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Tel: 02-568-7320
Mail: sales@jcbio.co.kr

Helios, a CyTOF system

The unrivaled leader in deep cell profiling and single-tube cytometry.

FLUIDIGM®

The best long-term investment in cytometry for any institution

- Supports basic, translational and clinical research
- In use in multiple clinical trials (51 as of August 2019)
- A proven and reliable technology for 20-plus parameters
- Hundreds of peer-reviewed publications
- Extremely wide range of proven applications
- Multiple publications support comparability to flow cytometry.
- No need to add lasers or detectors to upgrade for high-parameter studies
- Imaging module can be added:
  - Helios by day, Hyperion™ Imaging System by night.

Highlights

Comprehensive—Accelerate insight into mechanisms of health and disease with the most comprehensive view of cell phenotype and function.

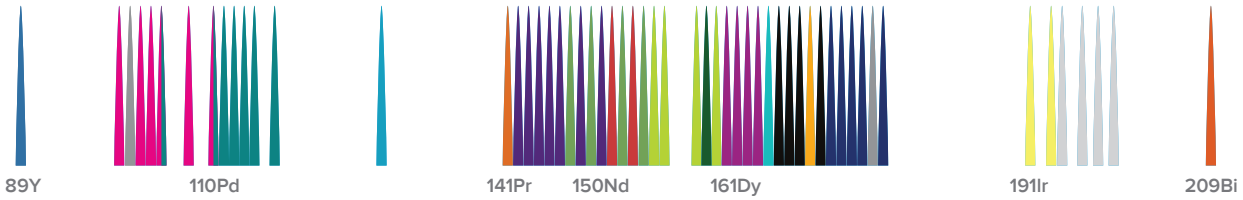
Powerful—Obtain the most actionable information from precious samples.

Proven—Trusted by translational and clinical study researchers around the world to power life changing insights in human health.

Uniquely CyTOF®

135 independent detection channels

Over 50 isotopic metal tags with discrete, non-overlapping signals



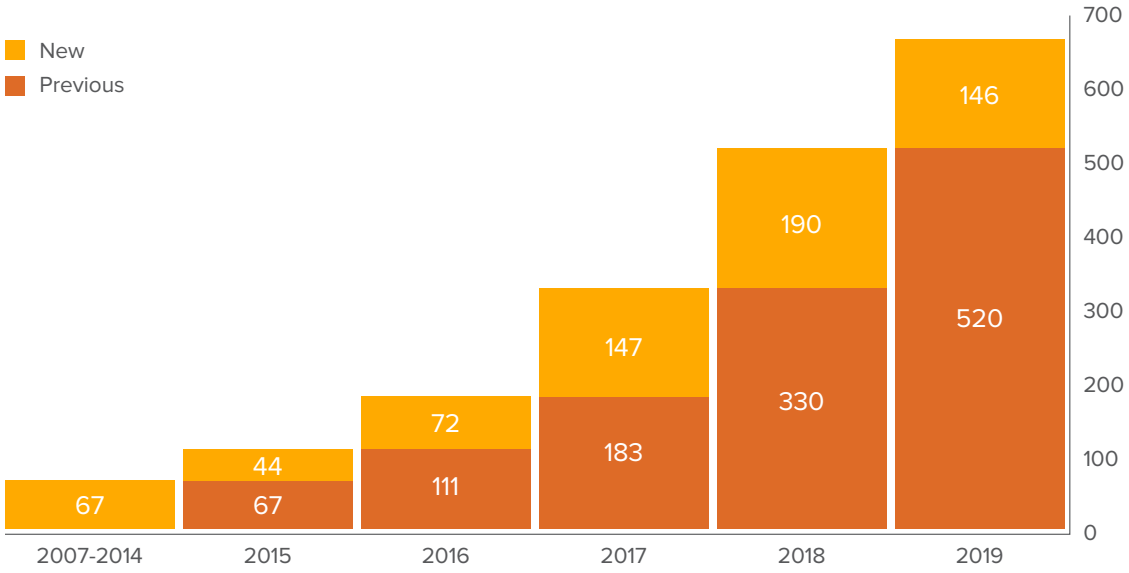
- Y (1)
- Pd (6)
- Rh (1)
- Cd (7)
- I (1)
- Pr (1)
- Nd (7)
- Sm (4)
- Eu (2)
- Gd (4)
- Tb (1)
- Dy (4)
- Ho (1)
- Er (4)
- Tm (1)
- Yb (5)
- Lu (1)
- Ir (2)
- Pt (4)
- Bi (1)

Tags and antibodies are available for diverse applications

- Phenotyping by cell surface or intracellular markers
- Signaling and transcriptional protein analysis
- Cytokine production
- Cell death and apoptosis
- Cell cycle analysis
- TCR identification with tetramer technology
- Epigenetic studies
- Biomolecular and enzymatic processes (for example, protein synthesis, metabolism)

Mass cytometry use is growing quickly

Peer-reviewed* publications as of June 2019



*Does not include commentaries or reviews

Why?

- **Experiments are single-tube** due to lack of signal spillover.
- Mass cytometry (MC) enables the **broadest range of applications** for both basic and translational research.
- 20-plus-parameter **panels are easier to build** and to modify than fluorescence-based panels.
- MC **antibodies and tags are more stable** than fluorescent tags. Cocktails and labeled cells can be frozen.
- Many published protocols and methods are available, **including guides to data analysis**.

Helios™ mass cytometer

A simple system

- A single-detector system with a direct path from cell ionization to signal detection
- One daily tuning and system optimization required, regardless of assay or isotopes used
- No compensation or single-stained controls needed
- No impact of autofluorescence on signal sensitivity

A real-world comparison

Comparing Fluorescent Flow and Mass Cytometry Optimization and Implementation Workflows*

Terry Wightman[1], Julia Houk[1], Ravi Misra[2], Meghann O'Brien[1], Gloria Pryhuber[2], Matthew Cochran[1,2], Wojciech Wojciechowski[1,2], and Timothy Bushnell[1,2]

[1]Flow Cytometry Shared Resource Laboratory, University of Rochester Medical Center, Rochester, NY 14642

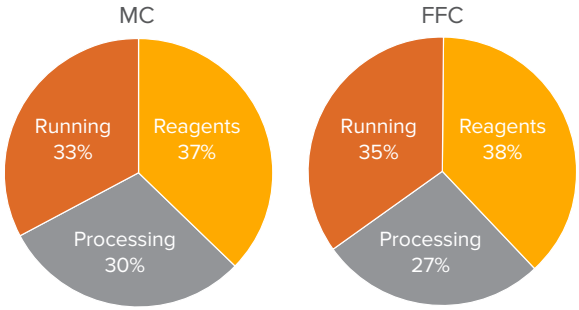
[2]Department of Pediatrics, University of Rochester, Rochester, NY, USA.

Parameter	MC**	FFC†
Workflow (sample prep and acquisition)	8 hr	10.5 hr
Panel design	Easy	Very complex
Panel size	32	17 (TH1) 15 (TH2) 12 (EOS)
Voltage optimization	NA	2 days
Antibody titrations	1 day	2 days
Sample consumption per experiment	1x	4x
Cell recovery	On par	On par
Cost (single experiment)	$987	$1,168

*Poster, CYTO 2019
**MC: mass cytometry
†FFC: fluorescence flow cytometry

Additional reasons cited for preferred use of MC for this project:

- Ability to increase the number of parameters without sacrificing detection sensitivity
- Obtaining more data and cellular relationship information from a single sample
- Autofluorescence not a factor in MC, enabling cleaner detection of intracellular targets



Cost distribution per experiment

Key advantages of CyTOF for higher-parameter (>20 markers) cytometric analysis

Metric	Helios Mass Cytometry	Standard Fluorescence	Spectral
Independent detection channels	135	30–40	NA*
Maximum published panel size	52	~30	~30
Publications with >35 markers**	>300	0	0
Available tags for simultaneous detection	>50†	~30	~30
Time required for 20+ marker panel design and validation	1 week	2–4 weeks	2–4 weeks
Tag flexibility/panel customization and-reconfiguration	Excellent	Moderate	Difficult
Immune profiling panel plus software solution	Yes	No	No
Need for signal deconvolution	None	Extensive	Extensive
Impact of autofluorescence on signal resolution	None	Extensive	Extensive
Instrument configuration is assay- and sample- independent	Yes	No	No
Configuration	Single detector, standard configuration; No experimental optimization	Lasers, detectors and instrument optimization vary with experiment.	Single detector bank, instrument optimization varies with experiment
Sample volume required for instrument optimization	0	mL§	mL§

*64 detectors are used in varying combinations to detect each fluorophore.
†As of September 2019
§Includes controls for instrument optimization

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