



Robotic Automation of T Cell Generation for the Treatment of Acute Myeloid Leukemia (AML)

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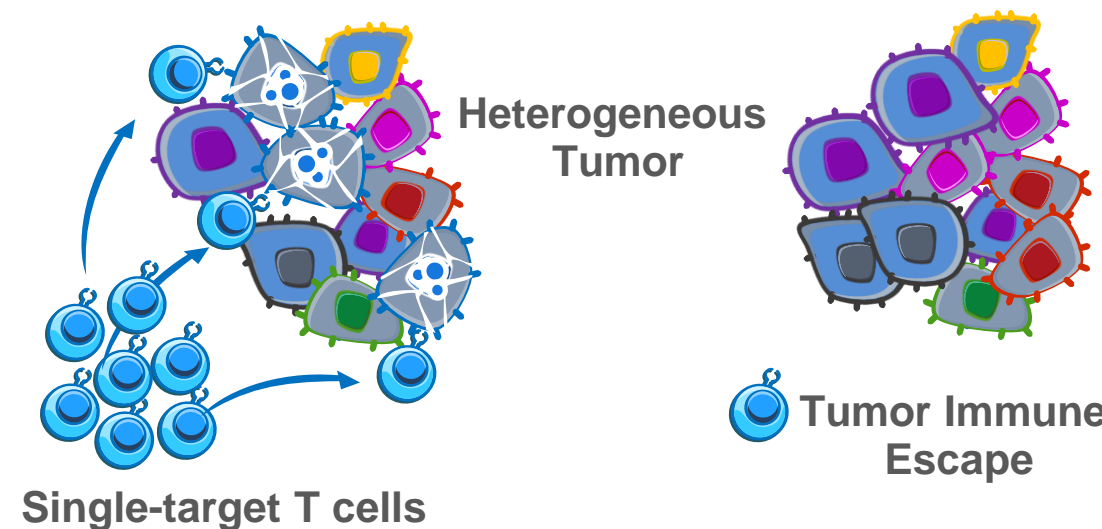


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Introduction

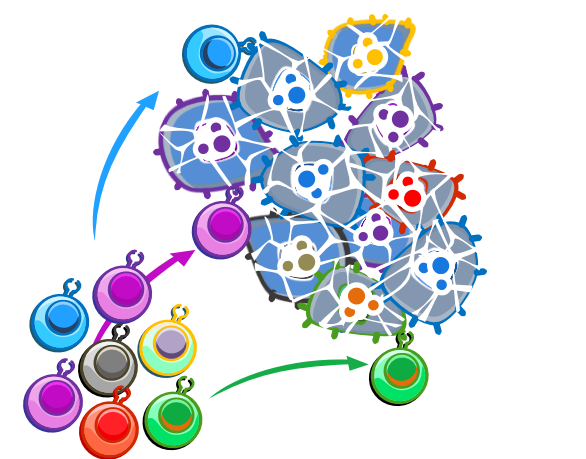
AML is a malignant neoplasm of myeloid lineage arising in the bone marrow and outgrowing normal hematopoietic elements. In 2021, there will be estimated 20,000 new cases of AML with ~11,000 deaths.

Single target therapies



The lack of one antigen in AML with sufficient tumor specificity leads to tumor immune escape

Marker's multi-target therapy



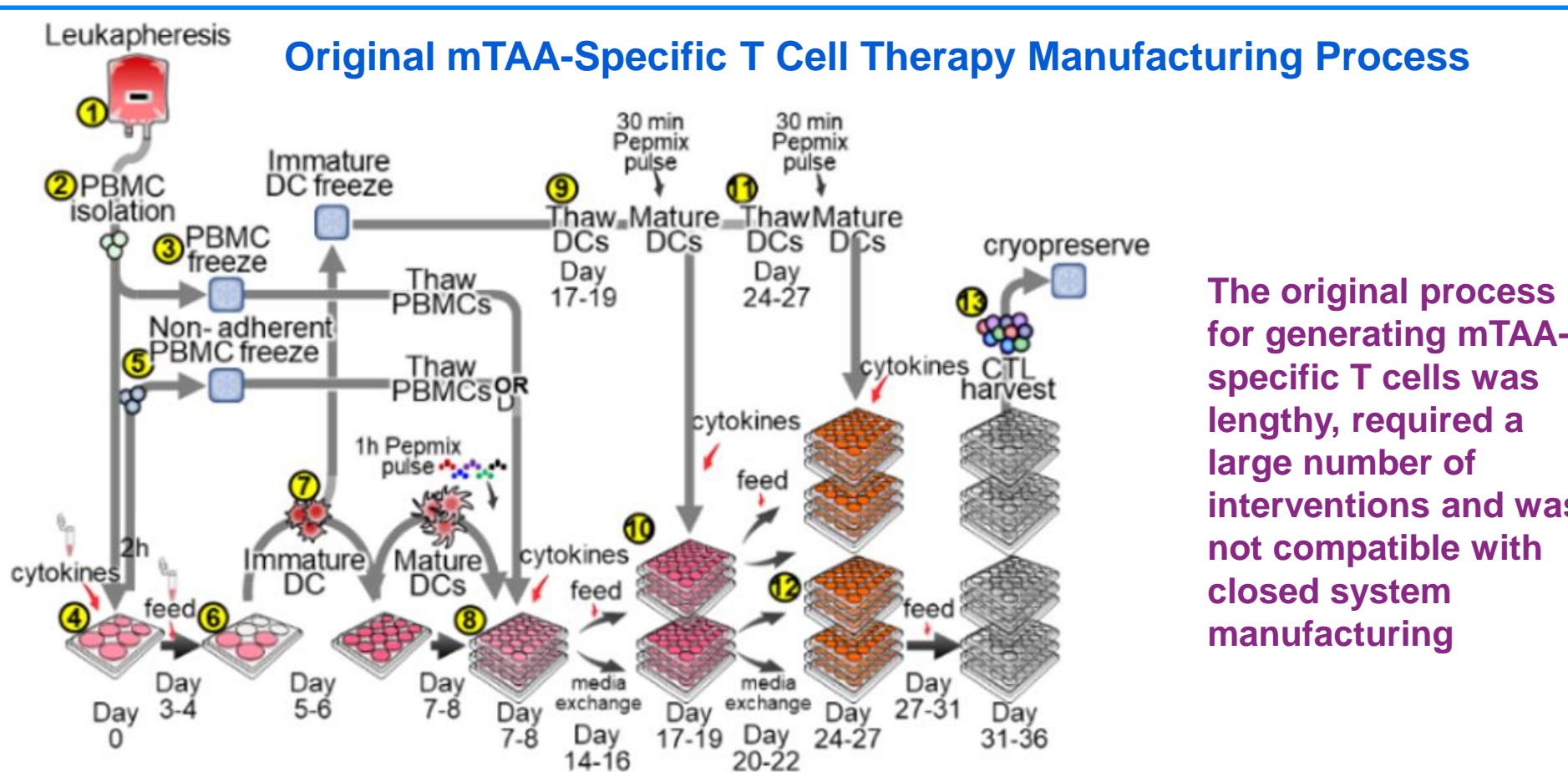
In contrast to single-target T cells, Marker's multi-tumor associated antigen (mTAA)-specific T cells recognize up to 4 antigens for a more potent and durable anti-tumor response.

Objectives

- To decrease the number of manufacturing interventions and the complexity of the process
- To develop a novel GMP-compatible robotic system to improve manufacturing throughput of cellular products

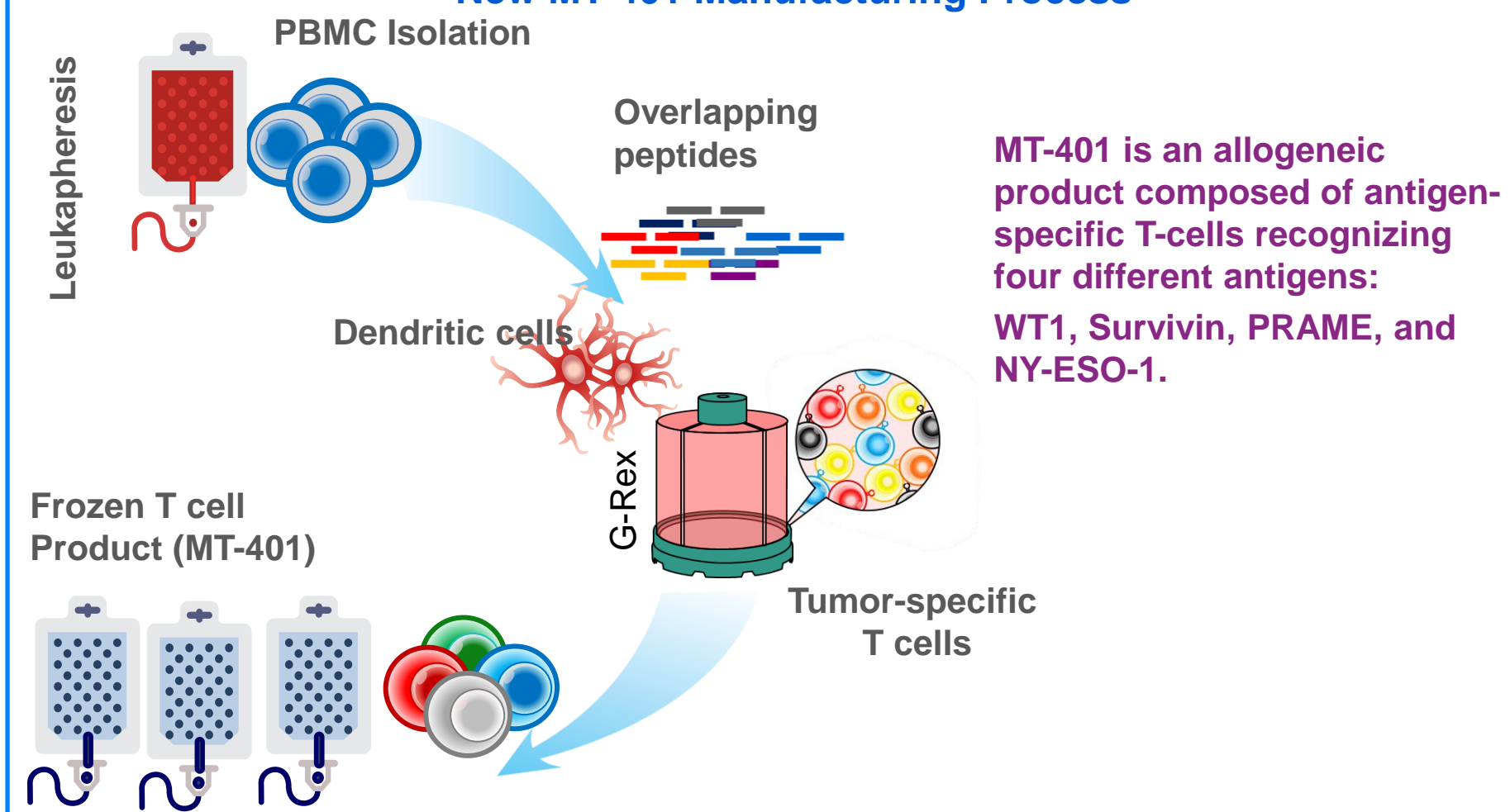
Methods

To commercialize the mTAA therapy, the number of interventions and complexity of the manufacturing process needed to be reduced.



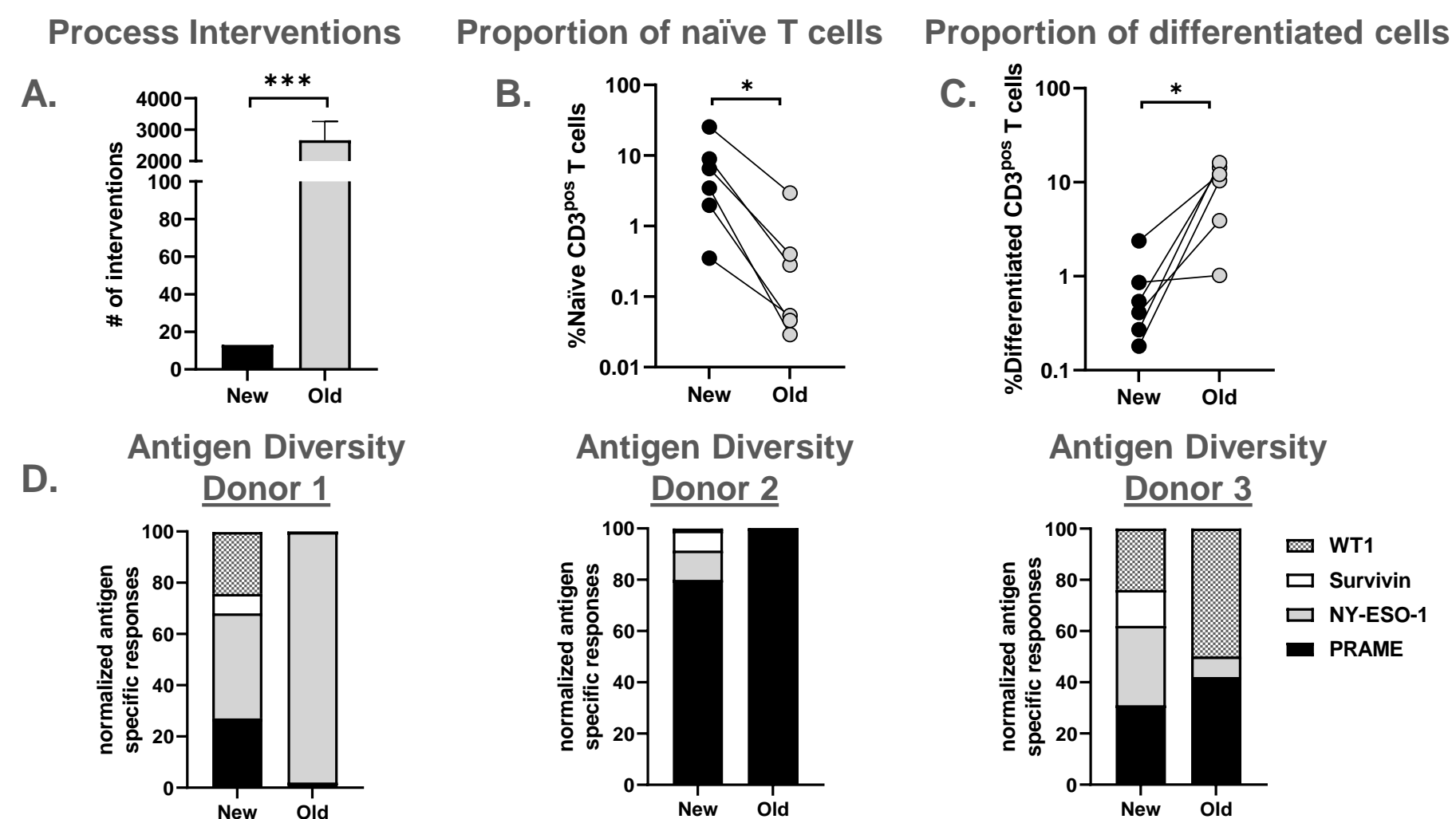
Methods

New MT-401 Manufacturing Process



Results

New Manufacturing Process Relies on Reduced Number of Interventions and Yields Products With Greater Antigen Specificity and Diversity Compared to Old Process

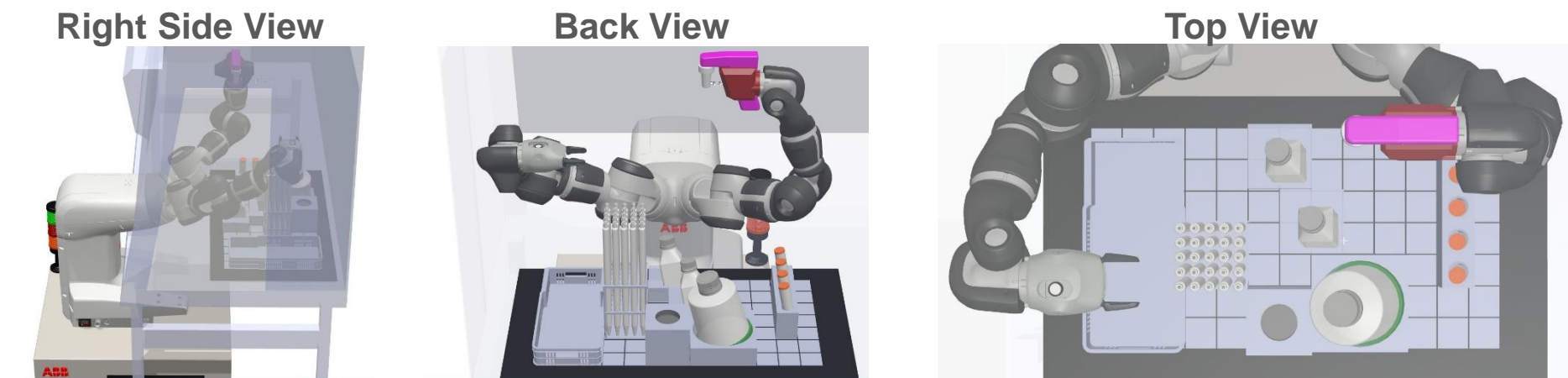


MultiTAA-specific T cells from healthy donors were manufactured using the new process with one stimulation (new) or the old process with three stimulations (old). Graphs depict: Comparison of the number of interventions performed throughout the T cell expansion phase (A), frequency of naive (B) or terminally differentiated T cells (C) as measured by flow cytometry, and antigen diversity as determined by IFN- γ ELISpot analysis (D), between the new and old manufacturing process.

Robotic Concept Design

Marker Therapeutics and ABB Robotics have partnered to co-develop the first GMP robotic assistant YuMi[®]

GMP Robotic Assistant YuMi[®]



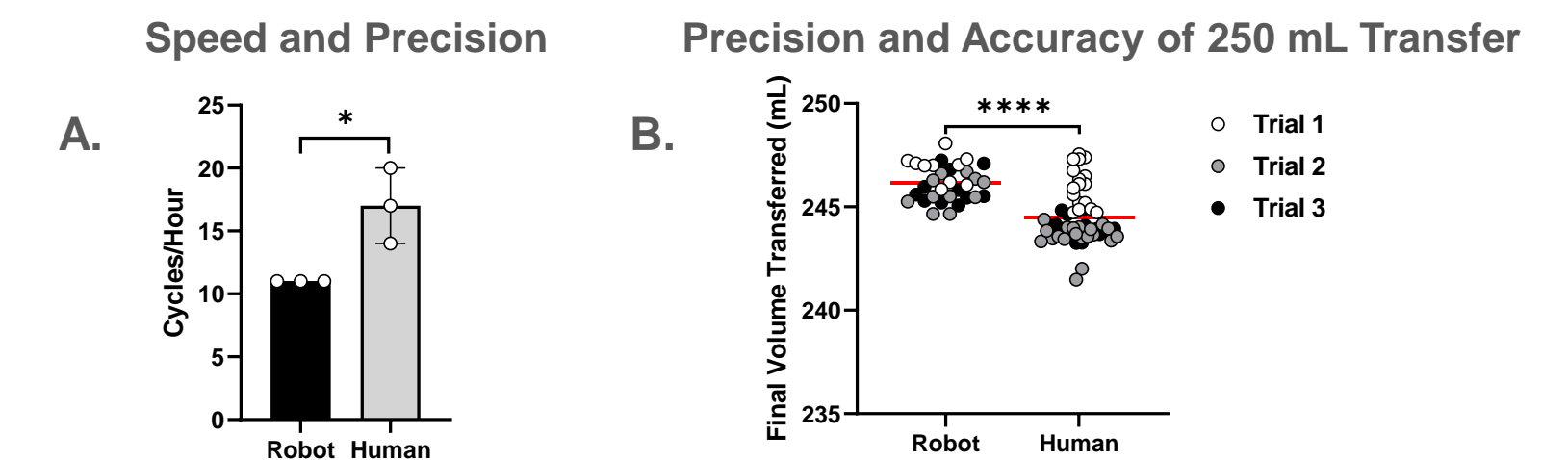
The ABB Concept details a cell culture assistant Robot for the use inside a GMP. The **Dual Arm YuMi[®]** extends into the biosafety cabinet and allows for simultaneous manipulation of the reagent bottle lids and use of a pipette aid to transfer liquids into a 1L G-Rex device.

ABB Robotics for Healthcare

Robotic Automation of T-Cell Generation for the treatment of Acute Myeloid Leukemia (AML)

Results

YuMi[®] is More Precise and Accurate Than Human Operators in Pipetting Cycles of 25 mL Liquid Aliquots to Achieve a Target Volume of 250 mL



The speed, precision and accuracy of the robotic and human-operated process. Graphs depict: Comparison in the number of times (cycles) 250 mL of liquid are transferred in 1 hour using a robotic or human-operated process (A), and the precision and accuracy with which the total volume is transferred when using a robotic or human-operated process (B).

Conclusions

- We simplified the manufacturing process of mTAA-specific T cells by decreasing the number of interventions and shortening culture time, allowing automation.
- The ABB robotic assistant was more precise and accurate than human operators in pipetting liquid, a critical step in cell therapy manufacturing, suggesting that the robot could revolutionize immunotherapy manufacturing worldwide.