

# Nurturing Minds, Touching Lives

Post graduate studies in the Department of Medicine



## A bacteria buster to keep our hospitals safe

“I’m in a unique and fortunate position, where the research work that I do for my full-time job has great synergy and significant overlap with the research work done for my PhD studies. While it is a challenge to juggle both work and studies, it does make me stringently prioritise my work, to ensure that I can meet the deadlines,” said Lim Tze Peng, who began his PhD studies under the NUS Department of Medicine in 2008, after obtaining a BSc from the NUS Department of Pharmacy. He is also a senior pharmacist at the Singapore General Hospital (SGH). “My research aims to find more effective ways to tackle the growing problem of multi-drug resistant bacteria, which is causing terrible consequence for patients, doctors and hospitals.”

The prevalence of multi-drug resistant organisms has been growing in recent years, due to the increased and often inappropriate use of antibiotics. This results in public health problems worldwide, as patients are no longer responding to existing antibiotic treatment. Furthermore, hospitals serve as the centre for the formation and transmission of these drug-resistant organisms. As it takes years or even decades to develop novel antibiotics and bring them to market, hospitals are rapidly running out of solutions.

Tze Peng’s research aims to solve this problem, through finding the right combination of antibiotic treatments that can have an effect on such difficult-to-treat infections. This is a research collaborative project between the National University Hospital, Changi General Hospital, Singapore General Hospital and Tan Tock Seng Hospital. The ability for Tze Peng to work closely with physicians and gain access to bacteria samples from the hospitals contributed significantly to the project. The antibiotic combination therapy aims to address two particular organisms – the *Acinetobacter baumannii* and *Pseudomonas aeruginosa*. Tze Peng has successfully raised various grants totalling \$400,000 from the Singhealth Foundation and the Singapore General Hospital Research Fund to conduct these pharmacokinetic and pharmacodynamic studies.

“We are employing novel in-vitro dynamic models that allow us to mimic human-like conditions. The preliminary results of our research are positive. We have identified specific antibiotic combinations that are effective against representative isolates from the four hospitals in Singapore. My role in the study was to direct the experiments, pertaining to the lucidity of the potential antibiotic combination. I worked in the team of some 10 individuals and was responsible for designing, preparing and running the experiments, as well as preparing the information for conference presentations and journal publications.” explained Tze Peng.

Currently, it takes approximately two days for clinicians to identify the infecting organisms, another 4 days to discover the most effective combination of antibiotics and a final 3 more days for the patient to respond positively to the treatment. Tze Peng hopes to shorten this time by developing a more rapid methodology, which can find the right antibiotic combination. This will allow clinicians to treat their patients faster and

better. This research work has already been published in a number of international, peer-reviewed publications, including the *Antimicrobial Agents of Chemotherapy*, the *Journal of Antibiotics* and the *Diagnostic Microbiology of Infectious Diseases*. Moving forward, Tze Peng hopes to validate the research findings in animal models and eventually progress to clinical studies.

Tze Peng credits much of his work to his supervisor, Dr Hsu Li Yang from the NUS Department of Medicine and mentor Dr Andrea Kwa from SGH, who have guided him and sparked his interest in infectious disease research. He has boosted his knowledge in this field, through two training stints, which were conducted in United States and supported by a talent development grant from the SingHealth Foundation. Upon completing his PhD, which he aims to do by 2012, Tze Peng hopes to carry on with post-doctorate training in the United States, where he believes pharmacokinetic and pharmacodynamic studies to be at their peak.

“I decided to undertake a PhD, as I wanted to boost my knowledge, technical skills and formal qualifications, in order to carry on in the field research. I chose to do my graduate studies with the NUS Department of Medicine because firstly, I knew that Prof Hsu was well-established in the area of infectious diseases and I am most interested in this research field. And secondly, I wanted to work with the Department of Medicine because it is geared towards translational research, which is particularly relevant for my field,” said Tze Peng. “I hope to extend this research in combination therapies to focus beyond just bacteria and look at other possible organisms such as fungi or viruses. At the end of the day, the main motivating factor driving me to do my research is my ambition to play a role in creating more effective treatment outcomes and see patients get better.”

To know more about the graduate programme, click [Here](#)