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BIOSCIENCE

Rarity support CAR-T cell study

On behalf of the sponsor, Elicera Therapeutics, Rarity is supporting the ELC301 translational study with analysis of the vector copy number (VCN) of integrated retroviral vectors in engineered Human T-cells.

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The analysis is done using the Rarity superRCA technology. The method is applied by having one amplification probe targeting the integrated transgene fragment and one amplification probe targeting human globin fragment as a cell copy number reference. After superRCA processing, each amplified integrated transgene and Human Globin superRCA products are enumerated by Flow cytometry. A spike-in curve is used to normalize any amplification bias between the two targets before quantification and vector copy number calculation.

Retroviral Vector spike-in

Figure 1: Retroviral Vector quantification on dilution series with actual retroviral vector spiked-in constant genomic DNA. The CV% was calculated with three replicated measurements per dilution series.

About SuperRCA VCN assay

The SuperRCA technology has a unique detecting sensitivity and precision, and the Car-T assay has a copy number counting precision (Coefficient Variation) CV <5% (range from 0.1% to 4.91%) in detecting 0.5-10 VCN copies per CAR-T cell. The assay is flexible in terms of sample input and quantification range, making it robust and easy to use. Turnaround time per test is around three hours and the equipment flexibility offers potential testing within the same lab for the CAR engineered T cell assessment, which can reduce the total turnaround time significantly.

Thanks to the flexibility of the SuperRCA technology, the assay works equally well during initial VCN assessment on 10,000 cells prior to re-insertion of the patient samples, as well during follow up assessments post therapy with 1-10 million cells input, still in a single tube format to keep costs down and maintain high throughput.

“Elicera have a very strong CAR-T cell therapy pipeline and measuring the integrated vector copy number is an important analysis for the CAR-T cell product. The assay from Rarity shows similar or better CV than current available ddPCR assays, and a much more cost efficient alternative. Based on the sensitivity and robustness of Rarity’s technique, we hope to use this technique for detecting CAR-T cell persistence during patient follow-up.”

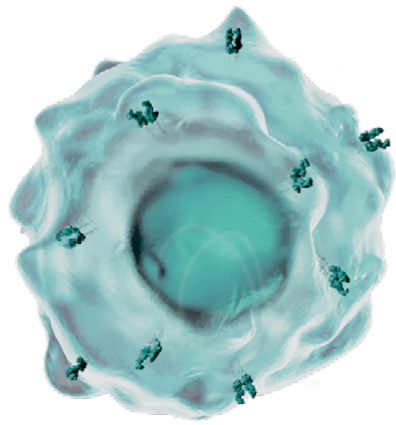
- Di Yu,
Co-founder of Elicera & Head of Translational Research & Technical Operations

What is Car-T cell therapy?

Chimeric antigen receptor T cells (also known as CAR-T cells) are T cells that have been genetically engineered to produce an artificial T cell receptor for use in immunotherapy.

Chimeric antigen receptors (CARs, also known as chimeric immunoreceptors, chimeric T cell receptors or artificial T cell receptors) are receptor proteins that have been engineered to give T cells the new ability to target a specific protein. The receptors are chimeric because they combine both antigen-binding and T cell activating functions into a single receptor.

CAR-T cell therapy uses T cells engineered with CARs for cancer therapy. The premise of CAR-T immunotherapy is to modify T cells to recognize cancer cells in order to more effectively target and destroy them. Scientists harvest T cells from people, genetically alter them, then infuse the resulting CAR-T cells into patients to attack their tumors.



T Cell

CAR

Why does copy number matter?

Retroviral and lentiviral vectors have been broadly used in Chimeric Antigen Receptor (CAR) T-cell therapy clinical trials. These vectors have the capacity to integrate permanently into host cell DNA. There is an increased risk of oncogenesis if the vector copy number (VCN) per cell is high. The Food and Drug Administration (FDA) recommends that the VCN shall be <5 copies per genome. Accurate and rapid measurement of VCN is an important quality control step required for release of CAR -T Cell products for patient infusion.
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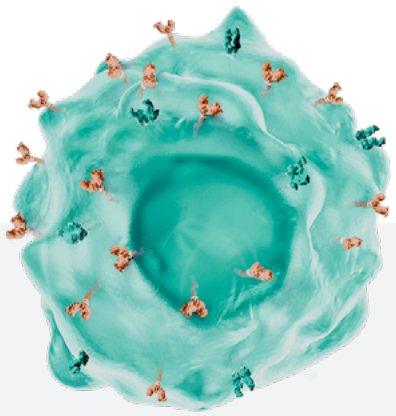

CAR-T Cell