



# Helios

A CyTOF system

Discover your inner cell





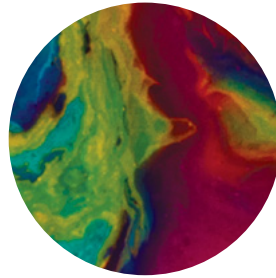
Mass cytometry has catalyzed the revolution of single-cell proteomics, enabling the most comprehensive understanding of cell phenotypes, signaling pathways and function. Helios™ dawns as the most advanced tool for cellular exploration with streamlined workflows and multimodal capabilities. It's system-level biology at single-cell resolution, on an accessible, expandable platform designed for breakthrough discovery.

## SYSTEM-LEVEL VIEW WITH SINGLE-CELL RESOLUTION



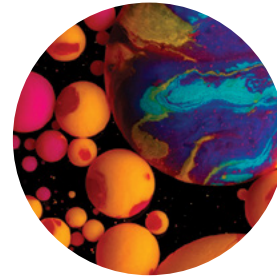
### DEPTH

Analyze biomarkers inside and out at the single cell level.



### BREADTH

Collect data for all cells in your system.



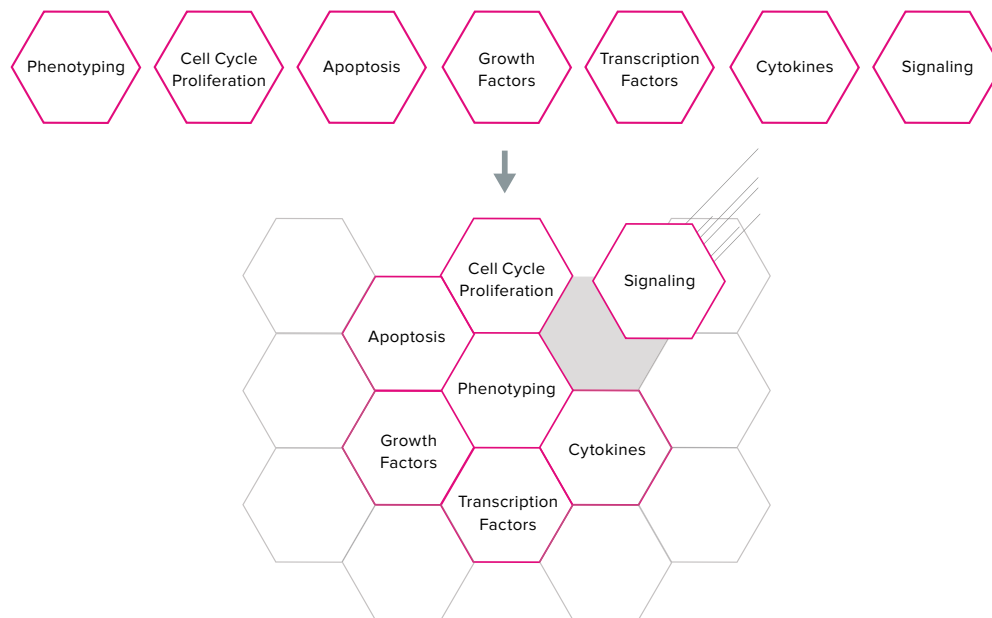
### COMPREHENSION

Mass cytometry provides both breadth and depth, bringing system-level comprehension with single-cell resolution.

## MORE THAN BEFORE

As our understanding of cellular heterogeneity's role in health and disease has grown, so has the need to precisely define an individual cell's phenotype, functional capabilities, signaling state and general health. Mass cytometry, or cytometry by time-of-flight (CyTOF®), enables greater comprehension to your research by letting you simultaneously measure more than 40 parameters for millions of cells.

### Design truly comprehensive experiments:



## PROVEN RESEARCH

Our customers' published research demonstrates transformative discovery in the life sciences.

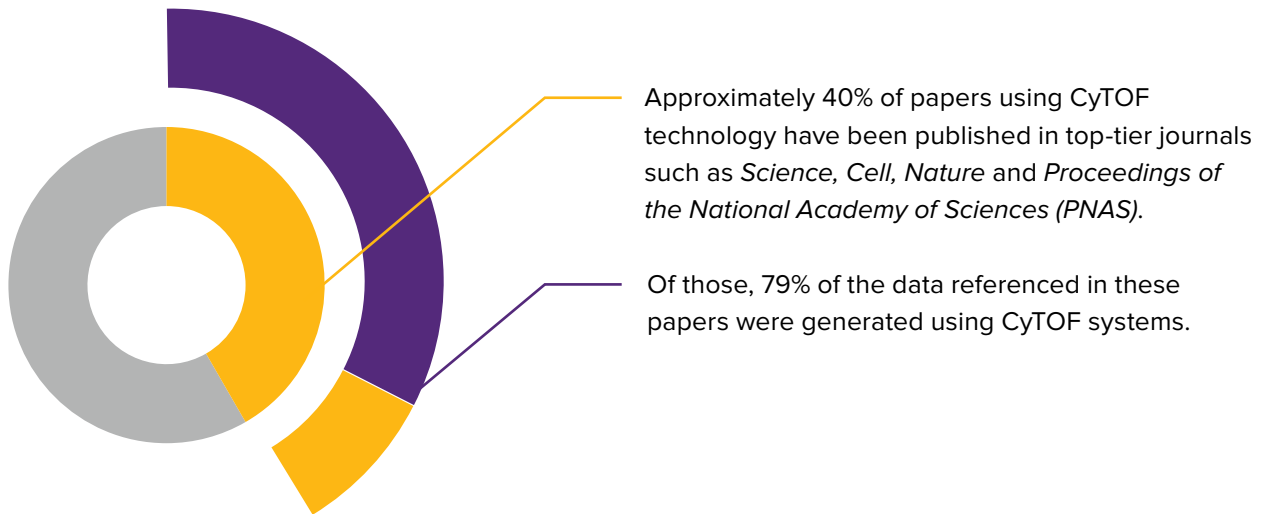
### Research areas:

- Cancer research
- Immunology
- Stem cell biology
- Vaccine research

### Advancing knowledge in:

- Basic science
- Drug discovery
- Translational research

## IMPACT



## THE ELEMENTS OF MASS CYTOMETRY

Discovery research and functional profiling require simultaneous measurement of multiple parameters per cell, for millions of cells per experiment. Mass cytometry uniquely combines five elements necessary for resolution of the functional and phenotypic complexity of biological systems at the single-cell level.

### METAL ISOTOPES:

Mass cytometry employs heavy metal isotope tags to simultaneously measure multiple cellular targets. High-purity metallic isotopes ensure minimal background from signal overlap or endogenous cellular components.

## CHANNELS:

Helios expands the mass cytometry range to 135 channels ensuring comprehensive studies today, and flexibility to scale in the future as new metal tags are developed.

## PANELS:

Fluidigm offers metal-tagged antibodies as individual reagents and in preassembled kits targeting specific applications, which can be combined to build high-dimensional proteomic panels for profiling cellular systems.

## RESOLUTION:

Helios uses time-of-flight (TOF) technology to focus isotope tags into discrete, finely resolved bands.

## THROUGHPUT:

Helios is barcoding enabled. This increases throughput while improving data quality, allowing you to analyze more experimental variables simultaneously.

1 <b>H</b> Hydrogen																	2 <b>He</b> Helium																	
3 <b>Li</b> Lithium	4 <b>Be</b> Beryllium																	5 <b>B</b> Boron	6 <b>C</b> Carbon	7 <b>N</b> Nitrogen	8 <b>O</b> Oxygen	9 <b>F</b> Fluorine	10 <b>Ne</b> Neon											
11 <b>Na</b> Sodium	12 <b>Mg</b> Magnesium																	13 <b>Al</b> Aluminium	14 <b>Si</b> Silicon	15 <b>P</b> Phosphorus	16 <b>S</b> Sulfur	17 <b>Cl</b> Chlorine	18 <b>Ar</b> Argon											
19 <b>K</b> Potassium	20 <b>Ca</b> Calcium	21 <b>Sc</b> Scandium	22 <b>Ti</b> Titanium	23 <b>V</b> Vanadium	24 <b>Cr</b> Chromium	25 <b>Mn</b> Manganese	26 <b>Fe</b> Iron	27 <b>Co</b> Cobalt	28 <b>Ni</b> Nickel	29 <b>Cu</b> Copper	30 <b>Zn</b> Zinc	31 <b>Ga</b> Gallium	32 <b>Ge</b> Germanium	33 <b>As</b> Arsenic	34 <b>Se</b> Selenium	35 <b>Br</b> Bromine	36 <b>Kr</b> Krypton																	
37 <b>Rb</b> Rubidium	38 <b>Sr</b> Strontium	39 <b>Y</b> Yttrium	40 <b>Zr</b> Zirconium	41 <b>Nb</b> Niobium	42 <b>Mo</b> Molybdenum	43 <b>Tc</b> Technetium	44 <b>Ru</b> Ruthenium	45 <b>Rh</b> Rhodium	46 <b>Pd</b> Palladium	47 <b>Ag</b> Silver	48 <b>Cd</b> Cadmium	49 <b>In</b> Indium	50 <b>Sn</b> Tin	51 <b>Sb</b> Antimony	52 <b>Te</b> Tellurium	53 <b>I</b> Iodine	54 <b>Xe</b> Xenon																	
55 <b>Cs</b> Cesium	56 <b>Ba</b> Barium																	72 <b>Hf</b> Hafnium	73 <b>Ta</b> Tantalum	74 <b>W</b> Tungsten	75 <b>Re</b> Rhenium	76 <b>Os</b> Osmium	77 <b>Ir</b> Iridium	78 <b>Pt</b> Platinum	79 <b>Au</b> Gold	80 <b>Hg</b> Mercury	81 <b>Tl</b> Thallium	82 <b>Pb</b> Lead	83 <b>Bi</b> Bismuth	84 <b>Po</b> Polonium	85 <b>At</b> Astatine	86 <b>Rn</b> Radon		
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium																	104 <b>Rf</b> Rutherfordium	105 <b>Db</b> Dubnium	106 <b>Sg</b> Seaborgium	107 <b>Bh</b> Bohrium	108 <b>Hs</b> Hassium	109 <b>Mt</b> Meitnerium	110 <b>Ds</b> Darmstadtium	111 <b>Rg</b> Roentgenium	112 <b>Cn</b> Copernicium			114 <b>Fl</b> Flerovium			116 <b>Lv</b> Livermorium		
57 <b>La</b> Lanthanum	58 <b>Ce</b> Cerium	59 <b>Pr</b> Praseodymium	60 <b>Nd</b> Neodymium	61 <b>Pm</b> Promethium	62 <b>Sm</b> Samarium	63 <b>Eu</b> Europium	64 <b>Gd</b> Gadolinium	65 <b>Tb</b> Terbium	66 <b>Dy</b> Dysprosium	67 <b>Ho</b> Holmium	68 <b>Er</b> Erbium	69 <b>Tm</b> Thulium	70 <b>Yb</b> Ytterbium	71 <b>Lu</b> Lutetium																				
89 <b>Ac</b> Actinium	90 <b>Th</b> Thorium	91 <b>Pa</b> Protactinium	92 <b>U</b> Uranium	93 <b>Np</b> Neptunium	94 <b>Pu</b> Plutonium	95 <b>Am</b> Americium	96 <b>Cm</b> Curium	97 <b>Bk</b> Berkelium	98 <b>Cf</b> Californium	99 <b>Es</b> Einsteinium	100 <b>Fm</b> Fermium	101 <b>Md</b> Mendelevium	102 <b>No</b> Nobelium	103 <b>Lr</b> Lawrencium																				

Mass cytometry elements: the stable isotopes of these 24 elements provide over 50 unique tags for use in mass cytometry experiments.

# DISCOVERY WORKFLOW WITH MASS CYTOMETRY

DESIGN

BUILD

STAIN

ACQUIRE

ANALYZE

## **DESIGN: Maxpar Panel Designer**

Design high-dimensional proteomic panels with this interactive, web-based application that simplifies and optimizes panel design using metal-conjugated antibodies from the Fluidigm catalog and your custom conjugates.

## **BUILD: Maxpar reagent catalog**

The catalog contains over 400 metal-conjugated antibodies to human and mouse targets covering a wide range of applications including phenotyping, cytokine expression, signaling responses, apoptosis and cell cycle, plus a variety of pre-validated panel kits. In addition, antibody labeling kits allow you to tag most IgG with your choice of 35 metals. Custom conjugation services are also available.

## **STAIN: Fluidigm-validated protocols, buffers and barcoding reagents**

Maxpar™ Sample Prep Buffers and Fluidigm-validated protocols provide optimal mass cytometry staining performance for surface and intracellular targets. Use Cell-ID™ barcoding to increase throughput and decrease sample-to-sample staining variability.

## **ACQUIRE: Helios, a CyTOF system**

The new Helios mass cytometer accelerates discovery through improved performance and a streamlined workflow, driven by a modern, intuitive user interface.

Key enhancements of this system include:

- More channels, enabling larger panels and more flexible panel design
- Increased sensitivity to improve detection of low-abundance targets
- A new tube loader that saves time and simplifies sample introduction
- A new user interface that simplifies and streamlines data acquisition
- Faster sample acquisition rates to reduce data collection time
- Automated system calibration to maintain the system's peak performance

## **ANALYZE: Cytobank**

High-content Helios data becomes high-impact knowledge with the cloud-based Cytobank analysis platform. Cytobank provides an array of analysis tools, including dot plots, clustering and dimensionality reduction algorithms (SPADE and viSNE), and summary statistics tools like heat maps and dose-response curves. All are customized for efficiently extracting discoveries from mass cytometry data.

## **SUPPORT AND TRAINING**

Helios is advanced mass cytometry technology, backed by the commitment of Fluidigm.

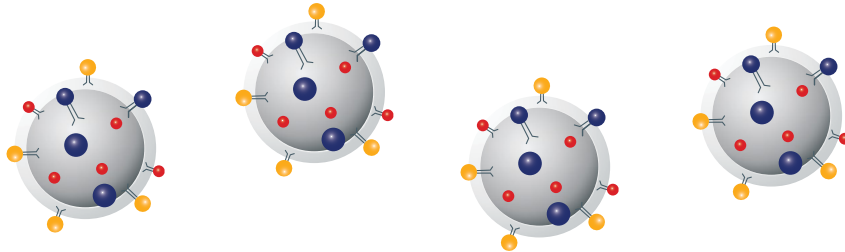
At Fluidigm, we create biotech tools that enable our customers to seek truth in life sciences—to push limits and envision ever more creative answers to “what if...?” And we consider fulfilling your order to be just the first step. That’s why we’ve designed complete training and support programs to help you make the most of your Helios purchase.



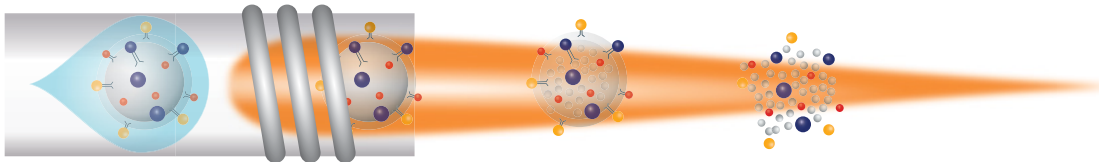
# DISCOVER YOUR INNER CELL

## How mass cytometry works:

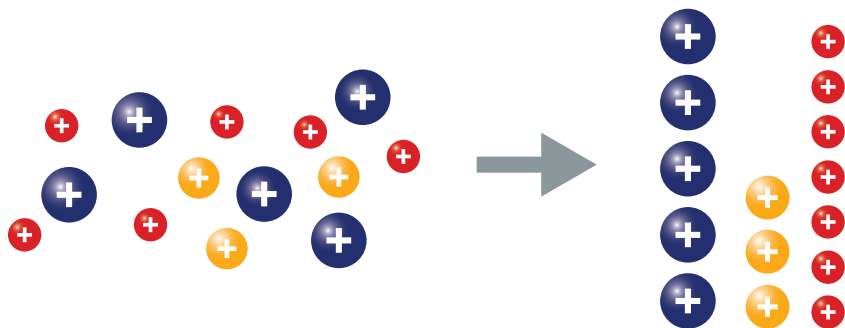
Cells are stained in suspension with a customized panel of metal-conjugated antibodies directed against surface and intracellular protein targets. High-purity metallic isotopes ensure minimal background from signal overlap or endogenous cellular components.



Inside Helios cells are individually atomized to release the metal ions. Ions derived from each stained cell are maintained in discrete clouds.

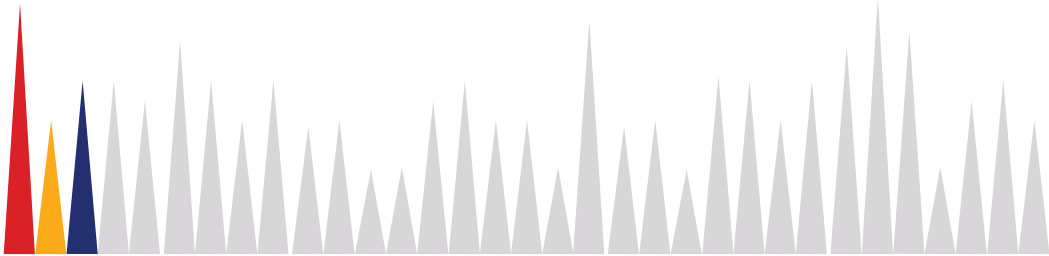


Metal ions of interest are resolved by mass in the time-of-flight (TOF) chamber.

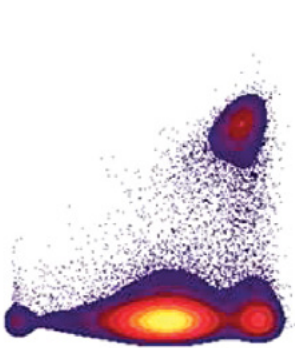




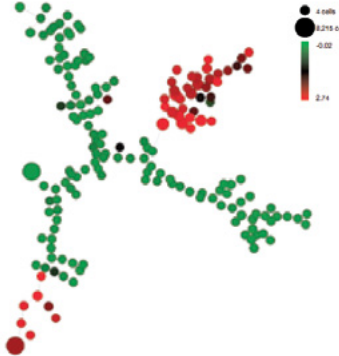
The time-resolved detector produces a mass spectrum that represents the identity and quantity of each isotopic metal tag on a per-cell basis. Quantitation of metal ions is predictable, linear and highly resolved.



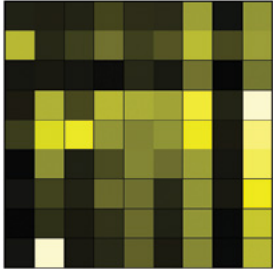
Data is generated in .fcs format and can be analyzed using Cytobank and other data analysis programs. A representative dataset including a heat map summary, SPADE clustering tree and bivariate dot-plot display from the same sample are shown below.



Bivariate plot



SPADE



Heat map







#### CORPORATE HEADQUARTERS

7000 Shoreline Court, Suite 100  
South San Francisco, CA 94080 USA  
Toll-free: +1 866 359 4354  
Fax: +1 650 871 7152  
fluidigm.com

#### SALES

North America | +1 650 266 6170 | [info-us@fluidigm.com](mailto:info-us@fluidigm.com)  
Europe/EMEA | +33 1 60 92 42 40 | [info-europe@fluidigm.com](mailto:info-europe@fluidigm.com)  
China (excluding Hong Kong) | +86 21 3255 8368 | [info-china@fluidigm.com](mailto:info-china@fluidigm.com)  
Japan | +81 3 3662 2150 | [info-japan@fluidigm.com](mailto:info-japan@fluidigm.com)  
Asia | +1 650 266 6000 | [info-asia@fluidigm.com](mailto:info-asia@fluidigm.com)  
Latin America | +1 650 266 6000 | [info-latinamerica@fluidigm.com](mailto:info-latinamerica@fluidigm.com)



Information in this publication is subject to change without notice. Patent and license information [fluidigm.com/legalnotices](http://fluidigm.com/legalnotices) | Fluidigm, the Fluidigm logo, CyTOF, Helios, Maxpar and Cytobank are trademarks or registered trademarks of Fluidigm Corporation in the United States and/or other countries. All other trademarks are the sole property of their respective owners. © 2015 Fluidigm Corporation. All rights reserved. PN 101-0724 A1

**For Research Use Only. Not for use in diagnostic procedures.**