POLARIS
宸安生物

Lunarion
Mass Cytometry System

Next Resolution in Medicine

TABLE OF CONTENTS

Lunarion

Technical Specifications

|	
Resolution	800 – 1200
Sensitivity	16 - 30 x 10^5 cps @ 1ppb Lu solution
Sample Introduction	Automatic
Sample Size	30 µL - 4.5 mL
Flow Rate	80 µL/min
Average Event Rate	500 -1000 cells/s
Max Event Rate	2000 cells/s
Calibration	Automatic
Dynamic Range	4.5 Orders of Magnitude
Channels	141
Mass Range	70 - 210 amu
Replicate Sample CV	< 2%
TOF Pulser Frequency	> 125 KHz
ADC Conversion Rate	≥ 2 Gs/s
Operating System	Windows
UI Language	CHN, ENG

Lunarion

Automated Sample Introduction

Automated Sample Introduction

Configured with auto-sampler compatible with cytometry tubes, 96-well plates, and deep-well plates
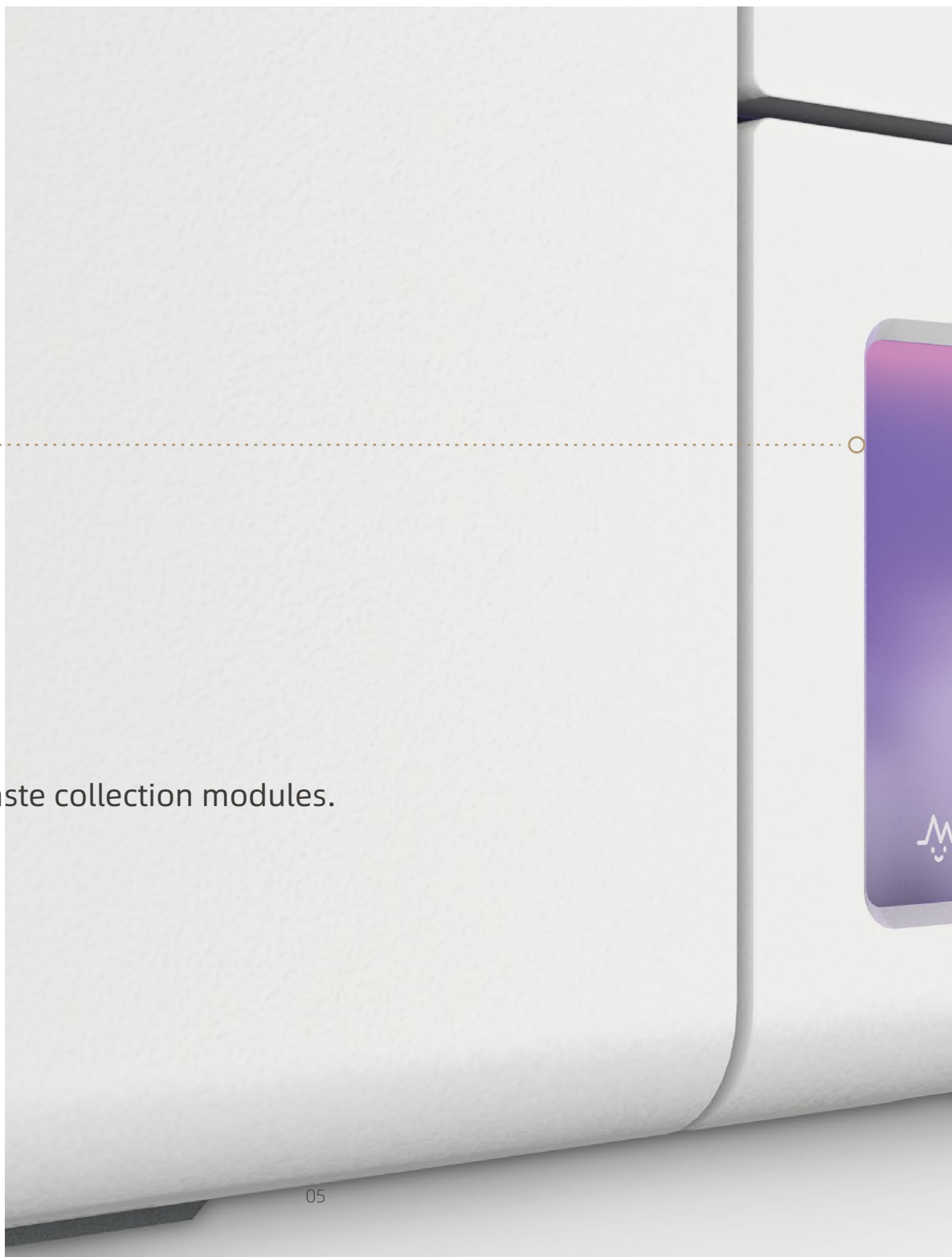
Configured with cooling features.

离子源　真空　高压　进样

▼开　合▲

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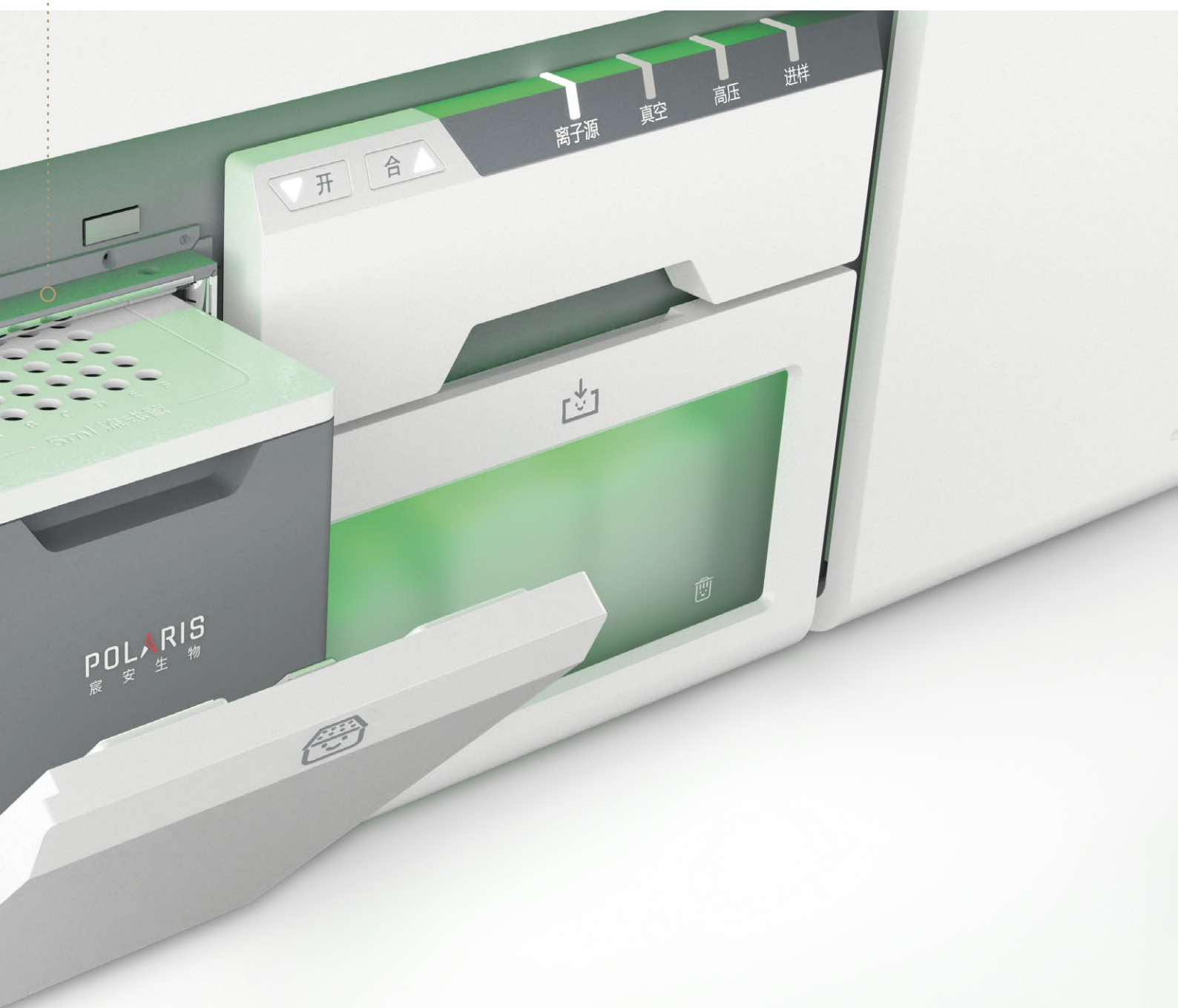
Lunarion

Automated Instrument Cleaning

○ Liquid waste collection modules.

Capable of performing unattended washing of the fluidics system.
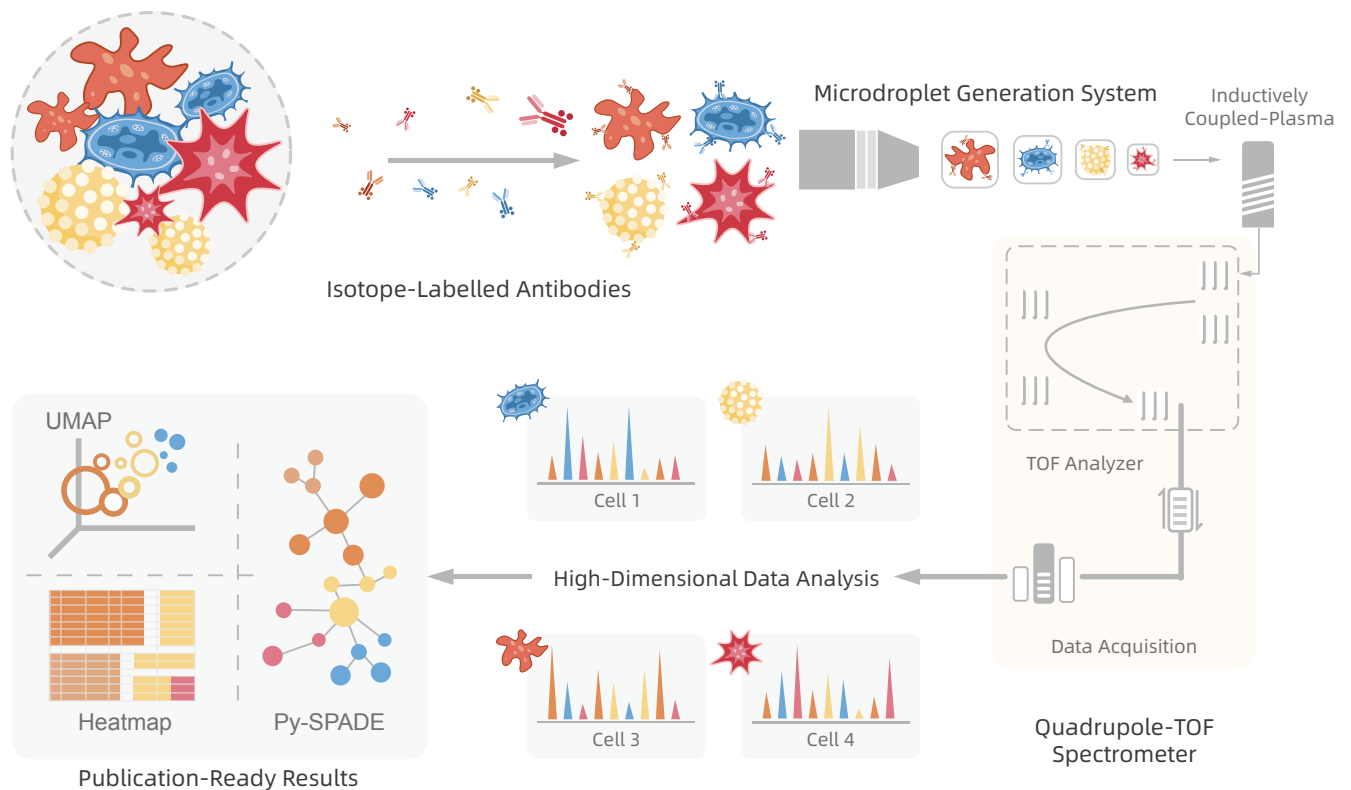
LUNARION

Mass Cytometry

Mass cytometry integrates the principles of flow cytometry with the quantitative capabilities of mass spectrometry, enabling multi-parametric single-cell analysis with exceptional throughput and resolution. By employing metal isotopes for antibody labeling, mass cytometry theoretically provides up to 140 detection channels with minimal signal spillover between channels.

Cells stained with metal isotope tags travel through the single-cell introduction system and are then ionized by an inductively coupled plasma (ICP). The ionized cells are transported to a time-of-flight (TOF) analyzer, where they are separated based on their mass-to-charge ratios, producing a mass spectrum that reflects the abundance of target proteins with minimal signal spillover. The high-dimensional datasets generated are processed using pattern recognition and dimensionality reduction algorithms. These analyses can reveal the phenotypes and functions of various cell populations based on target protein abundance.

The Breakthrough Single-Cell Technology

Isotope-Labelled Antibodies

Microdroplet Generation System

Inductively Coupled-Plasma

TOF Analyzer

Data Acquisition

Quadrupole-TOF Spectrometer

High-Dimensional Data Analysis

Cell 1

Cell 2

Cell 3

Cell 4

UMAP

Heatmap

Py-SPADE

Publication-Ready Results

*Specifications may vary depending on model and/or country.

1. Up To 140 Available Channels

Lunarion can detect elements in the mass range of 70 - 209 amu* without requiring compensation. This capability offers users 140 individual detection channels for multiparametric immunophenotyping.

	Lunarion	Flow Cytometers
Antibody Labeling	Metal Isotopes	Fluorophores
Detector	q - TOF	Photomultiplier Tubes (PMTs)
No. of Parameters	> 40	< 20
Panel Design	Easy	Becomes increasingly challenging as the number of channels increases
Sample Throughput	1-1140 Samples	1 Sample
Compensation	Not Needed	Needed
Operation	Simple	Complex
Cell Sorting	Incompatible	Compatible

Y	Rh	Pd	Ag	Cd	In	I	Ir	Pt	Au	Bi
89	103	102	107	106	113	127	191	190	197	209
		104	109	108	115		193	192		
		105		110				194		
		106		111				195		
		108		112				196		
		110		113				198		
				114						
				116						

| La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
138	136	141	142	144	151	152	159	156	165	162	169	168	175
139	138		143	147	153	154		158		164		170	176
	140		144	148		155		160		166		171	
	142		145	149		156		161		167		172	
			146	150		157		162		168		173	
			148	152		158		163		170		174	
			150	154		160		164				176	

2. Metal-Tagged Antibodies

Antibodies are conjugated with multiple ions of the same metal, for greater stability and signal intensity in the mass spectrometer.

3. Sample Barcoding

Sample multiplexing with our metal barcoding technology allows for the simultaneous measurement of more than 10 samples, significantly enhancing sample-to-sample consistency and throughput.

As shown below, 5 samples were individually barcoded and then mixed into a single tube for mass cytometry analysis.
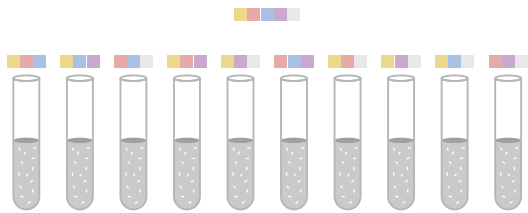
Barcodes	Pd104	Pd105	Pd106	Pd108	Pd110
Sample1	✓	✓	✓		
Sample2	✓	✓		✓	
Sample3		✓	✓		✓
Sample4		✓		✓	✓
Sample5			✓	✓	✓
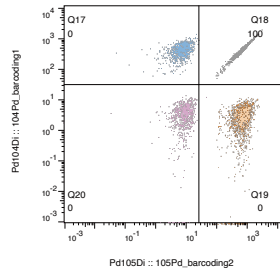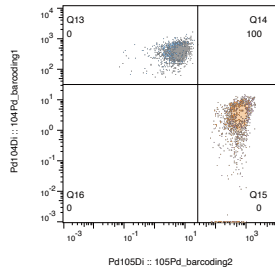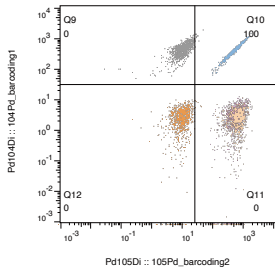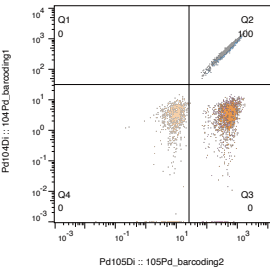
Sample Name	Count
sample1.fcs	950
sample2.fcs	982
sample3.fcs	893
sample4.fcs	972
sample5.fcs	924

Unassigned 5.58%
Sample1 19.00%
Sample2 19.64%
Sample3 17.86%
Sample4 19.44%
Sample5 18.48%
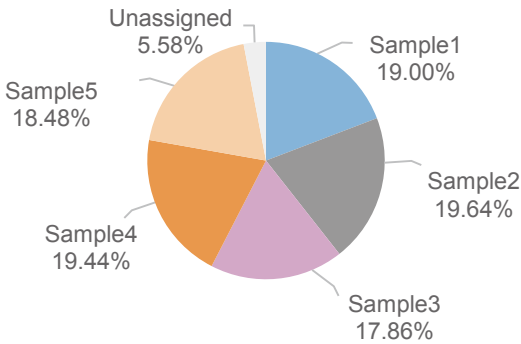
4. Quadrupole-TOF

The newly designed q-TOF system offers unparalleled mass accuracy and resolution.

Fluorescence Spillover in Flow Cytometry
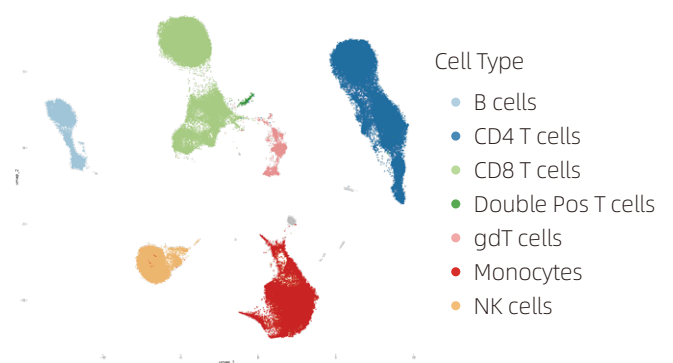
Minimal Spillover Between Metal Isotopes
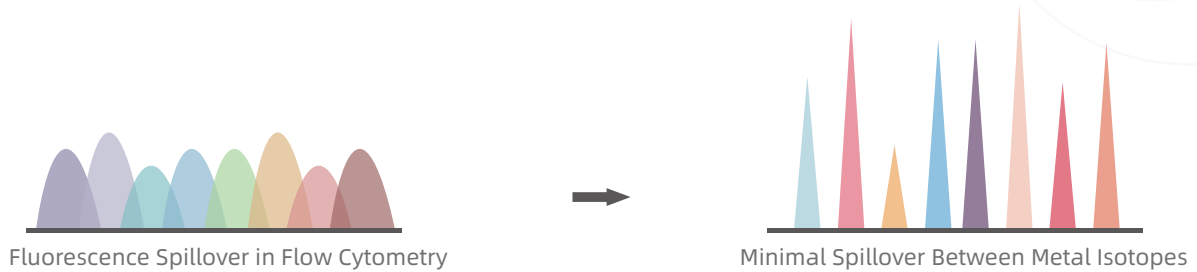
5. High Dimensional Cytometry Data

The mass cytometers generate standard FCS files which can be analyzed using common cytometry analysis software. Researchers are able to utilize different tools to produce presentation-ready results.
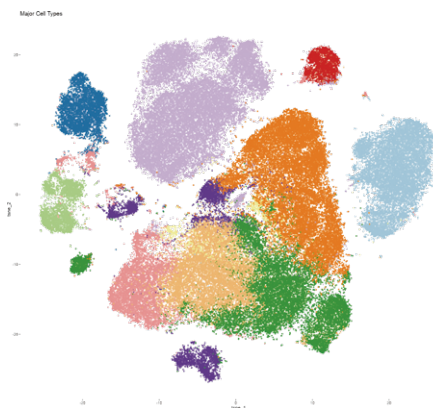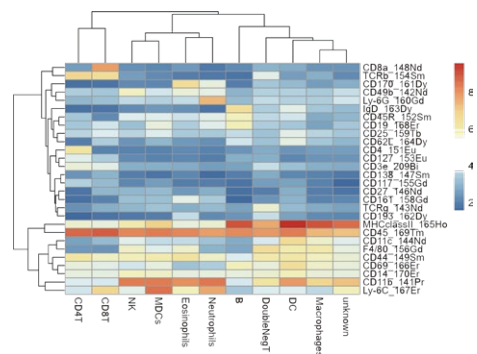

SPADE

UMAP

Cell Type
- B cells
- CD4 T cells
- CD8 T cells
- Double Pos T cells
- gdT cells
- Monocytes
- NK cells
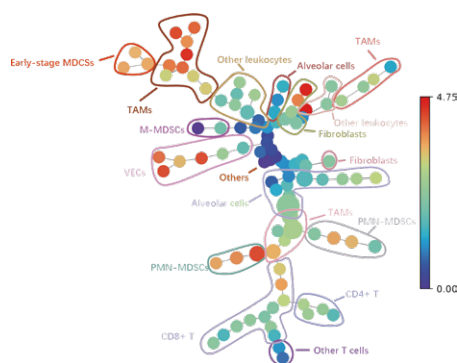
FCS File

t-SNE

Cell Type
- B cells
- CD4 T cells
- CD8 T cells
- DC
- Double Neg T cells
- Eosinophils
- Macrophages
- MDSC
- NK cells
- unKnown

Heatmap

Demo: 32-Color Human Lymphocyte Immunophenotyping Solution

#	Antigen	Clone	Tag	#	Antigen	Clone	Tag
1	CD127	A019D5	141Pr	9	HLA-DR	L243	151Eu
2	CD194/CCR4	L291H4	142Nd	10	CD8	UCHT4	152Sm
3	CD196/CCR6	G034E3	143Nd	11	CD45RA	HI100	153Eu
4	CD20	2H7	144Nd	12	CD123/IL-3R	6H6	154Sm
5	IgD	IA6-2	145Nd	13	CD294/CRTH2	BM16	155Gd
6	CD27	O323	146Nd	14	CD183/CXCR3	G025H7	156Gd
7	CD57	REA769	148Nd	15	CD11c	3.9	158Gd
8	CD28	CD28.2	149Sm	16	CD16	3G8	159Tb

Gating Strategy
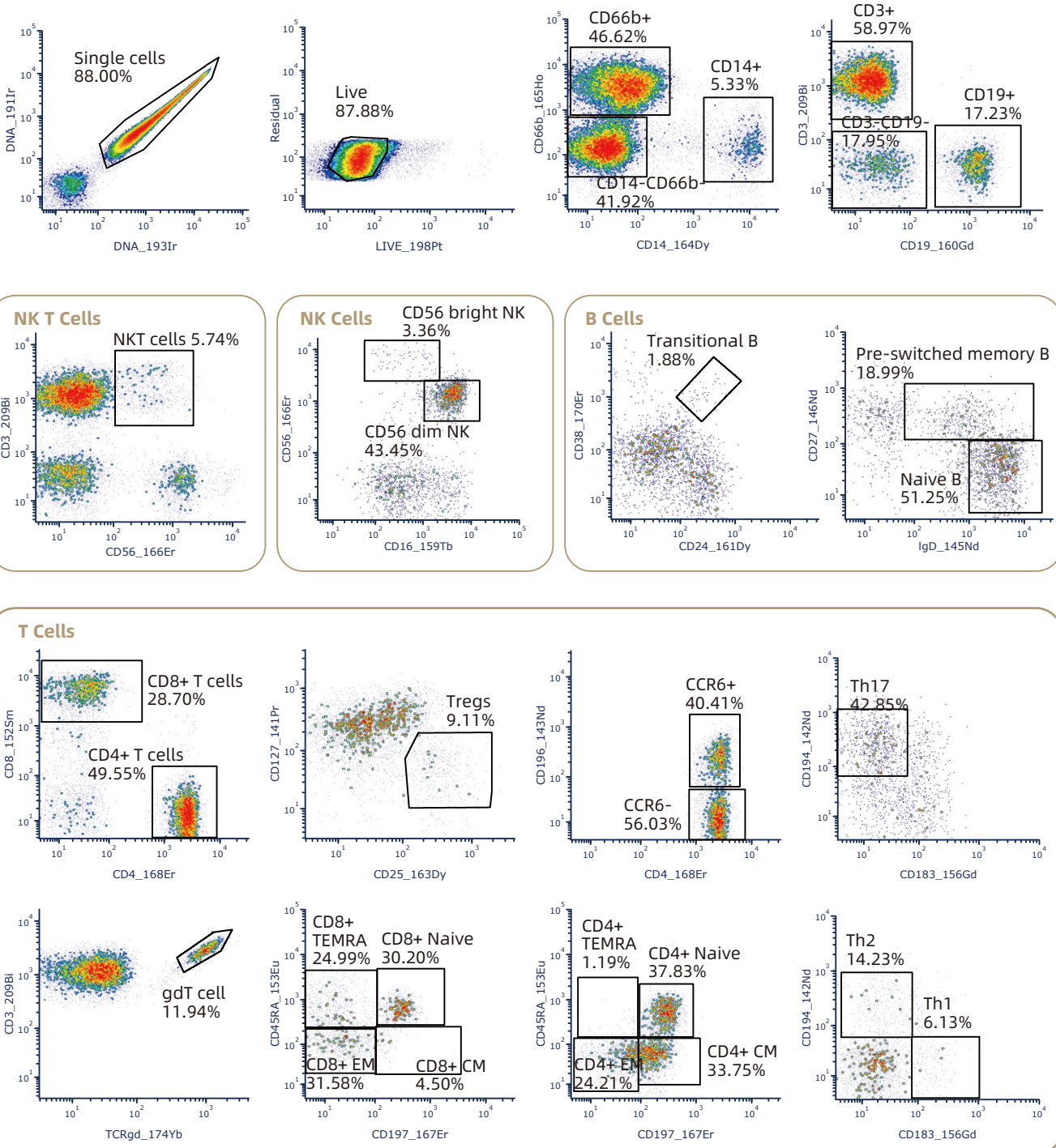
#	Antigen	Clone	Tag	#	Antigen	Clone	Tag
17	CD19	HIB19	160Gd	25	CD4	OKT4	168Er
18	CD24	ML5	161Dy	26	CD38	OKT10	170Er
19	CD185/CXCR5	J252D4	162Dy	27	CD45	BC8	171Yb
20	CD25/IL-2Rα	M-A251	163Dy	28	TCRγδ	REA591	174Yb
21	CD14	UCHM1	164Dy	29	CD3	UCHT1	209Bi
22	CD66b	6/40C	165Ho	30	DNA1		191Ir
23	CD56	NCAM16.2	166Er	31	DNA2		193Ir
24	CD197/CCR7	G043H7	167Er	32	Live/Dead		198Pt

Uniform Manifold Approximation and Projection (UMAP) Clustering
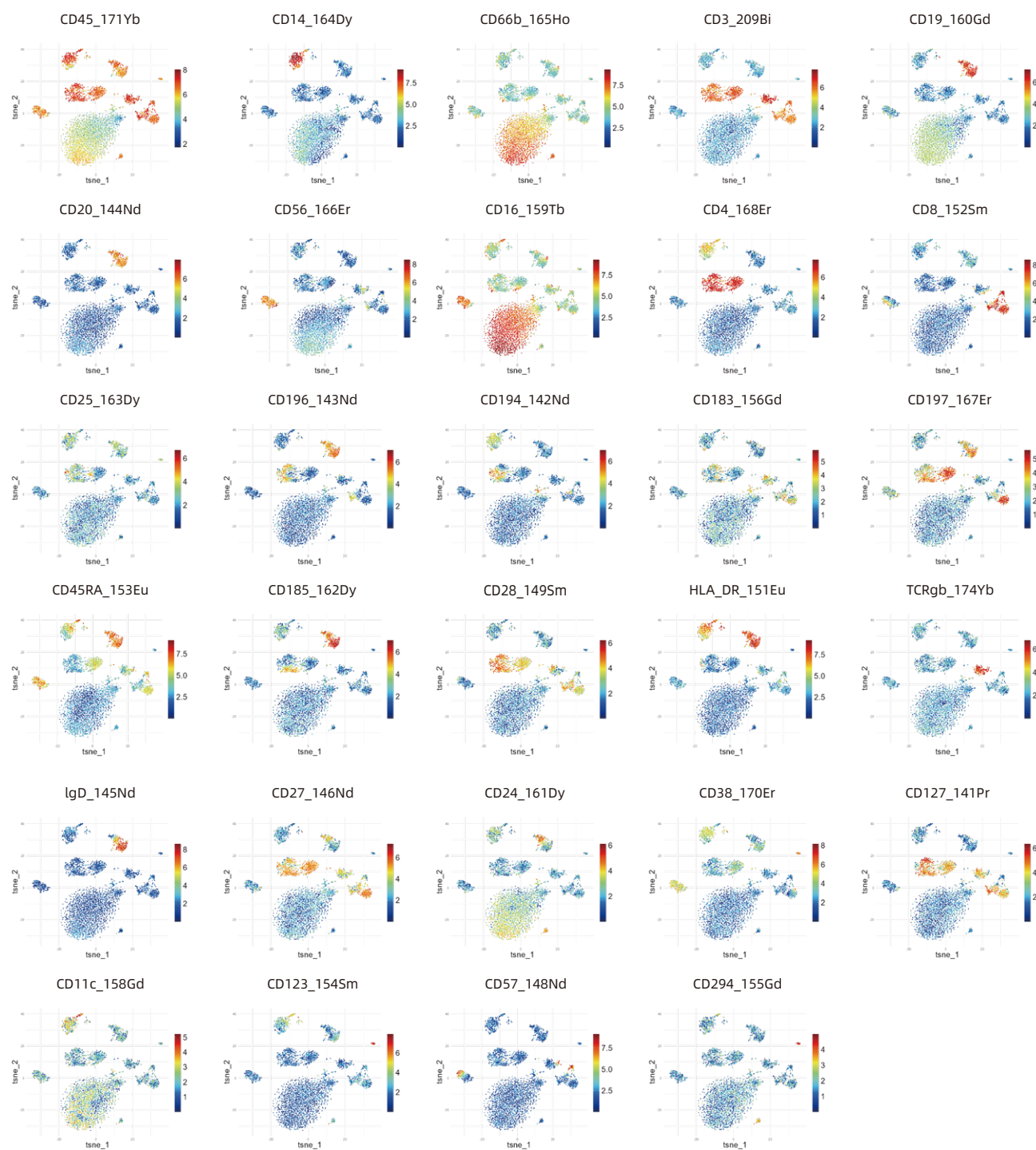
Mass Cytometry Reagents

Enhanced Bioconjugation Chemistry

Over 300 Unique Antibodies

Validated Antibody Cocktails Suitable for Different Applications

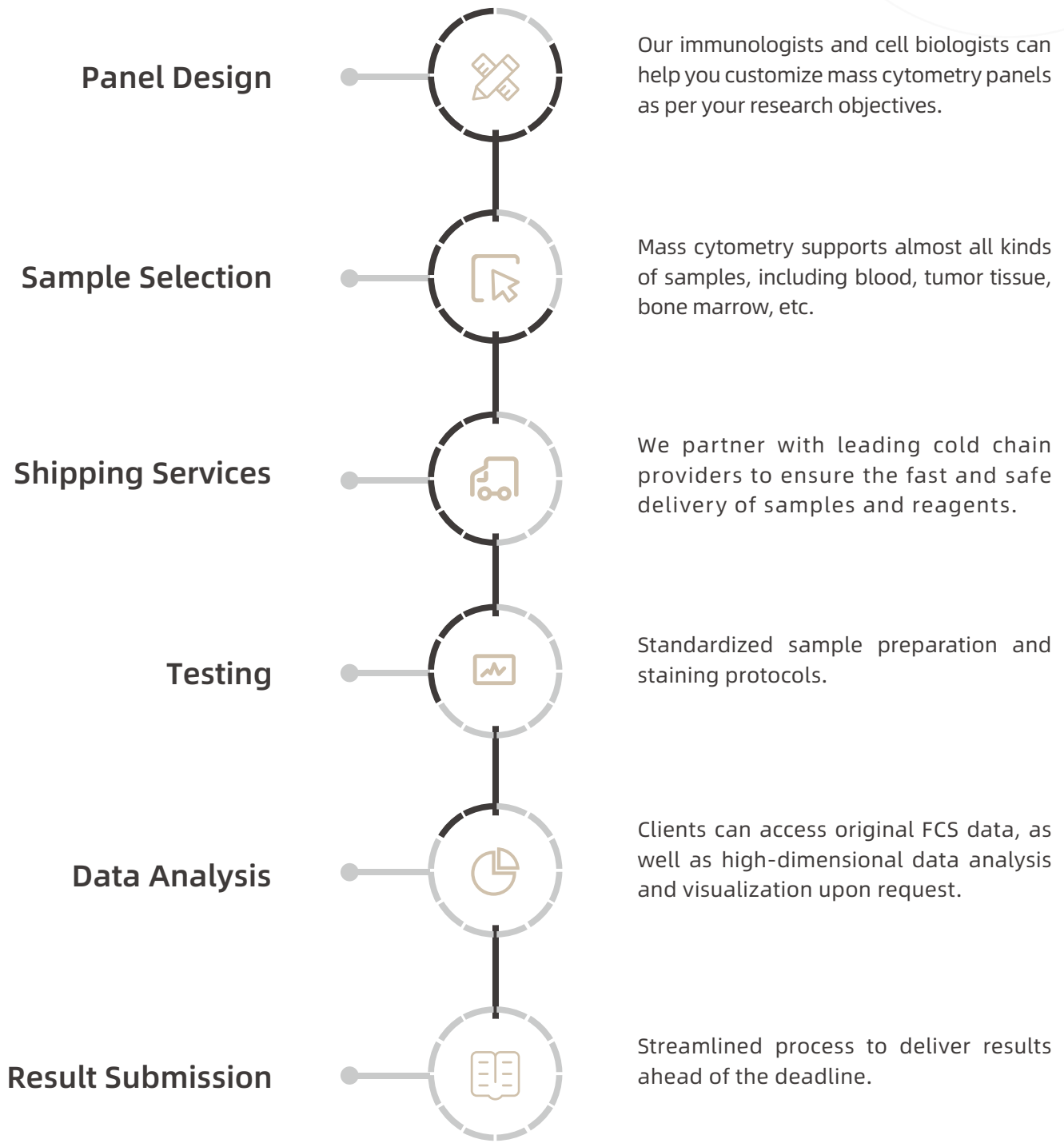|	
Human Lymphocyte Immunophenotyping Solution	Human Lung Cancer Lymphocyte Phenotyping Solution
Human CAR-T Phenotyping Landscape Solution	Human Lung Cancer Myeloid Cell Phenotyping Solution
Human Infectious Immunology Solution	Human Hepatic Cancer Immunophenotyping Solution
Human PBMC Landscape Phenotyping Solution	Human Breast Cancer Immunophenotyping Solution
Human Immuno-Oncology Solution	Human Breast TME Immunophenotyping Solution
Human CAR-T Functional Landscape Solution	Human Colorectal Cancer Immunophenotyping Solution
Human Autoimmunology Solution	Human Colorectal TME Immunophenotyping Solution
Mouse PBMC Phenotyping Solution	Human Kidney Cancer Lymphocyte Phenotyping Solution
Mouse Immuno-Oncology Solution	Human Kidney Cancer Myeloid Cell Phenotyping Solution
Mouse Sp/LN Phenotyping Landscape Solution	

Buffers & Supporting Reagents

Specially formulated to optimize staining conditions for mass cytometry experiments.

Cat. #	Name	Cat. #	Name
PB001	Phosphate-Buffered Saline (PBS)	PB011	LunaAcq Cell Acquisition Solution
PB002	Cisplatin Reagent	PB012	Ir-DNA Intercalator Reagent
PB003	LunaFix Cell Fix Buffer	PB013	Ir-DNA Intercalator Reagent
PB004	LunaPerm Cell Perm Buffer	PB014	Encode Pd Sample Barcoding Kit
PB005	LunaStain Cell Staining Buffer	PB015	Red Blood Cell Lysis Buffer
PB006	LunaClean Ultrapure Water for Trace Element Analysis	PB016	Background Solution
PB007	LunaWash Washing Solution	PB017	Universal Sample Barcoding Kit （For human cells）
PB008	LunaMix Tuning Solution	PB019	Foxp3/Transcription Factor Staining Kit

Your One-Stop Solution

Panel Design

Our immunologists and cell biologists can help you customize mass cytometry panels as per your research objectives.

Sample Selection

Mass cytometry supports almost all kinds of samples, including blood, tumor tissue, bone marrow, etc.

Shipping Services

We partner with leading cold chain providers to ensure the fast and safe delivery of samples and reagents.

Testing

Standardized sample preparation and staining protocols.

Data Analysis

Clients can access original FCS data, as well as high-dimensional data analysis and visualization upon request.

Result Submission

Streamlined process to deliver results ahead of the deadline.

Mass Cytometry Applications

Tumour Immunology

Mass cytometry represents the optimal tool to reveal the complex molecular crosstalk between tumor cells and the tumor microenvironment in cancer growth and dissemination.

Infectious Diseases

Profiling different types of immune cells and their functions during infection provides critical information about the immune system's response to pathogen invasion.
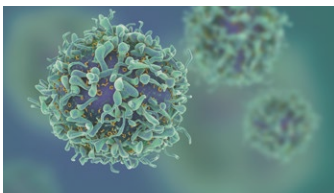
Autoimmune Diseases

Understanding the dysregulation of self-reactive immune cells is a major research goal that may allow for the development of more effective targeted immunotherapies for autoimmune diseases.
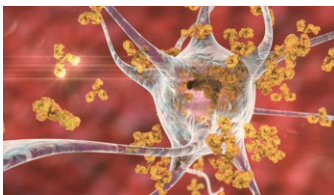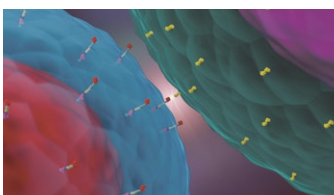
Neuroinflammation

Mass cytometry can reveal distinct immune cell populations in the CNS mediating neuroinflammatory pathways.

Immune Ageing

Tracking the modifications in the immune system of people of various age ranges through the use of mass cytometry provides insight into the role of the immune system in the development of age-related diseases.

T Cell Antigen Discovery

The combination of mass cytometry and peptide-major histocompatibility complex (MHC) tetramer staining is an efficient approach for identifying and analyzing antigen-specific T cells.

About Polaris Biology

Polaris Biology was founded by a multi-disciplinary team of scientists and engineers. We strive to advance technologies that could transform life science and healthcare.

Polaris Biology champions the path of self-driven R&D and innovation. Working with scientific communities, we develop cutting-edge single cell technologies, robust pharma solutions and novel translational researches.

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