

BIOENGINEERING OF FUNCTIONAL HUMAN INTESTINAL GRAFT FOR AUTOLOGOUS TRANSPLANTATION



VIVIAN LI, Group Leader, The Francis Crick Institute

Vivian Li obtained her PhD at the University of Hong Kong in 2008, characterising human colonic development and tumourigenesis. She then received the Croucher Foundation Fellowship to pursue her post-doctoral training with Hans Clevers at the Hubrecht Institute, where she studied Wnt regulatory mechanisms in intestinal stem cells. Vivian established her own lab initially at the MRC National Institute for Medical Research, one of the Crick's parent institutes in 2013. Her group at the Crick investigates signalling regulation of intestinal stem cell, cancer and tissue repair, with primary focus on Wnt signalling pathways.

How do you bioengineer the functional human intestinal graft?

Tissue engineering requires two key components: cells and scaffolds. We use intestinal organoids as the cell sources for intestinal tissue engineering. Organoids are 3D culture of stem cells that will self-organise to form mini-organs, which resemble the structure and function of the organs in our body. They are the ideal cells for tissue regeneration. A donor intestine will first be decellularised using enzyme-detergent mix, which serves as the biological scaffold. Organoids, together with other cell types such as fibroblasts and muscles, will then be seeded onto the acellular scaffold in a defined condition to reconstruct the intestine in vitro.

How is this translated into autologous transplantations?

Traditional organ transplantations have high risk of graft-host rejection due to the immune

response to the foreign cells. In our current design of intestinal tissue engineering, we use cells obtained directly from patients to reconstruct the neo-intestine. This allows us to perform autologous transplantations using patient-derived cells, which will avoid graft rejection issue.

What do you think is the future for bioengineering?

The fact that we can use organoid technology to reconstruct an intestine in the lab has opened up possibilities for organ bioengineering. This implies that we could potentially have unlimited supplies of organs for transplantations, which solves issues such as lack of donors and graft rejection. Together with the recent advances on gene editing tools, we could possibly correct genetic diseases in patient-derived cells before bioengineering and transplantation in the foreseeable future.

Vivian delivered a talk for the Stem Cell & Regenerative Medicine Congress.
Her talk was titled "Bioengineering of Functional Human Intestinal Graft for Autologous Transplantation"

To Learn more about the Cell Series Please [CLICK HERE](#) for more Information