ADVANCING IMMUNOLOGY RESEARCH WITH CUTTING-EDGE CYTOMETRY

Cytometry has revolutionized the study of the immune system, providing detailed insights into cellular processes and interactions. At Parean Biotechnologies, we offer state-of-the-art cytometry solutions tailored to the needs of immunologists. Our advanced technology and expertise enable researchers to achieve unprecedented accuracy and depth in their studies, fostering breakthroughs in immunology.

1. Introduction

Immunology research is pivotal in understanding and combating diseases, from autoimmune disorders to cancer. The immune system's complexity requires sophisticated tools to analyze cellular behaviors and interactions. Cytometry, with its ability to measure multiple parameters at the single-cell level, has become an indispensable technique in this field. Parean Biotechnologies is at the forefront of this technological advancement, providing top-tier cytometry services to researchers worldwide.

2. The Role of Cytometry in Immunology

2.1. Understanding Cellular Diversity

Cytometry allows for the identification and characterization of various immune cell types within a heterogeneous population. By analyzing markers on the cell surface and intracellularly, researchers can distinguish between T cells, B cells, natural killer cells, and other crucial players in the immune response. This detailed analysis is essential for understanding how the immune system functions and how it can be manipulated to fight diseases.

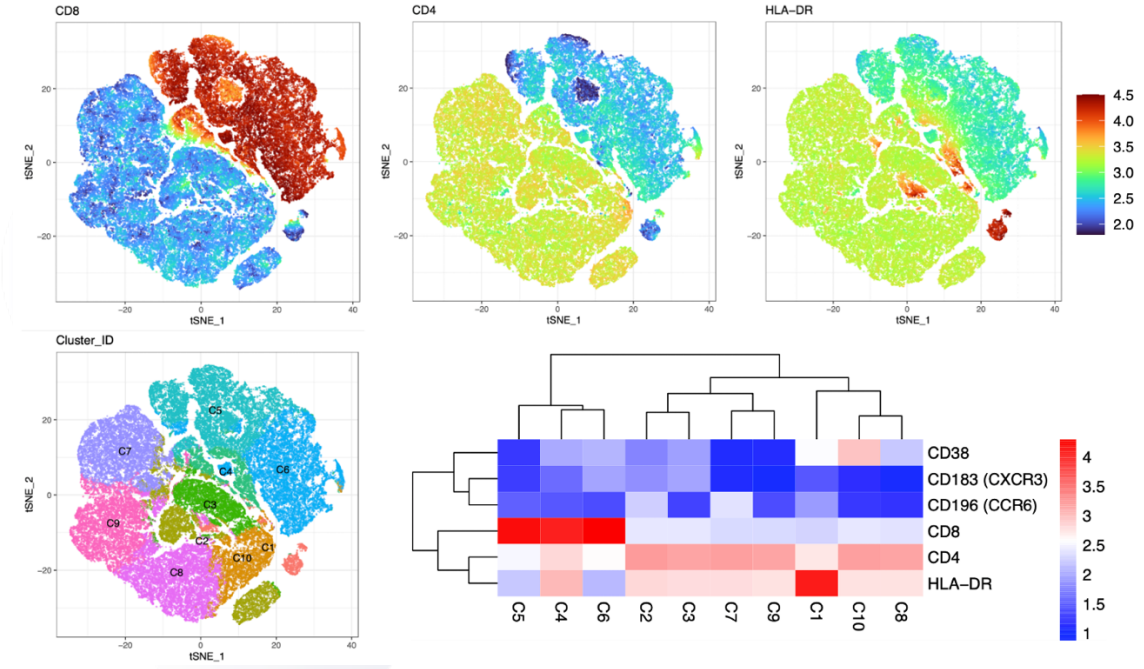

Figure 1. A collective tSNE was performed on CD45+ immune cells isolated from PBMCs of 10 donors, with each dot representing an individual cell. In top tSNE cells are colored according to the relative expression levels of the indicated immune markers. Clusters were identified based on the expression profiles of key immune markers. The tSNE plot illustrates the distribution of

different immune cell clusters, while the accompanying heatmap highlights markers that show significant differential expression between the identified clusters.

2.2. Functional Analysis

Beyond identifying cell types, cytometry can assess cell functions. Functional assays, such as cytokine production, cytotoxic activity, and cell proliferation, provide insights into how immune cells respond to different stimuli or conditions. These functional analyses are crucial for developing new therapies and understanding the mechanisms behind immune responses.

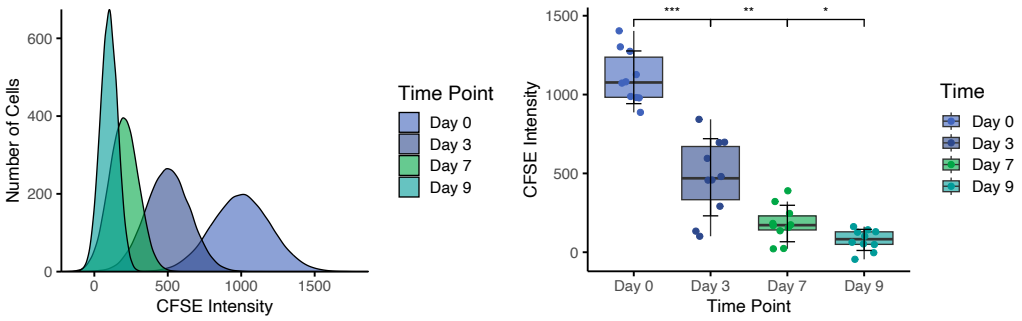

Figure 2. ***PBMC Cell Proliferation. PBMCs were stimulated for 9 days. PBMCs were stained with 1 µM CFSE before culture. Left: number of cells function of CFSE intensity. Right: boxplot showing the significative decrease of the CFSE intensity within the experiment from day 0 to day 9 for 10 samples (t-test, *: p-value<0,05, **: p-value<0,005, ***: p-value<0,0005).***

2.3. Tracking Immune Responses

Cytometry enables longitudinal studies, tracking immune responses over time. This is critical for understanding the dynamics of immune responses in health and disease, such as tracking T cell activation and differentiation during an infection or following vaccination and/or immunotherapy. Longitudinal studies help in monitoring the effectiveness of treatments such as cell therapies and understanding disease progression.

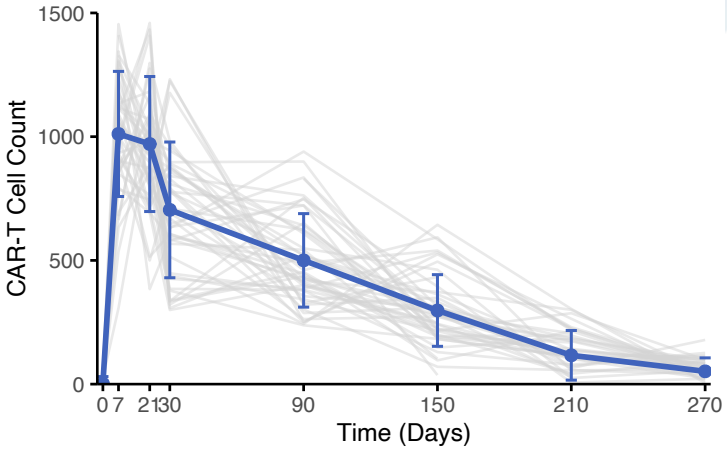

Figure 3. CAR-T cell kinetics. CAR-T cells concentration in blood samples over 9 month follow-up. Each grey curve represents the number of CAR-T in blood sample; The blue curve represents the mean number of cells with standard deviation.

3. Our Cytometry Services

3.1. Standard Flow Cytometry

Our facility is equipped with cutting-edge flow cytometer able to detect up to 9 parameters simultaneously. This high-dimensional analysis allows for comprehensive profiling of immune cell subsets and their functional states. Our standard flow cytometry panels are mainly based on the Human immunophenotyping consortium.

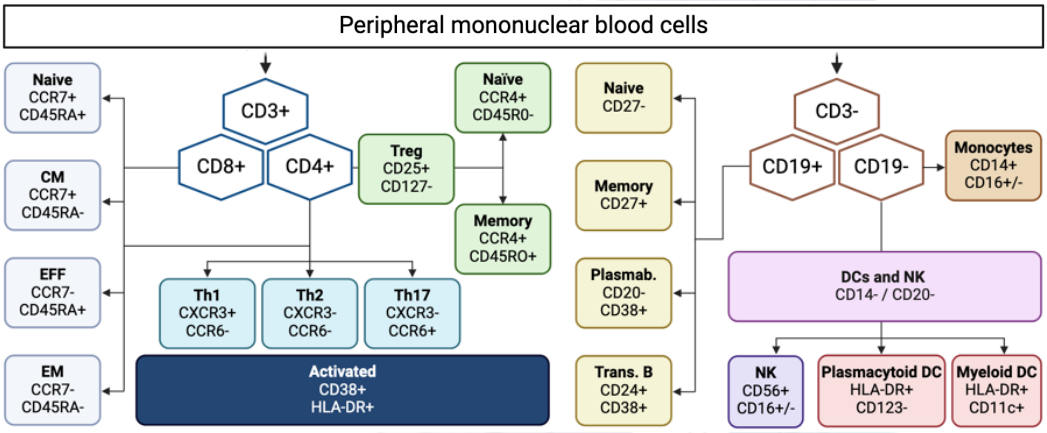

Figure 4. Example of flow cytometry gating strategy strategy to identify and analyse the major immune populations in one sample.

3.2. Custom Assay Development

Our team of experts collaborates with researchers to develop custom assays tailored to specific research needs. From panel design to data analysis, we provide comprehensive support to ensure optimal results. Custom assays are crucial for researchers with unique or complex requirements, allowing for tailored solutions that standard assays might not address.

3.3. Cytometry and cell sorting for sensitive Single-Cell analysis

Integrating cytometry and cell sorting with single-cell sequencing provides a powerful tool for understanding gene expression profiles within specific cell populations. This combined approach can reveal insights into cellular heterogeneity and regulatory mechanisms. Single-cell sequencing allows researchers to see not just what cells are present, but also what those cells are doing at a molecular level. For more information about our Single-Cell service please. With our expertise and or controlled temperature system that allow us to work at 4°C, the sorting of specific cells not impact the transcriptomic state of our cells as illustrated in figure 5:

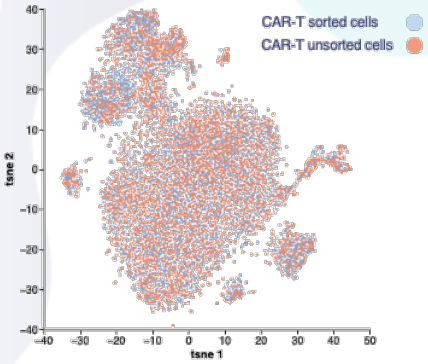

Figure 5. T-SNE of CAR-T cells based on transcriptomic signal. The t-sne represent the integration of 2 samples of CAR-T cells that have been sorted (blue) or not sorted (red).

4. Why Choose Parean Biotechnologies ?

4.1. Expertise and Experience

Our team comprises leading experts in cytometry and immunology, with years of experience in conducting and supporting advanced research. Our expertise ensures that we can provide high-quality services and support for your research needs.

4.2. Cutting-Edge Technology

We invest in the latest cytometry technologies to provide researchers with the best tools for their studies. Our advanced equipment ensures that you get the most accurate and reliable data possible. In our laboratory accredited ISO9001, we are equipe with 3 lasers cytometer/cell sorter under microbiological safety cabinet that allow numerous type of analysis.

4.3. Comprehensive Support

From initial consultation to final data analysis, we offer end-to-end support to ensure the success of your research projects. Our comprehensive support means that you can focus on your research while we take care of the technical details.

5. Contact Us

Cytometry is a powerful tool for immunology research, offering detailed insights into the immune system's complexities. At Parean Biotechnologies, we provide state-of-the-art cytometry services designed to meet the specific needs of researchers. By choosing us as your cytometry partner, you gain access to advanced technology, expert support, and a commitment to excellence that drives scientific discovery.

For more information on our cytometry services, or others, and how we can support your research, please contact us at : contact@pareanbiotech.fr