

# JOIN US AND CHANGE THE WORLD



Yong Loo Lin  
School of Medicine

# Cancer, Heart Failure, Metabolic and Neuro- Degenerative Diseases Do Not Recognise International Boundaries

Neither do we, when we scour the world for the best minds and committed people to join us in developing better ways of dealing with these and other scourges. At the National University of Singapore (NUS) Yong Loo Lin School of Medicine, our academic faculty comprises Singaporean and international scientists and clinicians. They lead as well as collaborate with counterparts from other research institutions here and around the world on key programmes that aim to improve the health of people in Singapore, Asia and elsewhere.



## **Excellence in medical education, biomedical research that makes a difference**

Established in 1905, the School is the founding faculty of the National University of Singapore. It is Asia's leading medical institution of higher learning\*, graduating 300 doctors a year.

The School strives to fulfil its mission of excellence in clinical care, training the next generation of healthcare professionals and also fostering translational clinical and scientific research that help to transform and improve the practice of medicine. The 18 NUS Medicine departments in the basic sciences and clinical specialties work closely with the Centre for Medical Education and the Centre for Biomedical Ethics to ensure that teaching and research are aligned and relevant to Singapore's healthcare needs as well as those of the region.

The School is proud of its role in educating and training tomorrow's doctors – young men and women who will take on the mantle of

leadership in healthcare, academic medicine and public service in Singapore and beyond.

Every effort is made to offer students a quality medical education and unique learning experience, allowing them to acquire clinical skills as well as qualities which will equip the doctors of tomorrow for roles in public healthcare service and administration as well as academic medicine.

Of equal importance is NUS Medicine's focus on translating research findings into impactful outcomes in clinical care. This is being done through the creation of a dynamic and exciting environment that actively encourages clinicians, basic scientists and clinician-scientists to work closely together to target common diseases in Singapore and Asia, to improve disease prevention, and to develop strategies to retard or reverse disease consequences.

\* The Times World University Subject Rankings 2015-2016 list NUS Medicine as Asia's leading medical school, while the Quacquarelli Symonds (QS) World University Rankings by Subject 2015 placed NUS Medicine 21st globally.



### Research at NUS Medicine

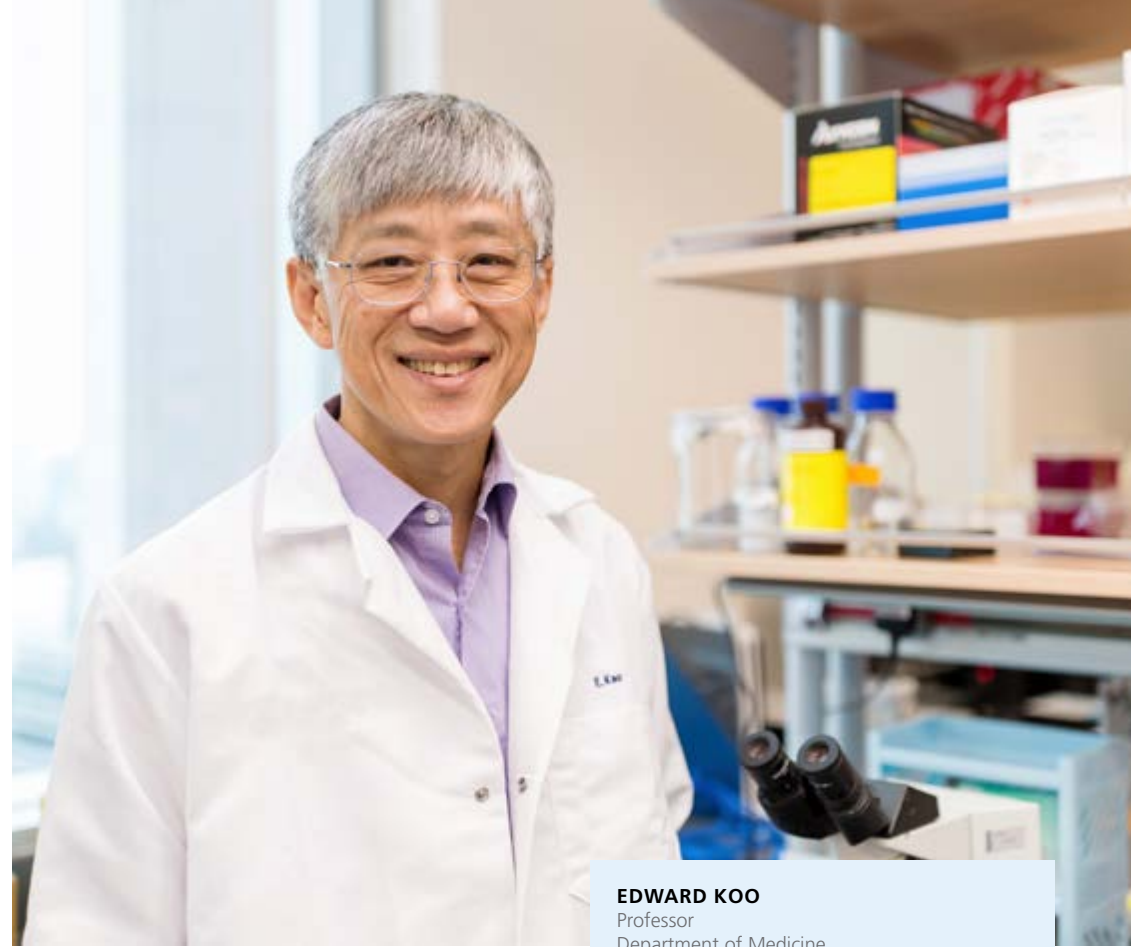
We welcome potential qualified candidates with a passion for teaching and research to embark on a fulfilling and rewarding career at NUS Medicine. The School recognises the need for plurality of expertise in our academic faculty: tailored career tracks thus enable staff to develop their interests and work to their strengths in order to deliver their best in healthcare, research and education.

The School places a premium on excellence in translational research that can positively impact health outcomes for our patients. This emphasis gives rise to a dynamic and exciting environment that actively encourages clinicians, basic science and clinical researchers to work closely together. This collaborative framework means diseases common in Singapore and Asia are targeted, improving prevention through early diagnosis and strategies to either retard or reverse the consequences. At NUS Medicine, clinician-scientists are supported with research space and start-up funding, in the process also rendering them competitive for the plethora of funding opportunities offered by the local research funding agencies.

In 2008, the School became an integral part of the National University Health System (NUHS), along with the National University Hospital (NUH), the NUS Faculty of Dentistry and the NUS Saw Swee Hock School of Public Health. Through a common governance structure, the NUHS forges synergies to advance its trio of missions – achieving and maintaining excellence in clinical care, research and education. The NUHS is Singapore's first academic medicine centre, and the National University Hospital is the only local restructured hospital that provides tertiary care with a full suite of clinical services for both adults and children. The standing of the NUHS and our proximity to research institutes located in Biopolis, Fusionopolis, the Science Parks and within the NUS campus itself provides tremendous opportunities for collaboration with other faculties and associated international networks.

These are now seeking Clinician-Scientists for areas of research in:

- Neuroscience
- Diabetes, Obesity and Metabolism
- Infectious Disease
- Cardiovascular Disease
- Cancer, as well as others



### EDWARD KOO

Professor  
Department of Medicine  
Department of Physiology, NUS

Professor Edward Koo's primary research focus is in the cellular and molecular biology of Alzheimer's Disease and Neuro-degeneration. Some of his noteworthy works involve the findings of a new physiological role of PS1 in facilitating phosphorylation and degradation of beta-catenin. Professor Koo has 45 publications where he is the first or last author and of which 12 publications are in high impact journals (with impact factor >10). To date, his work has been cited more than 14,000 times. He is a member of the Editorial Boards of the Journal of Neuropathology and Journal of Experimental Neurology and an ad hoc reviewer for journals such as Science and the New England Journal of Medicine.

### SOME OF OUR KEY RESEARCH AREAS

## Dementia, Neuro-degenerative Disorders and Stroke

Current Neuroscience research programmes at the School focus on ischaemic stroke, dementia, and neuro-degeneration.

### Ischaemic Stroke Programme

With a rapidly ageing population in Singapore and the increase in the prevalence of stroke risk factors, the incidence of stroke will increase exponentially over the next two decades to pose a heavy burden on national



healthcare, social services and the economy. Currently there is limited understanding of stroke etiology and limited effective treatment for stroke.

This research programme aims to study ischaemic stroke with a focus on intracranial stenosis or intracranial large artery disease, which is the predominant stroke subtype among Asians. The objective is to better understand the mechanism of stroke,

improve diagnostic and prognostic methods, improve patient care and treatment, and develop new treatment modalities including studying the feasibility of stem cell therapy. This will be a unique study of well-phenotyped patients that will provide important information on novel risk factors as well as biomarkers for the diagnosis, progression and clinical prognosis of stroke patients with intracranial stenosis. Such new

knowledge may lead to the identification of patentable new treatment targets and surrogate outcomes in clinical trials, and possibly result in improved therapeutic strategies and drug development for intracranial stenosis.

### **Vascular and Neuro-degenerative Mechanisms in Dementia**

One area of dementia research important to Singapore and Asia is Vascular & Neuro-degenerative Mechanisms in Dementia (VaD). Vascular disease is prominent among ethnic Asian dementia patients. Compared to Caucasian populations, a higher prevalence of VaD has been reported in Asian countries such as Japan and China. Moreover, studies have revealed a vascular basis contributing to the etiology and pathogenesis of VaD. The identification of biomarkers for vascular and neuro-degenerative mechanisms, and insights into the mechanisms of interaction may lead to potential therapeutic approaches. This will not only give rise to novel scientific insights and advances but also be of immense potential benefit to Singaporeans and the biomedical industry, since the increasing numbers of patients suffering from dementia exact a massive toll in health care costs, disability and lost productivity for both patients and caregivers. The NUHS plays a vital role in translational clinical dementia research because of strong interactions between clinical and basic science departments. These can lead to interventions,

which could prolong independent community function, delay institutionalisation and therefore lower healthcare expenditure. The NUHS Memory Ageing and Cognition Centre has been studying clinical and epidemiological cohorts with comprehensive neuro-psychological evaluations that will provide novel insights into the risk factors and biomarkers for dementia. Neuro-imaging (MRI and retinal imaging) studies may in turn help identify high-risk groups for intervention as well as mechanisms to be targeted for further investigation, as may neuro-chemical studies on brain samples and Animal Models, which will also provide opportunities to validate biomarkers.

### **Neuro-degeneration Programme**

The Neuro-degeneration Programme aims to conduct in-depth analyses of factors which contribute to, or modulate degeneration of the nervous system. The research is centered on the role of excitotoxicity in ageing and dementia and that played by free radicals in this process. The roles of glial cells and vascular factors in promoting neuro-inflammation are also elucidated. An accumulation of iron and lipid mediators including cholesterol oxidation products can also be toxic to neurons and research is underway to elucidate the role of metal ions and lipids in neuro-degeneration. Possible avenues for neuro-protection and promoting resolution of neuronal injury are also explored.

### **Dementia, Neuro-degenerative Disorders and Stroke** Qualifications and candidate requirements

Medical degree (MBBS or MD), with specialist accreditation in neurology, preferably with higher research degree. Candidates applying for the Neuroscience Programme should demonstrate interest

and expertise in neuroscience research in the area of dementia, stroke and neuro-degenerative diseases. We are very keen on candidates with complementary expertise, especially neuro-imaging.





## Diabetes, Obesity and Metabolism

The Diabetes, Obesity and Metabolism Programme at NUS Medicine seeks to address the rising incidence of metabolic diseases in Singapore and in Asia.

Metabolic diseases in Asia have features which are unique from what is seen in most Western countries. Interestingly, ethnic differences in the prevalence rates and pathogenesis of metabolic diseases are observed that are not yet understood or explainable by genetics alone. Given that the burden of diabetes will increase most rapidly in parts of Asia in the next few decades, these ethnic differences offer unique opportunities to interrogate the determinants of type 2 diabetes (cultural, dietary or biological) that are specifically relevant to the disease in Asia. In order to achieve this, the Programme has established capacity for epidemiology (multiple cohort studies are available),

### TAI E SHYONG

Professor  
Department of Medicine, NUS  
Head & Senior Consultant  
Division of Endocrinology, NUH

Professor Tai E Shyong is an endocrinologist whose research efforts have facilitated the identification of risk factors and assessed the impact of diabetes and other metabolic diseases in Singapore. Together with researchers in the Ministry of Health, Professor Tai has also developed a tool that enables physicians to target the most aggressive lipid-lowering therapy for those with the highest risk of heart disease, thus optimising the cost-effectiveness of the therapy. He has published over 250 papers and was mentioned in 1,500 citations in 2013. As a clinician-scientist, he has contributed to the understanding of the biological basis of type 2 diabetes and other metabolic traits.

physiology and metabolic imaging to facilitate the process of target identification and validation. The Programme has also established in-vitro models which include primary human myoblasts and pre-adipocytes from individuals of different ethnicities.

Currently, there are active programmes related to pathogenesis of type 2 diabetes with a focus on pathophysiological features of type 2 diabetes mellitus in Asia, with the main focus on:

- Understanding the mechanistic basis, through which some of the genetic variants identified lead to type 2 diabetes mellitus, particularly genetic variants with unique effects in populations of Asian ancestry;
- Explaining the ethnic differences in insulin resistance observed between South Asians and East Asians, particularly the differences in pathways leading to increased insulin resistance in South Asians despite their lean disposition.

### Nutrient metabolism and insulin resistance, with the main focus on understanding:

- The role of protein intake and amino acid metabolism in the pathogenesis of insulin resistance;
- The role of fat intake in the pathogenesis of insulin resistance via fat metabolism to ceramides and sphingolipids;
- The role of carbohydrate quality (glycaemic index) on glycaemic control and appetite regulation;
- The role of altered nutrient handling in the ability of bariatric surgery to ameliorate diabetes mellitus.

### The burden of diabetes mellitus and novel models of health care delivery for chronic disease, with the main focus on:

- Understanding the unique features of type 2 diabetes in Asia and designing treatments (drugs and nutritional therapy) that are optimised for Asian populations (stratified medicine);
- Designing programs for the prevention of type 2 diabetes mellitus;
- Demonstrating the efficacy of patient-centered medical homes in reducing hospitalisation and improving outcomes in patients with type 2 diabetes and other chronic diseases.

### Diabetes, Obesity and Metabolism Qualifications and candidate requirements

Medical degree (MBBS or MD), with specialist accreditation in endocrinology and/or diabetes, and preferably higher research degree such as MSc or PhD.

Candidates should be prepared to spend up to 20% of their time on clinical work, focusing on the provision of care for patients with diabetes or endocrine disorders. In addition, candidates must be able to

leverage on the unique resources available including, but not limited to the availability of human-derived in-vitro models of insulin resistance (particularly muscle and adipose tissue), the capacity to perform in vivo studies of human physiology and metabolic imaging (MRI, MRS and PET).

Experience leading a basic science team would be an advantage.



## Infectious Disease

Through the Infectious Disease Programme, NUS Medicine aims to take advantage of inter-disciplinary and inter-institutional alliances, to provide innovative solutions to local, regional and global infectious disease challenges through a programme of world-leading infection disease research.

The Infectious Disease group at NUS Medicine is part of the Infectious Diseases Themed Group and the Infectious Diseases Interdisciplinary Program, involving extensive collaboration across NUS (with the School of Public Health, Department of Mathematics, Engineering, Computer Science, Biological Sciences and Microbiology) and A\*STAR Research Institutes (Institute of Molecular and Cell Biology, Institute of Bioengineering

### NICHOLAS IAIN PATON

Professor  
Department of Medicine, NUS  
Senior Consultant  
Division of Infectious Disease, NUH

Professor Nicholas Paton is internationally recognised for his work on infectious diseases. He also has a wealth of clinical experience as an ID physician, with particular interests in HIV and TB. Professor Paton is committed to high-quality clinical research and has led major international clinical trials that have informed clinical practice. He has published over 130 papers (including first author publications in NEJM, Lancet and JAMA) and leads the SPRINT-TB programme, a national TB research programme based in NUS.

and Nanotechnology, Genome Institute of Singapore), together with industry. There are four main research activities currently:

#### Antibiotic Resistance Surveillance/ Infection Control

Research in the area of infection control emphasises Methicillin-resistant Staphylococcus Aureus (MRSA), multi-resistant gram-negative bacilli, hand hygiene and device-associated infections. Hospital-acquired infections are important issues that threaten the gains made in the antibiotic era. The region has many diverse forms of antimicrobial resistance, which pose unique challenges to all clinicians. With a strong clinical focus and leadership of national and international surveillance networks, the School's researchers work closely with counterparts from the Department of Haematology, Oncology, Microbiology as well as the various surgical disciplines to develop creative solutions to antimicrobial resistance problems.

#### Influenza

Work on Influenza virus is supported by industry as well as major national funders and include molecular typing, epidemiology, clinical trials and vaccine development.

Research is aimed at understanding influenza pathogenesis, ensuring pandemic influenza preparedness and business continuity, providing guidance to health policies, and developing cost-effective prevention strategies. Researchers have also worked on the mathematical modeling of influenza infections and helped with the development of novel prophylactic and therapeutic approaches.

#### HIV

At the NUHS, strong emphasis is placed on research into HIV pathogenesis and its metabolic consequences, such as dyslipidemia, heart diseases, osteoporosis, diabetes mellitus and other metabolic dysfunctions. Research is aimed at translating the basic science work into bedside applications that will improve HIV treatment strategies and patient management.

#### Tuberculosis

Tuberculosis research covers areas such as pathogenesis, genotyping and phenotyping of the various strains, clinical and immunological characterisation, development of diagnostic tests and assays and development of cost-effective treatment strategies.

### Infectious Disease Qualifications and candidate requirements

Medical degree (MBBS or MD), with specialist accreditation in infectious disease, preferably with higher research degree.  
Candidates applying for the Infectious

Disease Programme should demonstrate interest and expertise in antibiotic resistance surveillance/infection control and influenza. Candidates with expertise in HIV and TB research will also be considered.



## Cardiovascular Disease

Diseases of the heart and blood vessels account for more premature loss of life and impaired quality of life than any other category of disease. Every year, more than 20,000 people are admitted to hospitals in Singapore with heart problems. More than 30% of Singaporeans aged over 40 years harbour key factors for cardiovascular disease, including high blood pressure, high cholesterol levels and/or diabetes.

Tremendous advances in the treatment of cardiovascular diseases have been made over the last 30 years, though much work still remains to be done. With the ability to read the human genetic code, and to measure circulating biomarkers in the blood, investigators at NUS Medicine are able to further our understanding of the biological processes leading to cardiovascular disease and to target parts of those disease pathways with new treatments in order to prevent or ameliorate the disease. The Clinical Imaging Research Centre (CIRC)

at the School's Centre for Translational Medicine has state-of-the-art equipment for research to extend our imaging capabilities, in partnership with the National University Heart Centre, Singapore (NUHCS) and the Cardiovascular Research Institute (CVRI), together with input from world-renowned researchers in cardiac imaging.

### MARK RICHARDS

Professor  
Department of Medicine, NUS  
Director  
Cardiovascular Research Institute  
Senior Consultant  
National University Heart Centre, Singapore

Professor Mark Richards graduated from the University of Otago, New Zealand, and was trained in cardiology in both New Zealand and the United Kingdom. He has directed NUHCS's CVRI since October 2009. He has held clinical responsibilities in Cardiology for over 25 years and for many years has also worked alongside basic scientists in researching new biochemical pathways in heart failure. He established the Christchurch Cardioendocrine Research Group (now Christchurch Heart Institute) which has conducted integrated research into the pathophysiology, diagnostics and therapeutics of cardiovascular disease in the four disciplines of clinical observational and therapeutic trials, molecular biology, pre-clinical physiology (models of heart failure) and biomarker discovery and immunoassay.

### Cardiovascular Disease

#### Qualifications and candidate requirements

Basic medical degree (MBBS or MD), with specialist accreditation in cardiology, preferably with higher research degree.

Candidates applying for the Cardiovascular Disease Programme should demonstrate interest and expertise in biomarker research aimed at accelerating recognition of serious cardiovascular problems and facilitating early and effective management of heart failure and related

heart conditions. Specifically, we are very keen on candidates with interest and expertise in the imaging of hearts and blood vessels by ultrasound and by other modalities, including magnetic resonance scanning and positron emission tomography, along with strong track records in clinical trial research. Candidates can expect to be involved in exciting research work that will lead to the development of new scanning methods.

### ROGER FOO

Associate Professor  
Department of Medicine, NUS  
Senior Consultant  
National University Heart Centre, Singapore

Associate Professor Roger Foo is a graduate of NUS Medicine and has nearly 20 years of training and work experience in the UK and USA. Prior to his return to Singapore, he was a Research Fellow and Consultant Physician at the University of Cambridge and at Addenbrooke's Hospital, the University teaching hospital at Cambridge. He led a research group of scientists based in the Division of Cardiovascular Medicine, where he continues to hold a Visiting Fellowship. A recipient of various awards, including the British Cardiac Society Philip White Fellowship, The Wellcome Trust Advanced Research Fellowship and The British Heart Foundation Intermediate Research Fellowship, Associate Professor Foo was also one of four finalists for the prestigious Louis N. and Arnold M. Katz Basic Science Research Prize awarded by the Basic Cardiovascular Science Council of the American Heart Association. In Singapore, his lab's research focus remains on Cardiovascular Epigenomics and Epigenetics. This work makes use of human and experimental models of disease, and harnesses a range of genome-wide integrative technologies based both at the Cardiovascular Research Institute (CVRI) and the Genome Institute of Singapore (GIS). Associate Professor Foo is also a group leader at GIS. He has published over 30 papers specifically on the molecular mechanisms of heart failure, including the world's first epigenome map of human heart failure.



## Cancer

Cancer is one of the most common causes of death in Singapore. About 30% of people will eventually die of the illness. This therefore represents a significant burden on healthcare. Cancer is also an extremely heterogeneous group of diseases with different biologies and treatment outcomes depending on tissue of origin, histology and genetics. This represents a significant challenge in terms of treatment and finding ways to eradicate cancer.

The Cancer Science Institute of Singapore (CSI) at NUS and the National University Cancer Institute, Singapore (NCIS) collaborate extensively in research. At CSI, the focus is on understanding cancer biology and discovering new therapeutic opportunities; at NCIS, the focus is on delivering new therapy to the patients through clinical trials and personalised treatment through genomic medicine. Together, CSI and NCIS cover the spectrum from discovery to translation and finally, clinical delivery.

### Cancer Qualifications and candidate requirements

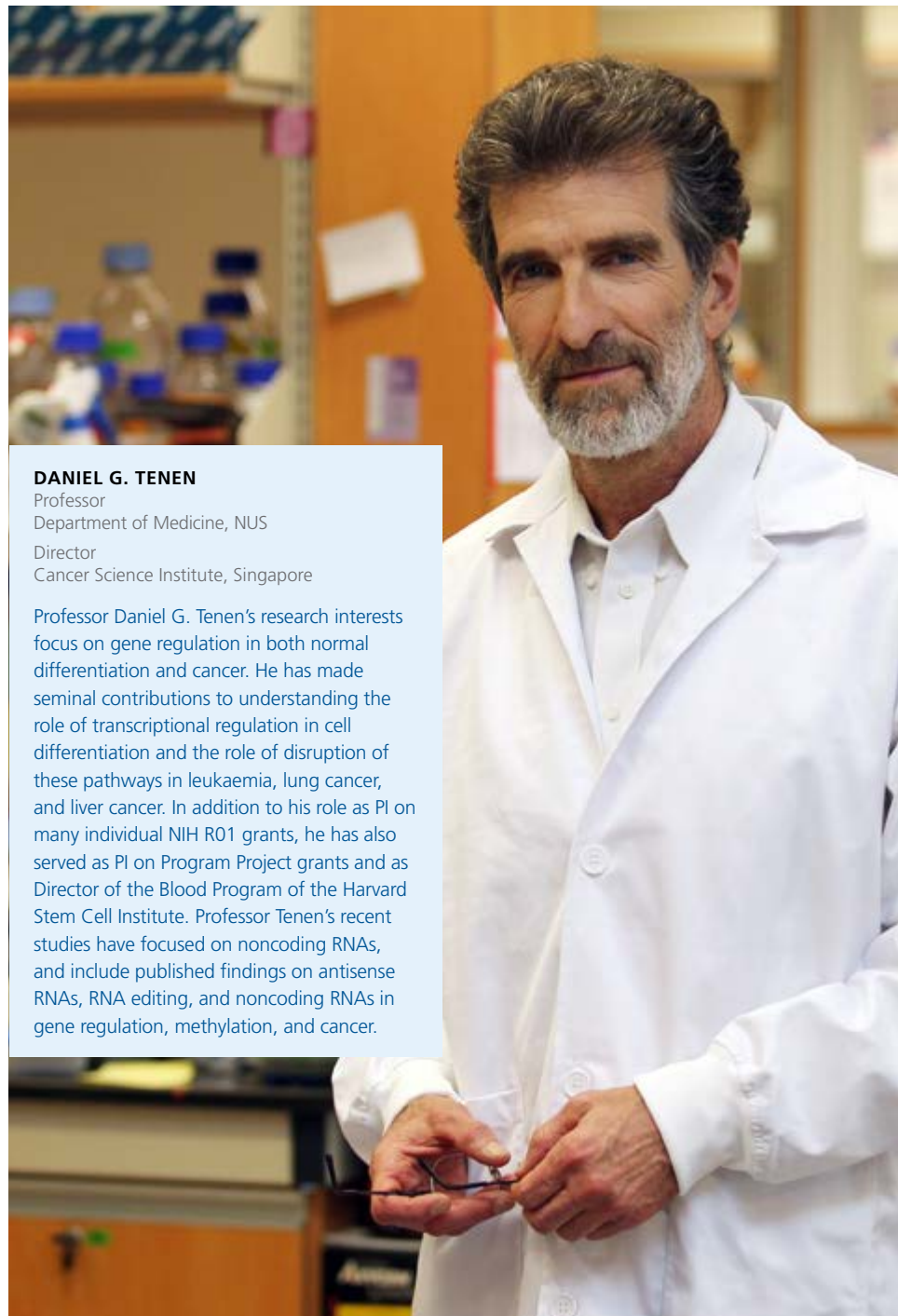
#### Qualifications and candidate requirements

Medical degree (MBBS or MD), with specialist accreditation in medical oncology or haematology, preferably with higher research degree.

#### CHNG WEE JOO

Professor  
Department of Medicine, NUS  
Director & Senior Consultant  
National University Cancer Institute, Singapore

Professor Chng Wee Joo's research interests focus around multiple myeloma, and the biology and therapeutics of haematologic malignancies. He is a member of many international professional committees and Grant Review Committees and has authored more than 150 publications in many reputed journals, such as The New England Journal of Medicine, Cancer Cell, Blood, Leukemia, Nature Medicine, and Cancer Research. He is the recipient of multiple local and international research awards, including the National Medical Research Council Clinician Scientist Award, the National University of Singapore Young Researcher Award and the Celgene Future Leaders in Haematology Award.



#### DANIEL G. TENEN

Professor  
Department of Medicine, NUS  
Director  
Cancer Science Institute, Singapore

Professor Daniel G. Tenen's research interests focus on gene regulation in both normal differentiation and cancer. He has made seminal contributions to understanding the role of transcriptional regulation in cell differentiation and the role of disruption of these pathways in leukaemia, lung cancer, and liver cancer. In addition to his role as PI on many individual NIH R01 grants, he has also served as PI on Program Project grants and as Director of the Blood Program of the Harvard Stem Cell Institute. Professor Tenen's recent studies have focused on noncoding RNAs, and include published findings on antisense RNAs, RNA editing, and noncoding RNAs in gene regulation, methylation, and cancer.



# Join Us

If you would like to know about research at NUS Medicine, please write to the Vice-Dean (Academic Affairs) at [medacademicaffairs@nus.edu.sg](mailto:medacademicaffairs@nus.edu.sg) or visit [medicine.nus.edu.sg](http://medicine.nus.edu.sg)



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School of Medicine