

Nurturing Minds, Touching Lives

Post graduate studies in the Department of Medicine



Combating diabetes and obesity for Asians, in Asia

Growing affluence, combined with a change in lifestyle and diet, has resulted in an increased prevalence of obesity and its associated disorders, such as Type 2 diabetes mellitus, across Asia. This worrying medical trend is heightened in Singapore, which has one of the highest incidences of diabetes in the developed world. And yet, the majority of research on diabetes has been done in the West, despite there being ethnic differences between the disease's physical and behavioural characteristics. Research done by Tammy Song, a PhD student under the NUS Department of Medicine, aims to address the growing medical and societal problems of metabolic diseases.

“I have always wanted to do research, especially in the area of metabolic diseases. It not only stretches your capabilities and challenges you intellectually, but it is also highly rewarding, as I can make an impact in improving people’s lives through innovation and scientific discovery. In particular, I wanted to do my PhD under the Department of Medicine, as it provides opportunities to conduct translational research, which can bring tangible improvements in clinical practice and in public healthcare. Upon completing my BSc in Biomedical Sciences in NUS, I worked with Prof Tai E Shyong, who is an expert in the field of diabetes and obesity, for nearly a year as his Research Assistant. The mentorship under him and the exposure to real people with real medical problems have prepared me well for the research that I’m doing now at graduate school,” said Tammy, who began her PhD studies under a scholarship in mid 2010. “The end goal of my research work is to develop effective preventative and therapeutic interventions to reduce the burden of metabolic diseases in Asia.”

Tammy is working on the Singapore Adult Metabolism Study (SAMS), which aims to evaluate how genomic variation, ethnicity and the foetal environment contribute towards disease risk in adults with obesity and/or type 2 diabetes. Tammy is part of the team that examines factors such as body composition (regional distribution of fats, total lean mass, total fat mass), metabolic physiology (insulin sensitivity level, resting energy expenditure), birth weight and genetics/epigenetics that may explain for ethnic differences in obesity and diabetes risk. This study is conducted in humans and Tammy needs to work closely with doctors and nurses at NUS to collect and analyse the data.

“Ethnic differences in the relationship between body mass index and insulin resistance exist. For example, Indian individuals tend to be more predisposed to insulin resistance, despite relatively low levels of obesity, as compared to Chinese and Malay individuals,” explained Tammy. “Knowledge of ethnic differences will facilitate the development of targeted and more efficacious lifestyle and nutritional intervention or prevention treatments. These can be tailored to the needs of different ethnic groups for better disease management, improving outcomes for the patients.” Singapore is uniquely positioned to be able to carry out these studies

because of the nation's three major ethnic groups, living in a highly urbanised environment with a high burden of diabetes.

The second part of Tammy's research under SAMS will study developmental pathways towards later risks of obesity and diabetes. The metabolic physiology, body composition and genetic/epigenetic factors will be examined in healthy, overweight and obese individuals, drawn from three different birth weights with similar body mass index. The study aims to provide deeper insight into the extent such factors operate in the various developmental pathways that influence the risk of developing metabolic disease. Subjects recruited in this part of the study will undergo a lifestyle intervention of dieting and exercise, in order to observe if these individuals have a differential metabolic response to weight loss.

Tammy's research will collaborate with another research project, called Growing Up in Singapore Towards Healthy Outcomes (GUSTO). This study follows pregnant mothers, documenting their pregnancy conditions, foetuses' growth patterns and epigenetic changes detected during birth, to assess how these relate to subsequent developments and predispose the child to metabolic disease later in life.

"Previous studies have demonstrated a 'U-shaped' curve which relates birthweight to risk of adult obesity and insulin resistance. Babies subjected either to early life nutritional deprivation or over-nutrition appear to be at highest risk. We will be looking to see if this is true in Asians, as well as testing out another hypothesis that individuals with lower birth rates when challenged with a weight loss intervention will experience greater reduction in energy expenditure, resulting in lower efficacy of the intervention," said Tammy. "By working with the GUSTO project, we want to see if early intervention and prevention strategies during pregnancy and early childhood can have a role in managing metabolic disease better."

Both the SAMS and GUSTO studies fall under the Translational & Clinical Research Flagship Programme of Metabolic Diseases, a programme that has received a S\$25 million grant from the National Research Foundation. This multi-organisational collaborative study encompasses epidemiology, molecular biology, experimental physiology, metabolic imaging, clinical physiology, nutritional ecology and public health. The programme brings together basic science and clinical investigators from Singapore hospitals, research institutes and universities, as well as international organisations, such as the Liggins Institute, Maastricht University (Netherlands), University of Auckland and University of Cambridge.

"The ability to collaborate with world-class experts in the field is an invaluable opportunity for me. By doing so, I look forward to building up my own research capabilities, as well as playing a role in influencing the way that metabolic diseases in Asia are investigated, prevented and treated," concluded Tammy.

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