

Summer Studentships 2026/2027

PROJECT TITLE:

CLARITY: Computational Learning for Accelerated Release using Imaging cytometry

AIM:

Timely delivery of cellular therapies, such as chimeric antigen receptor (CAR) T-cells, relies on product 'release testing' to quantify cell numbers, viability, purity, residual contaminants, and assess functional potency. CLARITY aims to leverage automated imaging and machine learning to improve release testing for CAR T-cell therapies.

METHODS:

Primary human CD19-directed CAR T-cells will be generated and imaged with a 3-channel auto-focusing benchtop device (LUNA-FX7). An open-source image analysis pipeline will be used to segment cells and residual microbeads in positive control, negative control and test samples (generated with CD3/CD28, uncoated, and CD19-coated beads, respectively). We shall extract three classes of feature for each cell: morphological (cell area and granularity), phenotypic (fluorescence intensity of activation markers), and spatial (distance to nearest microbead, clustering). Machine learning using positive and negative control samples will be used to generate a cell activation classifier, which will be applied to test samples to form a 'functional potency index' (FPI). This will be benchmarked against standard functional potency assays (IFN- γ ELISA) conducted using the same CAR T-cells.

RESEARCH SIGNIFICANCE:

In conjunction with parallel work to validate the LUNA-FX7 for cell number, viability, purity and residual microbead determination, this project is expected to generate an automated pipeline for accelerated CAR T-cell product release. We hope to integrate these workflows into our future CAR T-cell clinical trial portfolio at the Malaghan Institute.

STUDENT'S ROLE AND EXPOSURE TO SCIENTIFIC METHOD:

The student will gain experience in cell culture and preparation, imaging, image analysis and machine learning. They will also gain exposure to the process of validating new laboratory assays in a GxP environment.

RELEVANT PREVIOUS EXPERIENCE FOR STUDENTS (Education or Research):

Experience in cell culture (or other core laboratory techniques), and/or machine learning, would be an advantage.

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Host Department:	Malaghan Institute of Medical Research	
Location:	Wellington	
	Can students work remotely?	No