This report covers NMRC's 2007 financial year, which ran from 1 April 2007 to 31 March 2008.

“Symbiosis: Connecting Research to Life” highlights the important interaction between clinicians and scientists in Singapore’s medical research sector. In this symbiotic relationship, the two sides work hand in hand, and each side benefits from the insights and experience of the other. The result is a vibrant translational research sector that brings findings from bench to bedside, and insights from bedside to bench; ultimately improving patients’ outcomes.

NMRC Mission Statement:

“To promote excellence in translational and clinical research, nurture a vibrant research community of clinicians and scientists in Singapore and enhance knowledge exchange to improve human health.”
Great progress, optimistic outlook
Singapore’s translational research landscape has made tremendous progress since the start of Phase 1 of the Biomedical Sciences (BMS) Initiatives in 2000, and NMRC has played a key role in this development. The early years focused on major investments and capacity-building in basic research, which has laid the foundation on which NMRC is now building up translational research capabilities.

As of 2007—more than two years into BMS Phase 2—NMRC has made considerable strides in setting up new programmes and planting the seeds for future achievements. But we are still only in the beginning stages of the process. Translational research tends to require a lengthy time frame to see results, so a measuring stick longer than two years is required to assess the success of our efforts thus far. Singapore has committed to making translational research and biomedical science a strategic component of the country’s economy, and this long-term view, and the stability that it entails, will enable the translational research initiatives to bear fruit.

World-class research, Asian emphasis
With its excellent infrastructure and resources and a rapidly growing community of experienced clinical researchers, Singapore is building up its capabilities as a world-class translational research centre. One area in which Singapore is particularly well-positioned to carve out a niche for itself on the world stage—one due to the combination of a predominantly Asian population, an advanced and efficient scientific environment, and a superb healthcare system—is in the study of diseases affecting Asian populations. From infectious diseases prevalent in the region to specific types of eye diseases and cancers that are particularly common among Asians, researchers in Singapore are taking the lead in tackling these problems.

Bright future, abundant opportunities
As we look to 2008 and beyond, we are optimistic about what the future holds for translational research in Singapore. Having implemented various programmes and funded many studies, the challenge going forward will be to remain nimble as we start to see what is working and what is not, and to adapt how we channel our resources accordingly.

The ultimate achievement that we strive for is the day when we can say that investigators in Singapore have conceptualised, researched, developed and tested a novel solution to a disease that improves the way medical professionals worldwide treat their patients. As the investigators funded by NMRC and our many other stakeholders take steps every day towards reaching this goal, we will make many other contributions along the way that will be smaller in scale but no less important. In the end, every new insight, development and innovation resulting from these research efforts will benefit patients, thus fulfilling the primary objective of our “bench to bedside” translational research activities.

“With its excellent infrastructure and resources and a rapidly growing community of experienced clinical researchers, Singapore is building up its capabilities as a world-class translational research centre.”
Working in close collaboration with other agencies, we aim to fulfil our role in driving translational research in Singapore, both now and in the future.

A catalyst for innovation
Translational and clinical research was added to the Ministry of Health’s mandate in 2006, and since then NMRC has embraced its expanded role in leading, coordinating and funding medical research in Singapore. With a newly minted mission and additional funding, we have actively expanded our activities in the two key areas that form the pillars of NMRC’s function: grant and talent development. In both areas we serve as a catalyst for translational research, either by selecting and funding specific research initiatives or by identifying and supporting the growth of talented researchers. Working in close collaboration with other agencies, we aim to fulfil our role in driving translational research in Singapore, both now and in the future.

A year of achievement
We had a busy 2007 financial year, with NMRC launching several major initiatives. One of our key achievements of the past year was the awarding of the inaugural Translational & Clinical Research (TCR) Flagship Programme for gastric cancer research. Awarded in July 2007, this landmark initiative will see NMRC provide S$25 million in funding over five years to the Singapore Gastric Cancer Consortium for research aimed at improving early detection of gastric cancer. This project was the first of five TCR grants to be given out by NMRC. Two more, one for neuroscience and one for eye diseases, were subsequently awarded in early 2008.

Another important first was the inaugural National Medical Excellence Awards (NMEA), an initiative by the Ministry of Health launched in March 2008. Aimed at recognising individuals and teams in Singapore’s medical sector for their achievements in clinical work, research and mentoring of young clinicians, the NMEA will help to focus the spotlight on the groundbreaking work being done here. NMEA 2008 saw six awards given out to four individuals and two teams in fields ranging from paediatric nephrology and ophthalmology research to mental health and perinatal care.

While less glamorous than the TCR programme and the NMEA, another important NMRC milestone for 2007 was the revamping of our grants’ terms and conditions. Aiming to create a smoother process for grant applicants and awardees while maintaining strong governance, we implemented changes such as simplifying the grant extension procedure. Previously, awardees wishing to extend their grant had to submit detailed documentation in support of their request; now, as long as their funding requirements do not increase, awardees can automatically renew their grant for one year by simply notifying NMRC of their desire to do so. Ultimately, we want to ensure that scientists and clinicians spend as little time as possible on administrative work and as much time as possible conducting research.

Plans for the future
We have done well to successfully launch and support various grant and talent programmes over the past few years—no small feat as we were essentially building the road while already driving on it. NMRC is constantly working to enhance existing programmes and develop new initiatives to facilitate translational research in Singapore. We continue to undertake study trips to see how other countries support their translational research sectors, but we are mindful of the need to adapt international best practices to our uniquely Singaporean environment.

Looking ahead, we have plans to launch a new programme in 2008 that will facilitate dialogue and networking between members of the scientific community and industry in specific fields, with the aim of encouraging greater collaboration. The coming year will also see work continue on the development of an electronic grant-management system. This is a massive undertaking—involving collaboration with sister funding agencies such as the National Research Foundation and the Ministry of Education—that aims to streamline the management of grant applications and awards by developing common interfaces and data fields that will be harmonised across various agencies.

In this annual report we have highlighted a handful of the many exciting projects and talented investigators that NMRC funds to give our stakeholders a better insight into the work that we support. These profiles provide just a hint of what’s to come as Singapore’s translational research sector gains momentum, and we look forward to writing that future together with our partners in the research and medical community.

Executive Director’s Message
Dr Edwin Low
Executive Director
About NMRC

The National Medical Research Council was established in 1994 as an agency under the Ministry of Health. It was tasked with overseeing the development and advancement of medical research in Singapore. Its responsibilities now include the provision of research funds to healthcare institutions, the awarding of competitive research funds for individual projects, and the development of clinician scientists through awards and fellowships.

Grant applications to NMRC are evaluated by multi-disciplinary review panels consisting of specialists from a variety of fields. This peer review process ensures rigorous screening so that funding is distributed in a consistent and effective manner. Since its inception, NMRC has funded more than 1,100 individual research projects and 13 national research programmes.

NMRC’s activities also extend beyond the distribution of funds to include initiatives to promote closer collaboration between various stakeholders in Singapore’s medical sector, attract and develop new research talent, and assist with the commercialisation of research findings.
Overall Grant Framework

**TALENT DEVELOPMENT PROGRAMMES**

- SINGAPORE TRANSLATIONAL RESEARCH INVESTIGATOR AWARD (STaR)
- NMRC FELLOWSHIP / NRF - MOH RESEARCH SCHOLARSHIPS

**RESEARCH GRANTS**

- STRATEGIC / PROGRAMMATIC INVESTIGATOR-LED RESEARCH
- TRANSLATIONAL AND CLINICAL RESEARCH (TCR) FLAGSHIP PROGRAMME
- BLOCK GRANTS (INSTITUTIONAL BLOCK GRANT AND ENABLING GRANT)
- NEW INVESTIGATOR GRANT (NIG)

**EXPLORATORY / DEVELOPMENTAL GRANT (EDG)**

**INDIVIDUAL RESEARCH GRANT (IRG)**
overseas PhDs), as well as protected time for tuition fees, and a maintenance allowance (for research. The scholarship provides a salary, targeted at clinicians intending to pursue a career in a PhD programme locally or overseas. It is Specialty Trainee (AST) doctors who wish to enrol. This scholarship provides support to Advanced Healthcare Research Scholarship (PhD) National Research Foundation-Ministry of Health to together with a competitive research grant. The award provides funding for full salary support, and a one-time start-up grant. The funding of a StaR award runs between three and five years.

Clinician Scientist Award (CSA)

The CSA is structured to develop local research talent and give clinician scientists protected time to focus on their research. The Senior Investigator level of the CSA offers funding for five years, while the Investigator level runs for three years. The award provides funding for the researcher’s salary, an annual budget for research support, and a one-time start-up grant. The funding of a CSA award runs between three and five years.

National Research Foundation-Ministry of Health Research Scholarship (MCI)

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

NMRC Research Training Fellowship

The NMRC Fellowship aims to provide doctors with the training necessary to become clinician scientists. This can include overseas research training or pursuing a PhD in research at a local institution. The award is available to medical doctors and dental surgeons registered with the Singapore Medical Council or Singapore Dental Board. Recipients of the fellowship receive salary and tuition fees for local PhD programmes, or allowances and other benefits in line with the host institution’s policies for overseas research attachments.

Individual Research Grant

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.

Exploratory/Developmental Grant

These grants support the development of innovative and new areas of research. They are applicable to research on untested and novel ideas, original research fields, and the application of new expertise or approaches to established research topics. Funding is available for a two-year period, with the possibility of a one-year extension.

New Investigator Grant

A sub-category under the Exploratory/Developmental Grant, the New Investigator Grant (NIG) is open to investigators who have not held a reputable national or international grant previously. Each investigator will work with a mentor for guidance in their research. This mentorship will provide support for a period of supervised research leading eventually to the clinician researcher conducting larger-scale research projects independently.

NMRC Talent Development Programmes

Singapore Translational Research (StaR) Investigator Award

The prestigious StaR award is designed to recruit and nurture world-class clinician scientists to undertake cutting edge translational and clinical research in Singapore. The StaR programme comprises three award levels—Distinguished Senior Investigator, Senior Investigator and Investigator. Each award includes funding for the researcher’s salary, an annual budget for research support, and a one-time start-up grant. The funding of a StaR award runs between three and five years.

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Translational & Clinical Research (TCR) Flagship Programme

The TCR programme provides a significant level of funding, with the aim of establishing Singapore as a global leader in the study of key strategic medical research fields. The programme is designed to help build up a critical mass of experienced high-level researchers, facilitating a broader research platform and increased collaboration both locally and internationally. Each TCR recipient is awarded S$25 million over five years, with the funding provided by the National Research Foundation. The five key areas targeted by the TCR programme are selected for their relevance to Singapore and the existence of strong local expertise. The five key areas are cancer, cardiovascular/metabolic disorders, neurosciences, infectious diseases and eye diseases.

Block Grant

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Note: The TCR Flagship Programme and the EDG are funded by the National Research Foundation.
Pushing the Limits

How one doctor driven by passion has improved the lives of thousands of children suffering from kidney failure

From a young doctor in the early 1980s to Head of the Paediatric Nephrology Division at the University Children’s Medical Institute, National University Hospital—which evolved from the paediatric nephrology programme started by Prof Yap more than 20 years ago—treats more than 2,000 patients annually. Funded primarily by sponsors and donations, the centre operates on the principle that no child suffering from kidney failure should be denied access to treatment due to a lack of financial means.

The ten minutes that made a difference

Back in Singapore and armed with experience gained in the US, Professor Yap questioned why the same treatment given to children suffering from kidney failure there could not be administered here. As the biggest obstacle was a lack of funding, she decided to take matters into her own hands, despite the naysayers. “I called up a large company for an appointment and was told that I would have only ten minutes. I took along two slides illustrating the dialysis procedure in one of the child patients and explained that I was seeking funding to provide him with dialysis,” reminisces Prof Yap. “I walked out of that first meeting with a commitment for S$20,000 in funding, and that’s how our paediatric nephrology programme was born.”

Encouraged by this early success, Prof Yap pushed on, approaching more sponsors and raising more funding one child at a time. After two years of dialysis for the programme’s first patient, Prof Yap and her team achieved another major milestone by carrying out Singapore’s first paediatric kidney transplant on the 3-year-old child.

Bigger, better and still innovating

Today, the Shaw-NKF Children’s Kidney Centre at the University Children’s Medical Institute, National University Hospital—which started as a clinic serving sick children suffering from kidney failure—back to Singapore. Over the past 10 years, Prof Yap has been awarded more than 12 grants by NMRC, making her one of the council’s top researchers.

Prof Yap’s paediatric nephrology department is recognised as a centre of excellence throughout the region, attracting doctors from across Asia who come to Singapore to develop expertise in this field. “We now have international fellows coming to Singapore from other countries to learn,” explains Prof Yap. “Their studies here involve training in all aspects of paediatric nephrology, including dialysis training by our specialised nurses so that they can then train others when they return home. So far we have trained about 15 foreign doctors and two nurses from the region.”

Advice for the next generation

While it is difficult to imagine this dynamic doctor ever slowing down, Prof Yap notes that one of the things on her to-do list is to identify and develop others to carry on the programmes that she has started. Describing the ideal candidate, she notes: “You need to have passion and you must be prepared to continue even when you don’t succeed the first time.” Indeed, spoken from experience.

If you put a limit on what you think you can achieve, then you will be limited. This applies in research just as much as it does in other areas of life.

Ongoing research and learning

Always on the go, Prof Yap maintains a busy schedule of teaching and clinical duties. However, research continues to play an important role in her activities as she strives to improve the treatment options for children with kidney failure. Over the past 10 years, Prof Yap has been awarded more than 12 grants by NMRC, making her one of the council’s top researchers.

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Professor Yap Hui Kim

From a young doctor in the early 1980s to Head of the Paediatric Nephrology Division at the University Children’s Medical Institute, National University Hospital System today, Professor Yap Hui Kim has consistently been driven by her passion to make a difference in the lives of her patients.

“Back when I started out, the outlook for children diagnosed with kidney failure in Singapore was very bleak due to the lack of specialised equipment and expertise to treat them,” explains Prof Yap. Appalled by the dismal prospects facing these sick children, Prof Yap went to the US to learn about paediatric nephrology, in particular dialysis and transplantation, in order to bring this knowledge—and hope for young patients with kidney failure—back to Singapore. Over the course of two years, she carried out extensive research and gained practical experience, persevering through challenging conditions along the way.

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If you put a limit on what you think you can achieve, then you will be limited. This applies in research just as much as it does in other areas of life.
Research is to see what everybody else has seen, and to think what nobody else has thought.

- Albert Szent-Gyorgyi, winner of the 1937 Nobel Prize for Medicine

TALENT Development Programmes

Investing in People

Talent development plays a primary role in NMRC’s efforts to nurture a vibrant research community of clinician scientists in Singapore.
Awarding innovative research

Professor Virshup’s many years of research experience and considerable expertise in his field garnered him a newly introduced Singapore Translational Research Investigator Award (STaR). Given out to top-level researchers who have attained a high level of international recognition and competitiveness, the STaR award enables recipients to perform exploratory research, particularly on novel or pioneering ideas.

Keenly aware of the importance of a significant and stable source of funding for medical research, NMRC has developed a framework of grants that provides funding to not only institutions, but also individual researchers and teams. Its focus on providing an environment conducive to world-class research has not gone unnoticed, and has started to attract promising research talents from around the world to Singapore.

Focus on research

Prof Virshup points out that receiving the award has removed a major source of worry and will allow him and his team to focus much more effectively on the task at hand—namely, research. “The funding gives a lot of freedom to stop worrying about grants … and concentrate on just doing the best research you can.”

As part of the STaR award, Prof Virshup will receive a S$5 million grant over five years to continue to develop his innovative research on cancer treatment. Prior to arriving in Singapore, he was involved in research targeting the proliferation of cancer stem cells as a potential treatment for many common cancers such as colon, liver and breast cancers, and leukaemias. Research in this area is still very new and there is much more work to be done before reaching the stage at which new drugs will become available to patients.

For his research under STaR, Prof Virshup will be working on developing small molecule inhibitors of Wnt signalling, a complex network of proteins known to have a role in the development of cancer stem cells. It is hoped that by controlling Wnt signalling, it will be possible to regulate stem cell maintenance and proliferation, resulting in a therapy treatment for certain kinds of cancer.

With talented researchers like Prof Virshup and the exciting work that he and his team are undertaking, the future of translational research in Singapore holds much promise.
The Accidental Researcher

How a combination of passion and chance has led to a successful career as a clinician scientist

For Associate Professor Tan Eng King, a chance invitation to work in a lab grew into a passion for research—and set this young doctor on an unexpected but ultimately rewarding career path.

A twist of fate
As a clinical neurologist, A/Prof Tan went to the US on a fellowship for specialised training in disorders of movement, his sub-specialty. He originally planned to return to Singapore after one year in the US, but a chance encounter in a corridor with Professor Tetsuo Ashizawa one evening changed everything. “Professor Ashizawa said that I must be very hardworking as I always seemed to be at the hospital, so he asked whether I was interested in gaining some experience in his neuro-genetics lab,” recalls A/Prof Tan. “I went to have a look at his lab and found it quite interesting, with people working there from around the world. So I applied and was approved for an NMRC fellowship to stay on in the US to work with Professor Ashizawa and Professor Joseph Jankovic. It was that chance meeting that started my career in lab research.”

That first foray into research has helped to shape much of A/Prof Tan’s career to date. His current research work focuses on understanding the genetics behind neuropsychiatric diseases—an important field given the age-related nature of these illnesses and Singapore’s aging population—in order to better identify those at risk. He was part of a team that discovered two common risk variants likely to cause Parkinson’s disease. As the risk variants are carried by a proportion of the population that may otherwise be healthy, the aim of the research is now to determine whether there are specific biomarkers related to these risk variants that indicate a higher probability of developing the disease.

Other serendipitous events over the years have helped to further A/Prof Tan’s career as a clinician scientist. For instance, when he returned to Singapore from the US he was enthusiastic and full of ambition to continue his research work here, but he lacked the resources to start a lab. It was only when Dr Aw Swee Eng, chair of the Clinical Research Department at Singapore General Hospital, decided to take a chance on A/Prof Tan that he got a break. Dr Aw provided the funding that enabled him to hire a post-doc and start building up a lab.

Another important boost in his translational research career path came in 2002, when SingHealth introduced a clinician scientist scheme at Singapore General Hospital. Although he had only recently returned to Singapore and was only just starting to establish himself, A/Prof Tan was persuaded by colleagues to apply for the programme and ended up being chosen as one of the four doctors in the scheme’s pioneer batch. Being chosen for the programme gave his research work a boost in terms of access to resources, and he hasn’t looked back since.

A driving force
The research that A/Prof Tan carries out has evolved over the years, growing in complexity and depth along with his understanding of the field. His research is now moving increasingly from applied science into basic science. His group is now trying to elucidate functions of proteins encoded by disease-causing genes. Growth as a scientist is the main reason for this shift, he explains with enthusiasm: “The work becomes more and more complicated—and thus more interesting—as I move further into basic science. It is a learning process for me. At the end of the day, doing basic research while also carrying out clinical duties gives my work a competitive advantage in terms of my overall understanding of the issues.”

A/Prof Tan’s passion and achievements in the field of neuroscience have brought him international recognition and led him to wear many professional hats. In addition to his already heavy workload as a clinician scientist, he is currently an associate editor for two leading neurological journals (European Journal of Neurology and Parkinsonism & Related Disorders)—positions for which he was selected and appointed based on his international reputation.

On occasion, A/Prof Tan’s enthusiasm for research has gotten him into a spot of trouble. “While living in the US, I came home one evening at midnight to find that my wife had locked me out of our condo,” relates A/Prof Tan. “It was a four-day long weekend—a time when most people would be enjoying a break with family and friends—and this was the fourth night in a row that I had come home late from the lab, so my wife had had enough! This is the passion I have for my work and my research—I get so engrossed in it.”
Supported Research
Overview of NMRC-
patients with CML.

Two-drug combination in clinical study to test a novel

Collaboration plays a critical role in this research. A/Prof Ong's team works closely with members of the Department of Haematology at the Singapore General Hospital, and it is starting to collaborate with doctors at the National Cancer Centre Singapore on work related to solid tumours. Within Duke-NUS Graduate Medical School, the team works with scientists in the cancer stem cell biology programme, and it also has ongoing studies with collaborators at National University Hospital and various local and overseas research institutes.

One of the benefits of Singapore's expanding translational research scene is the diversification of scientific expertise available here. Laundering the growing research community, A/Prof Ong notes, "Now you don't necessarily have to go overseas to find a collaborator with the right skills and background. This was an important motivation for me to come back to Singapore."

"Timing is everything. "Ten to fifteen years ago, there was not a critical mass of translational research work being done in Singapore," says A/Prof Ong, "I had always wanted to come back here, but only if there were some... "

In 1993, A/Prof Ong left Singapore for the US to pursue his ambitions to work as a clinician scientist, a career for which the prospects here were limited at the time. As a young doctor with an interest in medical research, he was attracted to the opportunities available overseas to pursue further specialised training and get involved in groundbreaking research. Starting out with four years of haematology/oncology fellowship training at the University of Chicago, he then moved to the University of California at Irvine, where he worked for 10 years.

Fourteen years after leaving Singapore to pursue a career in the US, one doctor has been drawn back home by the opportunities here. A/Prof Ong finds the situation here to be quite good, with ample funding available for applicants with solid research proposals in terms of access to equipment and other scientific resources needed for lab work, A/Prof Ong feels that Singapore is on par with the US, although some materials such as reagents can take longer to obtain and can be more costly here. When it comes to human resources, he feels that it is now easier to attract talented graduates and post-docs in Singapore who are excited to pursue laboratory-based translational projects. He notes, "Some of the people that we have coming through our labs are as good if not better than the people who would apply to work in the labs back where I worked previously in the US."

Given the rapid growth of opportunities, these are indeed exciting times for the local translational research sector. As A/Prof Ong's example shows, there is no time like the present for researchers from around the world to follow suit and join Singapore's burgeoning scientific community.

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At Duke-NUS Graduate Medical School, A/Prof Ong now leads a research team working to improve the understanding of the mechanisms that fuel the uncontrolled growth of Chronic Myelogenous Leukaemia (CML) cells in patients with this form of cancer. Currently, the team is leading an international clinical study to test a novel two-drug combination in patients with CML.

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One of the benefits of Singapore's expanding translational research scene is the diversification of scientific expertise available here. Laundering the growing research community, A/Prof Ong notes, "Now you don't necessarily have to go overseas to find a collaborator with the right skills and background. This was an important motivation for me to come back to Singapore."

In 1993, A/Prof Ong left Singapore for the US to pursue his ambitions to work as a clinician scientist, a career for which the prospects here were limited at the time. As a young doctor with an interest in medical research, he was attracted to the opportunities available overseas to pursue further specialised training and get involved in groundbreaking research. Starting out with four years of haematology/oncology fellowship training at the University of Chicago, he then moved to the University of California at Irvine, where he worked for 10 years.

Fourteen years after leaving Singapore to pursue a career in the US, one doctor has been drawn back home by the opportunities here. A/Prof Ong finds the situation here to be quite good, with ample funding available for applicants with solid research proposals in terms of access to equipment and other scientific resources needed for lab work, A/Prof Ong feels that Singapore is on par with the US, although some materials such as reagents can take longer to obtain and can be more costly here. When it comes to human resources, he feels that it is now easier to attract talented graduates and post-docs in Singapore who are excited to pursue laboratory-based translational projects. He notes, "Some of the people that we have coming through our labs are as good if not better than the people who would apply to work in the labs back where I worked previously in the US."

Given the rapid growth of opportunities, these are indeed exciting times for the local translational research sector. As A/Prof Ong's example shows, there is no time like the present for researchers from around the world to follow suit and join Singapore's burgeoning scientific community.

Now you don’t necessarily have to go overseas to find a collaborator with the right skills and background. This was an important motivation for me to come back to Singapore.

Timing is everything. "Ten to fifteen years ago, there was not a critical mass of translational research work being done in Singapore," says A/Prof Ong, "I had always wanted to come back here, but only if there was a solid professional reason for doing so. It was only in the past two years or so, with the launch of Phase 2 of Singapore's Biomedical Sciences Initiatives, that I felt that there was a real push in this area that allowed me to come back and expand my research horizons. It was also an exciting opportunity to come back and be part of a new medical school."

At Duke-NUS Graduate Medical School, A/Prof Ong now leads a research team working to improve the understanding of the mechanisms that fuel the uncontrolled growth of Chronic Myelogenous Leukaemia (CML) cells in patients with this form of cancer. Currently, the team is leading an international clinical study to test a novel two-drug combination in patients with CML.

Collaboration plays a critical role in this research. A/Prof Ong’s team works closely with members of the Department of Haematology at the Singapore General Hospital, and it is starting to collaborate with doctors at the National Cancer Centre Singapore on work related to solid tumours. Within Duke-NUS Graduate Medical School, the team works with scientists in the cancer stem cell biology programme, and it also has ongoing studies with collaborators at National University Hospital and various local and overseas research institutes.

One of the benefits of Singapore’s expanding translational research scene is the diversification of scientific expertise available here. Laundering the growing research community, A/Prof Ong notes, “Now you don’t necessarily have to go overseas to find a collaborator with the right skills and background. This was an important motivation for me to come back to Singapore.”

Timing is everything. "Ten to fifteen years ago, there was not a critical mass of translational research work being done in Singapore," says A/Prof Ong, "I had always wanted to come back here, but only if there was a solid professional reason for doing so. It was only in the past two years or so, with the launch of Phase 2 of Singapore's Biomedical Sciences Initiatives, that I felt that there was a real push in this area that allowed me to come back and expand my research horizons. It was also an exciting opportunity to come back and be part of a new medical school."
Dr Leong Hoe Nam doesn’t disguise his feelings about the freedom to explore that he felt during his studies for a PhD at University College of London in the UK. “It was fantastic, and very different from clinical work,” he explains. “You get the opportunity to phrase questions for a problem, and then form experiments to answer those questions.”

The chance to be a student again and let his mind run free gave Dr Leong the opportunity to explore problems of specific interest to his area of research. “There were fewer restrictions on experimental work, and I was not limited by a syllabus. I was answering questions because I wanted to—able to do this while surrounded by students and professors from various disciplines made it a truly special environment for learning and research,” he points out.

Dr Leong’s research focus is in the area of infectious diseases and novo-pathogens. He is the recipient of two NMRC fellowships: one to study for his PhD in the United Kingdom, and another to take up a research attachment at Columbia University in the US. He currently splits his time between clinical work and lab research at Singapore General Hospital.

Consultant, Department of Internal Medicine, Singapore General Hospital
Recipient of NMRC Medical Research Fellowship

Overview of NMRC-Supported Research
Dr Leong’s research focus is in the area of infectious diseases and novo-pathogens. He is the recipient of two NMRC fellowships: one to study for his PhD in the United Kingdom, and another to take up a research attachment at Columbia University in New York. There, he was able to immerse himself in some of the cutting-edge research being done in novo-pathogens and infectious diseases.

He now puts the knowledge gained in the UK and US to good use back in Singapore, where he works as a consultant in the Department of Internal Medicine at Singapore General Hospital—splitting his time between clinical work and lab research. As part of the funding for his overseas research attachment, Dr Leong also received S$30,000 as seed funding to allow him to undertake translational research when he returned. This allowed him to hit the ground running upon his return and gave him some time to get started on the process of further grant writing.

Making an impact
Dr Leong’s enthusiasm for research is driven in part by a desire to help as many people as possible. He points out that as a clinician you can see only a certain number of patients per day, but the developments coming from science and research have the potential to help countless number of people. “New scientific or medical developments can have an impact across borders and time,” he adds.

In this light, Dr Leong sees doing a PhD as something of an altruistic act. “You need to have a passion to find answers to help mankind,” he explains. “And the reward for your hard work is the possibility to add an important brick to the foundation of understanding.”

Novo-pathogen niche
Dr Leong’s sees a bright outlook for his area of research, which involves novo-pathogens and infectious diseases. He believes that Singapore is well placed to create a special niche for itself, as it has a number of factors in its favour. First, the study of novo-pathogens requires samples (from clinics and hospitals), and Singapore’s position as a medical hub means it sees many regional cases. There are also a lot of transplants done in Singapore, which can often lead to interesting and novel infections. Another important factor is the need for lab facilities, which Singapore has, and the fact that no other country in Asia-Pacific has a specific focus on novo-pathogens, leaving the door open for Singapore to establish itself as a regional, if not global, leader in the field.

Of course, any significant development of the translational research sector will require a pool of trained and capable scientists and researchers. To this end, Dr Leong sees the need for more doctors with entrepreneurial minds who are willing to think outside the box. “Doing a PhD requires you to be a maverick in some ways. You’re trying something new and taking more risks,” he explains.

If more doctors take their cue from Dr Leong and explore the rewarding possibilities that a PhD and career in research offer, there’s no doubt Singapore will be well on its way to developing a vibrant research community.

Dr Leong Hoe Nam

Position & Institution
Consultant, Department of Internal Medicine, Singapore General Hospital
Recipient of NMRC Medical Research Fellowship

The desire to explore new areas and have a broader impact on medical advances drives one doctor’s interest in research

NMRC support
Dr Leong’s three years of study, from 2004 to 2007, were made possible in part by an NMRC Medical Research Fellowship. He received further support from NMRC following his PhD studies in the form of funding for an overseas research attachment at Columbia University in New York. There, he was able to immerse himself in some of the cutting-edge research being done in novo-pathogens and infectious diseases.

New scientific or medical developments can have an impact across borders and time. And the reward for your hard work is the possibility to add an important brick to the foundation of understanding.
### Singapore Translational Research Investigator Award (STaR)

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Area of Research / Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof Michael Chee Wei Liang*</td>
<td>Duke-NUS GMS</td>
<td>“Neuroergo: A Multimodality Study of the Effects of Cognitive Workload and Sleep Deprivation on Lapses in Attention and Decision Making”</td>
</tr>
<tr>
<td>Prof David M Vinhup</td>
<td>Duke-NUS GMS</td>
<td>“Targeting the Wnt signaling pathway to inhibit cancer proliferation”</td>
</tr>
<tr>
<td>Prof Daniel G Tenen</td>
<td>NUS</td>
<td>“Targeting hematopoietic and leukemic stem cells”</td>
</tr>
<tr>
<td>Prof Wong Tian Yin</td>
<td>SERI &amp; NUS</td>
<td>“Retinal Imaging for Disease Prediction: From Bench to Bedside”</td>
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### Clinician Scientist Award

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<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Area of Research / Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Senior Investigator – five-year programme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/Prof Aung Tin*</td>
<td>SNEC &amp; NUS</td>
<td>“Accurate phenotyping of angle closure glaucoma”</td>
</tr>
<tr>
<td>A/Prof Ong Sin Tiang</td>
<td>Duke-NUS GMS</td>
<td>“Overcoming resistance to targeted therapies in blast phase chronic myelogenous leukemia”</td>
</tr>
<tr>
<td>A/Prof Allen Yee Eng Juh*</td>
<td>NUH &amp; NUS</td>
<td>“A multi-centre, multi-faceted therapeutic study incorporating whole genome association and candidate pathway studies for pharmacogenetics and biomarker discovery in childhood acute lymphoblastic leukemia: Malaysian-Singapore ALL 2008 study”</td>
</tr>
<tr>
<td>A/Prof Tan Eng King*</td>
<td>NM &amp; NUS</td>
<td>“Investigating genetic factors in essential tremor”</td>
</tr>
<tr>
<td><strong>Investigator – three-year programme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/Prof Cheng Woe Joo</td>
<td>NUH &amp; NUS</td>
<td>“Using unbiased forward genetic screen and comparative genomics in murine to model progression and transformation of multiple myeloma”</td>
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* Pioneer batch of CSI awardees in 2004

### List of Awardees Recipients for 2007

#### NMRC Medical Research Fellowship/Scientist Award

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Area of Research / Projects</th>
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</thead>
<tbody>
<tr>
<td><strong>Medical Research Fellowship Award</strong></td>
<td></td>
<td>Two of which were training for a degree whereas the rest were in training not leading to a degree.</td>
</tr>
<tr>
<td>Dr Lee Shermin</td>
<td>NDC Fellowship (PhD) at University of Nijmegen, Netherlands</td>
<td>“Modular endoprosthesis replacement of mandibular defects—a soft tissue analysis”</td>
</tr>
<tr>
<td>Dr Tiah Ling</td>
<td>CGH Fellowship (MPH) at Bloomberg School of Public Health, Johns Hopkins University, USA</td>
<td>“Understanding the mindset of health personnel volunteering for humanitarian assignments: A qualitative approach”</td>
</tr>
<tr>
<td>Dr Leong Sau-Hon Benjamin</td>
<td>NUH Fellowship (Overseas Attachment) at North Shore Long Island Jewish Medical Center- Department of New York, USA</td>
<td>“Evaluate the efficacy on an automated external defibrillator (AED) programmed with ventricular fibrillation (VF) waveform analysis to advise CPR first or shock first in patient with a shockable rhythm”</td>
</tr>
<tr>
<td>Dr Tan Hui Hui</td>
<td>SGH Fellowship (Overseas Attachment) at Mount Sinai Hospital, New York, USA</td>
<td>“Air Pollution and Hepatic Fibrogenesis in Non-Alcoholic Steatohepatitis”</td>
</tr>
<tr>
<td>Dr Tan Yao Min Gerald</td>
<td>TTSH Fellowship (Overseas Attachment) at Weill Medical College, Cornell University, New York, USA</td>
<td>“Novel use of monoclonal antibodies to prostate-specific membrane antigen in intra-operative assessment of remnant microscopic disease during robotic prostatectomy for prostate cancer”</td>
</tr>
<tr>
<td>Dr Subramaniam Tavintharan</td>
<td>AHI Fellowship (Overseas Attachment) at NUS</td>
<td>“Mechanisms of simvastatin-induced hepatotoxicity – a study of hepatic gene expression profiles to explain the pathogenesis of hepatopathy” and “Riboregulators as potential biomarkers and therapeutic targets in common metabolic diseases”</td>
</tr>
<tr>
<td><strong>Medical Research Scientist Award</strong></td>
<td></td>
<td>Four scientists were awarded the NMRC Medical Research Scientist Award in FY2007 for training leading to a degree.</td>
</tr>
<tr>
<td>Ms Vairagkery Janvi Aijt</td>
<td>IMH Scientist Award (MSc) at NUS</td>
<td>“Perceptions and attitudes towards mental health problems in Singapore”</td>
</tr>
<tr>
<td>Ms Lee Hui Yin Jenny</td>
<td>NUH Scientist Award (PhD) at Academic Unit of Audiology Medicine, University College of London, UK</td>
<td>“Management for children with Central Auditory Processing Deficits due to RO46-mutation”</td>
</tr>
<tr>
<td>Mr Wei Hening</td>
<td>NHC Scientist Award (PhD) at NUS</td>
<td>“Stem cell-based cell therapy for post-myocardial infarction myocardial repair and regeneration”</td>
</tr>
<tr>
<td>Ms Chan Mei Leng</td>
<td>TTSH Scientist Award (PhD) at School of Health and Rehabilitation Sciences, University of Queensland, Australia</td>
<td>“Improving Outcome for Older Retired Drivers”</td>
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</table>
Nine doctors and one scientist completed their training under the Medical Research Fellowship/Scientist Award in FY2007:

**NMRC Medical Research Fellowship/Scientist Award**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Area of Research / Projects</th>
</tr>
</thead>
</table>
| Dr Pang Si Yin Grace          | NCC Fellowship (PhD) at NCC and University of Adelaide, Australia | "To screen for variant SNPs in genes encoding opioid drug receptors in Asian cancer patients and to identify functional SNPs and to determine their influence on the PK/PD of opioids in cancer patients."
| Dr Tan Kiat Tee Berita        | SGH Fellowship (PhD) at Karolinska Institute, Sweden | "Gene expression profile of breast cancer with allele-specific mutations"                     |
| Dr Tan Soo Yang               | TTSH Fellowship (PhD) at John Radcliffe Hospital, University of Oxford, UK | "Novel cellular subsets in lymphoid tissue and relevance to the pathogenesis of lymphoma subtypes" |
| Dr Koh Fang Yung Angelita     | A*STAR Fellowship (Overseas-Attachment) at University of Alberta, Canada | "Islet cell transplant: An exciting treatment possibility for diabetes mellitus"              |
| Dr Tan Em Yu                  | TTSH Fellowship (MSc) at Weatherall Institute of Molecular Medicine, John Radcliffe Hospital, University of Oxford, UK | "The Role of Vasculargenesis in the Various Stages of Breast Tumour Development"              |
| Dr Wong Ting Haney           | SGH Fellowship (MSc) at Bloomberg School of Public Health, Johns Hopkins University, USA | "A critical survey of trauma systems: Comparison of trauma systems in developed and developing countries and conclusions for trauma management in Singapore" |
| Dr Chung Hai Wei              | Singhealth Fellowship (PhD) at the Mayo Clinic College of Medicine, Rochester, USA | "Arthroscopic osteocapsular arthroplasty for primary degenerative osteoarthritis of the elbow: Outcome and complications" |
| Dr Choo Tae-Wai Martin        | NSC Fellowship (MSc) at Royal Free & University College London Medical School, UK | "Identifying key social determinants for high-risk lifestyle factors that are linked to STI and HIV infection in Singapore in order to develop improved prevention and intervention strategies" |
| Dr Wong Jen San               | SGH Fellowship (MSc) at Sarah W. Germain Nutrition and Metabolism Center, Duke University Medical Center, USA | "The effects of prolonged NFKB1 expression in primary cells and its influence on glucose-stimulated insulin secretion and cell proliferation" |
| Ms Tan See Huey               | NUS Scientific Award (MSc) at London School of Hygiene & Tropical Medicine, UK | "Sensitivity analysis for an Asthma Trial with Missing Data"                                  |

**NRF-MOH Healthcare Research Scholarship (PhD)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Area of Research / Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRF-MOH Healthcare Research Scholarship (PhD)</td>
<td>One doctor was awarded the NRF-MOH Healthcare Research Scholarship (PhD) in FY2007.</td>
<td>&quot;Polarised innate immune responses in MCNS - A systems approach to define the molecular basis of pathogenesis&quot;</td>
</tr>
<tr>
<td>Dr Yeo Wee Song</td>
<td>NUS</td>
<td>&quot;Polarised innate immune responses in MCNS - A systems approach to define the molecular basis of pathogenesis&quot;</td>
</tr>
</tbody>
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"If you think research is expensive, try disease." - Mary Lasker, philanthropist and medical research advocate
Tackling schizophrenia
The purpose of this TCR programme is to study schizophrenia and related psychotic disorders—among the most severe and disabling mental illnesses—by looking specifically at the various factors affecting vulnerability, progression of the illness and protection against these disorders.

“We currently don’t have a good enough way to identify people who will likely develop schizophrenia,” says A/Prof Chong. “Part of the TCR programme’s objective is to enable us to better identify these people, not only based on clinical observations, but also based on biological factors.” To tackle this illness and bring hope to those affected by schizophrenia, A/Prof Chong has assembled a team of collaborators spanning multiple institutions and fields both in Singapore and overseas to undertake this five-year research programme.

Many players, one common goal
“Big science these days needs to be collaborative, and that is really one of the aims of this TCR programme. We want to integrate what is available here in Singapore, such as different technological platforms and resources, and create a common platform to tackle a particular disorder,” explains A/Prof Chong.

“To help people with serious mental illnesses, we really need a multi-disciplinary team. We need to find people at the forefront of their particular area of research and bring them together to work towards a common goal.”

A team led by A/Prof Chong Siow Ann of the Institute of Mental Health (IMH) hopes to change these perceptions about mental health through an ambitious research initiative aimed at tackling schizophrenia and related psychotic disorders. Armed with a S$25 million grant under the Translational and Clinical Research (TCR) Flagship Programme, the team has big plans that will help people suffering from these illnesses, while also showcasing the valuable contributions that are possible through mental health research with a multi-disciplinary approach.

For years, mental health has been treated as the poor relation of medicine, receiving less support and attention for research due to a myriad of reasons. However, the consequences of mental illnesses can be just as damaging, and in some cases more so—at times leading to increased mortality and significant morbidity resulting in lifelong suffering at a huge cost to society.

A landmark translational research study aims to ease the burden of schizophrenia by improving early identification, and treatment of neurocognitive impairments.

Mind Over Matter: Major Funding for Mental Health Research

Throughout this study participants will undergo regular reviews including clinical assessments, neurocognitive tests, blood tests and brain scans—all aimed at developing a better understanding of the diverse factors related to schizophrenia. Leveraging local advantages
“The research we are doing is not entirely unique, but in Singapore we have an advantage,” says A/Prof Chong, explaining why he is optimistic about what the TCR programme will achieve. One important advantage is that Singapore is a small country with a relatively homogeneous population that is largely non-mobile, making it easier to recruit and retain research subjects. Singapore also has a low prevalence of substance abuse—behaviour that can confound studies on mental health.

The IMH, the lead institution spearheading the research, is well-positioned to carry out the study given the fact that it is the biggest provider of mental health care in Singapore. IMH also has extensive experience in collaborating with researchers and stakeholders on major projects and enjoys good relationships with these partners. For example, the programme’s prospects for success are boosted by the research team’s access to cutting-edge technology through partners such as the Genome Institute of Singapore and the research expertise of Duke University, University of Melbourne and its various other collaborators.

Research for a better future
Summing up the impact that this research will have, A/Prof Chong notes: “It is a privilege for us that we are in a position to help people. The outcome of this project will be an important contribution to the identification of schizophrenia and awareness of this illness. It will benefit care providers and mental health professionals by giving them better tools to help people, and, most importantly, it will give new hope to the individuals who suffer from schizophrenia.”

To ensure that the research carried out by his team is continued and advanced further in the future, A/Prof Chong is a strong proponent of mentoring the next generation of clinician scientists and researchers. “Mentoring is an essential part of research. All young researchers need mentors to help guide them on the right course. It is not just about imparting knowledge about methods and techniques and asking the right questions, but also about helping them identify their own strengths and weaknesses and navigate the politics of research, as well as keeping them going and helping them mature.” With innovative research and strong leadership both now and in the future, there is hope on the horizon for those suffering from schizophrenia.
The Singapore Gastric Cancer Consortium is mobilising resources on a large scale in its bid to improve early detection of a silent killer.

A/Prof Yeoh Khay Guan

Overview of NMRC-Supported Research

A/Prof Yeoh leads the Singapore Gastric Cancer Consortium (SGCC), which is carrying out research to improve the early detection of gastric cancer. In addition, the consortium also hopes to gain a better understanding of how the disease develops, as well as develop and test new treatments.

While it may lack the notoriety of other major illnesses, gastric cancer is nonetheless a leading killer in Singapore, taking about 400 lives per year. To tackle this silent killer, a group of clinicians and scientists have come together to form the Singapore Gastric Cancer Consortium (SGCC). Led by Associate Professor Yeoh Khay Guan of the Department of Gastroenterology and Hepatology at National University Hospital, the SGCC is carrying out research to improve the early detection of gastric cancer.

The consortium was awarded the first Translational and Clinical Research (TCR) Flagship Programme by NMRC for its gastric cancer research initiative, which will provide S$25 million in funding over five years. This high level of funding allows the SGCC to conduct research on a large scale. Since being awarded the TCR in July 2007, the SGCC has launched a large clinical trial to study gastric cancer risk factors in local patients. So far, screening of the first 1,200 study participants has resulted in six cases of early-stage gastric cancer being detected and successfully removed. Not only has this benefited the patients by preventing the progression of their cancer to a more advanced stage, it has also enabled SGCC team members to study the earliest stages of gastric cancer.

Another part of the consortium’s efforts involves work to identify biomarkers that can help in early detection of the illness. To date, 180 patients with gastric cancer have given permission for their operatively removed cancer tissues and blood specimens to be studied. These samples will be used in order to find potential biomarkers, while validation studies will be carried out later to verify the clinical usefulness of the biomarkers.

Assembling an all-star team

With ambitious goals for its research, the SGCC has assembled a large team of professionals from a variety of fields and institutions around the world. Locally, the team brings together clinicians from Singapore’s four largest public hospitals to join forces with scientists at the local universities and the Agency for Science, Technology and Research’s (A*STAR) research institutes. Outlining the collaborative process, A/Prof Yeoh says, “First we discuss the research objectives together, which are aimed at tackling important clinical problems. We then discuss the research design and ensure that both the clinical protocols and scientific methodologies are compatible with the aims. This requires frequent and close interaction, open communication and mutual respect.”

While based in Singapore, the SGCC taps the expertise of researchers from across Asia and other parts of the world. The SGCC Annual Scientific Meeting in July 2008 was attended by regional scientists from Japan, Korea, Hong Kong and Taiwan, and there are plans to follow up with them for closer collaboration. “Gastric cancer is more common in Asia, and research to improve outcomes in this disease must be done in Asia,” notes A/Prof Yeoh. Outside of Asia, the SGCC is already collaborating with leading institutions in the US, including the Fred Hutchinson Cancer Center in Seattle and the International Cancer Biomarker Consortium (ICBC).

Making a mark on the international stage

The TCR funding from the National Research Foundation has enabled A/Prof Yeoh and his team to take their research to the next level, elevating it to a major international initiative. “The TCR funding has been transformational. It has enabled our nascent group, which has been working together for the past two years, to make the bold plans that are necessary to tackle the key clinical problems in gastric cancer,” explains A/Prof Yeoh. “The funding is on a very significant level and makes us a credible programmatic translational research group internationally. This has led to multiple collaborations with international research centres and with industry, and it will enable our group to contribute to improving the science and treatment related to gastric cancer.”

According to A/Prof Yeoh, the inclusion of clinical research in the mandate of the Ministry of Health in 2006 was a far-sighted move that has already had a positive impact on Singapore’s medical research sector and the research initiatives of the SGCC. He explains, “On the one hand, it links up clinical research with the basic research being done at the universities and A*STAR research institutes, giving them a translational context. On the other hand, it recognises that the Singapore healthcare system is in the league of developed countries, and that we have to find new ways of improving health and treatment, rather than relying on others to test new approaches for us. In our work, it inspires us to aim for the highest standards for our patients and develop the best solutions that do not exist elsewhere in the world ourselves.”

With big ambitions and a large, well-resourced team of talented clinicians and scientists working together, the SGCC represents a ray of hope on the horizon for gastric cancer patients everywhere. And for Singapore’s medical research community, these efforts are a fine example of what can be achieved by thinking big.
Supported Research

Overview of NMRC—focus on wound healing.

corneal disease, with a special

problems, glaucoma and

straddles two of the biggest eye

Flagship Programme. TRIOS

programme, funded by the TCR

Surgery (TRIOS) research

Research Innovations in Ocular

Professor Tan heads a team

Donald Tan

Position & Institution

Director, the Singapore National Eye Centre (SNEC)

Professor and Head, the Department of Ophthalmology, Yong Loo Lin School of Medicine, NUS

Chairman, the Singapore Eye Research Institute (SERI)

Lead Principal Investigator for the TCR Flagship Programme on Eye Diseases

Recipient of the National Medical Excellence Awards (NMEA) 2008 - National Outstanding Clinician Scientist Award

NMRC Board Member

Overview of NMRC—Supported Research

Professor Tan heads a team working on the Translational Research Innovations in Ocular Surgery (TRIOS) research programme, funded by the TCR Flagship Programme. TRIOS tackles two of the biggest eye problems, glaucoma and corneal disease, with a special focus on wound healing.

Eyeing Solutions

TCR funding is helping to drive a coordinated effort that is putting Singapore on the map for its ocular disease capabilities.

The work is very translational and patient-centric, but also has a strong upstream component centred around healing, imaging and inflammation control-elements that can be applied across other fields.

"The work is very translational and patient-centric, but also has a strong upstream component centred around healing, imaging and inflammation control-elements that can be applied across other fields." At the same time, he points out that his team’s work on glaucoma and corneal disease has global applicability, but also a more specific Asian focus given that many Asians, particularly Chinese and Indians, have a higher incidence of glaucoma, and are more susceptible to scarring and failure after ocular surgery.

With the funding in place, Prof Tan wasted no time in developing his team. He now has lab space and has gathered a team of around 20 people, including seven principal investigators (PIs) and a number of co-PIs. The target is to recruit another 30 staff to round out the team as TRIOS gets into full swing.

Local and global partners

However, TRIOS’s efforts are not limited to the research being done at SERI, they span several collaborations with institutions in Singapore and around the world. Locally, SERI is working together with Nanyang Technological University, several departments at National University of Singapore, Duke-NUS Graduate Medical School, research institutes and eye departments in hospitals across both clusters. For example, a team at NTU is contributing a new drug-delivery system to more effectively administer drugs to the eye.

Further afield, SERI’s collaborations under the TRIOS programme with teams from the US, Europe, Japan, China, Israel and Australia are bringing a decidedly global flavour to the project. For example, a team at Kyoto University in Japan is helping to culture stem cells for the eye. Stressing the value of such diverse partnerships, Prof Tan is quick to point out that “collaboration on this scale would not be possible without the TCR funding.”

SERI’s growing reputation

The global reach of the TRIOS programme has started to put Singapore, and more specifically SERI, on the map as a centre for ocular disease research. People are now starting to come to Singapore for research and training in the field, including two principal investigators on the TRIOS programme team who relocated to Singapore from the UK. “Researchers are attracted to Singapore not just because of its growing reputation in certain research areas, but also because of its processes, such as quick grant turnarounds. The approach here is efficient and practical,” explains Prof Tan.

SERI has come a long way in the 10 years since it was set up with block grant funding from NMRC in 1998. It has stayed true to its initial focus on translational research (then called “clinical applicability”) and built up a strong reputation in the field—to the point that it is now increasingly attracting requests for collaboration from abroad. “SERI is now comparable to some of the leading global institutions, including top centres in the US, the top centre in Europe, and Melbourne University in Australia,” says Prof Tan. “While SERI’s funding is not at the same level as some leading global centres, our impact factor is higher than most,” he explains, referring to SERI’s strong track record of research and publication activity.

A lasting legacy

Collaboration and support at SERI are not limited to external relationships. Within SERI, senior researchers have a role as mentors to newer staff, supporting and advising them in their research efforts and career planning. Prof Tan acts as a mentor to one of his TCR collaborators, Dr Louis Tong, a recent PhD graduate who is working on the cell and molecular basis of wound healing. Such internal “collaborations” play a part in developing the overall capabilities and knowledge within SERI, ensuring that it continues to develop and stay at the cutting edge of ocular research.

With infrastructure now in place, and strong support from the medical community in Singapore and NMRC, Prof Tan believes that Singapore is well placed to continue to grow its reputation and leading role as a global centre for ocular surgery and research.
Dr Sylvie Alonso
Position & Institution
Assistant Professor, Department of Microbiology, National University of Singapore
Recipient of four Individual Research Grants (IRGs) from NMRC
Overview of NMRC-Supported Research
Dr Alonso is conducting applied research into host-pathogen interactions and infectious diseases. She is currently working on vaccine development against influenza and dengue viruses, looking specifically at using live bacteria to deliver vaccine candidates—an innovative approach to vaccine delivery that she hopes will result in greater efficacy and improved outcomes for patients. Grateful for the independence that the IRGs afford, Dr Alonso feels that part of her success in obtaining funding lies in the fact that she is working on diseases that are particularly important in the local context.

Originally from France, Dr Alonso appreciates the strengths of Singapore’s medical research environment and the opportunities that they present. For example, at NUS she runs her own lab with a team of 10 undergraduate and post-graduate students and research associates working under her supervision, and has independence in her research and funding—an arrangement that she would be unlikely to enjoy in her home country. “In France, the organisational structure of labs is very hierarchical, with one big boss at the top who maintains control over the entire lab. The boss is usually the one who applies for funding and then delegates it out to the lab’s senior investigators, which means that they have less independence and also a limited amount of money to conduct their research and hire manpower,” explains Dr Alonso. “Given my age and level of experience, I would have less freedom and certainly much less money to develop my own research if I were back in France.”

Having benefited from NMRC’s IRG programme several times, Dr Alonso praises the availability of such grants and the opportunities that they present to individual researchers. She notes, “In France, researchers and individual labs generally apply to the European Community for funding, which is a very competitive process. There are no IRGs, as they tend to focus on programme grants. To successfully apply for funding, you need to be part of a big consortium with many researchers involved.”

Good support makes the difference
Since arriving in Singapore in September 2004, Dr Alonso has witnessed the rapid growth of the local translational research sector, which has included improvements in access to funding and an increase in funding quantum in recent years. “Four years ago, the funding awarded to individuals was considerably smaller, and you would not receive the full amount that you requested. Now, as long as you can justify why you need it, you can receive almost all of the funding that you apply for,” she says. “Having sufficient funding makes a huge difference, particularly if I require specialised equipment for my research. If I need a high-tech kit, I can afford to purchase it—this really improves the impact of my work.”

While funding is certainly a crucial part of the equation, other factors such as mentorship and support from senior researchers also play an important role in giving scientists like Dr Alonso the freedom to explore. When she arrived at NUS to take up a Lee Kuan Yew Post-doctoral Fellowship, Dr Alonso received encouragement to carry out independent research right from the start. “From the moment I arrived, Associate Professor Vincent Chow, then the head of the Department of Microbiology, was very supportive and acted as my mentor. I thought that the fellowship would be more like a post-doc position, but then Associate Professor Chow showed me a lab and told me it was mine to run independently,” she recalls.

With the right elements in place, from a variety of accessible funding options to senior researchers who are willing and able to provide mentorship and support, Singapore is well positioned to give medical investigators the freedom to ask challenging questions—and truly make an impact when their innovative research bears fruit.
For Dr. Louis Tong, NMRC funding has played an important role in getting his research career on track. Since completing his medical studies in Singapore, the UK and research training in the US, he has received a number of smaller grants from NMRC to support his research on ocular surface diseases and defence mechanisms. However, it was a recent New Investigator Grant (NIG) that has given a valuable boost to his research efforts. “It’s important for a researcher to establish a track record,” he explains. “The NIG is a good way for me to get the ball rolling on this.”

Dr. Louis Tong

Position & Institution

- Consultant, Corneal and External Eye Disease Service, the Singapore National Eye Centre (SNEC)
- Clinician Scientist, the Singapore Eye Research Institute (SERI)
- Recipient of New Investigator Grant (NIG)

Overview of NMRC-Supported Research

Dr. Louis Tong’s research focus is on corneal defence against germs, the death of corneal epithelial cells, and the mechanical defences of the cornea. He is also working as an investigator under the Translational Research Innovations in Ocular Surgery (TRIOS) programme as part of the Translational and Clinical Research (TCR) Flagship Programme awarded to the Singapore Eye Research Institute.

Dr. Tong’s research interests and abilities have garnered him positions at the Singapore National Eye Centre (SNEC) and the Singapore Eye Research Institute (SERI), where he splits his time between clinical work at the former and research and lab work at the latter. At SERI, part of his time is spent as an investigator looking at ocular wound healing as part of the TRIOS team led by Professor Donald Tan, the lead Principal Investigator for the TCR Flagship Programme on eye diseases.

Challenges

Dr. Tong doesn’t hide the fact that getting started in research can be difficult at times. He recounts how upon coming back from his studies in the US, there was no funding waiting for him, so he was left without any clear direction until he was able to secure some funding for his research. “As a researcher you were kind of lost,” he explains. However, he notes that the situation has improved in recent years, adding: “Now the overseas fellowships provide some funding to get you started while you find your feet and get going with applying for grants.”

While some challenges are obstacles in the way of focusing on research, others are the very reason that Dr. Tong was drawn to a research career in the first place. “The challenge is what keeps me going. It’s a learning experience each time I go into the lab,” he explains. “I got into research because the challenges are huge—things are always changing, and it’s a very dynamic area to be in. By comparison, clinical work is quite safe, but not nearly as intellectually stimulating.”

A guiding hand

While funding has been important in developing his research career, Dr. Tong is also benefiting from the guidance and support of a number of mentors, including Professor Tan, the Medical Director at SERI, and Professor Roger Beuerman, also of SERI. “Mentorship in a research setting is different from receiving guidance while taking a PhD,” Dr. Tong notes. “Now, the only people that can assist me are my peers, and Professors Tan and Beuerman provide me with support in a number of forms, including lobbying on my behalf, some assistance with administrative matters, and general guidance in my research.”

And with Singapore’s research sector continuing to develop, Dr. Tong sees a positive outlook for doctors and scientists looking to break into the research field. “The research environment here is quite good, and Singapore and SERI are building up a critical mass of researchers and clinical-related research,” he comments. “Ultimately, researchers are coming here, so something is being done right.”

Getting Started

NMRC funding can be an important success factor for researchers in the early stages of their careers.

“...it’s important for a researcher to establish a track record, and the NIG is a good way for me to get the ball rolling on this.”

Dr. Louis Tong
Singapore’s medical sector took centre stage during the inaugural National Medical Excellence Awards (NMEA), held in March 2008. Recognising achievements in clinical work, research, and mentoring of young clinicians, the NMEA highlighted some of the exceptional work being done in Singapore.

Six awards were given out to four individuals and two teams.
Doctors, researchers lauded for their work

50m given for research on eye diseases, psychotic disorders

Research awards

$25m each for blindness, schizophrenia research

News Highlight

$5m for sleep study

LEADERSHIP

"To add value to Singapore medics, we should not be just followers of Western medicine. We want to innovate and develop medicine on our own terms, to be leaders.)"
NMRC’s annual budget is part of MOH’s Operating Expenses Budget and NRF’s budget for Singapore Biomedical Sciences Initiatives.

For Financial Year 2007, the amount committed to support NMRC’s various grants and talent development programmes was S$204.61m. These were given in the form of grants, awards, scholarships and fellowships; with most of the projects’ actual spending commencing from FY2008 onwards.

For the projects that have commenced spending and for ongoing projects and programmes approved in previous years, NMRC incurred a total of S$8.72m in FY2007 to support them.