phenotypes of persistent rhinitis in young children (0–5 years) and the role of respiratory viral infections: A prospective evaluation of a birth control". This award includes a grant totalling \$675,000 over three years, three years' salary support and 20% of project indirect costs.



INFECTIOUS DISEASES TCR FLAGSHIP PROGRAMME

Launched in December 2008, this TCR flagship programme has a simple objective: to stop dengue. The overall goal of this programme is to study the major gaps in treatment and management of dengue diseases through translation of bench-to-bedside research activities. Specifically, the programme aims to:

1. Create a global centre of excellence for the clinical study and management of dengue diseases
2. Establish a centre for clinical trials of small molecules and therapeutic antibodies to all four serotypes of the dengue virus
3. Elucidate pathogenesis of adult dengue disease and identify new biomarkers for prognostication of dengue diseases for therapeutic monitoring
4. Develop a new strategy for disease control using state-of-the-art epidemiology and full-genome analysis



Key 2010 highlights:

- The programme's vaccine and therapeutic group has produced the first fully characterised human anti-dengue antibody with prophylactic plus therapeutic effects *in vivo* (in AG-129 mice).
- Over 2,000 patients have been recruited for the EDEN study, of which slightly less than 300 have laboratory-confirmed dengue infection and another 300 non-dengue patients have influenza A infection. This early febrile pool of patients has already provided the project team with insights and information of immediate relevance to clinical practice. It also provides the platform to study early intervention of dengue disease.
- The retrospective ARDENT study is making good progress, having completed data collection for more than 4,000 dengue cases from 2005 to 2008 as of October 2010. These records were taken from a structured care system in Tan Tock Seng Hospital. Once completed, the data will span five years and include more than 7,000 dengue cases, making it the largest case series collection internationally.
- The Dengue Research Clinic at the Communicable Disease Centre was established in January 2010. Slightly more than 200 subjects were enrolled, with approximately 60% of them confirmed with dengue infection. Detailed day-to-day monitoring of study subjects is beginning to provide an in-depth understanding of disease progress in adults with dengue infection. Work on validating the utility of the latest WHO guidelines on diagnostic and prognostic criteria has begun.
- Together with the Environmental Health Institute, the programme has demonstrated the usefulness of saliva IgA as a non-invasive diagnostic tool to diagnose dengue. This has attracted commercial interest.



PRINCIPAL INVESTIGATOR:
A/Prof Leo Yee Sin,
Communicable Disease Centre,
Tan Tock Seng Hospital

TRANSLATIONAL AND CLINICAL RESEARCH FLAGSHIP SYMPOSIUM 2010

On 6 October 2010, NMRC hosted the inaugural Translational and Clinical Research (TCR) Flagship Symposium at Singapore's Marina Mandarin Hotel. Bringing together more than 300 clinicians, scientists and industry experts, the symposium was an opportunity for the leading clinician scientists behind Singapore's five TCR flagship programmes to share their latest research findings in the areas of gastric cancer, eye diseases, neuroscience, metabolic diseases and dengue.

The symposium featured plenary presentations from all five TCR flagship programmes, as well as thematic discussions in the areas of biomarkers, diagnostics, therapeutics and clinical trials. With the theme "Innovations for Tomorrow's Medicine", the event highlighted some of the cutting-edge research taking place in Singapore and promising developments with the potential to have a game-changing impact on healthcare practices and patient outcomes.

Commenting on how her project team benefitted from the symposium, A/Prof Leo Yee Sin, principal investigator for the infectious diseases TCR flagship programme, said: "First of all it helped to identify the gaps and areas for improvement within our TCR flagship programme, which spurred the entire group towards positive achievement. It also created industry awareness of projects with commercial potential that can improve patient care, such as diagnostic tools—a point-of-care dengue test was a much talked about topic. Learning from the positive examples from the other teams, our TCR flagship programme took the opportunity to review and streamline the entire programme with an emphasis on the clinical focus."

LEARNING FROM EACH OTHER

While there had previously been seminars organised by NMRC to highlight individual TCR flagship programmes, this symposium was the first time that all five programmes were brought together for one event, thereby creating more opportunities for the sharing of ideas across disciplines. "This inaugural symposium brought together key researchers and other players including pharma and policymakers into one event fully devoted to raising awareness of the five disease-centric TCR flagship programmes. The symposium served as a catalyst for connecting researchers from various disciplines by providing a platform for mutual exchange of ideas and collaboration. We have since had some discussions with pharmaceutical industry players," noted A/Prof Chong Siow Ann, principal investigator for the neuroscience TCR flagship programme.

Sharing a similar view, A/Prof Chong Yap Seng, principal investigator for the metabolic diseases TCR flagship programme, added, "The symposium rekindled industry interest in collaborations already underway. For our SAMS study, the symposium



has given rise to potential collaborations with two other pharmaceutical companies. The TCR flagship programmes are currently focused on their own projects. As our projects mature, we look forward to carving out collaborations across the various TCR flagship programmes."

For the gastric cancer TCR flagship programme, principal investigator A/Prof Yeoh Khay Guan commented that the discussions at the symposium brought to light an area of potential collaboration between his team and that of the eye diseases TCR flagship programme: "A potential collaborative project involving the SPARC molecule in the anti-cancer pathway was identified with the eye diseases group."

With plans already underway for the 2011 TCR Flagship Symposium, Prof Donald Tan, principal investigator for the eye diseases TCR flagship programme, pointed out that there is plenty of potential for NMRC to build upon the success of the 2010 event and make future instalments even more fruitful. Commenting on what he would like to see in future, he said, "More industry participation, interest and awareness of the work being carried out by the five flagship programmes, which in turn could potentially lead to more industry collaborations and investment. Also, more support and participation from the local scientific committee, especially the A*STAR institutes, and more efforts to initiate greater international exposure for the work being done here so as to potentially attract more international academic as well as industry interest, participation and collaboration."



CENTRE GRANTS & PROGRAMME PROJECT GRANTS

CENTRE GRANTS

Centre Grants (CGs) are institution-centric grants intended to support a research programme in which a team of investigators works on a clearly defined central theme of mutual scientific interest. Encouraging a stable, long-term institutional focus on a complex set of problems, CGs foster collaborative and mission-driven environments that bring together multidisciplinary teams with the diverse expertise needed to capture and rapidly translate new and emerging ideas into clinical benefits. This team approach stimulates scientific creativity and speeds new developments in ways that would not be possible with individual investigators working in relative isolation. CGs are awarded in an annual quantum of up to \$3 million for a period of up to five years.

PROGRAMME PROJECT GRANTS

Programme Project Grants (PPGs) support broad-based research programmes with a translational or clinical research focus involving a number of established investigators who share knowledge and resources. PPGs focus on projects based on a ground-up approach, rather than those that are strategically directed. PPGs are awarded in an annual quantum of up to \$1 million for a period of up to three years.

The main difference between CGs and PPGs is that CGs include pilot grants and provide funding for education and training of both research professionals and the public. This allows CG institutions to link together their strategies for disease treatment, research (seed funding) and education.

All CG and PPG applications undergo a two-stage process similar to that of IRGs. The first stage consists of international peer review. The second stage review is conducted by the Programmatic Grant Review Panel (PGRP), whose members are renowned local and international researchers. The PGRP takes into consideration the views of the overseas reviewers when making its recommendations for funding.

The first grant call for CGs and PPGs was launched in January 2009, with six CGs and one PPG being awarded, with funding commencing in FY2010. The grantees are listed below in alphabetical order.

Centre Grants (FY2010):

- National Cancer Centre Singapore
- National University Cancer Institute Singapore
- National University Heart Centre Singapore
- NUHS Memory, Aging and Cognition Centre
- Singapore Eye Research Institute
- Singapore General Hospital

Programme Project Grant (FY2010):

- KK Women's and Children's Hospital

INDIVIDUAL RESEARCH GRANTS

Individual Research Grants (IRGs) are awarded for up to three years to individual researchers for translational or clinical studies on a specific topic. The proposed projects must be based in Singapore, and the Principal Investigator should reside in Singapore and work in one of the local health clusters or a local academic institution.

IRGs play a critical role in funding investigator-led studies that are deemed to be both important and innovative, and which have the potential to make a significant impact in their respective field. The quantum supported for IRGs is up to \$1.5 million over a period of three years.

There are two IRG grant calls per year, opening in May and November each year, with submission deadlines of 1 June and 1 December. The table below indicates the number of IRG applications and awards since May 2006, as well as the total sum of the IRGs awarded in each grant call.

Period	Proposals Reviewed	Grants Awarded	Success Rate	Total Sum Awarded (\$ millions)
May-06	142	30	21.1%	10.15
Nov-06	188	27	14.4%	10.23
May-07	129	22	17.1%	13.59
Nov-07	139	27	19.4%	17.99
May-08	115	24	20.9%	16.67
Nov-08	92	23	25.0%	16.45
May-09	94	19	20.2%	17.77
Nov-09	103	21	20.4%	20.60
May-10	118	19	16.1%	19.96
Total	1,120	212	19.4%	143.41

IRG proposals undergo a two-stage peer review process:

1. Stage One: International Review Process
 - a. Applications are assessed in an international review process by external reviewers who score each proposal according to review guidelines and a scoring index that take into account the following factors:
 - i. Originality
 - ii. Importance
 - iii. Feasibility (in terms of scientific/technical competency and budgets)
 - iv. Primary impact
 - b. Shortlisted applicants are invited to provide written rebuttal on international reviewers' comments before the proposals are sent to the Local Review Panel (LRP) for further evaluation.
2. Stage Two: Local Review Panel
 - a. All shortlisted proposals are reviewed and subsequently presented to local reviewers at an LRP meeting and discussed by the panel.
 - b. The list of proposals recommended for funding based on the results of an e-vote is sent to the NMRC Board for final approval.

EXPLORATORY/DEVELOPMENTAL GRANTS AND NEW INVESTIGATOR GRANTS

EXPLORATORY/DEVELOPMENTAL GRANTS

Exploratory/Developmental Grants (EDGs) support the development of innovative and new areas of research. They are applicable to investigator-led studies involving untested and novel ideas, original research fields, and the application of new expertise or approaches to established research topics. EDGs play an important role in supporting research that might have difficulty competing for funding with more conventional studies.

EDG funding is available for a two-year period, with the possibility of a one-year extension. The quantum supported for EDGs is up to \$200,000.

There are two EDG grant calls per year, similar to the IRG, with deadlines of 1 June and 1 December. The table below indicates the number of EDG applications and awards since May 2007, as well as the total sum of the EDGs awarded in each grant call.

Period	Proposals Reviewed	Grants Awarded	Success Rate	Total Sum Awarded (\$ millions)
May-07	55	17	30.9%	2.70
Nov-07	42	15	35.7%	2.62
May-08	34	15	44.1%	2.65
Nov-08	48	14	29.2%	2.68
May-09	71	16	22.5%	2.84
Nov-09	79	16	20.3%	2.75
May-10	64	15	23.4%	2.86
Total	393	108	29.4%	19.10

EDG proposals undergo a peer review process similar to the second stage of the IRG review process (i.e. excluding international peer reviewing). Scientific Review Panel 2, consisting of Singapore-based members, assigns a primary and secondary reviewer to each proposal. Shortlisted proposals are then voted on by the review panel, which send its list of recommended awardees to the NMRC Board for approval.

NEW INVESTIGATOR GRANTS

A sub-category under the EDG, the New Investigator Grant (NIG) is open to investigators who have not previously held a reputable national or international grant. Structured as a mentorship in which awardees work with a mentor for guidance in their research, NIGs represent an attractive opportunity for researchers who might otherwise lack the experience necessary to compete for grants with more seasoned investigators.

This mentorship provides support for a period of supervised research leading eventually to the clinician researcher conducting larger-scale research projects independently. The quantum supported for NIGs is up to \$200,000 for two years.

There are two NIG grant calls per year, similar to the IRG, with deadlines of 1 June and 1 December. The table below indicates the number of NIG applications and awards since May 2007, as well as the total sum of the NIGs awarded in each grant call.

Period	Proposals Reviewed	Grants Awarded	Success Rate	Total Sum Awarded (\$ millions)
May-07	57	16	28.1%	2.64
Nov-07	55	16	29.1%	2.89
May-08	36	17	47.2%	2.86
Nov-08	33	12	36.4%	2.33
May-09	33	16	48.5%	2.78
Nov-09	50	14	28.0%	2.50
May-10	55	16	29.1%	2.67
Total	319	107	35.2%	18.67

NIG proposals undergo a peer review process similar to the second stage of the IRG review process (i.e. excluding international peer reviewing). Scientific Review Panel 1, consisting of Singapore-based members, assigns a primary and secondary reviewer for each proposal. Shortlisted proposals are then voted on by the review panel, which sends its list of recommended awardees to the NMRC Board for approval.

INFRASTRUCTURE GRANTS PROGRAMME

Biomedical sciences are a key pillar of Singapore's economy, and over the past decade impressive progress has been made in developing this sector. Home to a growing population of leading clinician scientists and researchers, both local and foreign, Singapore is actively investing in its infrastructure to continue its development as a leading regional and global hub for biomedical sciences. Through its infrastructure grants programme, NMRC plays an active role in promoting and guiding the development of world-class facilities to support cutting-edge translational and clinical research in Singapore.

Infrastructure Grants



INFRASTRUCTURE GRANTS

SINGAPORE CLINICAL RESEARCH INSTITUTE

Awarded an NMRC infrastructure grant in May 2008 and officially launched in June 2008, the Singapore Clinical Research Institute (SCRI) provides core services (clinical, bio-statistical, data and project management expertise, as well as medical informatics solutions) and infrastructure at the national level for later phase clinical research, as well as selected epidemiological and outcome research studies.

Since the commencement of its funding in 2008, SCRI has been extremely active in carrying out studies and building up its infrastructure and capabilities. To date the institute's achievements include:

- Developing a skilled and committed team of 53 staff.
- Establishing SCRI's operational capabilities, including a market presence through its website and marketing materials, and standard operating procedures (SOPs) for investigator-initiated clinical research grants and commercial contracts.
- An alliance agreement with Choice Pharma to expand SCRI's presence in the Asia-Pacific region.
- Providing single and multi-site expertise to 24 investigator-initiated studies.
- Four industry contracts, of which two are co-funded with NMRC funding.
- Two electronic data capture systems have been implemented: REDcap and Oracl Pharmaceutical.
- Establishing SCRI as the trial coordinating centre for four networks: the Asia-Pacific Hepatocellular Carcinoma (AHCC) Trials Group; the Pan-Asian Resuscitation Outcomes Study (PAROS) CRN; the Family Medicine Research Network (FMRN); and the Dementia Network.
- Thirty-eight publications in 2009–2010; seven articles with an impact factor greater than or equal to four.
- Awarding of seven NMRC grants with SCRI collaboration in 2009–2010, as well as four other foundation grants.
- Conducting of three Grant Enhancement Training workshops.
- Hosting of the 17th Cochrane Colloquium.

Through its efforts and achievements, SCRI has made great strides in developing clinical trial capabilities locally, which has helped to attract investments to Singapore and raise its profile as a leading regional location for conducting competitive, leading-edge clinical research.

More details about SCRI are available on its website: www.scri.edu.sg

INVESTIGATIONAL MEDICINE UNITS

In October 2007, NMRC approved a five-year infrastructure grant for the establishment of two Investigational Medicine Units (IMUs) under the auspices of the National University Health System (NUHS) and SingHealth healthcare clusters. The IMUs' mandate is to provide supporting infrastructure for clinician investigations—including dedicated space and beds for inpatient research, computer hardware and software systems for data management and analysis, and human resources such as clinical pharmacologists, specialised research nurses and biostatisticians—for early stage (Phase 1 to 2a) clinical trials.

The NUHS IMU, a 16-bed facility with full monitoring capability and synchronisation for pharmacokinetics/pharmacodynamics studies, as well as an outpatient consultation room, has established a volunteer database of 1,500 healthy individuals that mirror Singapore's demography. As of November 2010, the NUHS IMU has completed 24 studies, of which about 40% are investigator-initiated trials. This includes the largest H1N1-related study conducted in Singapore on the use of Choroquine for influenza prevention, which involved 1,518 trial participants over a three-month period.

The NUHS IMU has also formed an in-house Clinical Pharmacology group to provide specific clinical pharmacology expertise and advice. The group conducted novel PK/PD studies on modafinil dosing in the Singapore population and the co-administration of anti-viral drugs efavirenz, darunavir and ritonavir in healthy volunteers.

The SingHealth IMU, a 32-bed facility with a state-of-the-art chronobiology laboratory featuring two suites and an instrumentation room that provide a controlled environment for the study of circadian rhythms, has built up a database of 1,000 volunteers to support the studies it conducts. As of November 2010, the SingHealth IMU has completed 23 studies, including seven investigator-initiated trials. The IMU is focusing on innovative clinical trials such as microdosing and chronobiology, which represent distinct skills sets and competitive assets attractive to industry.

Both IMUs are actively engaged in international collaborations aimed at strengthening their international standing and exposure. The NUHS IMU is collaborating with the Mayo Clinic and a US biotech company, while the SingHealth IMU is developing its ties with the Duke Clinical Research Unit to facilitate trial collaborations between Singapore and the US.



CENTRE FOR BIOMEDICAL ETHICS

Established in 2006 in National University of Singapore's Yong Loo Lin School of Medicine, the Centre for Biomedical Ethics (CBmE) is Southeast Asia's first academic centre for biomedical ethics in a medical school. In January 2008, CBmE was awarded a four-year NMRC infrastructure grant for capacity development in biomedical ethics in Singapore, which has since been extended to the end of FY2013.

The funding is intended to support CBmE's efforts in the following areas:

- Training Singapore's biomedical science community in research ethics
- Strengthening clinical ethics training and support
- Educating the public to improve understanding of biomedical ethics issues and encourage greater involvement in biomedical research
- Creating a regional and international centre of excellence for bioethics
- Carrying out research of relevance to Singapore and the Bioethics Advisory Committee

In 2010, CBmE achieved several significant milestones, including the following:

- Hosting of the "International Conference on Death and Care of the Dying 2010", which saw a strong response from the clinical and academic communities in Singapore and the region, with 127 participants attending.
- Collaborating with A*STAR to provide training workshops on scientific misconduct, whistleblowing, conflicts of interest, authorship disputes and publication ethics.
- Involvement in the planning of the scientific programme of the 10th World Congress on Bioethics, including the hosting of a symposium on "Western or Eastern Principles in a Globalised Bioethics?" and a workshop on writing journal papers.
- Jointly organising the 11th Asian Bioethics Conference together with the Asian Bioethics Association and UNESCO.
- Conducting various workshops at schools in Singapore, targeted at both students and teachers.
- The launch of a bioethics exhibition at the Singapore Science Centre that will run for five years. This will greatly enhance the understanding and capacity amongst students in Singapore.
- Continued publication of Asian Bioethics Review (ABR), a quarterly journal. ABR has been accepted into the ProjectMUSE and ProQuest online academic databases.

Going forward, CBmE will continue to develop its outreach and global profile through collaborations with international bioethics bodies worldwide. It will also build on its efforts locally to grow the bioethics capacity in Singapore.

More details about CBmE are available on its website: <http://cbme.nus.edu.sg/>

RESEARCH BUILDINGS

In September 2008, two infrastructure grants of \$40 million each were recommended for the development of two new research buildings in Singapore, one at the Kent Ridge Campus and the other at the Outram Campus. The buildings will house wet and dry laboratories, as well as large shared equipment; in future, they may also house clinical research units and other research facilities.

The new research buildings will provide additional space to support new researchers (clinician scientists, clinician investigators and PhD scientists) recruited internationally or from the local population under BMS Phases II and III. The new facilities will also allow local institutions' existing research programmes to develop the scale necessary to be competitive internationally.

This new research infrastructure will establish the two sites as key centres of excellence for translational and clinical research. The new research infrastructure will be co-located and integrated with the two national tertiary hospitals (NUH at Kent Ridge; SGH and the various national centres at Outram), as well as the two medical schools (NUS Yong Loo Lin School of Medicine and Duke-NUS Graduate Medical School). The new buildings will also dovetail with the current plans to strengthen academic medicine at these two campuses.

Construction of both buildings is underway and on track, with the Centre for Translational Medicine (CeTM) at NUHS's Kent Ridge Campus expected to be completed by the third quarter of 2011 and the Research Tower at SingHealth's Outram Campus expected to be completed by the end of 2012. Following the construction phase, at least one year will be required to get the research labs up and running.

PUBLIC ENGAGEMENT PROGRAMME

As Singapore continues to develop into a hub for translational and clinical research, the need for a ready pool of participants for clinical trials will grow. It will become increasingly important for the public not just to be aware of the clinical research activities taking place here, but also to actively support them. To this end, NMRC formed a Public Engagement (PE) Advisory Committee in August 2009 to increase awareness of clinical research and in the process create a more active, informed and engaged partnership between the research community and the public.

Co-chaired by NMRC Board member Mrs Carmee Lim and Prof Ong Yong Yau, the PE Advisory Committee has pushed ahead with a number of initiatives, including developing a website (www.clinicalresearch.org.sg) and a set of education materials about clinical research and clinical trials. The website brings together a range of relevant information on clinical research that will be of interest to members of the public who want to learn more before deciding to take part in a clinical study. The booklets and brochures—which will be available at hospitals, national disease centres and polyclinics—contain information to address

the specific questions and concerns that potential volunteers may have, as well as providing a list of resources for further information.

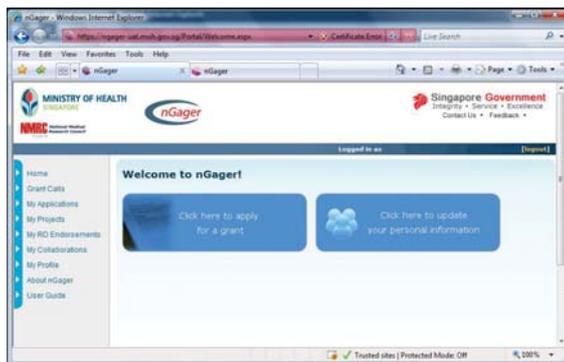
The efforts put in during 2010 have laid the groundwork for the public launch of NMRC's PE initiative, which took place in early January 2011. This includes a public forum held at Suntec City, which will highlight one of the studies within the Neuroscience TCR Flagship Programme—the Longitudinal Youth-At-Risk Study (LYRIKS). Presenters will educate the attendees on the importance of clinical research such as LYRIKS and the need for active participation from the public to make it a success.



NMRC GRANT APPLICATION AND GRANT EVALUATION FOR RESEARCH (nGager) SYSTEM

The NMRC Grant Application and Grant Evaluation for Research (nGager) System is an online application system developed by NMRC to streamline research grant application and management activities. The system brings together the processes for grant application, peer review, grant award and post-award activities in a single online interface.

In May 2010, the nGager System was commissioned for three NMRC grants: the New Investigator Grant (NIG), Exploratory/Developmental Grant (EDG) and Individual Research Grant (IRG). Going forward, the system will be continuously fine-tuned to adapt to changing requirements arising from new programmes under Singapore's Research, Innovation and Enterprise (RIE) 2015 roadmap. These changes will also be incorporated into the Phase II development of the nGager System under the auspices of MOH's IT master plan.



NEWS AND HIGHLIGHTS



Lab officer Pauline Lee checking the brain wave patterns of a subject who is sleeping in an almost silent suite at the chronology laboratory of Singapore General Hospital's Integrational Medicine Unit. ST PHOTO: NG SUI LIAN



The behaviour of the subject is monitored by researchers to determine how light affects the body's internal rhythm.

Trial and error

CLINICAL drug trials are typically conducted to test the benefits and risks of new drugs and how they best serve the patient.

The Health Sciences Authority regulates the conduct of these trials here, and those interested in starting a study must first obtain a clinical trial certificate.

Most clinical drug trials here are done by senior doctors or specialists in their fields of practice, and in recent years a sizeable number of trials have been in oncology and cardiology. Trials can last up to a year and are usually conducted on between 20 and 50 people. Before any trial begins, volunteers must be fully briefed on the process of the trial and the risks involved. They also have to sign a consent form after being given a detailed outline of what to expect.

While some trials are done on healthy volunteers, those taking part in certain trials, like for cancer drugs, are usually patients in advanced stages of the disease.

On the success rate of trials in cancer patients, Professor Stanley Kaye, a cancer researcher from Britain, said: "70 per cent of patients can have measurable benefits where the cancer shrinks."

SGH opens early-stage drug trial unit

32-bed centre's opening marks S'pore's bid to be hub for clinical studies

By Kimberly Sperkman
4 MAIN TOP

SINGAPORE General Hospital (SGH) has set up a centre with 32 beds for clinical scientists to conduct early-stage drug trials.

Already, more than 20 trials are going on at the SingHealth Investigational Medicine Unit, with patients and volunteers undergoing tests.

At a cost of \$20 million, the unit, which includes laboratories meant for the

study of the human body clock and how it works, was officially opened yesterday and marked Singapore's growing reputation as a place for clinical studies.

Between 2007 and last year, the number of clinical trials here shot up by 50 per cent, a trend mirrored across Asia.

Last year, the Health Sciences Authority certified 282 clinical trials. Of these, about a third were for cancer drugs.

There are other such units here, like the one at the National University Hospital. But the SGI unit is the largest in the public sector here. Funds will be pumped into the unit over five years by the Health Ministry's National Medical Research Council, SingHealth, Duke-NUS Graduate Medical School and the Singapore Institute of Clinical Sciences.

ciens are not subject to vagaries such as a bed crunch, unlike those who have to use beds in the existing wards.

SingHealth's group director of clinical research, Professor Fong Kok Yong, hopes the set-up will encourage more clinicians to undertake early-phase clinical research.

"The earlier phase is where you're more at the cutting edge as those are the newer therapeutic agents that you want to test and see how they work and react within the human body itself."

In the early phase of a trial, an experimental drug is tested for the first time in a small group of between 20 and 80 people, to evaluate its safety, determine a safe dosage range, and identify side effects. A full clinical trial has four phases before the drug can be marketed.

It was important to build up a research culture here. Referring to the pioneer batch of Duke-NUS medical graduates who will enter the field next year, he said:

"They have been prepared to be clinician scientists. We don't expect everyone to make clinical science a career for life, but we certainly hope the vast majority will start the first few years down the clinical science track."

He said a supportive environment was crucial for progress. "If it's stifling or destructive, I think that would be terrible. Students would be totally discouraged."

Professor Soo Ewe Chae, deputy CEO of SingHealth, referred to Singapore's population mix, which gives a good cross-section of people for clinical studies to be done, as a plus. "If a company were to do research in Singapore, it's like

doing it in three different countries - in China, India and Indonesia," he said.

"And if you couple that with the very high standard of medicine here, whatever clinical trials we do here will be more easily accepted by the regulatory authorities in the United States or Europe than if they were done in other countries."

Prof Fong said the centre has built up a database with close to 1,000 volunteers.

Most of the ongoing trials are for cancer patients, although links are also going on in fields such as immunology and infectious diseases.

When The Straits Times visited the unit yesterday, one patient was in the middle of a six-day "w/le" trial, which involved large amounts of rapid depuration, to study the effects of light on the internal body clock.

More doctor-scientists by 2015

Number of clinician-scientists to double; aim is to turn R&D into applications

By Grace Chea

THE number of science-trained doctors in Singapore is set to double by 2015, as the Government announced its target of training more clinician-scientists.

The announcement comes hot on the heels of a \$3.7 billion, five-year boost to the biomedical sciences research and development budget, announced earlier this month.

This aim is part of a \$16.1 billion research and development kitty for the next five years, most of which is intended to increase economic outcomes and industry value from research and development activities.

Speaking at a scientific conference yesterday, Deputy Prime Minister and Defence Minister Teo Chee Hean said a key goal was to have 160 such researchers by 2015, up from the current 80. The conference at Suntec Convention Centre was jointly hosted for the first time by health-care group SingHealth and the Duke-National University of Singapore (NUS) medical school.

These scientists, who also treat patients, get dedicated time to do their research and are the "critical link" to help convert biomedical laboratory research into medical applications, DPM Teo said. Such efforts are important to ensure that health care remains affordable to meet the needs of Singapore's ageing population.

But the current shortage of clinician-scientists is a key bottleneck to growing industry collaborations, he pointed out. "Grooming a larger pipeline of world-class clinician-scientists is therefore a priority," he said.

Already, such clinician-scientists have been involved in clinical breakthroughs and innovations. For instance, Professor Wong Tien Yin, director of the Singapore Eye Research Institute, has tested whether simple eye scans can predict a patient's risk of heart attack and diabetes. For his work, he received the President's Science Award last month.

There are about 8,000 registered doctors here, many of whom also do some form of medical research. But by the official definition, clinician-scientists are those who spend at least half their time conducting studies and clinical trials.

Singapore's push to train more physician-scientists began in earnest several years ago with the setting up of a fund for MBBS-PhD scholarships. And in 2006, the Duke-NUS Graduate Medical School began recruiting students. Today, it takes in about 50 students a year, with some 10 to 20 per cent expressing keen interest in research, said Duke-NUS dean Ranga Krishnan.

So training another 80 clinician-scientists in

Twice as many clinician-scientists by 2015

Boost to 160 needed to make big jump here in translational and clinical research: DPM

By Felda Chay
feldac@sph.com.sg

SINGAPORE will double the number of clinician-scientists here to 160 by 2015 to boost translational and clinical research, says Deputy Prime Minister and Minister for Defence Teo Chee Hean.

He added that more funding will be channelled to the area under the government's \$3.7 billion R&D budget, while speaking at the SingHealth Duke-NUS Scientific Congress yesterday. Singapore's translational and clinical research initiative was started in 2006.

The moves come as industry

players in the research area - which translates laboratory discoveries into health and industrial applications - say that the sector is facing a shortage of such scientists, who are doctors holding PhDs in science. There are currently 80 clinician scientists focusing on translational and clinical research.

"Industry has fed back that the current shortage of clinician-scientists is a key bottleneck to growing our industry collaborations. Grooming a larger pipeline of world-class clinician scientists is therefore a priority," said Mr Teo to an audience of doctors, clinician-scientists, nurses and allied health professionals.

Unlike basic scientists, clinician-scientists treat human patients, and therefore have a real-world understanding of what is needed to discover and develop new drugs and medical devices.

This understanding is essential

to help the research community derive economic returns from their work - an area that the government will focus on, said Mr Teo.

"In the next R&D funding period, there will be a sharper focus on deriving economic value and outcomes with high impact," said Mr Teo. This means being able to turn research into products and solutions that can be sold in the market, in turn spurring private sector investment.

"While clinician-scientists can develop new drugs and medical devices, most patients will not be able to benefit until companies manufacture and make them generally available," he said. The research community must therefore engage more with industry players.

But not all healthcare research can create direct economic value in the short term - a point that Mr Teo acknowledged.

"We will therefore continue to take a portfolio approach, and research projects will be evaluated on the basis of the overall impact that they are likely to generate," he said.

Mr Teo's comments come amid a national thrust to promote research, innovation and enterprise.

Last month, the government said that it would spend one per cent of GDP, or \$16.1 billion, over the next five years to achieve Singapore's long-term goal of being among the most research-intensive, innovative and entrepreneurial economies in the world.

Last week, the government announced that it will be investing \$3.7 billion in biomedical sciences research for the next five years.

This is a 12 per cent increase over the investment by the government for 2006-2010.

FINANCIAL HIGHLIGHTS

NMRC 2010 COMMITMENTS

TALENT DEVELOPMENT AWARDS

Singapore Translational Research (STaR) Investigator Award	9.50
Clinician Scientist Award (CSA)	20.67
NRF-MOH Healthcare Research Scholarship	0.50
NMRC Research Training Fellowship	2.00
Masters of Clinical Investigation (MCI)	0.65

RESEARCH GRANTS (STRATEGIC/INVESTIGATOR-INITIATED)

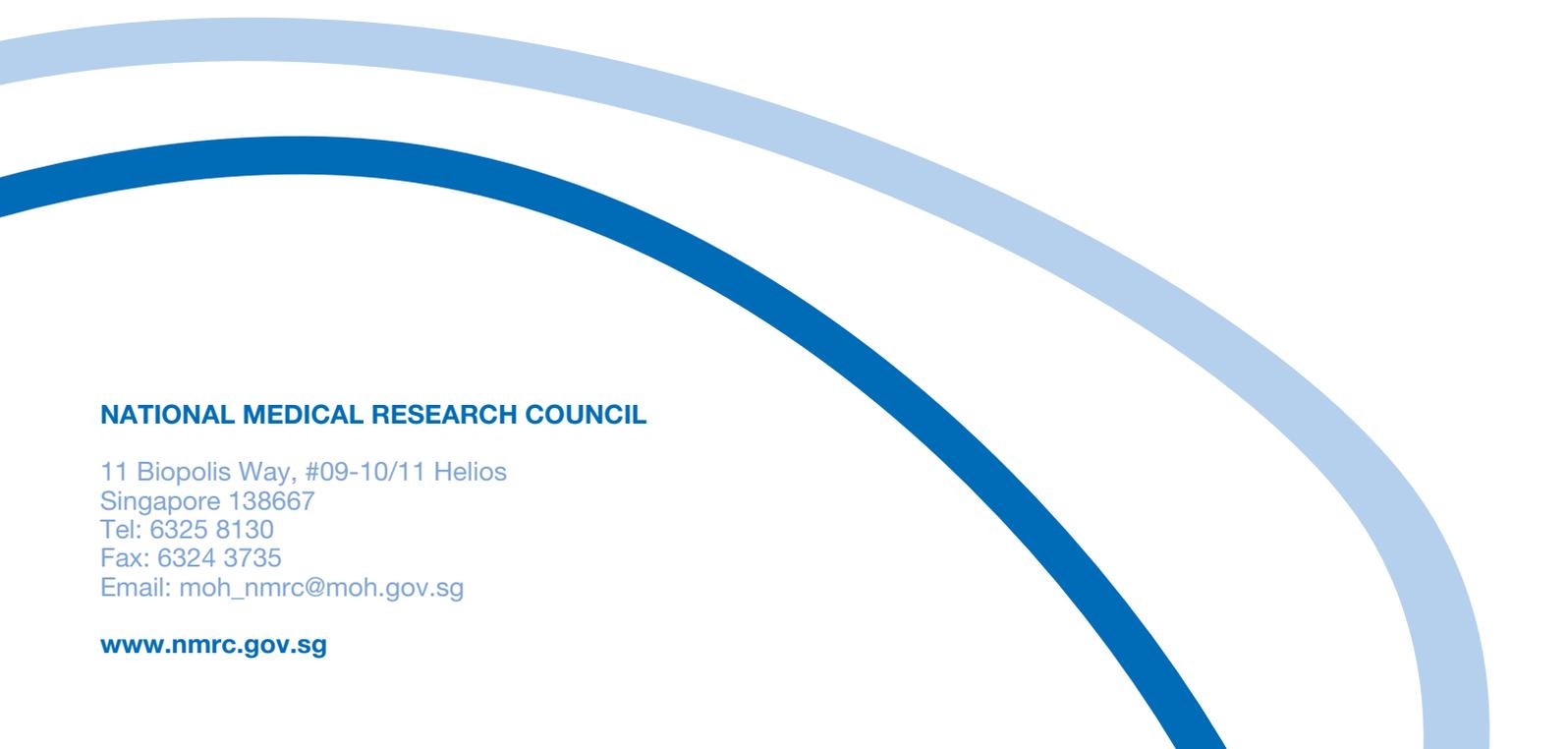
Individual Research Grant (IRG)	40.56
Exploratory/Developmental Grant (EDG) & New Investigator Grant (NIG)	10.78
Centre Grant (CG)/ Programme Project Grant (PPG)	9.60

Committed Amount (\$M)

	9.50
	20.67
	0.50
	2.00
	0.65
	40.56
	10.78
	9.60
	94.26

BMS PHASE II COMMITMENTS AS OF 31 DECEMBER 2010 (\$M)





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