

The NUS MBBS-PhD Programme: Nurturing Clinician-Scientists for Tomorrow

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Abstract

The MBBS-PhD programme is a significant milestone in medical education in Singapore. In July 2000, the Faculty of Medicine, National University of Singapore launched this programme in collaboration with the Institute of Molecular and Cell Biology, with support from the Economic Development Board, and the Agency for Science, Technology and Research, Singapore. The objectives of the programme are to nurture and develop the talents of the brightest medical students by integrating clinical and basic biomedical research training, as well as to stimulate advanced basic and applied research in areas of growing importance to clinical medicine. The programme also aims to train clinician-scientists who will interface basic biology and clinical practice to solve biomedical problems and spearhead biomedical research initiatives in Singapore. Successful MBBS-PhD graduates can pursue career tracks in clinical research, basic biomedical research or in the biotechnology industry.

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Introduction and Rationale

The MBBS-PhD programme is a significant milestone in medical education in Singapore. In July 2000, the Faculty of Medicine, National University of Singapore (NUS) launched this programme in collaboration with the Institute of Molecular and Cell Biology (IMCB), with support from the Economic Development Board (EDB), and the Agency for Science, Technology and Research (A*STAR). The major impetus for initiating the programme is the recognition that clinician-scientists have important roles to play in biomedical research and training. Clinician-scientists have unique and integrated perspectives arising from their dual understanding of disease processes and basic biology. These perspectives are critical in directing translational research and teaching activities in the investigation and solution of biomedical problems in Singapore as it aspires to be a world-class hub for biomedical research and healthcare. In view of the nature of their work and training, clinician-scientists have better access to both clinical and basic science research materials, and to collaborative networks.

Prior to the implementation of the MBBS-PhD programme, clinicians who were interested in research

underwent formal research training and pursued a PhD or MD degree after completion of the MBBS degree or specialist training. However, the long period of clinical training and the considerable financial opportunity cost severely restricted the number of clinicians who chose this path. Furthermore, the apparent dichotomisation between clinical training and basic research is an artificial one, and is not conducive to the student in fostering integration of these 2 important components. Hence, the NUS MBBS-PhD programme provides prospective candidates with the alternative opportunity of integrated clinical and research training whilst they are young, energetic and creative.

Nurturing Medical Scientist Leaders for the Future

The objectives of the programme are to nurture and develop the talents of the brightest medical students by integrating clinical and basic biomedical research training, as well as to stimulate advanced basic and applied research in areas of growing importance to clinical medicine. The programme also aims to train clinician-scientists who will interface basic biology and clinical practice to solve biomedical problems and spearhead biomedical research initiatives in Singapore. It is anticipated that these clinician-scientists will assume key leadership positions in academia,

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hospitals, research institutes and industry, not unlike the experience of many other reputable universities offering similar programmes.¹ For example, a survey in 1996 of 109 Harvard University alumni who graduated from its MD-PhD programme and who had completed post-doctoral training revealed that 2 were Chiefs in the National Institutes of Health (NIH), 9 were Professors, 24 Associate Professors and 50 Assistant Professors, while 9 held senior positions in industry. This reflects both the calibre of the individuals who successfully completed this competitive programme, and the value academic institutions and industry place on such individuals.

Rigorous Selection of Candidates

The selection criteria for this programme are understandably highly rigorous. Candidates must have either excelled in their preclinical subjects as medical students and have prior laboratory-based research experience of at least 3 months, or possess at least a 2nd Upper Honours degree in life science or even engineering disciplines. Shortlisted candidates attend 2 rounds of interviews during which they are assessed for their passion, creativity and interest in medicine and research. Since its inauguration, the programme has received between 21 and 70 applications every year with only 3 to 4 candidates who are eventually selected annually. Successful candidates are awarded prestigious scholarships from A*STAR and NUS, which will pay full tuition fees and provide generous stipends. The students are also given an option to pursue their PhD studies overseas at leading laboratories in the United Kingdom (UK), including those of Oxford University, Cambridge University and Imperial College London.

Structure and Administration of the Intercalated Programme

The structure of the programme is modeled after the Cambridge University MBBS-PhD programme in the UK,² and the highly successful Medical Scientist Training Programme (MSTP) in the United States, which has been in operation since the 1960s.³ Staff members from the NUS Faculty of Medicine visited Cambridge University to learn how the programme was implemented there. Existing NUS medical students are selected after they complete their second year of the medical course. Successful applicants with a first degree enter the NUS MBBS-PhD programme by joining the medical first-year class for the first 3 years. During this time, they also participate in at least 2 out of 3 mandatory research laboratory rotations (each with a minimum duration of 6 weeks) in either NUS or IMCB. During the first 2 years, they also attend regular Medical Research Seminars (MRS) at which principal investigators from NUS and IMCB highlight their research interests.

The laboratory rotations and MRS expose the students to the breadth of research opportunities available on campus. The students are also encouraged to attend and pass postgraduate level modules offered by the Faculty of Medicine or IMCB (e.g., Advanced Cell Biology – a partial requirement in the fulfillment of the NUS PhD degree).⁴ The PhD research project extends from years 4 to 6 of the programme. During their doctoral period, the students also attend weekly clinical and bedside teaching sessions (e.g., Medicine and Surgery) in order to keep in touch with clinical skills. Upon the successful completion of their PhD project at the end of the 6th year of the programme, students proceed with the final 2 years of the MBBS clinical component, culminating in the Final MBBS Professional Examination at the end of the 8th year of the programme. Although the average time to complete the MBBS-PhD programme is 8 years, it may be possible for exceptional students to complete the programme within 7 years.

In consultation with the senior management of A*STAR, the programme is administered by the MBBS-PhD Programme Committee appointed by the Dean, Faculty of Medicine. This Committee comprises the MBBS-PhD Coordinator, the Vice-Dean (Education), NUS clinician-scientists and an IMCB representative, assisted by a Programme Administrator.

Challenges, Future Directions and Career Paths

An important challenge is to sustain the candidates' enthusiasm for research after the completion of their PhD studies and during their clinical years of the MBBS course. This may be achieved by identifying suitable mentors to guide and nurture these post-PhD students to sustain their research mindset.⁵ A significant number of candidates desire to pursue postgraduate clinical specialist training in addition to acquiring their MBBS and PhD degrees. A sequential programme for the latter group may be more appropriate, whereby the candidates pursue their PhD and specialty training after completing the MBBS course, housemanship, and national service (in the case of male Singaporean citizens).^{6,7} Given the quality and development of biomedical research in Singapore, there is now a critical mass of excellent biomedical researchers in the Faculty of Medicine and various research institutes and hospitals. Together with colleagues from new schools like the NUS Graduate School for Integrative Sciences and Engineering, they will be able to help train the next generation of MBBS-PhD scholars. Successful MBBS-PhD graduates can choose to pursue one of the following career tracks:¹

- (a) clinical research track working primarily as clinician-scientists,
- (b) basic research track working primarily as researchers in the research institutes, research centres or universities,
- (c) A*STAR industry track primarily promoting the

development of biomedical sciences in Singapore or in the biotechnology industry.

In conclusion, the combined efforts and contributions of the MBBS-PhD scholars, mentors and administrators from the various agencies augur well in making it the premier programme for the training of clinician-scientists in Singapore.

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