TRANSFORMING

Medicine

IMPROVING

Lives
At the Forefront of Education and Medicine

On 14 April 2005, Duke University and the National University of Singapore inked an agreement to establish the Duke-NUS Graduate Medical School in Singapore. Beyond being merely an excellent medical school based on the US model, Duke-NUS’ role and relevance in Singapore are much more encompassing.

Today, a decade on, we continue to achieve our mission of graduating well-trained clinicians and specialists to care for patients, as well as clinician researchers and clinician scientists who can contribute to the advancement of medical knowledge. We believe that this can only be achieved through the relentless pursuit of excellence in education, research and academic medicine, with a strong emphasis on collaboration and innovation.

Besides training medical students, Duke-NUS has also trained a burgeoning number of clinicians at SingHealth in research and teaching pedagogy, and made an impact on local school systems and organisations through our distinctive learning methodology. Designed at Duke-NUS in Singapore, TeamLEAD has not only redefined learning, but has also positively influenced schools in Singapore as well as our parent institution, Duke University, to adopt this innovative approach into their curriculum.

We have also firmly established five world-class Signature Research Programmes (SRPs) in:

- Cancer & Stem Cell Biology
- Cardiovascular and Metabolic Disorders
- Emerging Infectious Diseases
- Neuroscience & Behavioural Disorders
- Health Services & Systems Research

These areas were set up because they not only address the immediate, major health concerns of Singapore and the region, but also capitalise on Duke University’s research prowess. In a relatively short span of time, our researchers have made significant contributions in dengue, cancer and heart disease research with many more important research studies in the pipeline.

Backed by Duke University Health System’s strong experience and reputation in research, clinical care and education, Duke-NUS has partnered with Singapore’s biggest healthcare group to establish a formidable collaboration in academic medicine. The SingHealth Duke-NUS Academic Medical Centre builds on the collective clinical strengths of the SingHealth Group with Duke-NUS’ research and medical education capabilities. Together, we create a vibrant academic nexus for new discoveries, learning and care innovation – and bring it to where it matters most: our patients.

Duke-NUS is greatly indebted to so many people and entities for making this enterprise an excellent one. Our enduring asset in making this journey a success has undoubtedly been our outstanding people and advocates. Their singular belief, commitment and perseverance to our common purpose have enabled the school to forge ahead in its endeavours. We have also benefited from the strong support we continue to receive from our stakeholders and donors, many of whom are driven by the contributions we have made to the local and global medical scene.

As we move into the next decade, we are constantly reminded that healthcare practices and needs are always evolving and continually influencing medical education and research. Duke-NUS will continue to deepen its partnership with SingHealth and our partners to further integrate our strengths and enhance our SRPs, creating a world-class Academic Medical Centre in Singapore.

Dean’s Message

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TeamLEAD

The educational strategy at Duke-NUS is closely aligned with the Duke curriculum, but incorporates a new learning approach designed at Duke-NUS in Singapore nine years ago called TeamLEAD, where LEAD stands for Learn, Engage, Apply and Develop. TeamLEAD has garnered widespread attention and is now adopted in several schools in Singapore and back at Duke University. This learning methodology has also been recognised by the Association of American Medical College as a case study for educational “best practices”.

Ms. Lai Hsuan and Mr. Darius Aw jointly invented a medical device to diagnose lumps in the neck. This enhances precision and efficiency during localisation and collection of samples while reducing dependency on experienced clinicians.

Medical Students File Patents

Several Duke-NUS students have patented their research inventions during their third year:

Mr. Apu Thanju was involved in the invention of a compact device designed to directly deliver medicine and apply a protective layer over a wound, reducing post-operative bleeding and promoting wound healing.

Duke-NUS Alumna Turns Inventor

Clinician and medical device innovator Dr. Rena Dharmawan (Duke-NUS MD ’11) is part of 5-member Team Privi that trumped 298 teams and clinched $100,000 cash funding in NTUC Income’s Future Starter competition. Their team developed a medical device called Privi that can be used at home to alleviate pain commonly experienced by haemorrhoid sufferers. Dr. Dharmawan met her Privi team mates as fellows in January 2014 in the Singapore-Stanford Biodesign Fellowship Office programme, a partnership between the Agency for Science Technology and Research (A*STAR), Economic Development Board (EDB) and Stanford University.

Dean Krishnan’s ‘Gift’ to Education

Between 2013 and 2015, Dean Ranga has contributed opinion editorials in TODAY, a leading newspaper, about learning in the 21st century. To date, 38 commentaries have been published. These have now been compiled into a book titled “How to LEAD” as Professor Ranga Krishnan’s legacy to Singapore.
At A Glance

- Published over 2,000 papers in international peer-reviewed journals
- 1,600 full-time and adjunct faculty in research and education
- 446 students, of which 55 are in the PhD programme in integrated biology & medicine
- >2,000 papers in international peer-reviewed journals
- >$280 million garnered in research funding locally and overseas
- >$450 million in donations raised to date with government matching
- 51 patents filed
- 8 licences awarded
- >80 research collaborations and partnerships
- 10 MOH NMRC transition awards
- 21 MOH NMRC Clinical Scientist awards
- 4 National Research Foundation fellowships
- 15 MOH NMRC Transition awards
- 3 biotech

*All information accurate as of December 2014
Singapore launched its $3-billion Biomedical Sciences Initiative to help the country become Asia’s biomedical hub. Led by then-Deputy Prime Minister Dr Tony Tan, a ministerial delegation visited several US universities to discuss a partnership in Singapore.

An MOE-appointed international Medical Education Review Panel recommended that Singapore sets up a graduate medical school to develop highly-trained clinicians and clinician scientists to support Singapore’s Biomedical Sciences Initiative.

Duke University and National University of Singapore (NUS) signed a Memorandum of Understanding (MOU) to set up a graduate medical school in Singapore.

April
- Duke University and NUS formalised the first phase of cooperation to proceed with Singapore’s first US-style medical school, named Duke-NUS Graduate Medical School.

2009
- Singapore’s Prime Minister Lee Hsien Loong officially opened the campus at 8 College Road.
- The inaugural cohort from the PhD programme in Integrated Biology and Medicine enrolled.
- Duke University and NUS officially signed the second phase of collaboration in medical education and research.

2010
- First MD class completed medical training and embarked on residency training in hospitals and national institutes.
- Duke University and NUS officially signed the second phase of collaboration in medical education and research.

2011
- Mr. Tony Chew appointed Founding Chairman and inaugural Governing Board is convened.

2012
- Mr. Kai Nargolwala appointed Chairman of Duke-NUS Governing Board.

2014
- Duke-NUS and Singapore signed MOUs to further clinch commitments to strengthening their Academic Medicine partnership.

2015
- Milestones
Although too many to mention here, these examples of Duke-NUS research outcomes demonstrate the health and medical impact they have made.

**Cancer Resistance in Asians: A Genetic Cause Found**

A multi-national team led by Duke-NUS Associate Professor Ong Sin Tiong successfully identified a gene mutation occurring in about 15% of East Asian populations as the underlying cause to why some blood and lung cancer patients failed to benefit from existing cancer medication. Not only did Assoc. Prof. Ong’s team uncover the defective gene, they also identified a novel class of drugs as the solution for such drug resistance. This discovery has the potential to benefit or extend the survival of more than 15,000 affected patients worldwide per year.

**Research with Impact**

**New Treatment for Dengue**

Professor Subhash Vasudevan, Associate Professor Ooi Eng Eong from the Emerging Infectious Diseases Programme and collaborators from Singapore General Hospital (SGH) have completed a clinical trial testing the efficacy of Celgosivir as an anti-dengue drug. With their findings, a US-based pharmaceutical company (60 Degrees Pharmaceuticals) has licensed the patent from Duke-NUS and will move this drug towards a clinical application through a full-scale Phase 2 clinical trial. This Phase 2 trial will be done as a multi-centre study involving several countries, including Singapore and Vietnam.

**Findings Result in Saving of Costs and Lives**

Professor Eric Finkelstein, PhD student Ms. Dong Di and Adjunct Associate Professor Cynthia Sung conducted a study which yielded significant evidence that it is more cost effective to perform genetic testing on Chinese and Malay patients in Singapore before prescribing carbamazepine (CBZ, an affordable but potentially hazardous anti-epileptic drug) to prevent serious adverse drug-induced reactions. The Health Sciences Authority of Singapore now requires genetic testing before drug prescription. Due to the prevalence of the risk allele in Asian population, the results of this comprehensive study is highly relevant to patients in other Southeast Asian countries such as Malaysia, Thailand and the Philippines.
The SingHealth Duke-NUS Academic Medical Centre brings together the expertise and knowledge of top clinician specialists, educators and researchers. This partnership created a vibrant environment for Duke-NUS’ five SRPs and SingHealth’s 11 Academic Clinical Programmes (ACPs) to work towards revolutionising medicine. This strong collaboration has already yielded positive results and exciting initiatives, bringing translational research – Bench to Bedside and Bedside to Bench – full circle.

The following examples in the areas of Cardiology, Oncology and Public Health exhibit the power and patient benefits of collaborative research efforts.

**Mutated ‘titin’ Gene Possible Link to Asian Heart Disease**

Tanoto Foundation Professor Stuart Cook, Deputy Director of the Cardiovascular and Metabolic Disorders Programme at Duke-NUS, who discovered the mutated ‘titin’ gene responsible for dilated cardiomyopathy (DCM) in Caucasians, is leading a team to determine if it also affects Asians. The researchers from SingHealth, Duke-NUS and National Heart Research Institute Singapore (NHRIS) also intend to examine another 60 genes and patients’ DNAs to determine if other genetic causes are at play. The findings from this study will help identify patients who are susceptible to developing this heart condition, and help them to monitor and administer personalised medicine to combat it.

**A Better Way for Diabetics to Monitor Blood Glucose Levels**

In 2013, Health Services and Systems Research (HSSR) Programme Director, Professor David Matchar, together with collaborators from SGH and Integrated Health Information System, detailed an on-going study to determine the effectiveness of a mobile phone application (app) SGH Diabetes Pal in helping Type 2 diabetic patients self-monitor their insulin intake. The app automatically calculates the required insulin dosage to be injected based on the fasting blood sugar levels recorded by users in the morning. Doctors are also able to track their patients’ progress remotely or intervene using the app’s administrative function.

**Breast Tumour Causing Gene Discovered**

A critical gene in breast tumours was uncovered by the collaborative efforts of scientists from Duke-NUS, National Cancer Centre and SGH. The multi-disciplinary team led by Professors Teh Bin Tean, Patrick Tan, Tan Puay Hoon and Steve Rozen identified the mutation of a gene – MED12, in nearly 60% of fibroadenomas. "Measuring the MED12 gene in breast lumps may help clinicians to distinguish fibroadenomas from other types of breast cancer," said Prof. Tan Puay Hoon. Findings from the study not only provided a deeper insight into the development of tumours, it also allowed for more effective treatments to be administered. The team intends to explore the role of MED12 in other categories of breast tumours in future studies.