

Nurturing Minds, Touching Lives

Post graduate studies in the Department of Medicine



Finding better ways to treat liver failure, as a clinician, a scientist and a supervisor

Many patients with liver disease are not fortunate enough to receive a liver transplant and outcomes for these patients are usually poor. Fortunately, latest advances in regenerative medicine have raised the possibility of using liver stem cells for the treatment of liver disease. Dr Dan Yock Young, who is both a medical doctor and a scientist, is conducting research with the aim of identifying, isolating and characterising a source of liver stem cells that could be used in various therapeutic applications. This research could be translated into new medical therapies that treat diseases such as acute and chronic liver failure, as well as various metabolic disorders.

“Being a clinician as well as a scientist helps me to better understand the most critical problems my patients are facing. My scientific training then enables me to ask the relevant questions and derive the right methods to answer them. So both the research and clinical processes are tightly interlinked,” explained Dr Dan Yock Young, who is an Assistant Professor with the NUS Department of Medicine and a Consultant at the National University Hospital’s Department of Gastroenterology and Hepatology.

After completing his basic medical degree (MBBS) at NUS, Dr Dan went on to pursue a PhD from the NUS Department of Medicine in 2004, and is currently in the concluding stages of submitting the final version of his thesis. His PhD research work involved developing improved methods to isolate and expand human foetal liver stem cells into a population of progenitor cells. Dr Dan successfully demonstrated that these progenitor cells were able to give rise to liver cells and bile ducts in *in-vitro* studies, and when transplanted into animal models of liver disease showed successful engraftment and functionality.

“My PhD research enabled me to gain a better understanding of the physiology of liver stem cells. Moving forward, I am now using this knowledge and applying it to alternative sources of liver stem cells, such as amniotic cells and gastric epithelial cells. I hope that this research will allow scientists to create a sustainable and practical source of liver cells that can be used in clinical applications,” said Dr Dan.

While the ability to convert these stem cells into liver-like cells has been exciting, in order for them to become clinically-useful to patients, Dr Dan needs to conduct further work to optimise their efficiency and yield. Having demonstrated positive outcomes in mice models, Dr Dan is now testing the safety and efficacy of these cells in larger animal models, before moving ahead with human clinical trials. Dr Dan has

collaborated with international organisations, including the University of Washington and the National Institute of Health, in particular to conduct research into the genetic expression of these cells and their relationship to liver cancer.

Dr Dan continued, “I wanted to do my PhD with the Department of Medicine because this department has a tripartite aim for excellence in clinical care, teaching and research. This definitely helps to support clinician scientists like me in bridging the gap between clinical medicine and basic research. Furthermore the teaching environment here and strong academic culture of mentorship allowed me to grow confidently in a guided, yet free and open environment.”

Dr Dan aims to continue creating this same mentoring environment for the next generation of graduate students, as he is now supervising two PhD students in their research work. His students are focusing on the analysis of genetic regulation of liver stem cells and exploration of amniotic membranes as a source of liver progenitor cells.

“I do enjoy the opportunity to guide raw gems, helping them to reach their maximum potential through education and mentorship. As such, I hope to be able to stay within the University and pursue an academic career in the long term,” said Dr Dan. “Chipping away at this jigsaw puzzle, known as ‘research’ is intriguing. It involves the challenge of pushing at the frontier of science - satisfying my thirst for knowledge and hunger for discovery. However, one of the most important motivating factors for me to continue in my research is the hope to be able to provide better solutions for patients who are at the mercy of liver disease.”

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