



Research Theme: Biotechnology

MSc Research Project Title:

Evaluation of a novel ex vivo protein engineering method to modulate cellular surface with anti-CD19 receptor, for therapeutic purposes

Principal Investigator/Supervisor: Wu Bin

Co-supervisor/ Collaborator(s) (if any):

Project Description

a) Background:

Chimeric antigen receptor (CAR) T cells are engineered T cells used in immunotherapy, given that such tumor-specific T cells are undeterred by certain tumor escape mechanisms. The receptor endodomain of third generation CARs are often made up of CD3 ζ , responsible for T cell activation, and multiple co-stimulatory domains such as CD28-OX40 or CD28-41BB, which improves proliferation, cytokine secretion and in vivo persistence (Hartmann et al., 2017). On the other hand, the receptor ectodomain could consist of either a single-chain fragment variable (scFv), antigen-binding fragment (Fab), or natural ligands, and thus functions as the antigen recognition and binding site. As compared to normal T cells receptors, CARs can bind to intact antigens, independent of major histocompatibility complex (MHC) molecules (Sadelain et al., 2013). Since one way in which tumor cells evade detection and hence CD8⁺ T cell mediated cytotoxicity is through the downregulation of MHC I proteins, this provides an advantage in CAR T cells unaffected by such an immune-evasion mechanism. Currently, the production of CAR T cells is most often done by using methods involving retroviral- or lentiviral-mediated gene transfer (Hartmann et al., 2017; Sadelain et al., 2013). Nevertheless, CAR T cell therapies are associated with high costs due to its complex manufacturing process in specialized facilities (Lyman et al., 2020).

b) Proposed work:



In this proposed work, we would experiment with a protein engineering strategy to generate a collection of CD19 related CAR cell lines.

c) Preferred skills:

Biochemistry, molecular biology

Supervisor contact:

If you have questions regarding this project, please email the Principal Investigator:

SBS contact and how to apply:

Associate Chair-Biological Sciences (Graduate Studies) : AC-SBS-GS@ntu.edu.sg

Please apply at the following:

Application portal:

<https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frmOnlineApplication.ASPX>