WEBINAR DIGEST

Enhancing non-viral gene editing, processing, & expansion of T & NK cells

Sung (Sung-Uk) Lee, PhD Scientist, Thermo Fisher Scientific **& Deepak Kumar,** PhD Scientist, Thermo Fisher Scientific

A key focus in cell therapy manufacturing is the development of closed, automated manufacturing processes to help reduce costs and increase the speed of getting treatments to patients. The Gibco™ CTS™ Rotea™ Counterflow Centrifugation system and the Gibco CTS Xenon™ Electroporation System are powerful modular tools in the quest towards creating a closed cell therapy manufacturing process by providing exceptional performance and helping to reduce contamination in a cell therapy manufacturing workflow. This poster provides a summary of how Thermo Fisher Scientific technologies have been proven for effective use in chimeric antigen receptor (CAR)-T cell workflow optimization and natural killer (NK) cell engineering.

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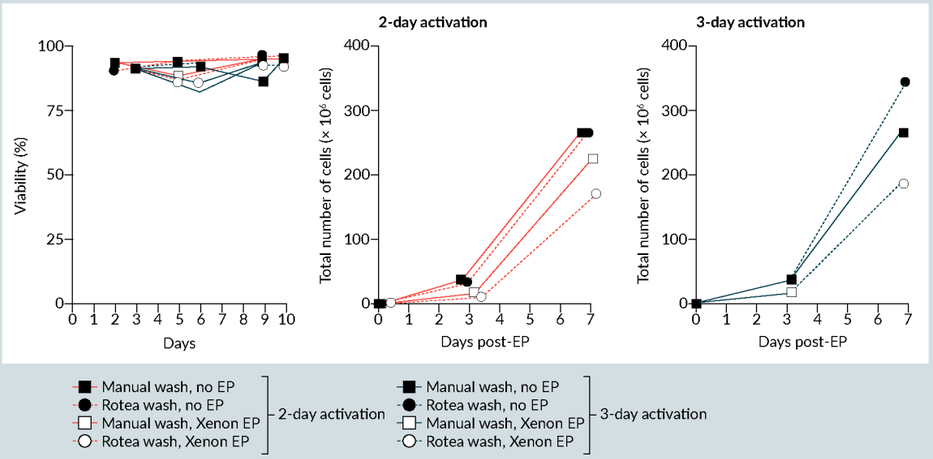
OPTIMIZING CAR-T WORKFLOWS

The CTS Rotea System applies a proven counterflow centrifugation method for a broad range of cell processing applications including CAR-T therapy. The CTS Rotea system can be programmed to perform effective washout of media and buffer components and is designed to handle a wide range of input volumes from 50 mL–20 L. Wash buffer can be washed through the fluidized cell bed, enabling 95% removal of original medium components with minimal cell loss and minimal disruption to cell viability. The single-use kit enables an easy transition to commercial manufacturing and GMP compliance with industry standards.

Thermo Fisher Scientific conducted a range of experiments to observe the cell viability and growth of cells processed using the CTS Rotea system versus manual washing, with and without CTS Xenon electroporation. CTS Rotea system outperformed manual buffer exchange demonstrating automation as a time saving measure while preserving process quality **(Figure 1)**. Good viability of >80% was observed for all conditions compared to no electroporation controls. Cells from the 2-day activation protocol showed a slightly improved growth over those from the 3-day activation protocol, but overall, growth scores showed a similar trend in both groups.

Figure 1. Cell viability and cell growth up to 7 days post-electroporation using a CTS Xenon Electroporation system



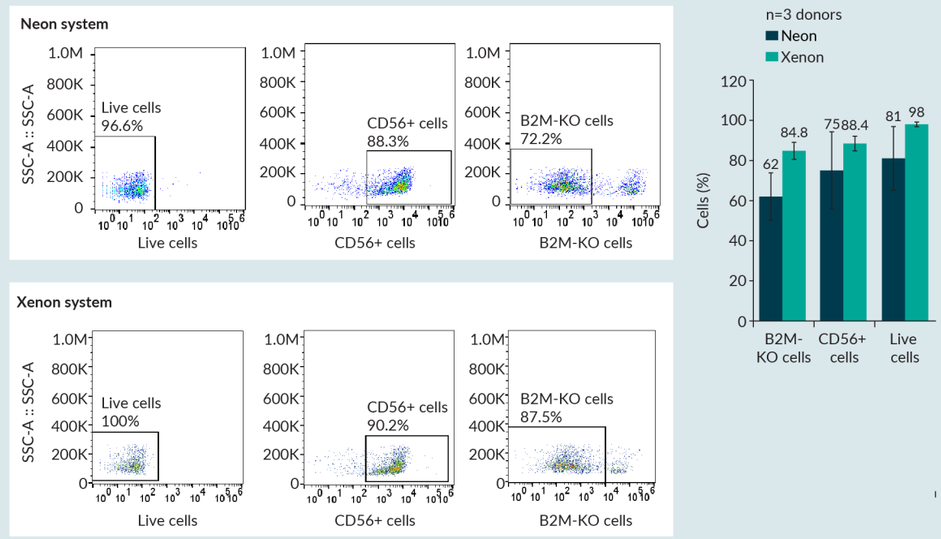
ENGINEERING NK CELLS

Engineering of NK cells is challenging using conventional methods, due to their limited efficiency, inconsistencies, and needs for high viral titer. A robust and precise toolkit is urgently needed for NK cell engineering and expansion.

Gibco CTS NK-Xpander™ Medium is designed to meet the needs of cell therapy developers by enabling expansion of human NK cells without the need for feeder cells. With this medium, cells have been proven to expand and maintain CD56 and CD16 expression as well as maintain robust cytotoxic capability.

Thermo Fisher Scientific investigated the use of electroporation to genetically engineer PBMC derived human NK cell. Results in **Figure 2** shows that, the CTS Xenon system achieved approximately 85% B2M knockout across three donors and demonstrated greater knockout efficiency than the Invitrogen™ Neon™ Transfection system.

Figure 2. Comparative analysis of gene editing efficiency in expanded NK cells using different electroporation systems.



In summary, the Thermo Fisher Scientific Cell Therapy Systems (CTS) portfolio of flexible, modular centrifugation and electroporation systems, including the CTS Rotea system and the CTS Xenon system, can be easily adapted into existing cell therapy manufacturing workflows. Find out more at **www.thermofisher.com/CTxManufacturing**.

Watch the webinar here

Read the full transcript here

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