



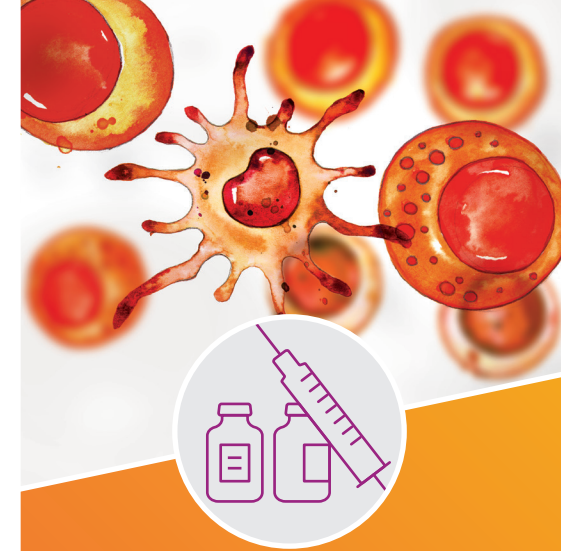
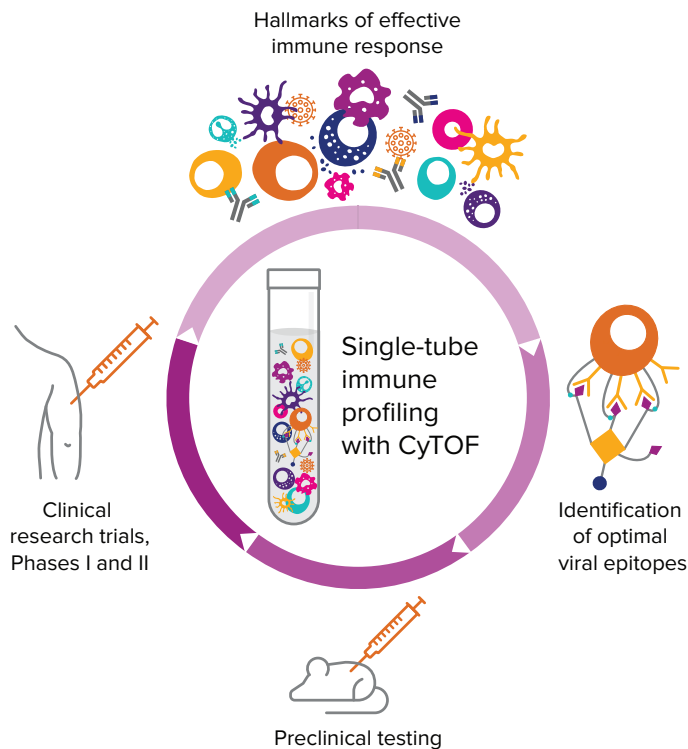
Uniquely CyTOF: Single-Tube Cytometry for Vaccine Development

CyTOF® technology, which powers mass cytometry and Imaging Mass Cytometry™, is being used by research groups around the world to investigate multiple aspects of vaccine development and testing.

The high-parameter data from CyTOF captures the complexity of the immune system, revealing often-unanticipated immune cell interactions. These results define the immune response and disease immunopathology to help refine development of treatments and vaccines for better disease management.

CyTOF Advantage for Vaccine Development and Testing

- Define disease immunopathology and immune response with high-parameter phenotype and functional single-cell analysis.
- Identify and phenotype antigen-specific T cells using hundreds of metal-tagged tetramers loaded with epitopes of interest.
- Perform preclinical vaccination and challenge studies for information on immunogens, adjuvants and efficacy.
- Obtain detailed longitudinal immune profiles during clinical research trials in order to assess efficacy and further refine dose, delivery method and schedule.



CyTOF: Simple yet Powerful

The world's most advanced single-cell cytometric technology, CyTOF offers deep profiling of cell phenotype and functional state, all in a single tube.

Mass cytometry is enabling breakthrough discoveries in a wide range of immune-mediated diseases including cancer, autoimmunity, infectious disease and transplantation disorders.

Examples of vaccine research areas where CyTOF has been applied:

- Preclinical vaccination and challenge study¹
- Biology of effective immune response²
- Assessment of immunogenicity³
- Biomarkers predictive of vaccine response⁴
- Age-related vaccine efficacy⁵
- Prime-boost vaccination schedules⁶
- Virus-specific T cell monitoring⁷



Speed Your Vaccine Research Efforts with CyTOF

A single mass cytometry panel can simultaneously evaluate many parameters related to vaccine efficacy:

- Quantify changes in both innate and adaptive immune cell populations with vaccination.
- Assess functional status of all identified populations:
 - Checkpoint and chemokine receptor expression
 - Cytokine and homing molecule expression
 - Phosphoproteins and signaling pathway activation
- Identify antigen-specific T cells using metal-barcoded tetramers.

CyTOF Advantage	Research Benefits
High-data density per sample volume	Measure 50-plus parameters per cell.
Single-tube cytometry	Small sample sizes can be stained in 1 sample tube due to non-overlapping signals and lack of autofluorescence.
Batch effect mitigation	Sample barcoding and tools for data normalization reduce sample-to-sample and run-to-run variability.
Multi-site reproducibility	White paper on PBMC and whole blood multi-site study data
Built-in biosafety	Sample fixation neutralizes viral pathogens for safe handling.
Flexible panel design with robust reagents	28 pre-designed panel kits to choose from or tag antibodies with metals of your choice using any of 42 labeling kits
Same antibody clones and workflow as flow cytometry	Over 800 antibody conjugates with familiar antibody clones
End-to-end workflow solutions	Maxpar® Direct™ Immune Profiling System and Maxpar Direct Expansion Panels enable robust immune profiling studies.
Sample-to-answer mass cytometry services	Consult our Therapeutic Insights Services experts to develop and execute a custom mass cytometry research plan.

Table 1. Advantages of using mass cytometry over high-parameter flow or spectral cytometry

Don't just research. CyTOF. Learn more at: fluidigm.com/covidvaccinedev

1. Reeves, P.M. et al. *Scientific Reports* (2020): 13311.
2. Zhao, Y. et al. *PLOS Neglected Tropical Diseases* (2020): e0008112.
3. Ausar, S.F. et al. *Communications Biology* (2020): 427.
4. Lingblom, C.M.D. et al. *Journal of Translational Medicine* (2018): 153.
5. Rudolph, M.E. et al. *International Immunology* (2019): 315–333.
6. Palgen, J-L. et al. *npj Vaccines* (2020): 24.
7. DeGottardi, Q. et al. *Scientific Reports* (2020): 15686.

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The technology

Mass cytometry, powered by CyTOF technology, is a cell analysis platform using metal-tagged antibodies to simultaneously resolve over 50 markers per cell.

CyTOF offers in-depth multiplexed evaluation of:

- Cell phenotype and function
- Signaling profiles and cellular networks
- Apoptosis, cell cycle analysis and other complex cellular activities

The proof

Mass cytometry is the industry standard for high-parameter cytometry in translational and clinical research around the world.

The proof is in the adoption:

- Over 1,000 peer-reviewed publications
- In use in over 100 National Clinical Trials
- Placements in over 30 countries

The results

With mass cytometry, what you see is what you get. Analyze 50-plus parameters simultaneously on millions of individual cells without compromising sensitivity or accuracy. Expect reliable data—from run to run and from site to site.