Arnie Charbonneau Cancer Institute
The Riddell Centre for Cancer Immunotherapy

University of Calgary | Alberta Health Services

The IMPACT Study: Understanding and Overcoming CAR T Manufacturing Failures

PROJECT TEAM

Dr. Kevin Hay (PI)

Co-Investigator:
Dr. Robert Holt *(BC Cancer)*

TARGETED CANCERS

Blood cancers

PARTNERS

BC CANCER

RESEARCH PRIORITIES

Discovery & Innovation

Biomanufacturing

PROJECT SUMMARY

CAR T-cell therapy has become a standard treatment for certain aggressive blood cancers, offering new hope to patients who have not responded to other options. These therapies are made using a patient's own immune cells, which are collected, modified in a lab, and then returned to the patient to target and destroy cancer cells. While this approach has shown strong results, it doesn't always go as planned.

In about seven per cent of cases, the manufacturing process fails — meaning the patient's cells can't be turned into a usable therapy. This can cause serious delays for patients who are already very ill and leads to wasted time, resources and cost. Researchers have observed that certain clinical factors may increase the risk of these failures. For example, patients who recently received specific types of chemotherapy, or who have low platelet counts or particular immune cell types in their blood, may be more likely to experience issues. These patterns suggest that the quality of the cells collected from patients plays a key role in whether the therapy can be successfully made. However, commercial manufacturers rarely share detailed data on these failures, leaving important questions unanswered.

To address this, a team led by Dr. Kevin Hay, medical director of biomanufacturing at the Riddell Centre, is studying the quality of the cells collected from patients at the start of the process. Building on the success of CLIC-1901 — Canada's first homegrown CAR T therapy, which was tested in a clinical trial by Dr. Hay and team — the researchers are analyzing samples from both successful and unsuccessful manufacturing attempts. By identifying what makes some cells more suitable than others, the team hopes to improve the reliability of the process and ensure more patients can benefit from these therapies.

The insights gained will not only strengthen the CLIC-1901 program, but will also inform the development of therapies being advanced by Riddell Centre investigators, including GCAR1 and BCAR1, both of which are expected to enter clinical trials in 2025 and 2026, respectively.

OVERALL IMPACT

The IMPACT project aims to improve the reliability and efficiency of CAR T-cell manufacturing by identifying key factors that influence product success. By understanding why some patient samples fail during production, this work will help reduce delays, lower costs and ensure more patients can benefit from life-saving cell therapies. Insights from this study will also guide the development of future therapies at the Riddell Centre, strengthening the entire cell-therapy pipeline.

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