Developing a Scale-Up Platform for high-quality human T cells production

Dr Viknesvaran Selvarajan
Research Scientist, Animal Cell Bioprocessing
Bioprocessing Technology Institute, A*STAR

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Host: Dr Ng Say Kong

Seminar Abstract

Cell and gene therapies are a promising treatment approach for severe diseases and unmet medical needs. Adoptive cell therapy (ACT) which is a form of cellular immunotherapies has gained great momentum after the approval of chimeric antigen receptor (CAR-T) products in recent years. The impressive global momentum of this therapeutic approach has highlighted the urgent need for establishing it as an effective and standardized approach. However, robustness and reproducibility of the manufacturing process remain challenging and it is therefore pivotal to understand the effect that cell culture conditions have on the expansion and differentiation of T-cells. The main concern is that primary T cells are shear sensitive and therefore do not grow as effectively in more scalable, agitated systems, such as stirred-tank bioreactors, as compared with static conditions.

The current study demonstrated a robust and practical platform for adoptive cell culture using stirred-tank, WAVE and novel biaxial rotary bioreactors for large-scale and high-quality cellular production. The design and operation of a bioreactor are complex tasks, not only to reactor configuration and size but also with respect to the mode of operation. Various factors were investigated, such as bioreactor parameters, media, supplements and stimulation. The suitable structure of scaling up in bioreactors and the robustness and reproducibility of the process was validated using different healthy donors' T cells. Finally, T cell quality was monitored using surface markers and intracellular cytokines as the critical quality assessment criteria in the early, middle and late stages of cell production. The approach addressed the fundamental challenges that remain unsolved in the manufacturing process before adoptive T cell therapy can be considered as a powerful new class of cancer therapeutics.

About the Speaker

Viknes graduated with a PhD in Cancer Biology from the National University of Singapore in 2016, working characterization of a transcription factor (RUNX3) in natural killer T-cell lymphoma (NKTL). Following the doctoral study, he continued at NUS as a Research Fellow, investigating on addressing the molecular pathogenesis and epidemiology of lymphomas together with identifying novel targets for diagnosis and therapy. He joined the Singapore Institute of Technology (SIT) in 2019 and was working on industry innovation projects in developing a scale-up platform for adoptive cell therapy before coming on board to the Bioprocessing Technology Institute in January 2022. He has published in a range of scientific journals, mentored and facilitated student learning.

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