Investor and Analyst Day

Dr. Wenbin Jiang, CEO

June 22, 2022

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This presentation contains adjusted EBITDA, adjusted gross profit and adjusted gross profit margin, financial measures that are not in accordance with Generally Accepted Accounting Principles (GAAP). Reconciliations of adjusted EBITDA, adjusted gross profit and adjusted gross profit margin to the most comparable GAAP measures are included at the end of this slide presentation. We present adjusted gross profit and adjusted gross profit margin because we believe they are frequently used by analysts, investors and other interested parties to evaluate companies in our industry and it facilitates comparisons on a consistent basis across reporting periods. Further, we believe it is helpful in highlighting trends in our operating results because it excludes items that are not indicative of our core operating performance.

Analyst / Investor Day Agenda

9:00 – 9:15	**Welcome |** Dr. Wenbin Jiang, CEO
9:15 – 9:45	**Market Overview |** Mark Herberger, Sr. Director, Marketing
9:45 – 10:00	**Aurora at the NIH |** Dr. Bill Telford, NIH/NCI *(by video)*
10:00 – 10:15	**High Dimensional Cell Sorting |** Kevin Weller, Ohio State
10:15 – 10:30	**Aurora Empowering Immunological Research |** Dr. Anna Belkina, Boston University
10:30 – 10:45	**Cytometry in Leukemia & Lymphoma |** Dr. Franklin “Buddy” Fuda, UTSW
10:45 – 10:55	**Break**
10:55 – 11:25	**Product and Technology Overview |** Dr. Ming Yan, CTO and Mark Herberger
11:25 – 11:35	**Financial Overview |** Patrik Jeanmonod, CFO
11:35 – 11:45	**Business Strategy and Conclusions |** Dr. Wenbin Jiang
11:45 – 12:00	**Q&A**
12:00 – 12:30	**Hors d’oeuvre and Social**

Cytek's Leadership Team

Wenbin Jiang, Ph.D.
Chief Executive Officer
Cosemi · LUMENTUM

Ming Yan, Ph.D.
Chief Technology Officer
BD · NeoPhotonics

Patrik Jeanmonod
Chief Financial Officer
CORE BRANDS · COVANCE

Todd Garland
Chief Commercial Officer
BD · CareFusion · CardinalHealth

Valerie Barnett
General Counsel
Dermira · FLUIDIGM · WILSON SONSINI

Allen Poirson, Ph.D.
SVP, Marketing and Corporate Development
SONY BIOTECHNOLOGY · AccuImage · twoXAR

Paul Goodson
Head of Investor Relations
Invitrogen living science · sequenom · XOMA

Mark Herberger
Sr. Director, Marketing
BD · BIO-RAD · ThermoFisher SCIENTIFIC

Ken Riley
General Manager
BD · INTUITIVE SURGICAL

Maria Jaimes, M.D.
VP, Applications
BD

Connie Wedel
Chief People Officer
Binding Site · ARGEN

Mark Edinger
VP, Scientific Affairs
BD · Q² Solutions

Melik Ulusu
VP, Operations &
Integrated Supply Chain
BD · PerkinElmer

Dave Kennedy
VP, Global Sales & Service
SARTORIUS · amnis

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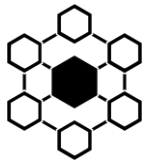
Cytek Highlights

Patented, transformative FSP platform, delivering deep insights, high-throughput and ease-of-use

Addresses unmet needs and provides highly intuitive and flexible customer experiences



Enabling broad applications in discovery, translational and clinical

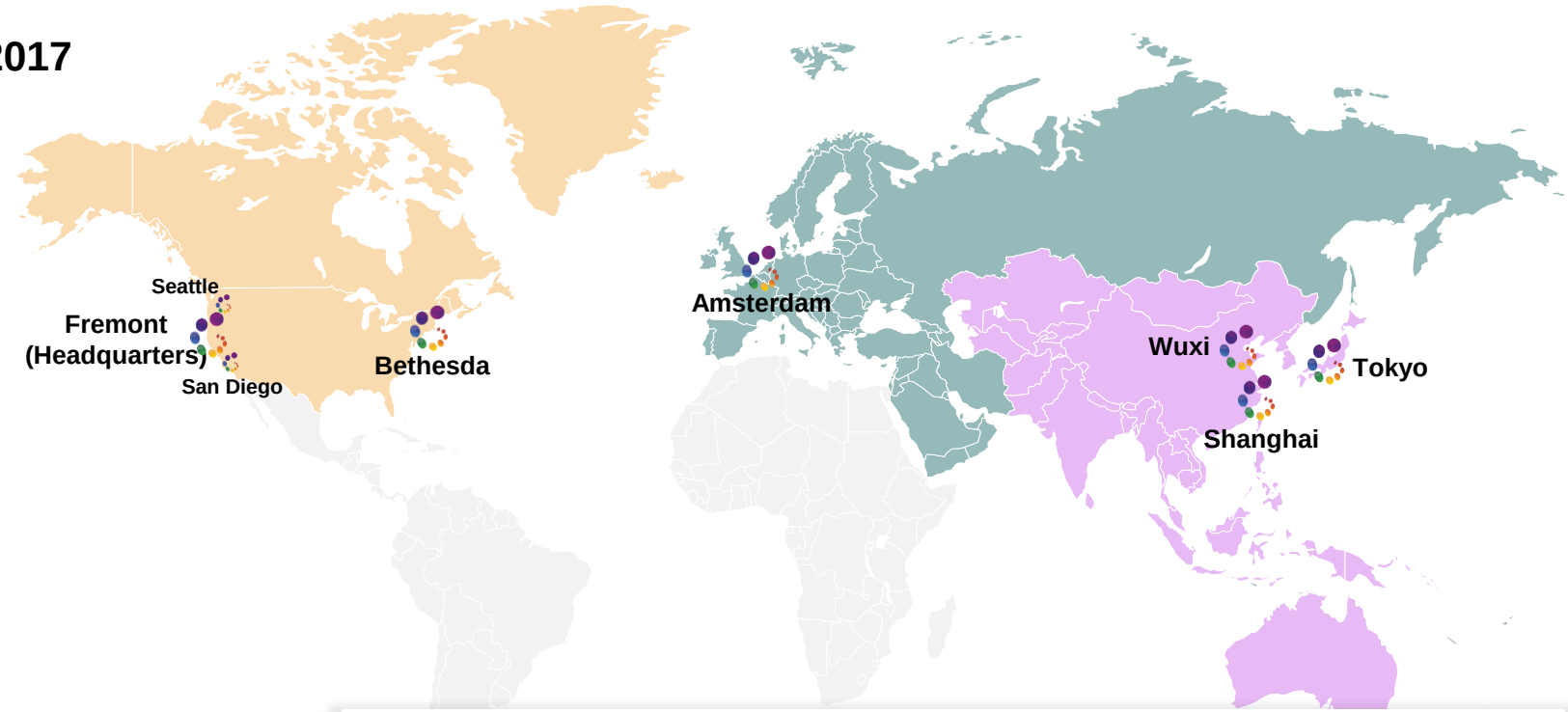
Diversified customer base with accelerating publications

Global scale and reach, with uniquely diversified geographics

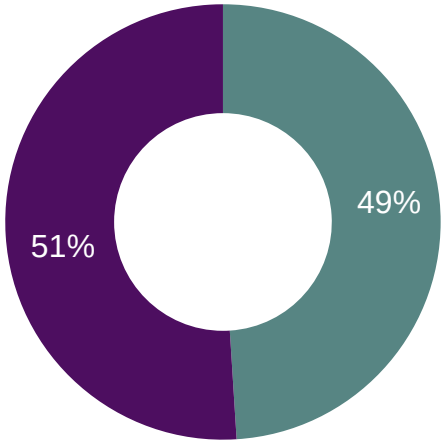
Global Scale and Reach with Diversified Revenue Mix

Since launch of Aurora Series in 2017

900+ Customers
500+ Employees
150+ Biopharma Companies
40+ Countries
WW Applications, Service & Sales



% Revenue by Industry



- Academic and Government-Owned Institutions
- Pharmaceutical and Biotechnology Companies, Distributors and CROs

% Revenue by Region

USA	EMEA	APAC
58%	**25%**	**17%**

Investing to Capture the Cell Analysis Opportunity

Validated Technology Platform*

1,226
Units Placed

740
Publications

*Units as of 3/31/22
Publications as of June ‘22

Broad Customer Base and Global Presence

900+
Customers

40+
Countries

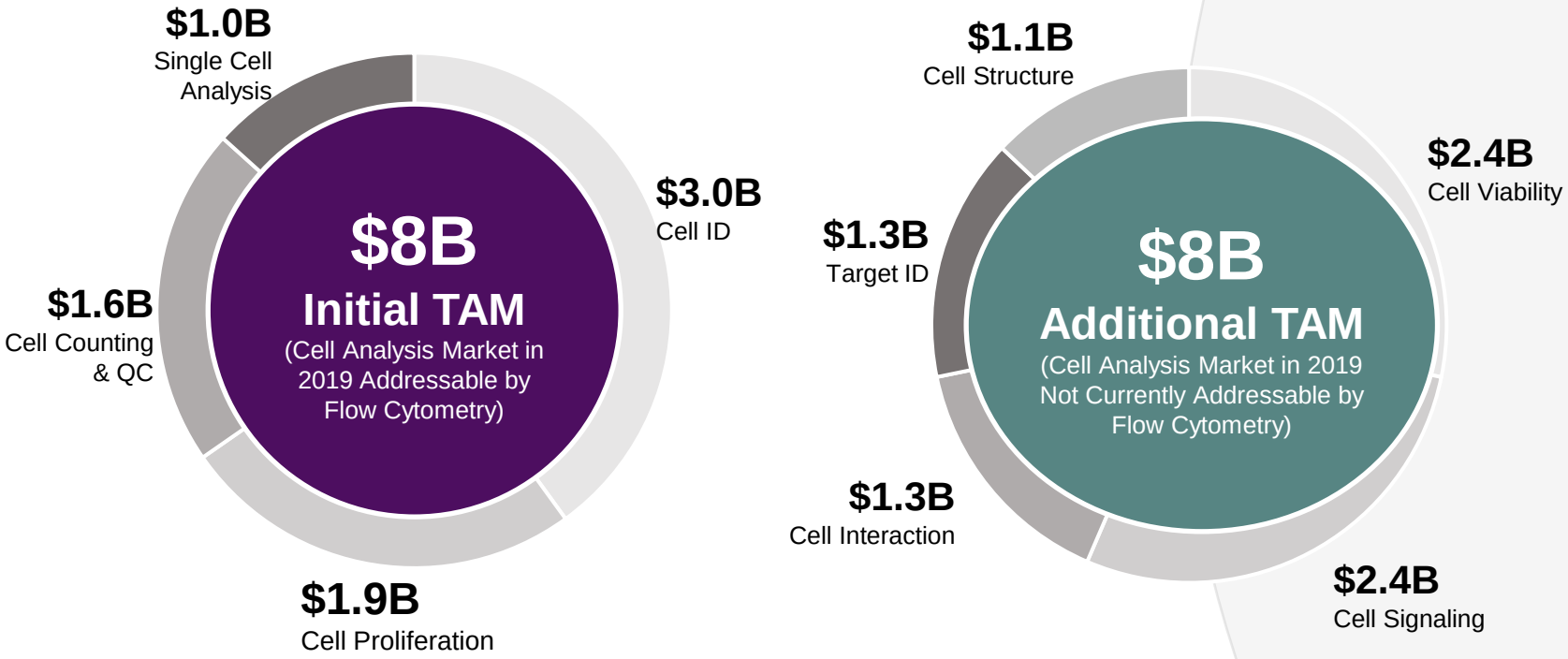
Strong Financial Profile*

$139M
$18M
TTM Revenue/
A-EBITDA

$362M
$0M
Cash/Debt

* Data as of 3/31/22

Our FSP Platform Allows Us to Address the Broader Cell Analysis Market



$23B

Long-Term TAM

(Total Cell Analysis Market in 2024)

Marine Biology

Water Supply Contamination

Alternative Biofuels

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Today's Focus Areas

- Where Flow Cytometry fits in Research, Clinical, Diagnostics, and Other Areas
- Market Segments, Sizes, and Growth Rates
- What our Technology Enables: Why Customers Choose Cytek
- Reagents – Markets and Opportunities
- 4 Real World Examples of Cytek's Use in Research and Clinical
- Our Financial Profile and Business Drivers
- Our Business Strategy and Objectives
- The Reasons Cytek Can Become #1 in Cell Analysis

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Investor and Analyst Day

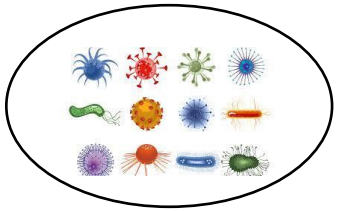
Market Overview

Mark Herberger, Sr. Director Marketing

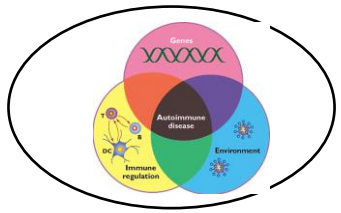
June 22, 2022

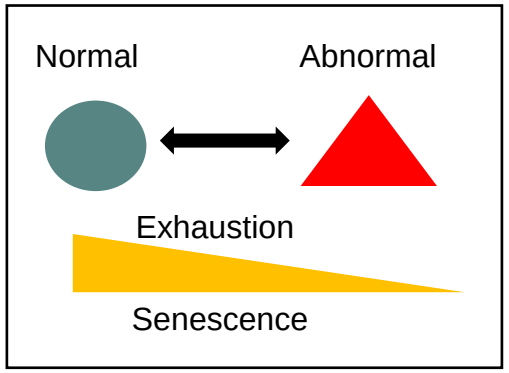
Why Flow Cytometry? A Transformative Platform Technology

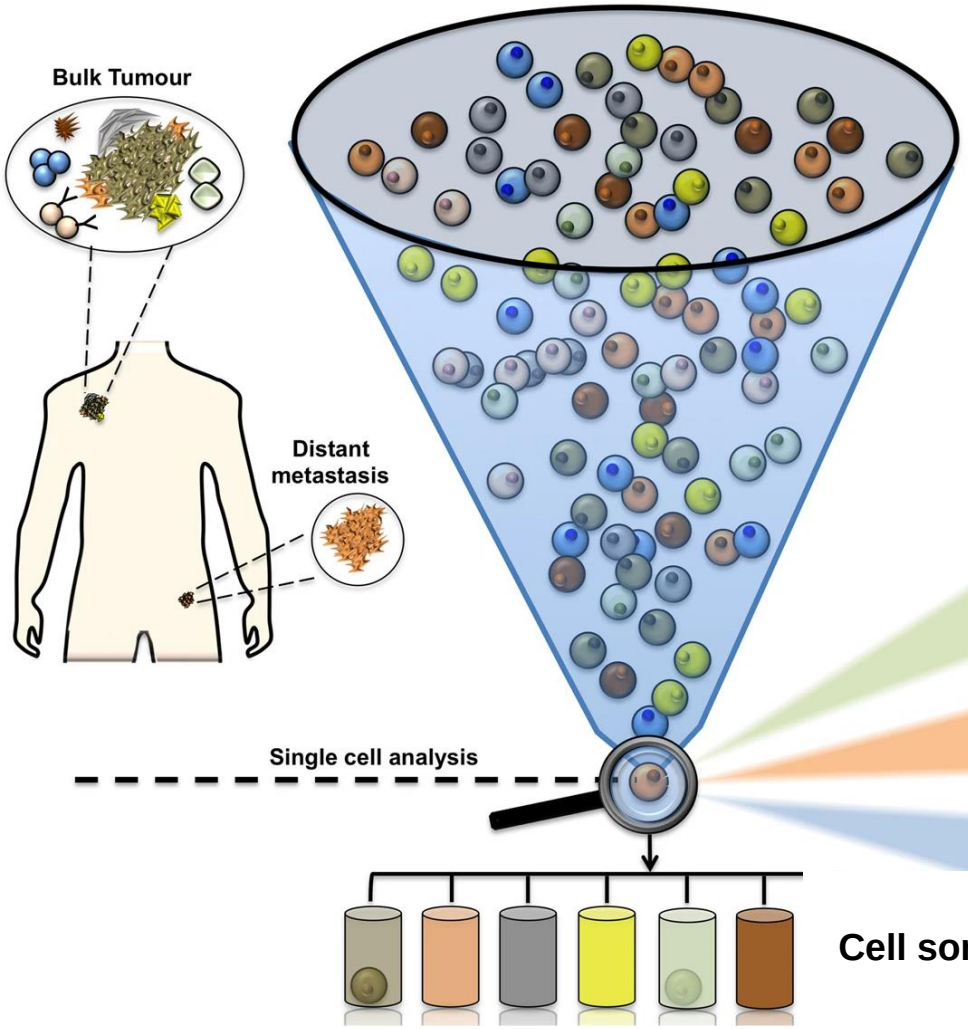
Infectious diseases



Autoimmune diseases







Immuno-Oncology

- Cancer cell clone 1
- Cancer cell clone 2

Malignant

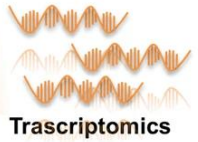
- CAF
- Endothelial cell

Stromal

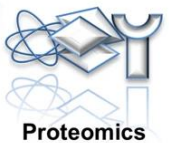
- Macrophage
- NK
- T-cell
- B-cell

Immune

Genomics

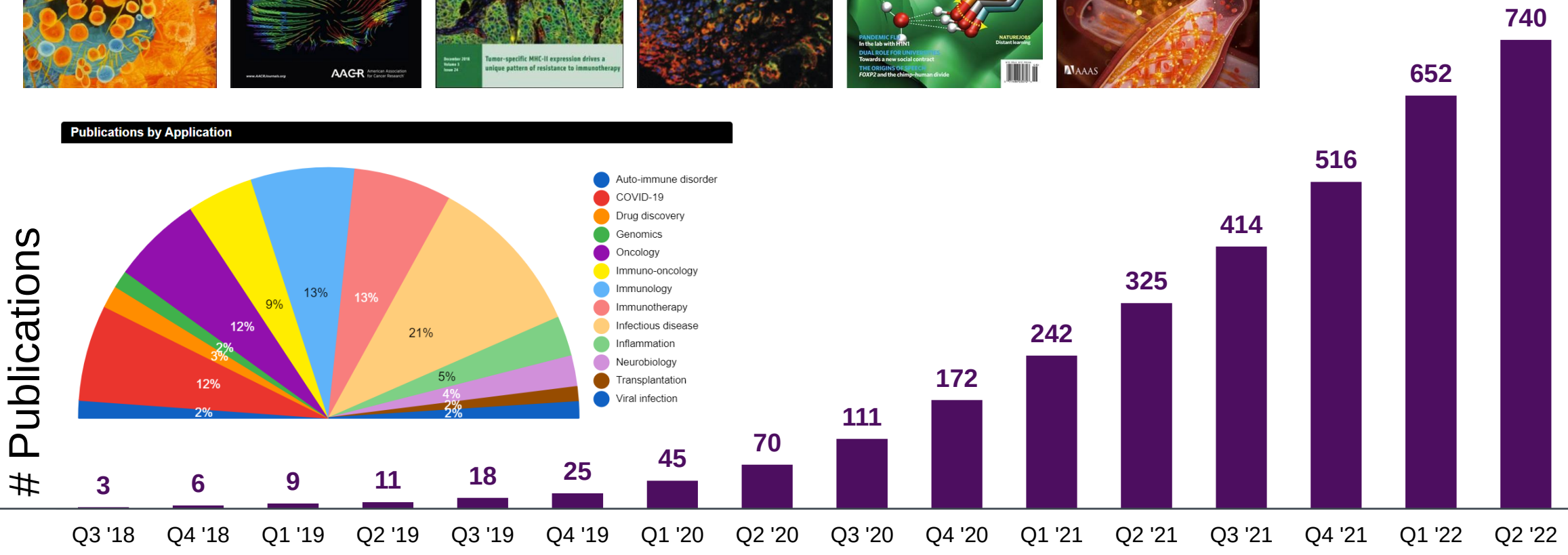


Trascriptomics



Proteomics

Cytek Technology Enables Applications



Market Forces and Needs Shaping Cell Analysis

Research

Emergence of high dimensional characterization & functional assays

- The rise of immunotherapy, tumor microenvironment, infectious disease studies (COVID)
- In 2021 Flow Cytometry accounted for the largest share of ~29% of the global cell analysis market

Target customers

- Academic Institutions
- Pharma & Biotech R&D

Translational

CRO focus on cell markers and biomarkers leads to new clinical applications

- Comprehensive Panels, New Fluorochromes
- Instrument Characterization, Optimization, Standardization
- Panel Construction, Optimization, Validation, Automation
- Data Analysis, Automated Analysis, Cloud-based

Target customers

- CRO, Pharma, Specialty labs

Clinical

Performance (quality), price, IVD, customer service are fundamental needs

- Validated applications & assay kits
- Understanding and adjusting to changing clinical regulations
- EU IVDR May 2022 (replacing IVDD)
- Laboratory Developed Tests (LDT)
- VALID Act proposed in US congress to replace 510 K and LDT with new category

Target customers

- Reference labs, hospital labs
- Developing country clinical labs

Cytek Plans to Expand the Market and Capture Share

	Research	Translational	Clinical
Customer Segment	Academic	Pharma / BioTech / CRO	Reference labs, hospitals
Application(s)	Immuoprofiling Immuno-Onc, Immunology	Dendritic cells, Car-T, Vaccine development & trials, Receptor Occupancy Assays	MRD, IO, LDT, Immunotherapy monitoring
Competitors	BD, Danaher, Cytek, Thermo, Agilent, Cytof, Miltenyi, Sony	BD, Danaher, Miltenyi, Agilent, Cytek	BD, Danaher, Cytek
Market CAGR	**~10-12%**	**~12-15%**	**~5-8%**

Cytek Market Share Expected to Increase

A Selection of Application Areas for FSP

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Flow Cytometry Cell Analysis

Immuno-oncology


blood

One Tube 24 Color Full Spectral Flow Cytometry and Multi-Dimensional Software to Study the Maturation Pattern and Antigen Expression of the Myeloid

Immuno-deficiencies

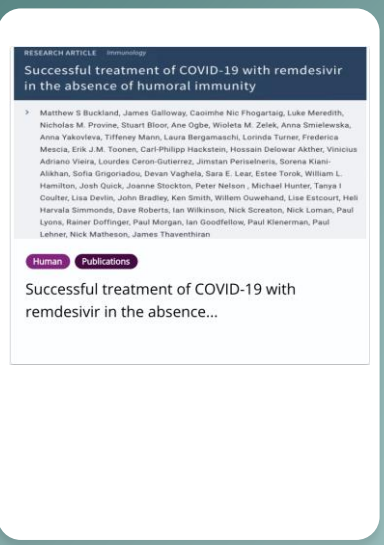

PLOS ONE

Natural killer cell phenotype is altered in HIV-exposed seronegative women

Allergy & Immunology


Androgen receptor signaling promotes Treg suppressive function during allergic airway inflammation

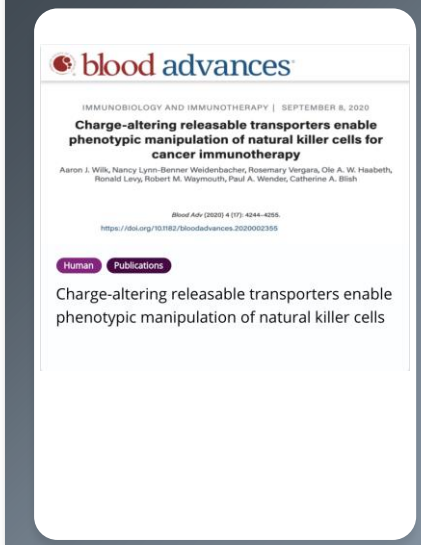
Infectious Disease


Successful treatment of COVID-19 with remdesivir in the absence of humoral immunity

Human Publications

Successful treatment of COVID-19 with remdesivir in the absence...

Immunotherapy


blood advances

Charge-altering releasable transporters enable phenotypic manipulation of natural killer cells for cancer immunotherapy

Human Publications

Charge-altering releasable transporters enable phenotypic manipulation of natural killer cells

Application of FSP in Myeloid Disorders in L/L

blood

803.EMERGING DIAGNOSTIC TOOLS AND TECHNIQUES | NOVEMBER 5, 2020

One Tube 24 Color Full Spectral Flow Cytometry and Multi-Dimensional Software to Study the Maturation Pattern and Antigen Expression of the Myeloid

Man Chen,[*,1] Hui Wang, MD,[*,2] Minjing Fu,[*,3] Aixian Wang,[*,1] Meiwei Gong,[*,1] Junyi Zhen,[*,1] Xueying Wu,[*,4] Kun Zhao,[*,3] Peihua Lu, MD[5]

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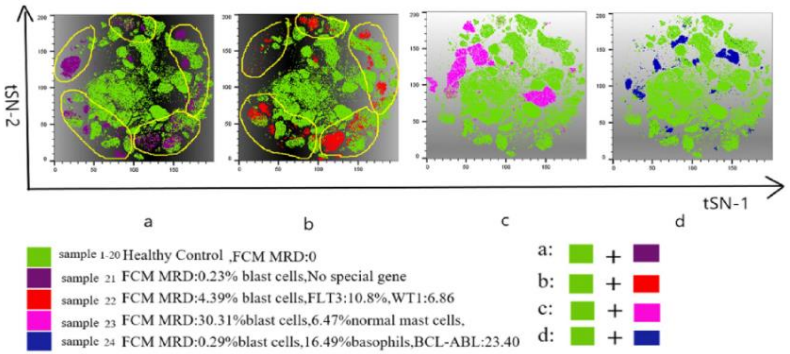
Blood (2020) 136 (Supplement 1) : 13.

http://doi.org/10.1182/blood-2020-140600

Introduction Flow cytometry(FC) plays an important role in the diagnosis of hematologic diseases and the study of cell maturation. Spectral multicolor flow cytometry(SMFC) has shown an advantage over traditional FC that more fluorescent markers could be detected simultaneously, more antigen combinations could be made, and the expression of cells could be scrutinized. However, published studies focused on lymphocyte subsets and the differentiation between hematogones and B-acute lymphoblastic leukaemia/lymphoma(ALL/LBL) minimal residual disease(MRD) detection, and there are few studies on myeloid development and expression. Besides, more powerful and cutting-edge software are needed for complicated combinations from SMFC because traditional dot plots are unable to meet the demand of analysis. Here we design a one-tube 24-color panel combining with the multidimensional data analysis software to study the expression and maturation of normal and malignant myeloid cells including minus subgroups. We hope to improve the sensitivity of MRD by FC and explore more information about myeloid diseases, finally promote the development of artificial intelligence(AI) in clinical FC diagnosis.

Methods: the one-tube 24-color panel was designed according to our experience and Euroflow recommendation. it is composed of backbones including CD45 and myeloblast markers CD34, CD117 and HLA-DR, adding myeloid markers CD33, CD13, CD371, CD15, CD64, CD11c,CD14, CD36 and CD11b, routine leukaemia associated immunophenotyping(LAIP) or different from normal(DFN) markers

- **Published by Pathology Laboratory at Ludaopei Hospital, China**
- **Spectral multicolor flow cytometry(SMFC) has shown an advantage over traditional FC**
  - that more fluorescent markers could be detected simultaneously,
  - more antigen combinations could be made,
  - Precise diagnosis through deep cellular level correlation
- **A one-tube 24-color panel was designed according to our experience and Euroflow recommendation**
- **Offers more cellular information that is unmatched by traditional FC**



Application of FSP in Multiple Myeloma Diagnostics

High-parameter and Effective Multiple Myeloma Diagnostic Panel on the Cytek NL-CLC Improves Sample Efficiency

Li Xiong[1], Wen Du[2,3], Yao-Kun Ma[1], Lei Qin[1], Qing Yuan[1], Yu Liu[1], Shi-Ying Xu[1], Juan-Hua Zheng[1], Xiao-Jian Xu[1], Fang-Ying Shang[1], Shi-Ang Huang[2,3], Jin-E Zheng[2,3]

[1]Flow cytometry laboratory, Wuhan Kindstar Medical Laboratory Co., Ltd, Wuhan, China
[2]Center for Stem Cell Research and Application, Institute of Hematology, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China
[3]Biological Targeted Therapy, Key Laboratory in Hubei, Wuhan, China

- Presented by Kindstar Medical Laboratory, China at ICCS 2021
- Compared the antigen expression and diagnostic results obtained from the Cytek NL-CLC vs. the widely used BD FACSCanto flow cytometer
- Converted four 6-, 7- color tubes to one 23-color tube
- Found no significant difference in detection accuracy between the instruments.
- However, Cytek NL-CLC has many advantages including more detection parameters in a single tube, lower compensation interference, easier processing with small-volume samples
- Established a new standard 23-color panel for highly accurate detection of MM

Results

(1) Both Cytek NL-CLC full-spectrum flow cytometer and BD FACSCanto™ II flow cytometer could effectively classify cells from all bone marrow samples (**Figure 1**). There was no significant difference in cell ratios between the two cytometers (differences < 7.1%).

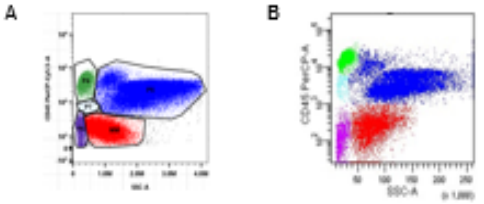


Figure 1. The Cell population distribution in bone marrow samples detected by different panels (A: Cytek 23-color panel; B: BD 8-color panel). Abnormal plasma cells are colored in red.

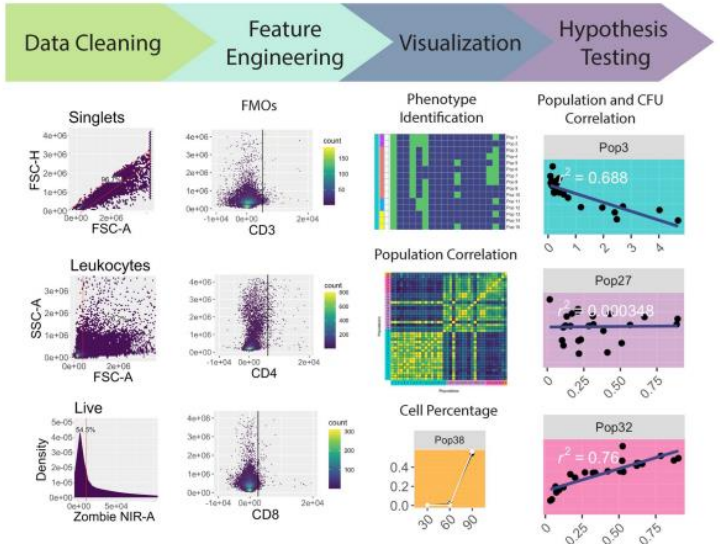
Flow Can Now Analyze 50 Parameters

Cyto-Feature Engineering: A Pipeline for Flow Cytometry Analysis to Uncover Immune Populations and Associations with Disease

Amy Fox[1], Taru S. Dutt[1], Burton Karger[1], Mauricio Rojas[2], Andrés Obregón-Henao[1], G. Brooke Anderson[3] & Marcela Henao-Tamayo[1] ✉

Flow cytometers can now analyze up to 50 parameters per cell and millions of cells per sample; however, conventional methods to analyze data are subjective and time-consuming. To address these issues, we have developed a novel flow cytometry analysis pipeline to identify a plethora of cell populations efficiently. Coupled with feature engineering and immunological context, researchers can immediately extrapolate novel discoveries through easy-to-understand plots. The R-based pipeline uses Fluorescence Minus One (FMO) controls or distinct population differences to develop thresholds for positive/negative marker expression. The continuous data is transformed into binary data, capturing a positive/negative biological dichotomy often of interest in characterizing cells. Next, a filtering step refines the data from all identified cell phenotypes to populations of interest. The data can be partitioned by immune lineages and statistically correlated to other experimental measurements. The pipeline's modularity allows customization of statistical testing, adoption of alternative initial gating steps, and incorporation of other datasets. Validation of this pipeline through manual gating of two datasets (murine splenocytes and human whole blood) confirmed its accuracy in identifying even rare subsets. Lastly, this pipeline can be applied in all disciplines utilizing flow cytometry regardless of cytometer or panel design. The code is available at https://github.com/aef1004/cyto-feature_engineering.

- Flow cytometers can now analyze up to 50 parameters (antigens, size, granularity, cytokines, transcription factors, etc.) per cell and millions of cells per sample
- Conventional flow cytometry data analysis uses manual gating of cells on 2D plots to distinguish populations 1–2 dimensions at a time; this makes it both subjective and time consuming (up to 15 hours per experiment)
- Better methods are therefore critically needed to take full advantage of this powerful technology.



Application of FSP in Immunology

Development of a 43 color panel for the characterization of conventional and unconventional T-cell subsets, B cells, NK cells, monocytes, dendritic cells, and innate lymphoid cells using spectral flow cytometry

Fairooz Sahir, Jericha Miles Mateo, Martin Steinhoff, Kodappully Sivaraman Siveen

First published: 18 December 2020 | https://doi.org/10.1002/cyto.a.24288 | Citations: 2

Funding information: Hamad Medical Corporation, Grant/Award Numbers: MRC-03-19-039, IRGC-04-SI-17-151, IRGC-03-NI-17-071

SECTIONS PDF TOOLS SHARE

Abstract

Although many flow cytometers can analyze 30–50 parameters, it is still challenging to develop a 40+ color panel for the phenotyping of immune cells using fluorochrome conjugated antibodies due to limitations in the availability of spectrally unique fluorochromes that can be excited by the commonly used laser lines (UV, Violet, Blue, Green/Yellow-green, and Red). Spectral flowcytometry is capable of differentiating fluorochromes with significant overlap in the emission spectra, enabling the use of spectrally similar fluorochrome pairs such as Brilliant Blue 515 and FITC in a single panel. We have developed a 43 color panel to characterize most of the immune subsets within the peripheral immune system, including conventional T cells, unconventional T cells such as invariant natural killer T cells (iNKT), Gamma delta (γδ) T-cell subsets (TCR Vδ2, TCR Vγ9) and mucosal-associated invariant T cells (MAIT), B-cell subsets, natural killer (NK) cells, plasmacytoid dendritic cells, dendritic cell subsets, hematopoietic progenitor cells, basophils, and innate lymphoid cell (ILC) subsets (CD117, CRTH2). The panel includes surface markers to analyze activation (CD38, HLA-DR, ICOS/CD278), differentiation (CD45RA, CD27, CD28, CD57), expression of cytokine and chemokine receptors (CD25, CD127, CCR10, CCR6, CCR4, CXCR3, CXCR5, CRTH2/CD294), and co-inhibitory molecules and exhaustion (PD-1, CD223/LAG-3, TIGIT), which enables a deep characterization of PBMCs from peripheral blood. Cells were analyzed on a 5-laser Cytek Aurora and data analysis was done using FlowJo. This panel can help to make a thorough interpretation of immune system, specifically when specimen quantity is low. The panel has not been completely optimized but would rather act as a guide toward the development of a

- **Scientists developed a 43 color panel to characterize most of the immune subsets within the peripheral immune system, including**
  - conventional T cells
  - unconventional T cells
  - B-cell subsets
  - natural killer (NK) cells
  - dendritic cells
  - hematopoietic progenitor cells
  - basophils
  - Innate lymphoid cell
- **Cells were analyzed on a 5-laser Cytek Aurora and data analysis was done using FlowJo.**
- **This panel can help to make a thorough interpretation of immune system, specifically when specimen quantity is low.**

Adjacent Markets: The Power of “AND”

Flow cytometry is often used with and enables downstream or companion technologies

Flow Cytometry Analysis

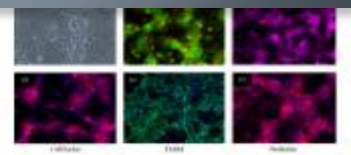
Cytek Instruments & cFluor™ Reagents

Flow Cytometry Sorting

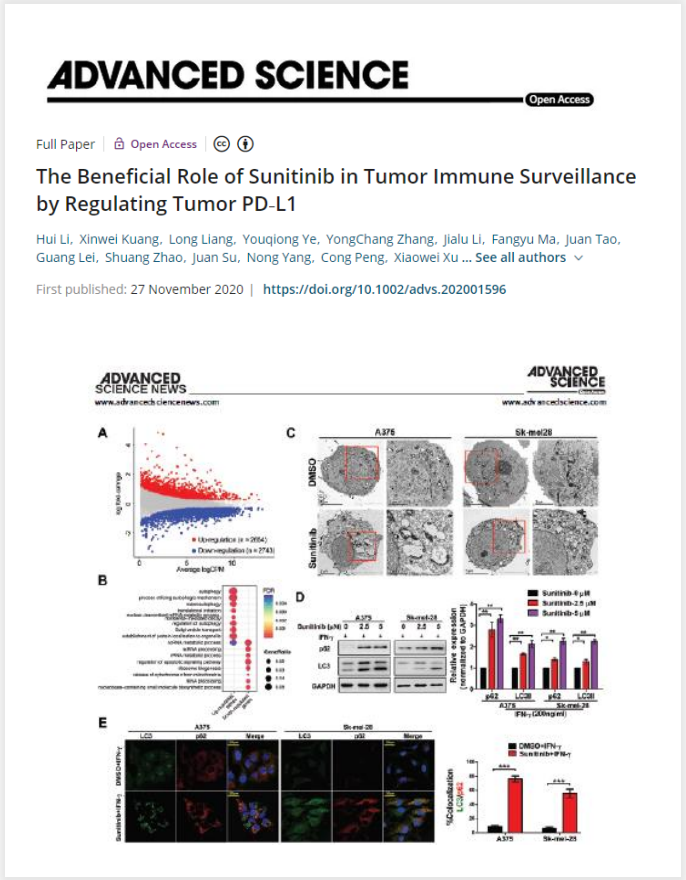
Next Gen Sequencing

10x GENOMICS illumina

High Content Imaging



Molecular Biology



ADVANCED SCIENCE Open Access

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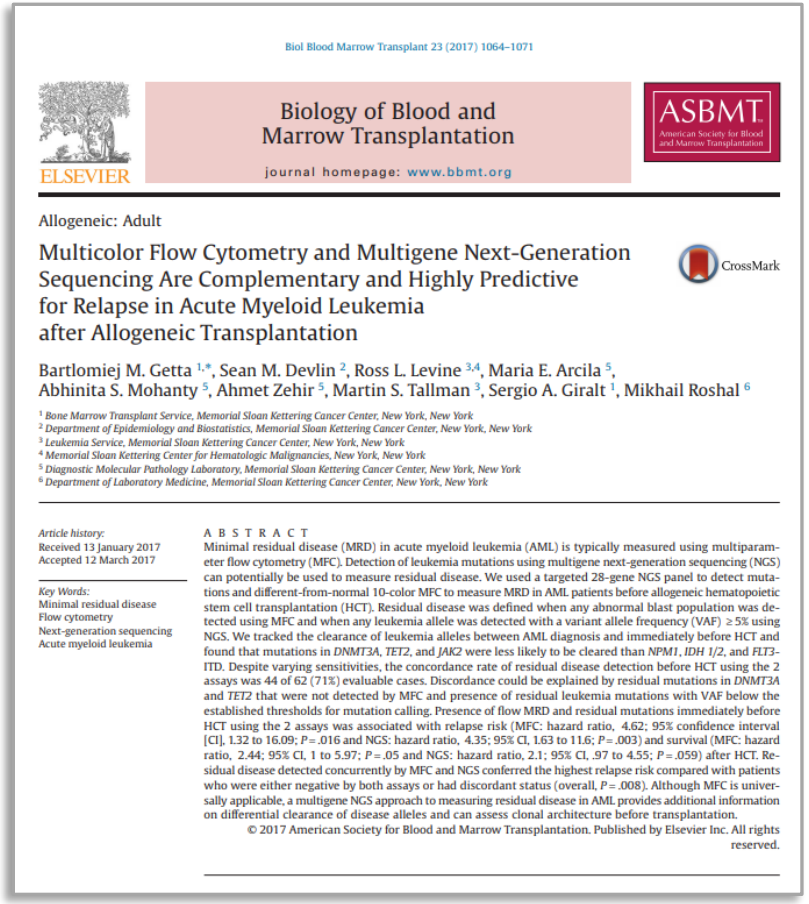
The Beneficial Role of Sunitinib in Tumor Immune Surveillance by Regulating Tumor PD-L1

Hui Li, Xinwei Kuang, Long Liang, Youqiong Ye, YongChang Zhang, Jialu Li, Fangyu Ma, Juan Tao, Guang Lei, Shuang Zhao, Juan Su, Nong Yang, Cong Peng, Xiaowei Xu ... See all authors

First published: 27 November 2020 | https://doi.org/10.1002/advs.202001596

Multicolor Flow Combined With Next Gen Sequencing

Combining these technologies **improves the ability to predict leukemia relapse** after therapy



Biol Blood Marrow Transplant 23 (2017) 1064–1071

Biology of Blood and Marrow Transplantation

journal homepage: www.bbmt.org

Allogeneic: Adult

Multicolor Flow Cytometry and Multigene Next-Generation Sequencing Are Complementary and Highly Predictive for Relapse in Acute Myeloid Leukemia after Allogeneic Transplantation

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Flow cytometry
Next-generation sequencing
Acute myeloid leukemia

A B S T R A C T

Minimal residual disease (MRD) in acute myeloid leukemia (AML) is typically measured using multiparameter flow cytometry (MFC). Detection of leukemia mutations using multigene next-generation sequencing (NGS) can potentially be used to measure residual disease. We used a targeted 28-gene NGS panel to detect mutations and different-from-normal 10-color MFC to measure MRD in AML patients before allogeneic hematopoietic stem cell transplantation (HCT). Residual disease was defined when any abnormal blast population was detected using MFC and when any leukemia allele was detected with a variant allele frequency (VAF) ≥ 5% using NGS. We tracked the clearance of leukemia alleles between AML diagnosis and immediately before HCT and found that mutations in *DNMT3A*, *TET2*, and *JAK2* were less likely to be cleared than *NPM1*, *IDH 1/2*, and *FLT3*-ITD. Despite varying sensitivities, the concordance rate of residual disease detection before HCT using the 2 assays was 44 of 62 (71%) evaluable cases. Discordance could be explained by residual mutations in *DNMT3A* and *TET2* that were not detected by MFC and presence of residual leukemia mutations with VAF below the established thresholds for mutation calling. Presence of flow MRD and residual mutations immediately before HCT using the 2 assays was associated with relapse risk (MFC: hazard ratio, 4.62; 95% confidence interval [CI], 1.32 to 16.09; $P = .016$ and NGS: hazard ratio, 4.35; 95% CI, 1.63 to 11.6; $P = .003$) and survival (MFC: hazard ratio, 2.44; 95% CI, 1 to 5.97; $P = .05$ and NGS: hazard ratio, 2.1; 95% CI, .97 to 4.55; $P = .059$) after HCT. Residual disease detected concurrently by MFC and NGS conferred the highest relapse risk compared with patients who were either negative by both assays or had discordant status (overall, $P = .008$). Although MFC is universally applicable, a multigene NGS approach to measuring residual disease in AML provides additional information on differential clearance of disease alleles and can assess clonal architecture before transplantation.

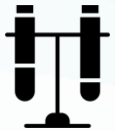
Minimal Residual Disease (MRD)

Predicting 4-Year Relapse for Acute Myeloid Leukemia (AML)

MFC	NGS	
✓	✓	**73%**
	✓	**52%**
✓		**50%**

Cytek Commercial and Reagent Strategy

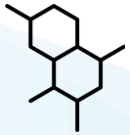
Establish *credibility*



Academic Labs

- Instruments at top research universities across US, Europe and Asia

Focus *on*



Cutting-Edge Applications

- Immunotherapy
- Immuno-oncology
- Immune-profiling
- CAR-T cells

Position *the platform*

Pharma, Biotech & CROs

- Instruments at top pharma and CRO companies

Translate *applications into*

Clinical Space

- Immunotherapy monitoring
- Minimal Residual Disease
- Infectious diseases

Transforming *Cytek to a*

Solutions Provider

- Kits & Panels
- Clinical & Research assays

Over 1200 instruments installed globally

>700 publications in many application areas

Cytek cFluor reagents and panels

Expanded KOL partnerships & collaborations / LDT support

IVD product registrations completed or in process

Cytek Continued Progress

KOL Profiles

Bill Telford, Ph.D.

NIH / NCI, Head of Core Flow Cytometry Facility

- More than 20 years experience in flow cytometry
- More than 100 publications in immunology and cytometry
- Domestic and international teaching experience in flow cytometry
- Research on hardware and wetware R&D, including novel laser technology

Kevin Weller

Co-Director - Flow Cytometry, The Ohio State University and Associate Director for Peletonia's Immune Monitoring & Discovery Platform

- Cutting edge flow cytometry advances in reagents and instrumentation at BD
- Trained hundreds of researchers to use and maximize results from flow cytometry

Anna Belkina, MD, Ph.D.

Asst. Professor, Pathology & Laboratory Medicine, Director, Flow Cytometry Core Lab, Boston University

- Spectral cytometry applications in immunology and stem cell research
- Designed the opt-SNE algorithm for visualizing multidimensional cytometry datasets
- Focused on the intersection of immunology and computational biology

Buddy Fuda, MD

Professor of Pathology at the University of Texas Southwestern

- Medical director, clinical flow cytometry labs for UTSW Hospital and Parkland Memorial Hospital
- Numerous flow cytometry related academic publications and lectures
- International Clinical Cytometry (ICCS) committees

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Investor and Analyst Day

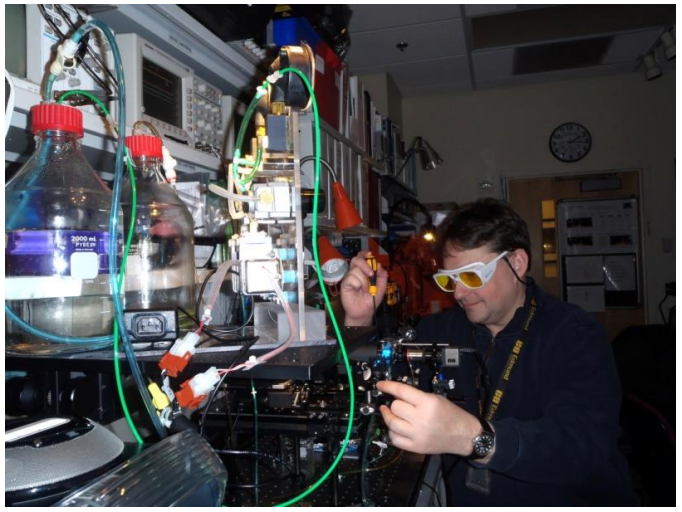
Flow Cytometry in Oncology

Dr. Bill Telford, NIH / NCI

June 22, 2022

NCI Flow Cytometry Core Laboratory

William Telford, Ph.D.
National Cancer Institute, National Institutes of Health



- A research **core laboratory** providing state-of-the-art flow and image cytometry services to NCI investigators.
- Building specialized instruments and improving flow cytometry technology is a big part of what we do.
- Our internal research and development program is guided and influenced by the scientists we serve.

NCI Flow Cytometry Core Laboratory

- While a research-oriented shared resource facility, we support both basic and clinical research projects within the National Cancer Institute.

- Clinical trial support is a major component of our mission – not diagnostic analysis for patient care, but high-level analysis of patient response to therapies.

- Recovery of the immune system following allogeneic bone marrow transplantation, CAR-T and TCR based immunotherapies.

- High-dimensional immunophenotyping – up to high-20 and low-30 immune cell markers.

- Identification of immune cell subsets in tumors, both circulating and solid.

- Some cancer cell analysis aimed at biochemical mechanisms.

- Fluorescent protein and physiological marker analysis.

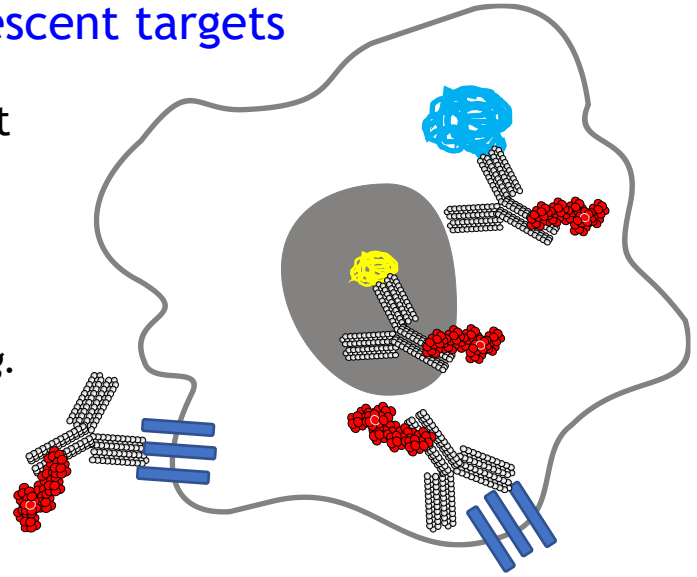
- Cell sorting is a major focus of our group. When a research group analyzes a cell sample, they will soon want to physically separate it for further analysis.

- *We need to provide cell sorting capability that matches our analysis-only capabilities.*

What do we analyze by flow cytometry?

Our lab analyzes virtually many potential fluorescent targets

Using antibodies, FPs and biosensors, we can target almost many cellular characteristics (and there are thousands)…

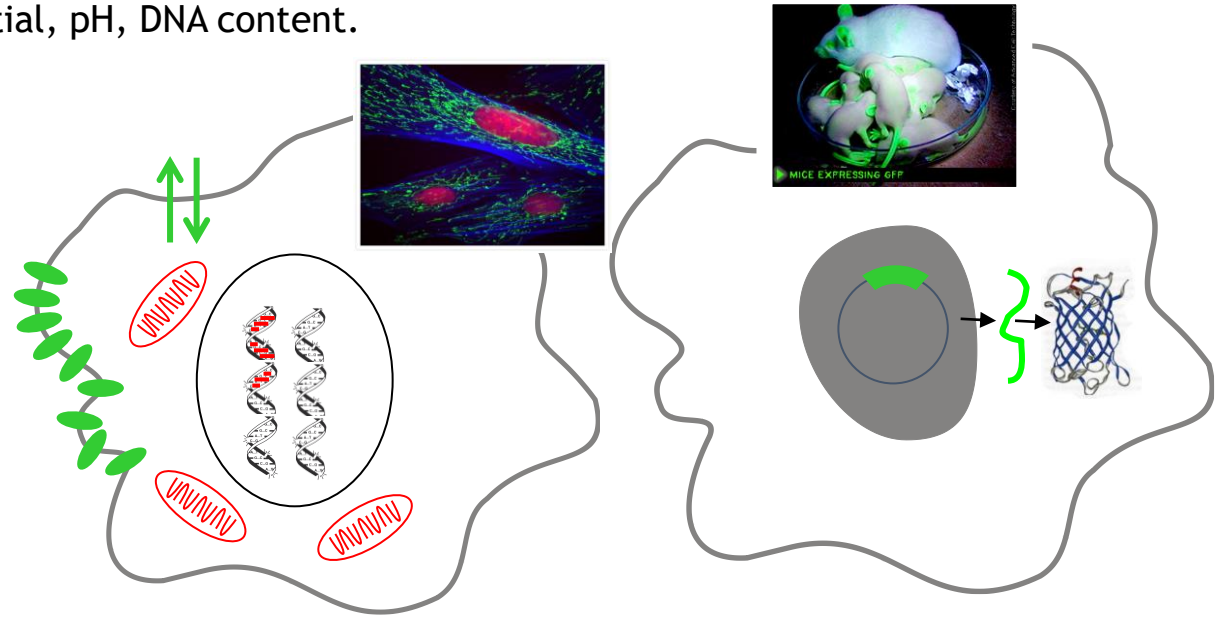


Extracellular and intracellular receptors. Thousands now known for the immune system alone. *Immunophenotyping*.

Expressible fluorescent proteins (FPs). Gene expression, tracking, organelle labeling.

Physiological markers. Fluorescent biosensors for membrane electrical potential, pH, DNA content.

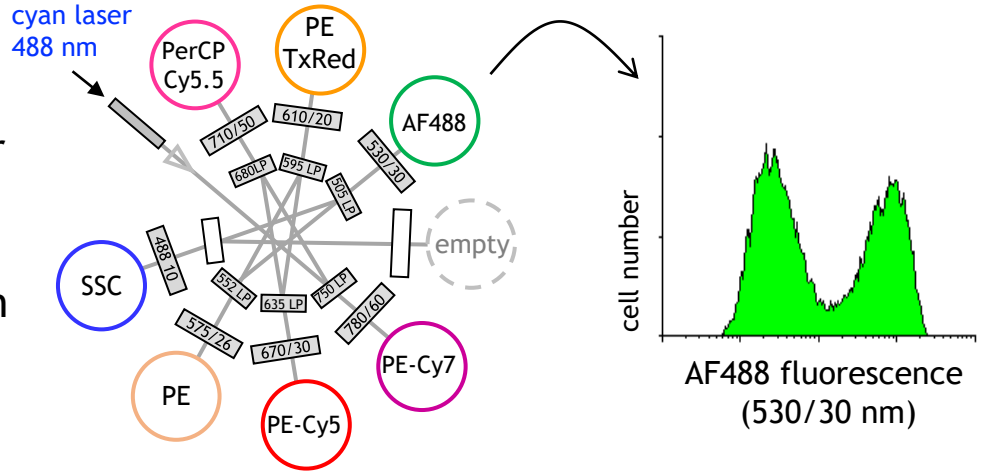
While fluorescent immunolabeling is the dominant, it is often combined with FPs and physiological markers. Complex high-dimensional labelings are now the norm. *Full spectrum analysis is essential for this.*



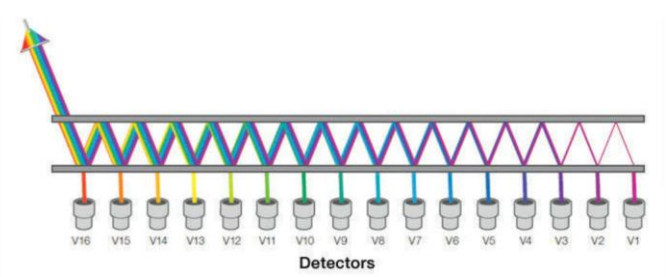
Spectral flow cytometry

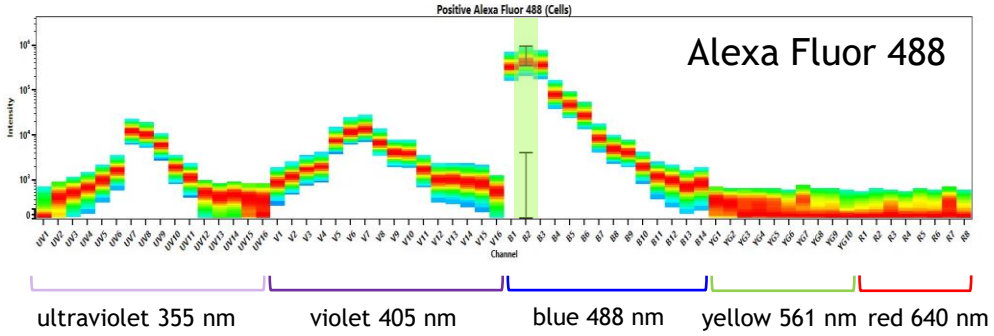
Traditional flow cytometers use single lasers to excite a fluorochrome, and detects fluorescence in narrow bandwidths using dichroic mirrors, filters and PMTs.

Spectral flow cytometry collects fluorochrome data as complete spectra using multichannel PMTs or multiplex APD or SiPM arrays. Rather than compensation, it uses spectral unmixing or deconvolution to separate fluorescent probes (similar to confocal microscopy).



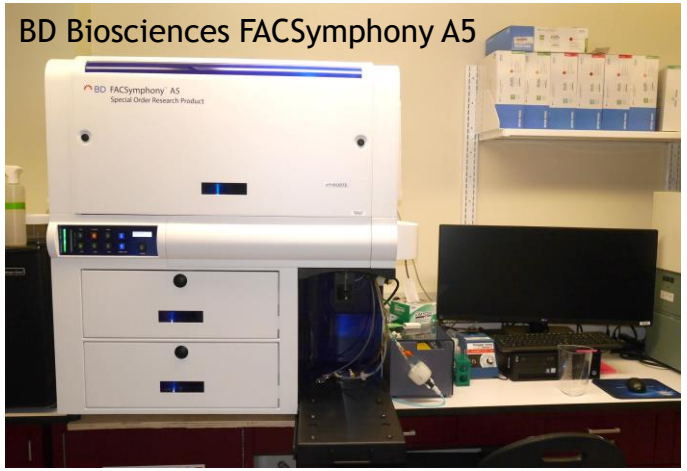
Spectral flow uses ***all*** lasers to excite ***all*** fluorochromes (not just the most optimal one) and collects the full spectra of each fluorochrome from ***all*** laser sources. The data is far more granular and allows better spectral separation that traditional compensation.

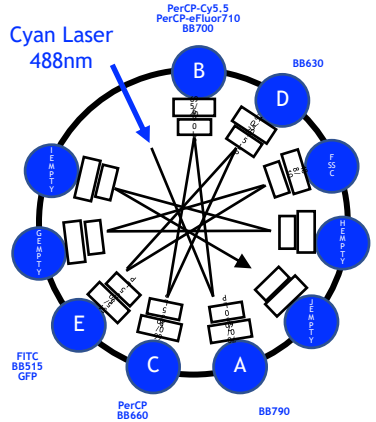


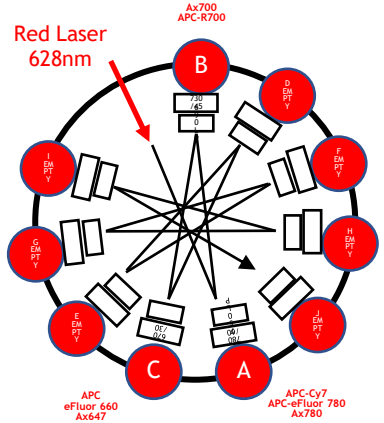


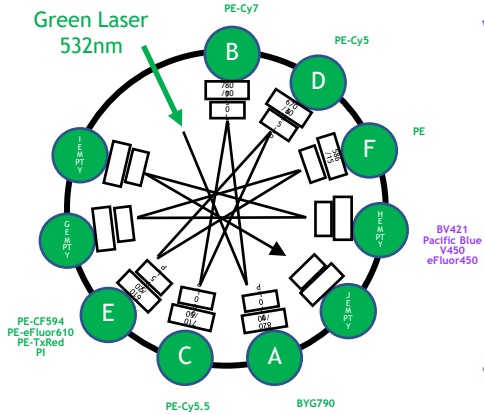
Traditional flow cytometry

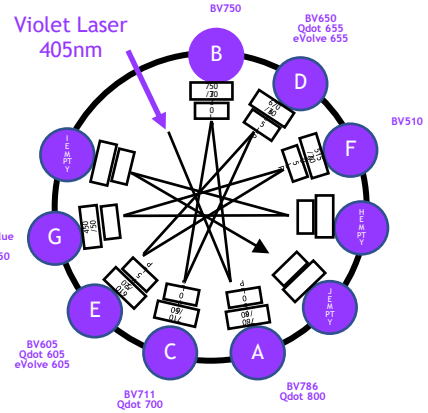
The traditional approach … expand the dichroic / filter single detector model. Complexity, size and cost become prohibitive and detection efficiency suffers.

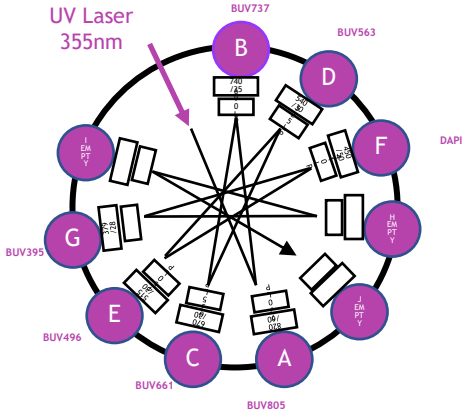












The traditional approach as reached its practical limit for high-dimensional analysis.

Spectral flow cytometry

Full spectrum flow cytometry provides many advantages over traditional cytometry

- Dramatically improved ability to separate the signals from fluorescent probes with similar (but non-identical) spectra. This allows us to analyze many more fluorescent probes (and cell markers) simultaneously. More than 40 marker analysis is now practical (and has been reported).

- Improved quality of signal separation. While spectral cytometry is not strictly more sensitive than traditional techniques, improved signal separation improves data quality.

Some interesting advantages derive from these improvements…

- Spectral cytometry is more "forgiving" of less-than-optimal fluorochrome selections.

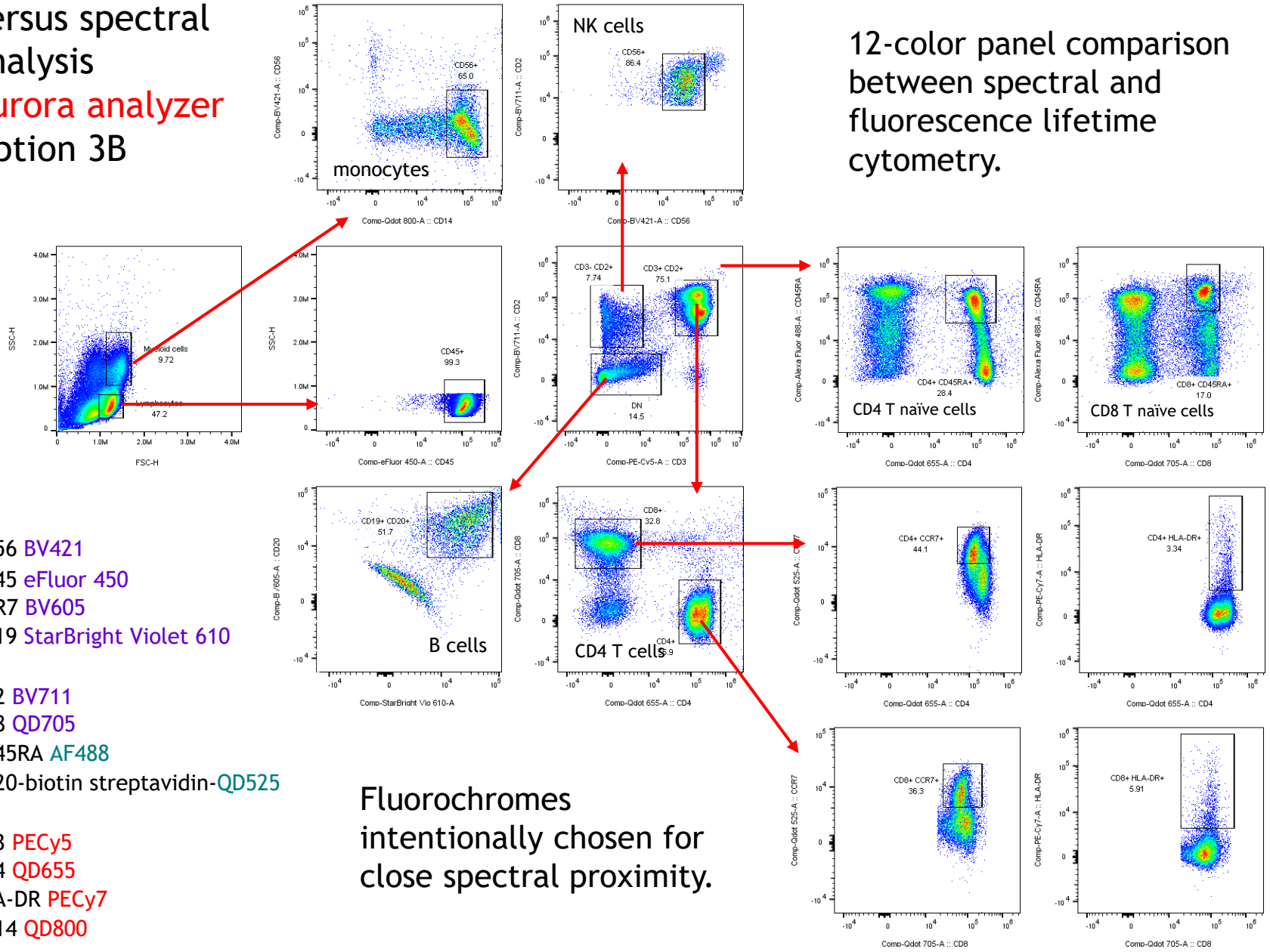
- Many older fluorochromes previously less useful for flow cytometry now have new potential. The variety of fluorescent probes now usable for cytometry is greatly increased. *Virtually any visible fluorochrome can be used.*

- Spectral analysis allows improved subtraction of cellular autofluorescence, improving detection sensitivity, particularly in difficult cell types like myeloid lineages and tumors.

DC1555 KRC Arno versus spectral analysis

Aurora analyzer

Option 3B



12-color panel comparison between spectral and fluorescence lifetime cytometry.

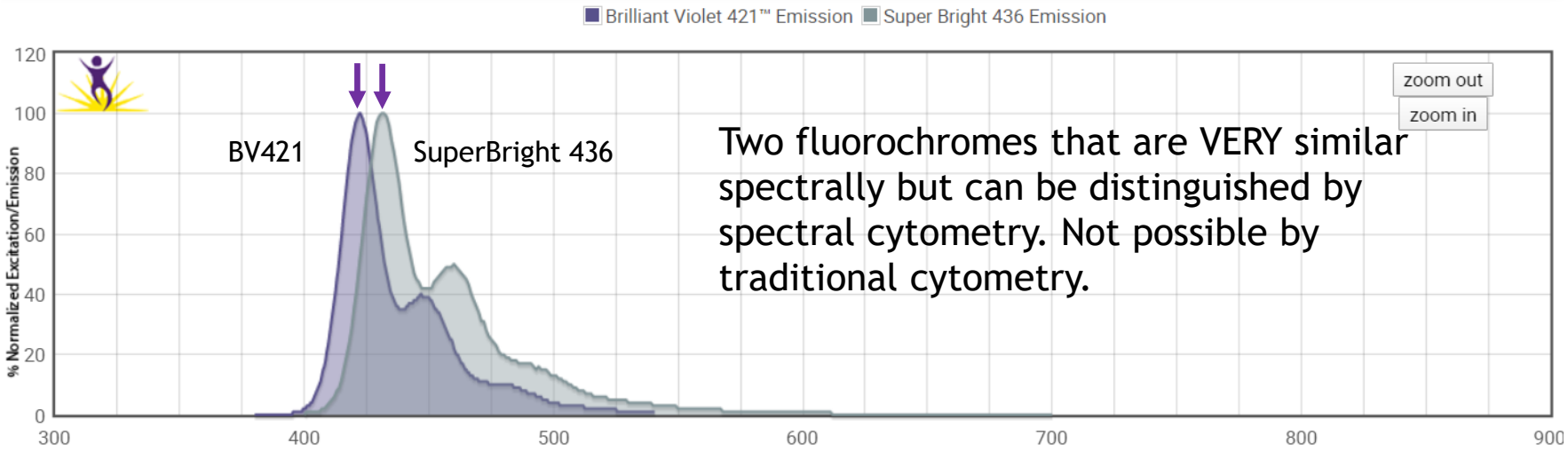
CD56 BV421
CD45 eFluor 450
CCR7 BV605
CD19 StarBright Violet 610

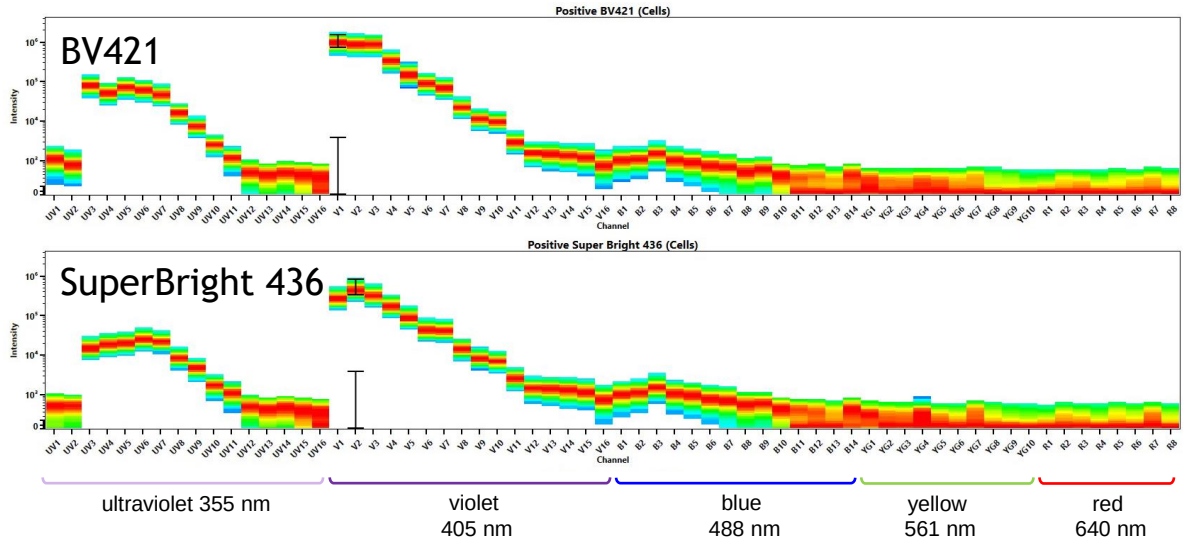
CD2 BV711
CD8 QD705
CD45RA AF488
CD20-biotin streptavidin-QD525

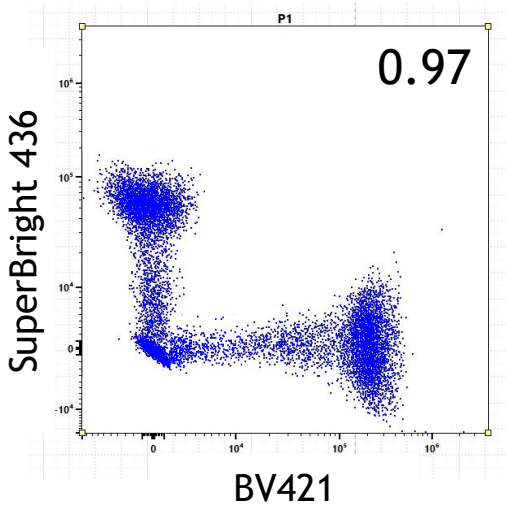
CD3 PECy5
CD4 QD655
HLA-DR PECy7
CD14 QD800

Fluorochromes intentionally chosen for close spectral proximity.

BV421 and SuperBright 436 by spectral cytometry







Cytek Aurora 27 colors

One of our users (Natalia Schneider-Nunez, Chris Kanakry Lab, ETIB-CCR-NCI) is designing a 27-color panel for murine B/T/NK/myeloid cells.

UV

BUV395 CD317
BUV496 CD24
BUV563 F4/80
BUV615 B220
BUV661 CD11b
BUV737 CD45.1
BUV805 CD8

violet

BV421 CD135
PacBlue CD80
BV510 Ter119
and L/D Aqua
BV570 NK1.1
BV605 CD86
BV650 I-A/I-E
BV711 CD172a
BV786 XCR-1

green-yellow

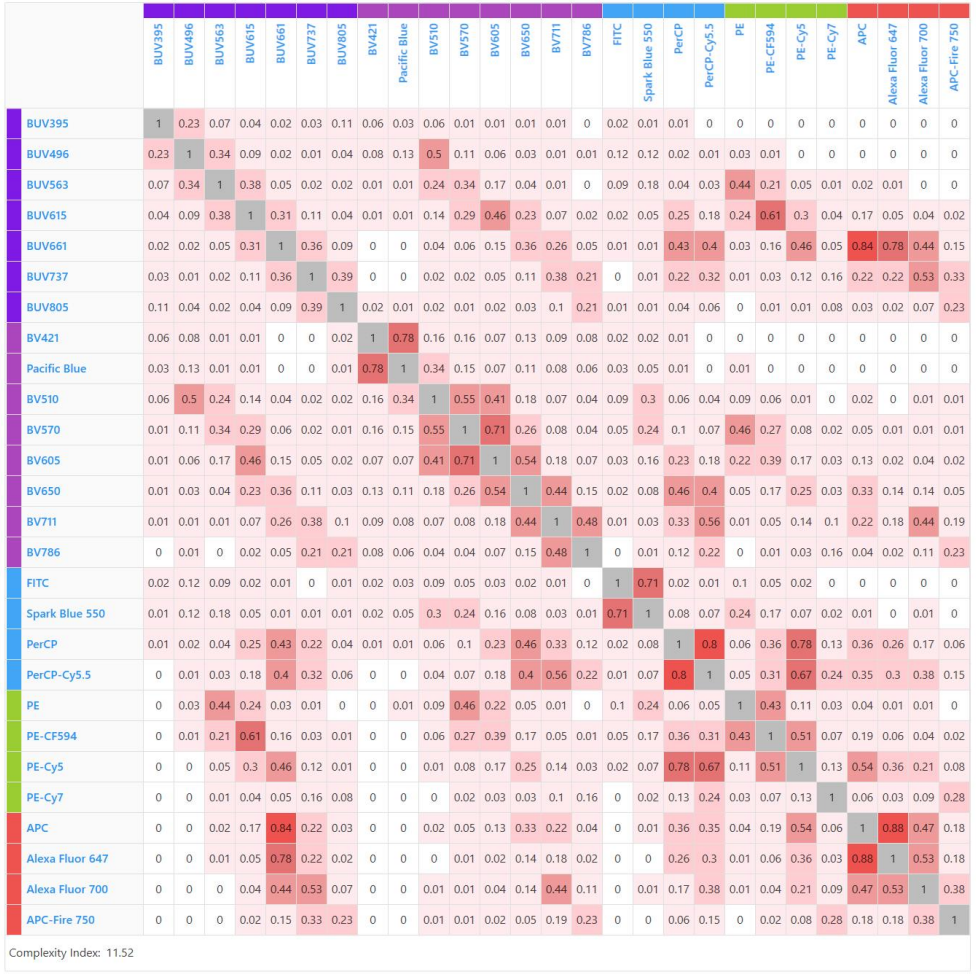
PE CD207
PE-CF594 CD103
PE-Cy5 Thy1.2
PE-Cy7 PD-L1

red

APC CD45.2
AF647 CD1d
AF700 H2Kb
APC-Cy7 CD40

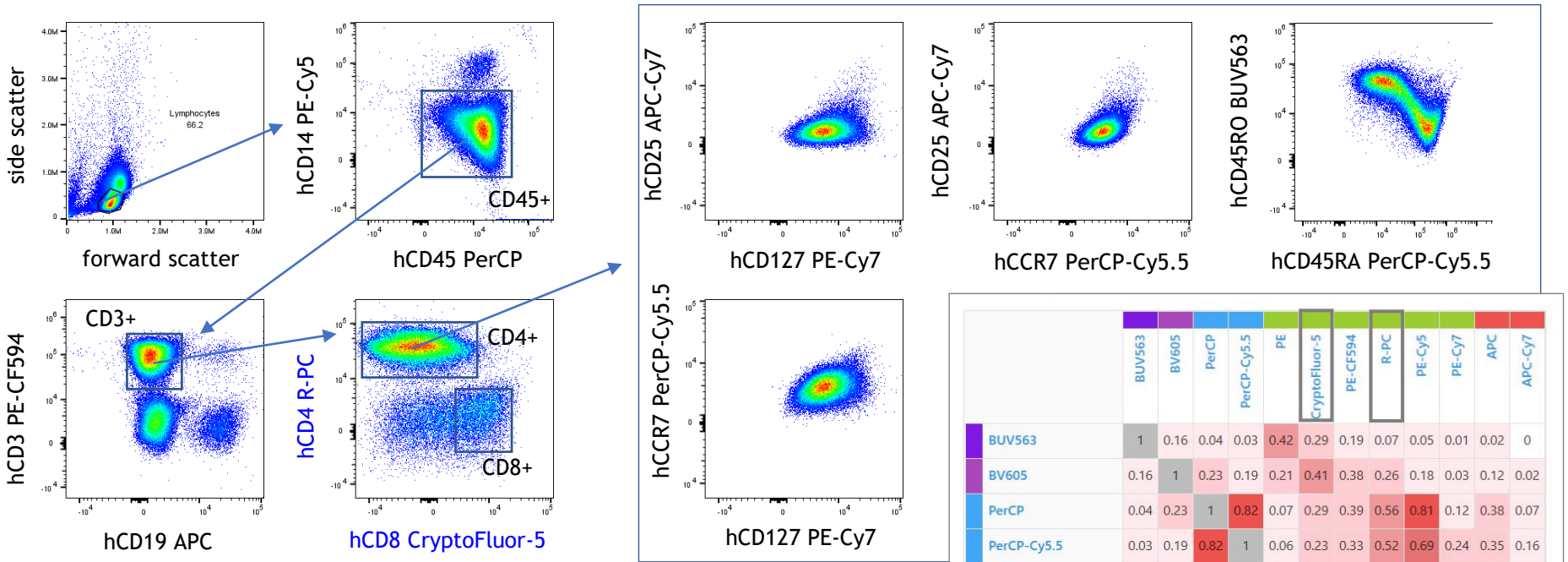
blue

FITC CD11c
SB550 CD4
PerCP Gr-1
PerCP-Cy5.5 CD64



The simple 12 color T regulatory cell panel below (designed not for low spectral overlap but to test fluorochromes spectrally close to CF-5 and R-PC) show that these probes can be reasonably combined with spectrally similar fluorochromes.

CYTO VIRTUAL INTERACTIVE JUNE 7–10 2021



	BUV563	BV605	PerCP	PerCP-Cy5.5	PE	CryptoFluor-5	PE-CF594	R-PC	PE-Cy5	PE-Cy7	APC	APC-Cy7
BUV563	1	0.16	0.04	0.03	0.42	0.29	0.19	0.07	0.05	0.01	0.02	0
BV605	0.16	1	0.23	0.19	0.21	0.41	0.38	0.26	0.18	0.03	0.12	0.02
PerCP	0.04	0.23	1	0.82	0.07	0.29	0.39	0.56	0.81	0.12	0.38	0.07
PerCP-Cy5.5	0.03	0.19	0.82	1	0.06	0.23	0.33	0.52	0.69	0.24	0.35	0.16
PE	0.42	0.21	0.07	0.06	1	0.67	0.42	0.15	0.11	0.03	0.04	0.01
CryptoFluor-5	0.29	0.41	0.29	0.23	0.67	1	0.83	0.53	0.44	0.08	0.21	0.03
PE-CF594	0.19	0.38	0.39	0.33	0.42	0.83	1	0.53	0.52	0.08	0.19	0.02
R-PC	0.07	0.26	0.56	0.52	0.15	0.53	0.53	1	0.85	0.14	0.74	0.15
PE-Cy5	0.05	0.18	0.81	0.69	0.11	0.44	0.52	0.85	1	0.14	0.52	0.09
PE-Cy7	0.01	0.03	0.12	0.24	0.03	0.08	0.08	0.14	0.14	1	0.06	0.3
APC	0.02	0.12	0.38	0.35	0.04	0.21	0.19	0.74	0.52	0.06	1	0.18
APC-Cy7	0	0.02	0.07	0.16	0.01	0.03	0.02	0.15	0.09	0.3	0.18	1

Complexity Index: 11.41

Above. Resting human PBMCs labeled with the 12 indicated antibodies and analyzed on a Cytek Biosciences Aurora. Right. Spectral indices matrix. Complexity index was 11.41.

These results indicate that both CryptoFluor-5 and R-phycocyanin can be used as fluorochromes in high-dimensional labeling panels for spectral cytometry (although conjugation conditions need to be optimized). These PBs can are not tandem dyes, making them potentially more spectrally uniform options.

Telford, DeLonge, Int Veldt, Kapoor, Hawk and Morseman (CYTO 2021)

“New” fluorochromes

Old fluorochromes previously not applicable for flow cytometry are now being reassessed, expanding the “palette” of fluorescent tags for high-dimensional labeling.

Cytometry 44:16–23 (2001)

Original Articles

Cryptomonad Algal Phycobiliproteins as Fluorochromes for Extracellular and Intracellular Antigen Detection by Flow Cytometry

William G. Telford,[1*] Mark W. Moss,[2] John P. Morseman,[2] and F.C. Thomas Allnutt[2]
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[2]Martek Biosciences Corporation, Columbia, Maryland

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R-phycocyanin (R-PC). Isolated from red algae (C-PC from cyanobacteria).
λ_{EX} = *533, 544 nm,* λ_{EM} = *646 nm*

CryptoFluor-5 (CR-PE_{555}, phycoerythrin 555)
Isolated from photosynthetic protozoans *Chroomonas* sp., *Chroomonas ovata*.
λ_{EX} = *566 nm,* λ_{EM} = *598 nm*

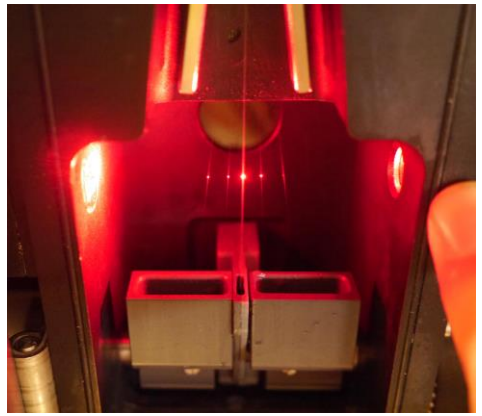
Cytek Biosciences Aurora CS cell sorter

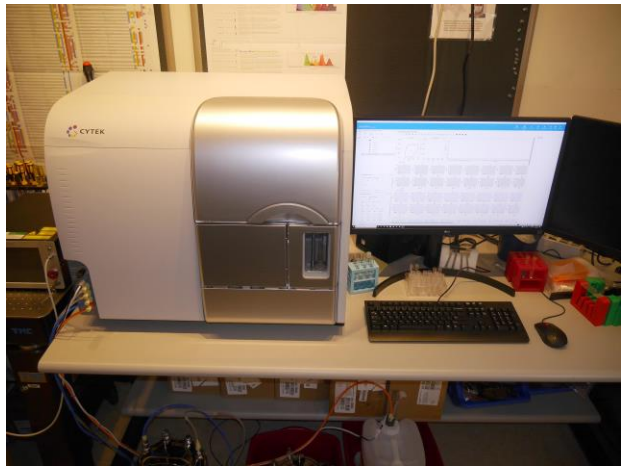
Cell sorting is a major focus of our group. When our users analyze a cell population, they will soon want to sort it! These cells can be put back into culture, analyzed for proteomics, genomics, etc.

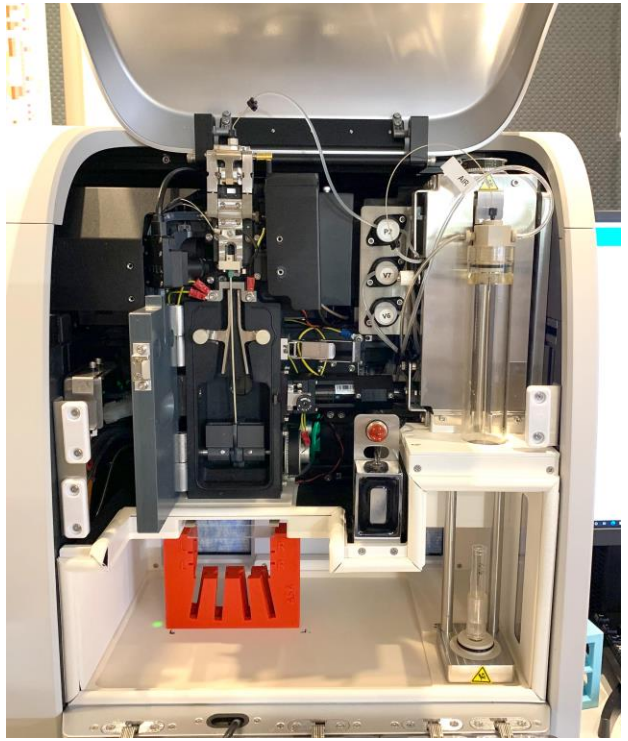
Traditionally, the capabilities of cell sorters lag behind analyzer development. Most manufacturers maximize their analyzer capabilities first, then build their sorters.

The Cytek Aurora CS cell sorter has the same analyzer optical "front end" as the analyzer. (5 lasers, 64 detectors, 40+ color analysis capability, real-time spectral unmixing for sorting).

Once our users have optimized their cell analysis experiments, *they can immediately transfer them to a cell sorter for physical separation.*

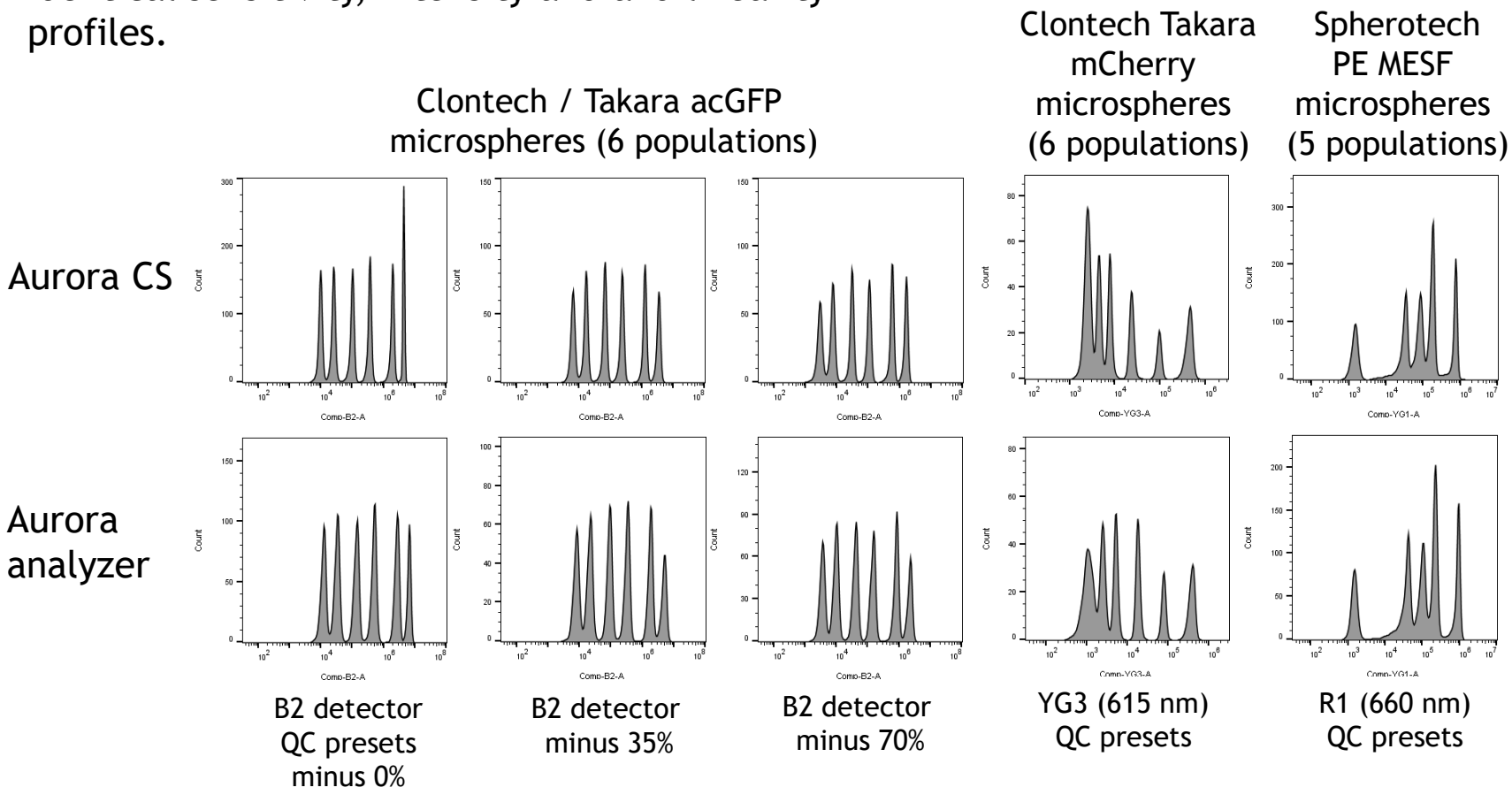




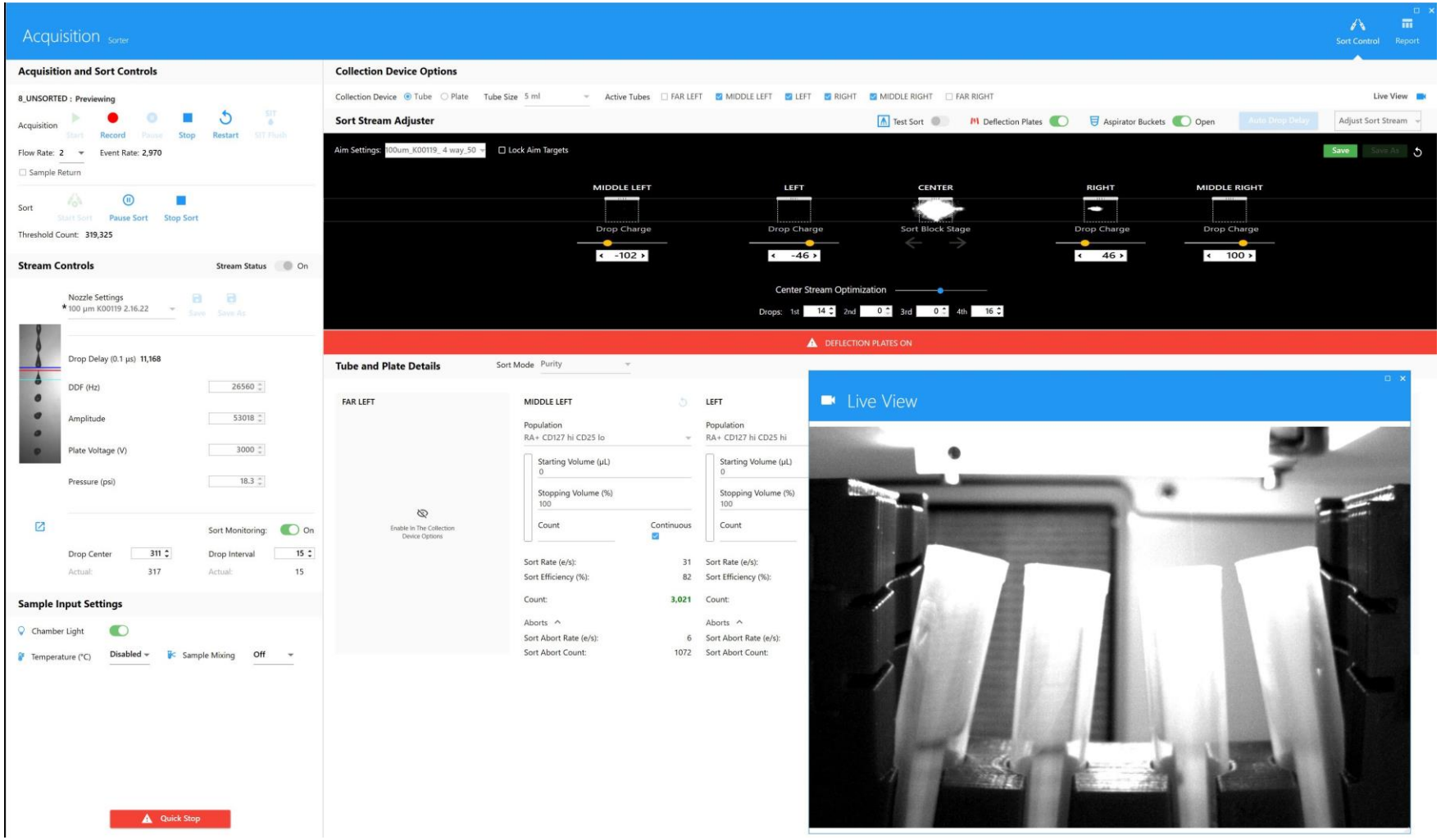


Cytek Biosciences Aurora CS cell sorter

Extensive sensitivity evaluations have shown that the Aurora analyzer and Aurora CS have virtual identical sensitivity, intensity and and linearity profiles.



Cytek Biosciences Aurora CS cell sorter

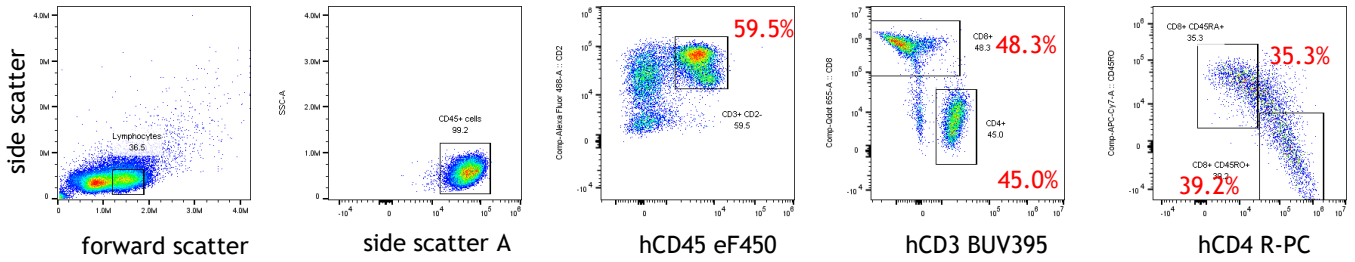


Cytek Biosciences Aurora CS cell sorter

Human PBMCs, 14 color panel (T cell subsets including naïve/memory and Treg)
Sorting for CD4+ and CD8+ populations

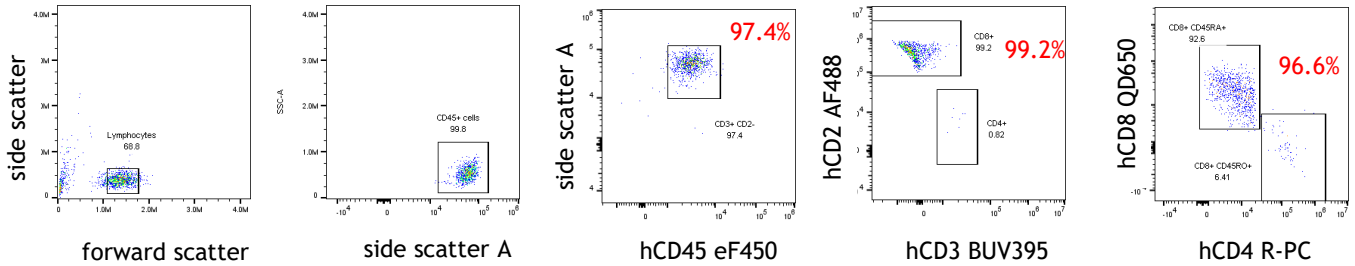
unlabeled
Alexa Fluor 488 hCD2
PE hCD56
R-PC hCD4
PECy7 hCD45RA
APC hCD19
APCCy7 hCD45RO
eF450 hCD45
BV605 hCD20
BV650 hCD25
QD655 CD8
BV711 hCD127
QD800 hCD14
BUV395 hCD3
BUV661 hCCR7

UNSORTED



CD8+ CD45RA+ SORTED

Percentage target population = 2.9%

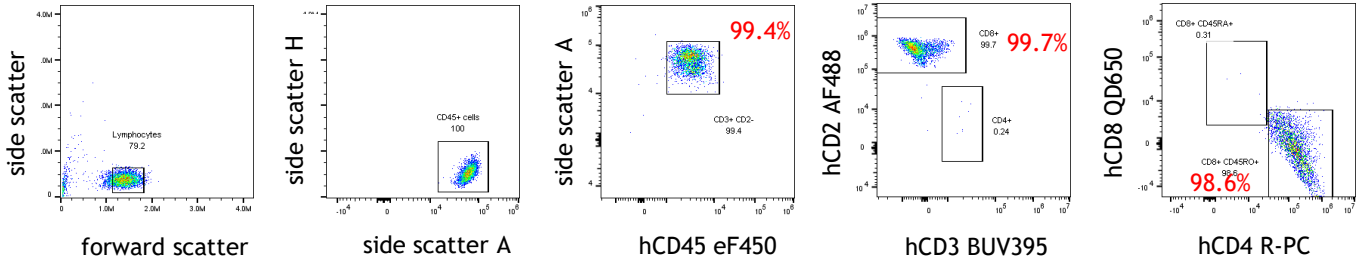


Sort purity = **96.6%**

Actual yield (actual over calculated) = 70.3%

CD8+ CD45RO+ SORTED

Percentage target population = 3.2%



Sort purity = **98.6%**

Actual yield (actual over calculated) = 71.3%

While still being fully optimized, we now have spectral cell sorting capability, a necessity for our group.

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Investor and Analyst Day
High Dimensional Cell Sorting

Kevin Weller, Ohio State University

June 22, 2022

High Dimensional Sorting for Discovery

Kevin P. Weller
Associate Director – PIIO
Co-Director – Flow Cytometry Share Resource
Pelotonia Institute for Immuno-Oncology

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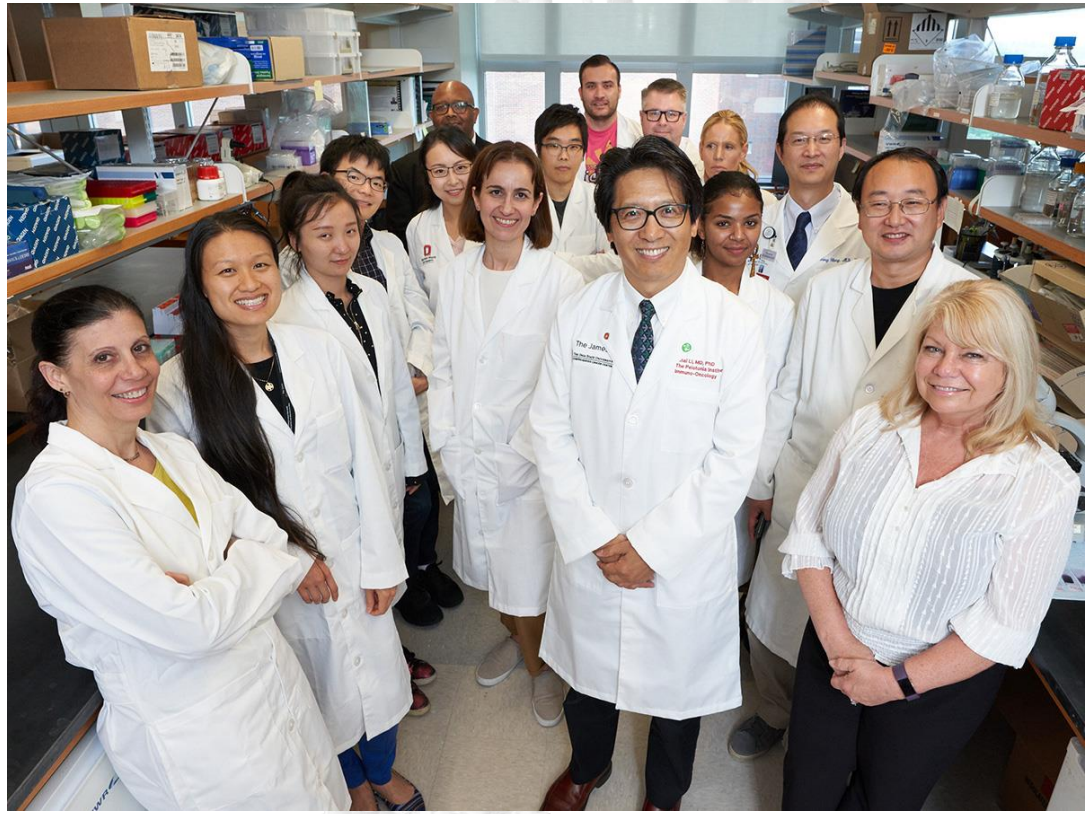
THE OHIO STATE UNIVERSITY
COMPREHENSIVE CANCER CENTER

Our Mission - PIIO

A comprehensive bench-to-clinical-trial research initiative that will accelerate advanced immunotherapies that harness the immune system to fight cancer

Founded in April 2019 with a starting donation of $102 million



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The IMDP is a key part of the bench

- Build a leading immune monitoring platform for supporting IO research from discovery to translation, using state-of-the-art technology, robust informatics, strong expertise and exceptional customer service
- A Shared Resource to provide IO researchers with the best laboratory equipment for discovery and immune monitoring
- As much of a 360 degree view of the immune system as we can provide

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The PIIO was built for this

- The PIIO has over 100 members with broad specialization
- Emphasis on bioinformatics, the first IO Database is already accruing
- We are planning large experiments with teams (5-10) investigators with different interests and expertise
- Currently optimized high dimensional (35+ biomarkers) panels are being customized based experimental goals
- Get as much information from precious patient samples as possible

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New Opportunities

- Previous generations of sorting equipment were limited by biomarker numbers (10-15)
- Other high dimensional platforms limited:
  - Mass Cytometry – cell destruction
  - FACS – not yet reaching stated potential (25-30 commonly reported)
- Current high dimensional panels are translating well to the CS sorting platform
- Constructing a discovery pipeline…

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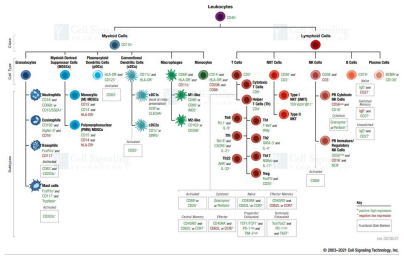
What would you do?

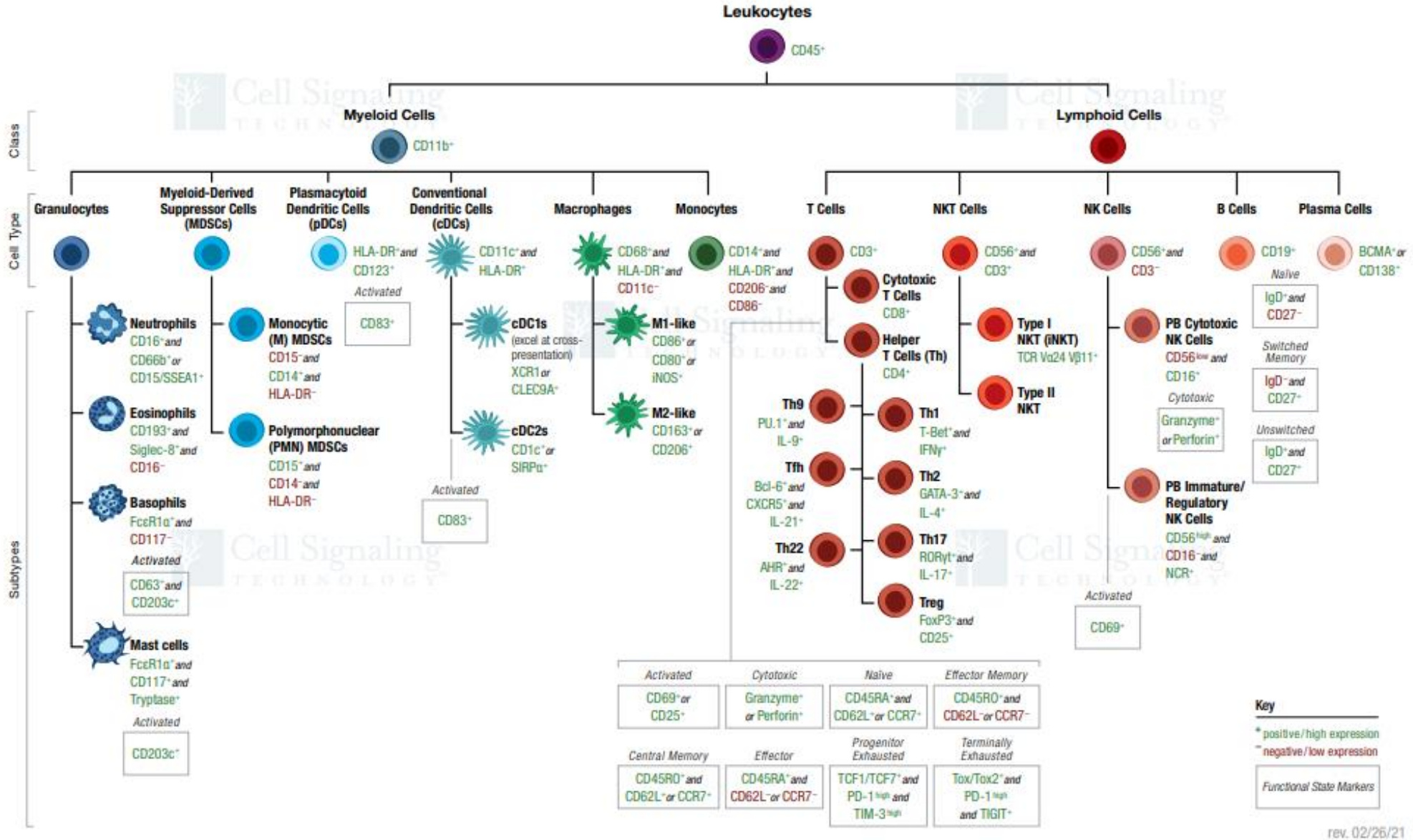
Let’s do everything

Single Cells/Team Science

Tumor/Blood/Tissue

Process and sort

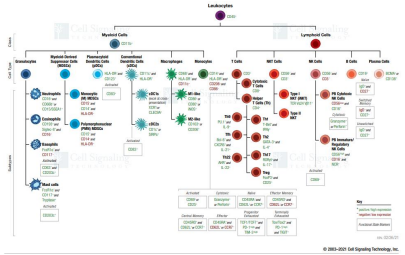




Single Cells/Team Science

Tumor/Blood/Tissue

Process and sort



Single Cell Genomics

Single Cell Proteomics

Single Cell Functional Screening

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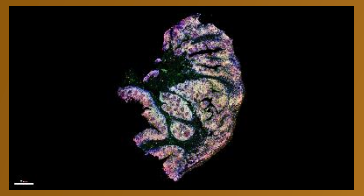
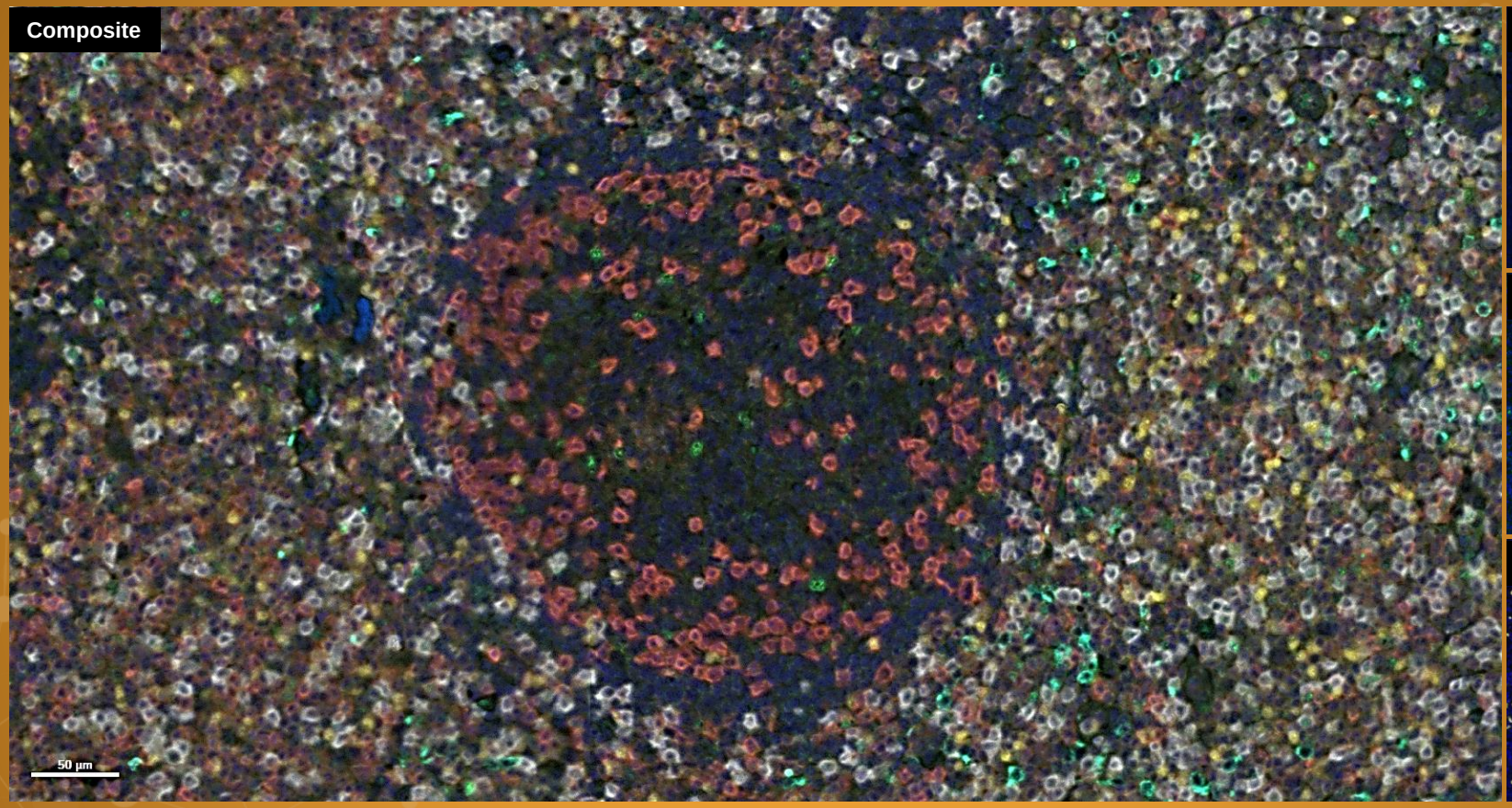
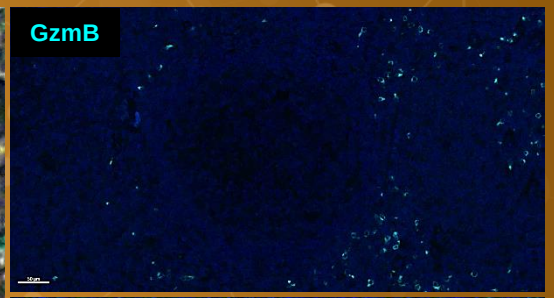
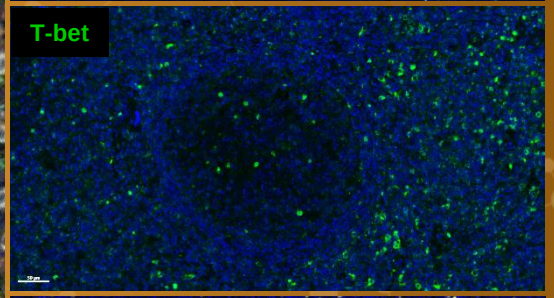
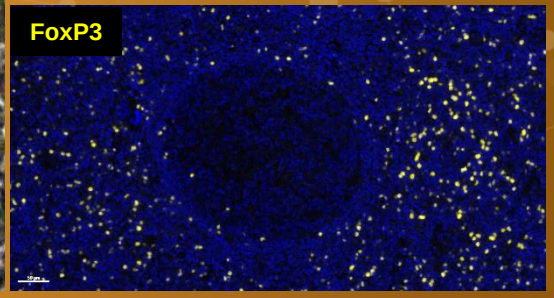
Combine with Spatial information

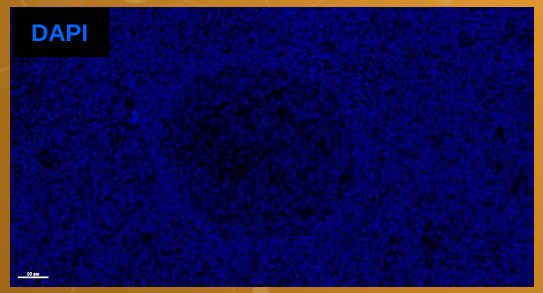


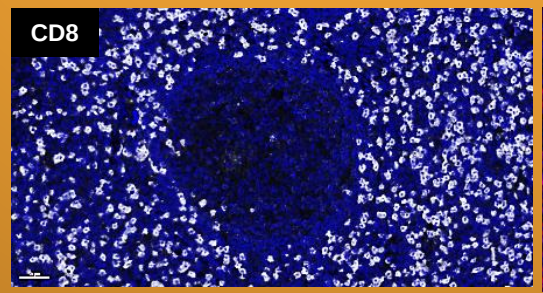


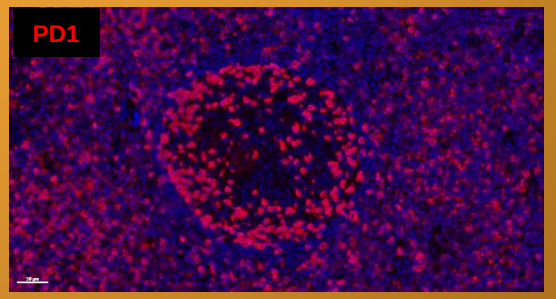


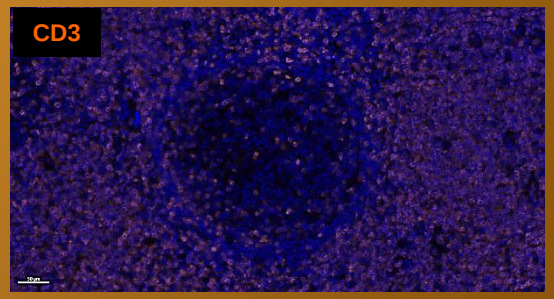




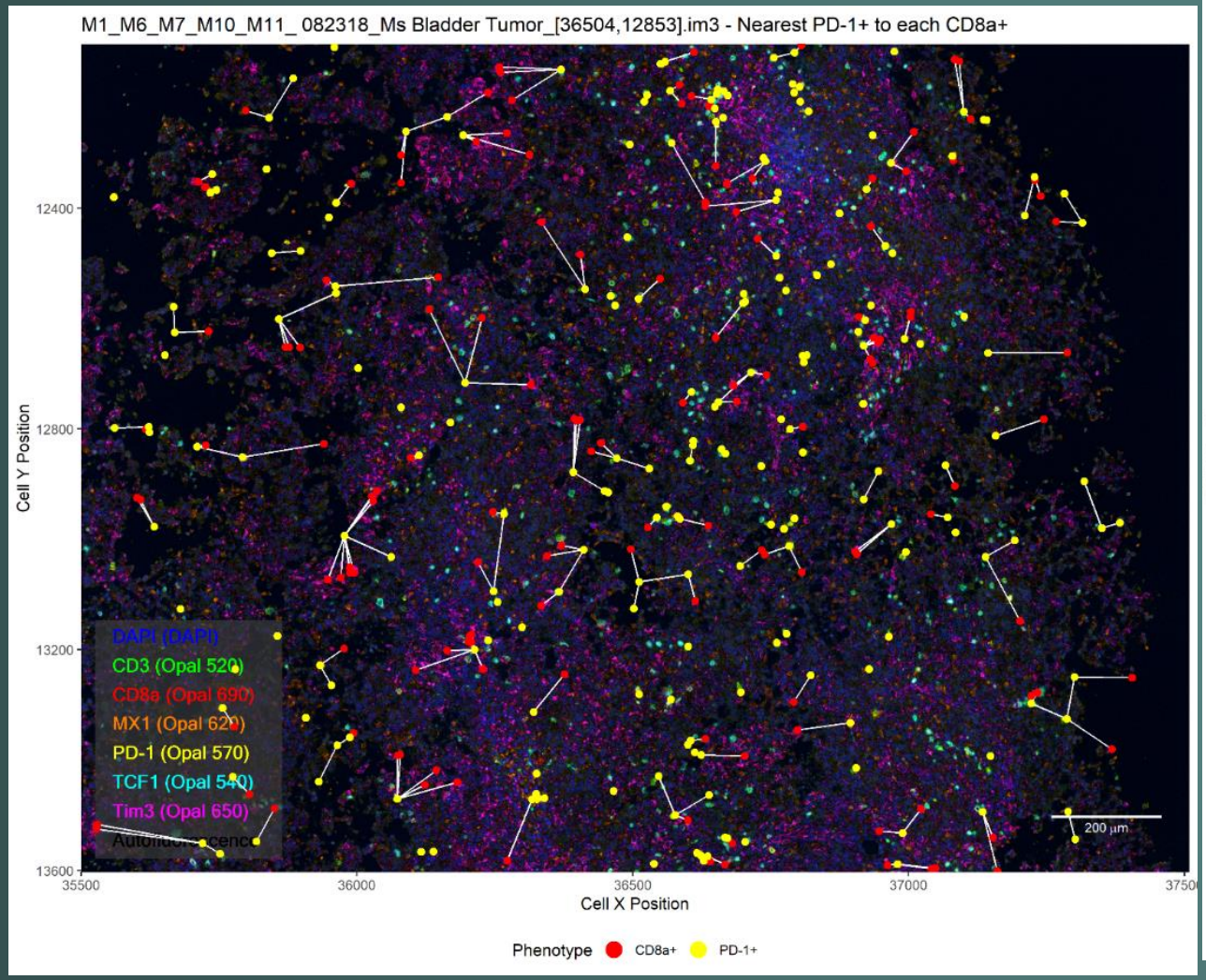


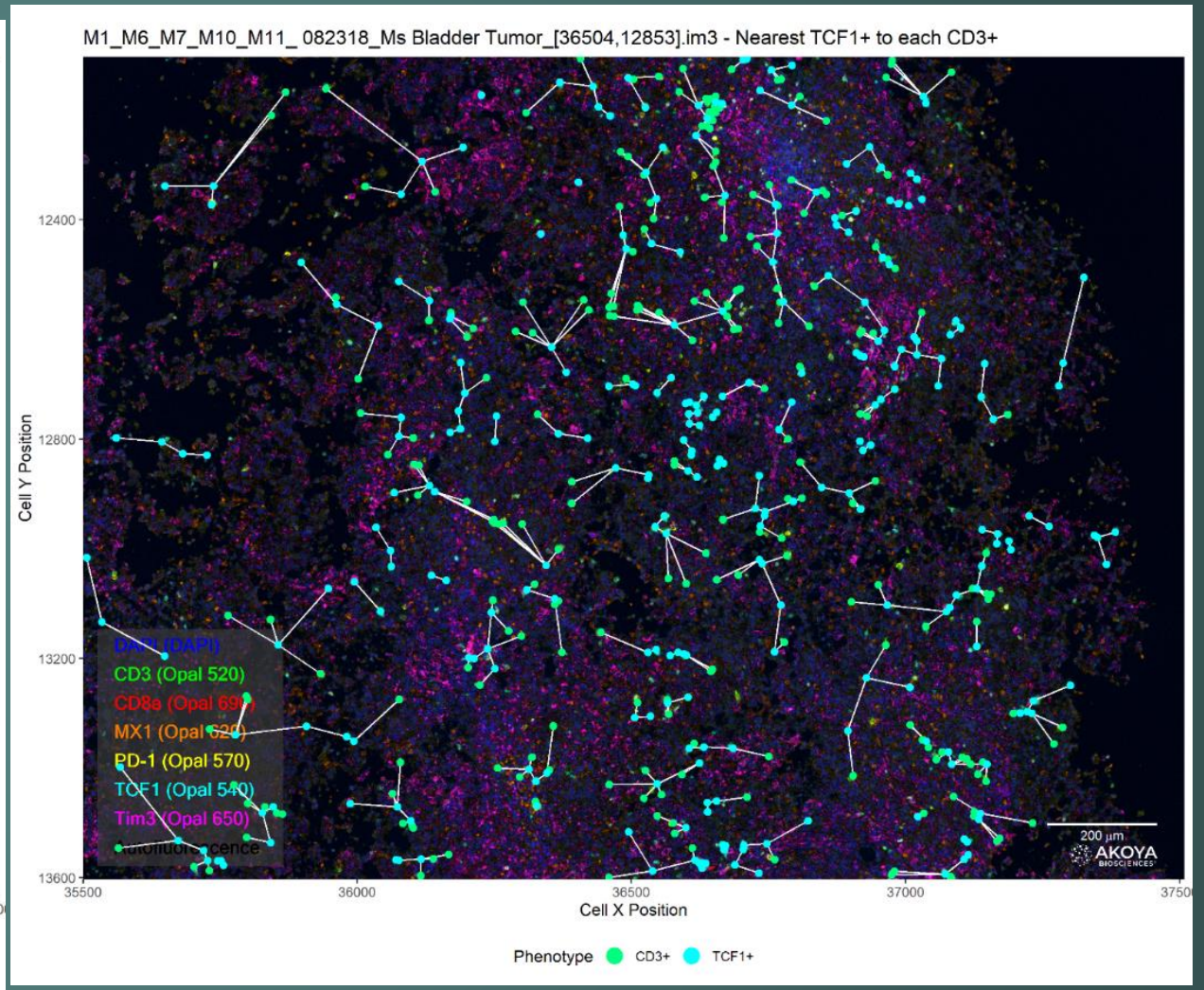






Examples of spatial maps for a given pair of biomarkers





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Single Cells/Team Science

- The experiments are designed and funded by multiple labs thereby distribution the costs
- Very costly becomes relatively affordable
- Each sorted cell population is selected for a specific expert on the project based on their interest
- Multiple publications and or single high-impact publications each experiment
- Every data set gets added to a mineable database
- New downstream technologies will be added as they are developed
- Unused cells can be banked

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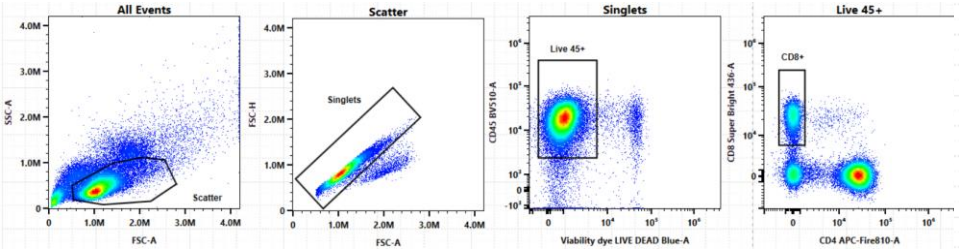
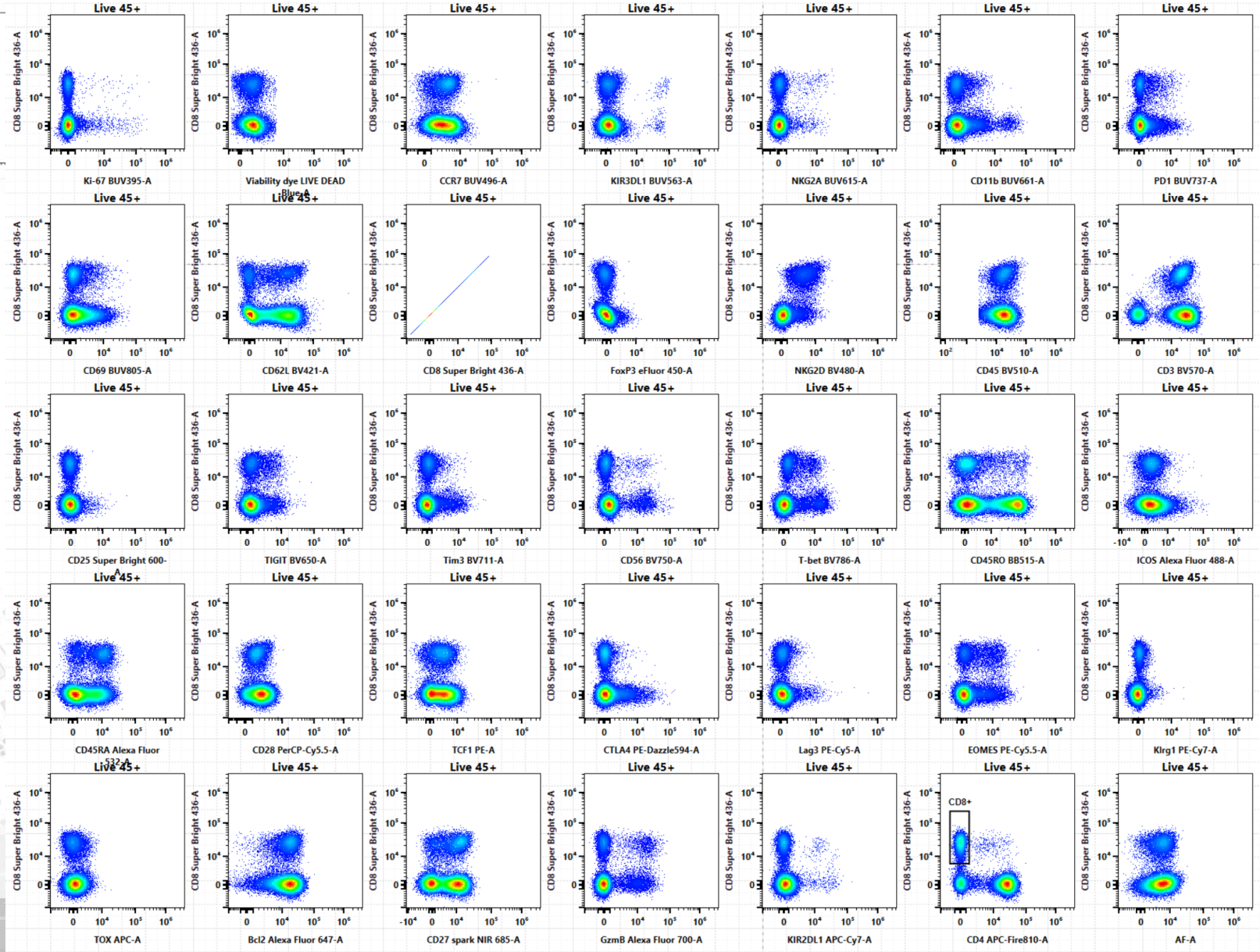
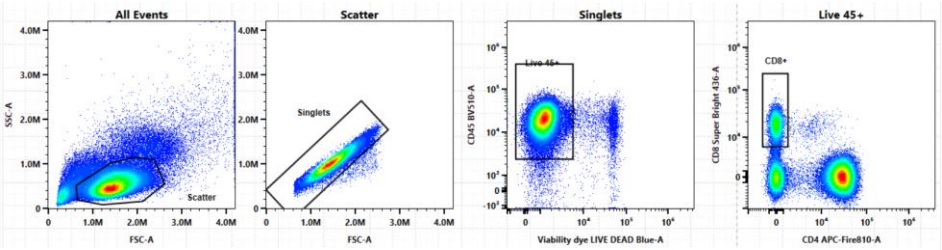
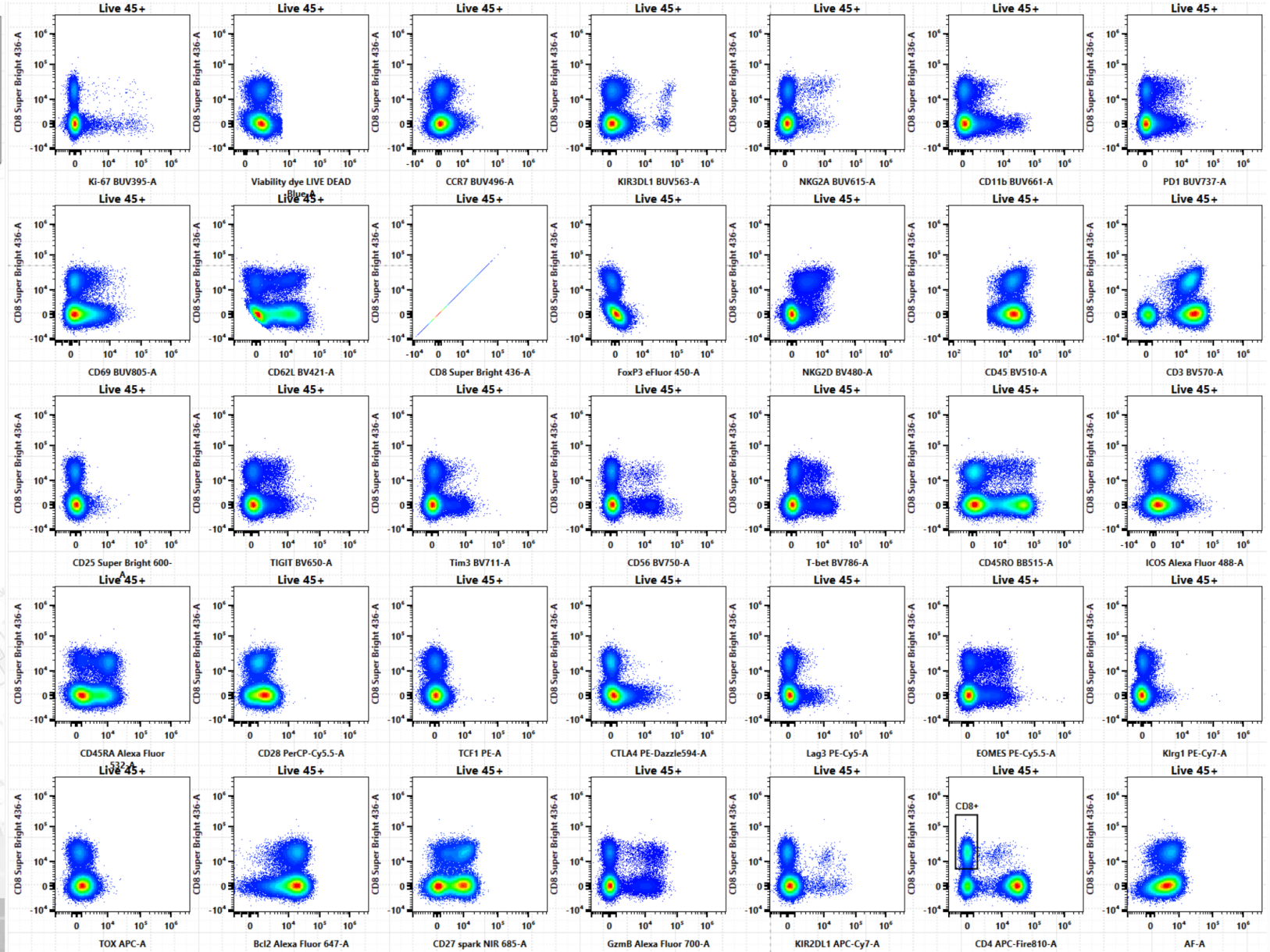
Healthy Donor 3 on Aurora – Y0245



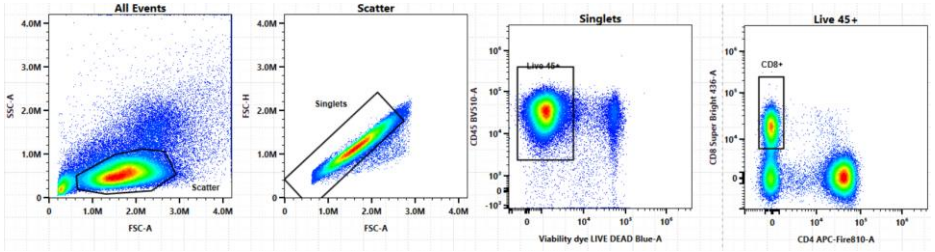


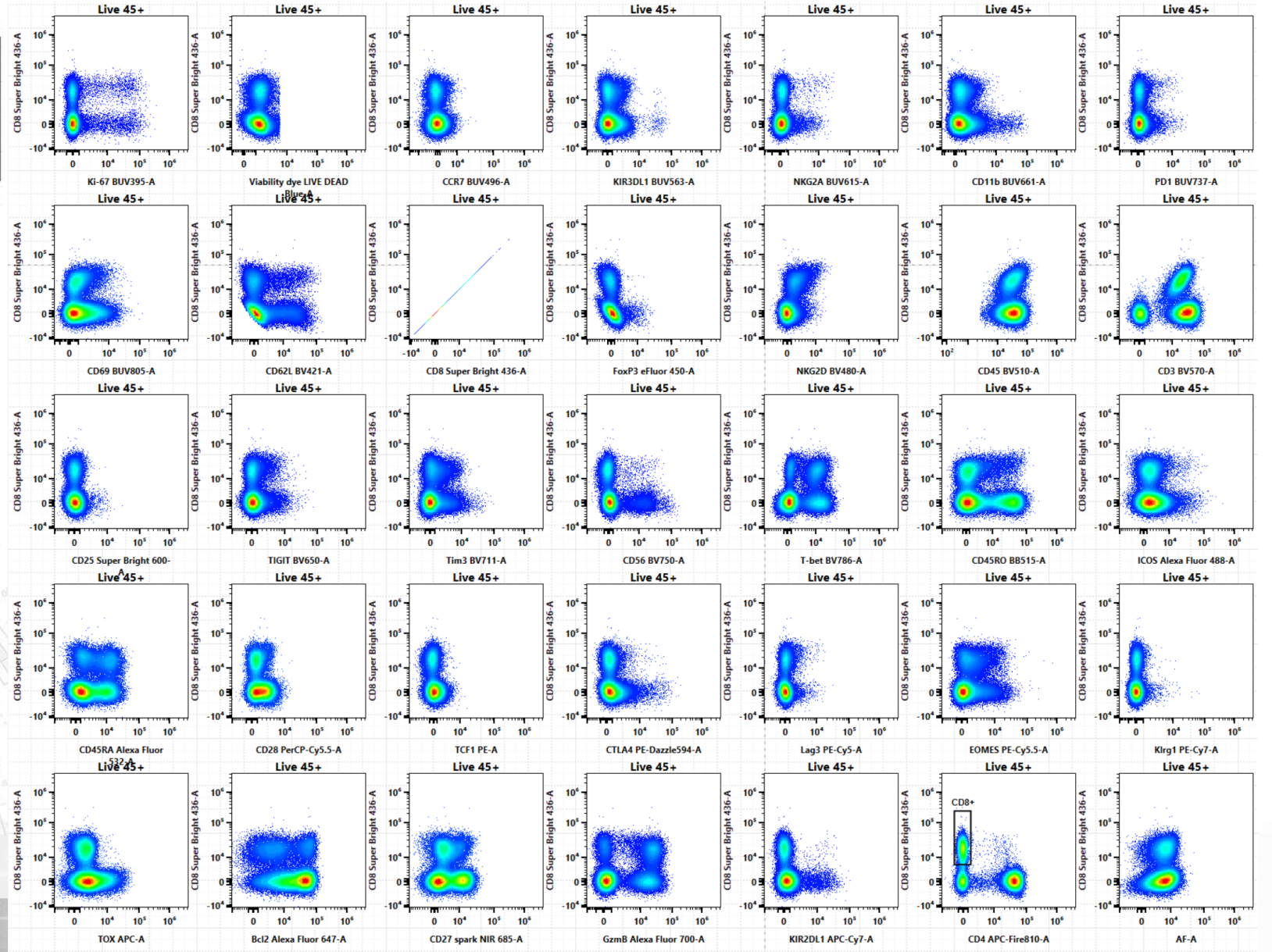
Healthy Donor 3 on Aurora CS – S0108



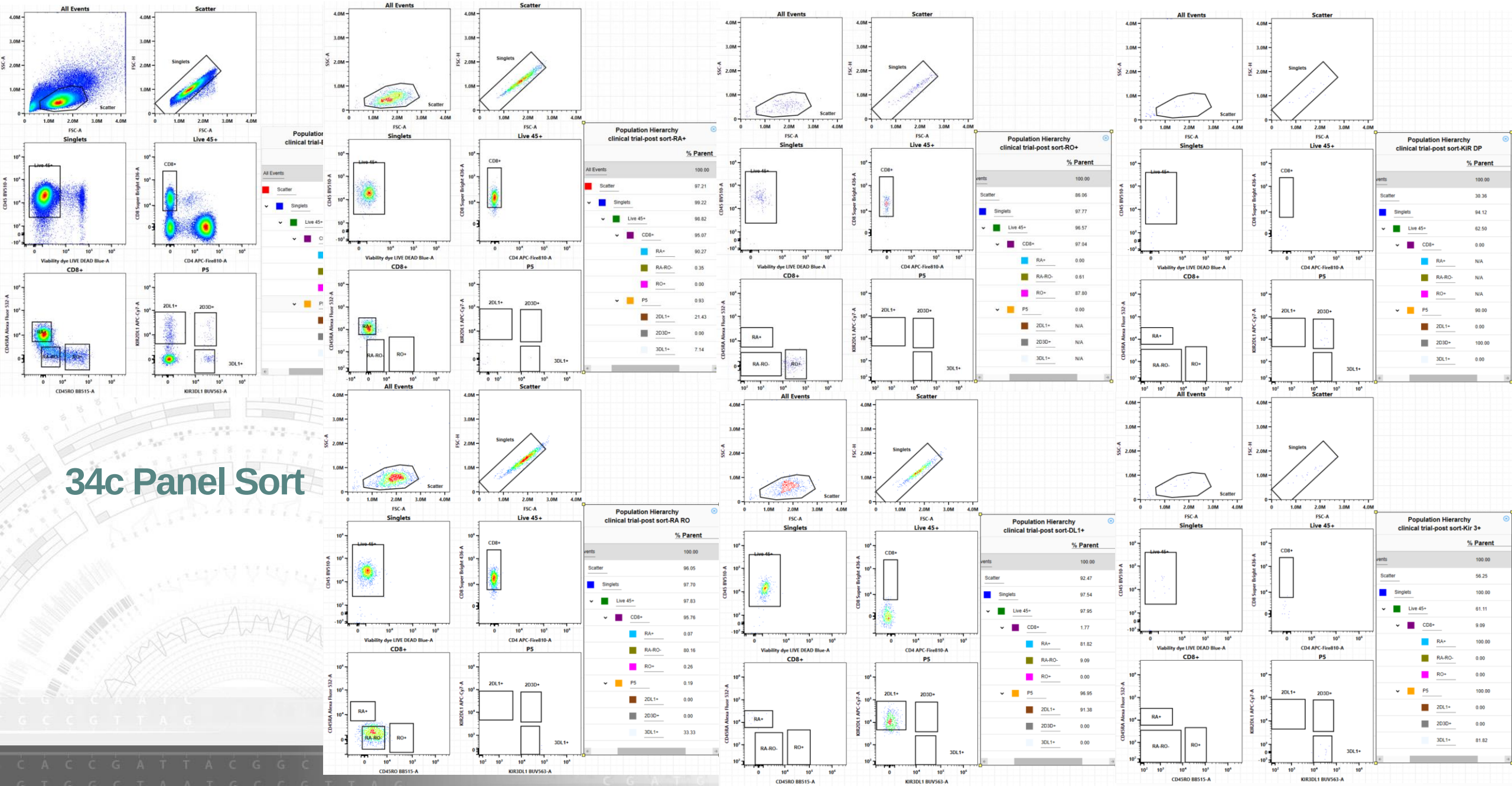


Aurora CS Data from ‘Patient 1’





34c Panel Sort



Thanks!

https://www.pelotonia.org/profile/KW0281

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Investor and Analyst Day

Aurora Empowering Immunological Research

Dr. Anna Belkina, Boston University

June 22, 2022

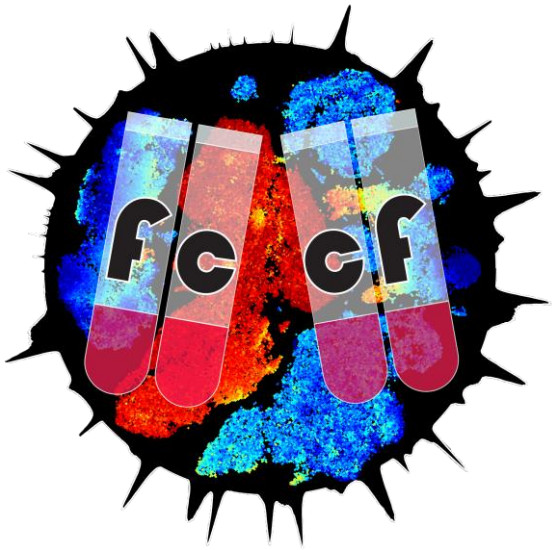
Full spectrum cell analysis reveals novel immune phenotypes in health and disease

Anna C. Belkina, M.D., Ph.D.

BOSTON UNIVERSITY

Assistant Professor
Department of Pathology
Boston University School of Medicine

Director
Flow Cytometry Core Facility



Introduction

- Assistant Professor of Pathology and Laboratory Medicine at Boston University School of Medicine

  My work is focused on chronic inflammatory processes in the context of variety of conditions:

  - HIV
  - Diabetes/obesity
  - Aging and ‘inflammaging’

  Bioinformatic approaches to study single cell data

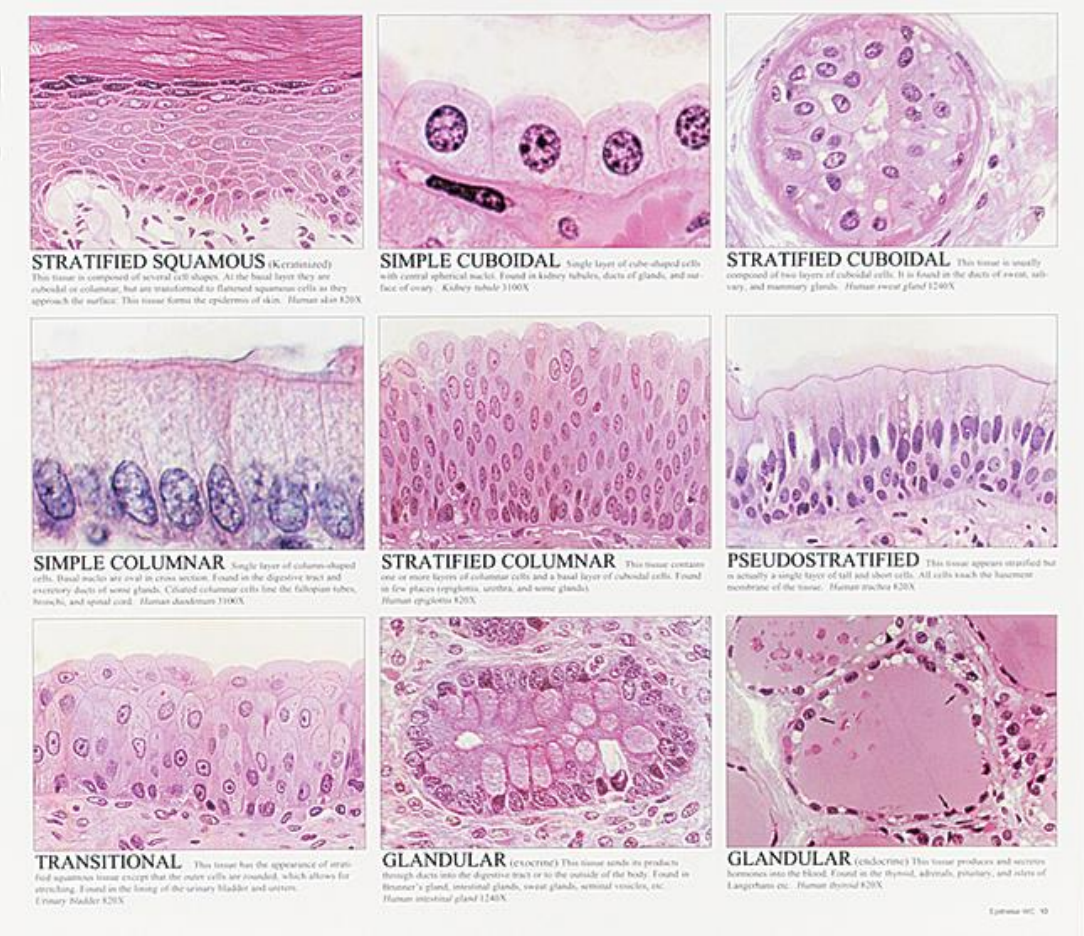
  - Visualization of flow cytometry data structure
  - Multivariate analyses of mixed datasets

- Director of the Flow Cytometry Core Facility

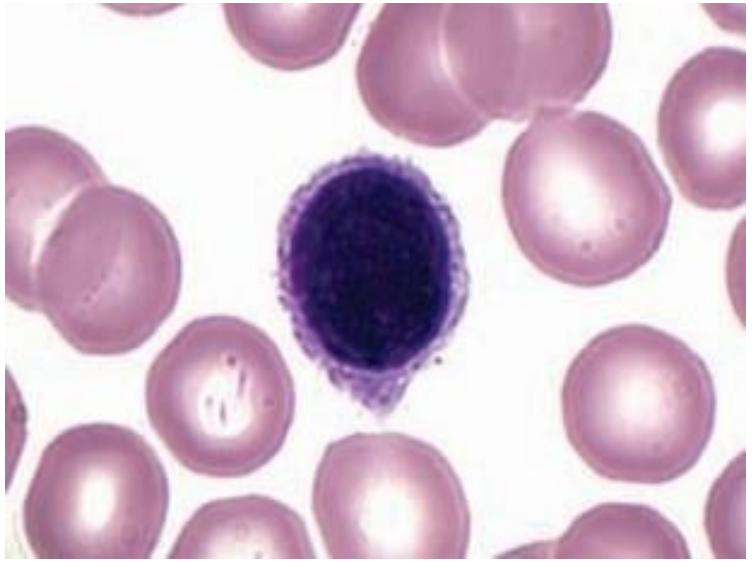
  Multiple instruments including 5L Cytek Aurora (spectral applications)

Immune system is known to be incredibly complex, but you would never suspect that if you look at the immune cells under the microscope...

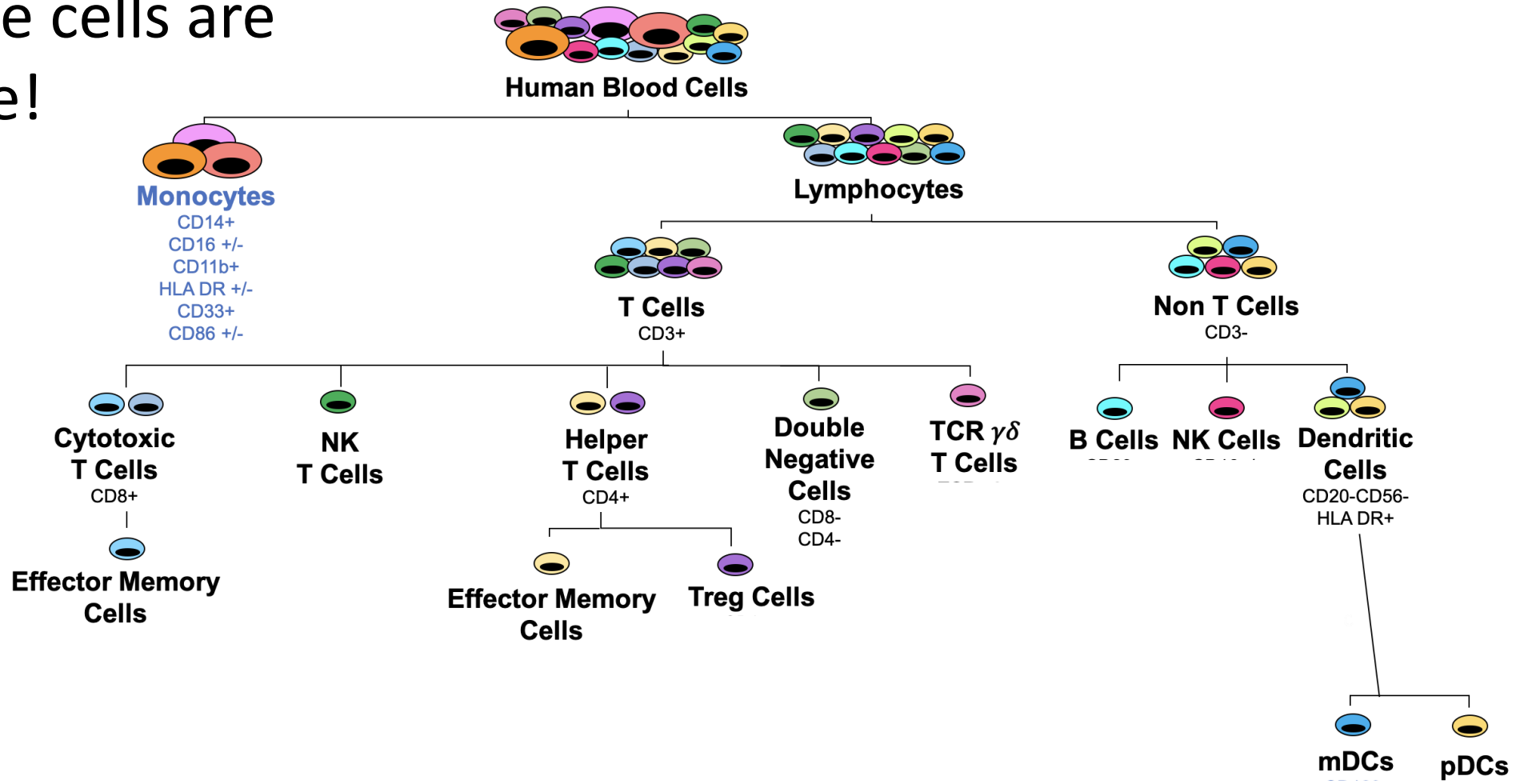
Epithelial tissues



Lymphocyte



However, immune cells are extremely diverse!

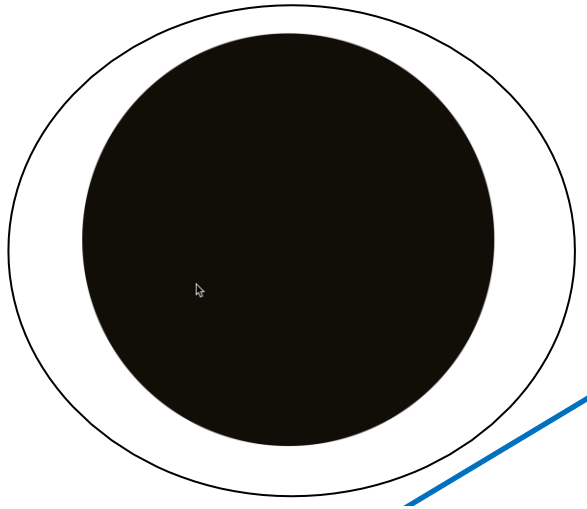


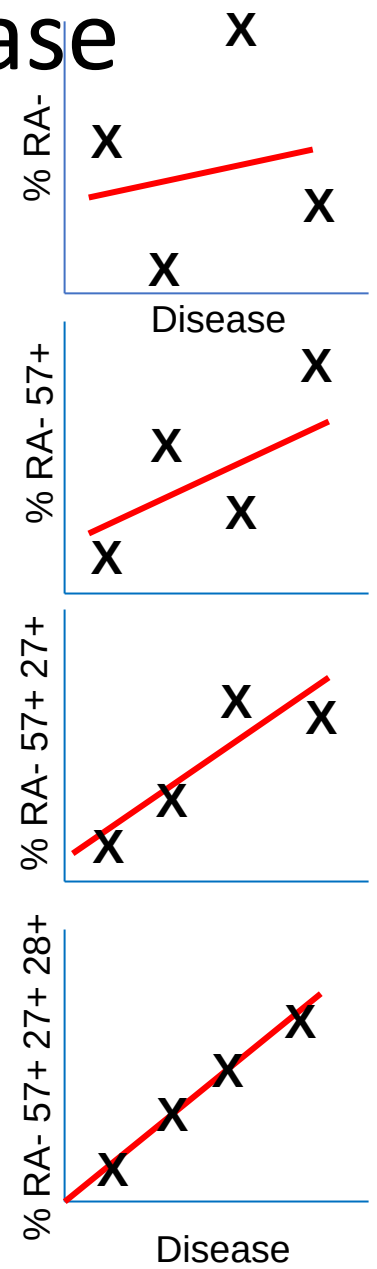
Protein 'fingerprints' that define diverse types and functions of immune cells

Multiparameter measurements allow us to detect the exact ‘fingerprint’ that correlates with disease

Immune feature:

- with no correlation
- with weak correlation
- with strong correlation to outcome.



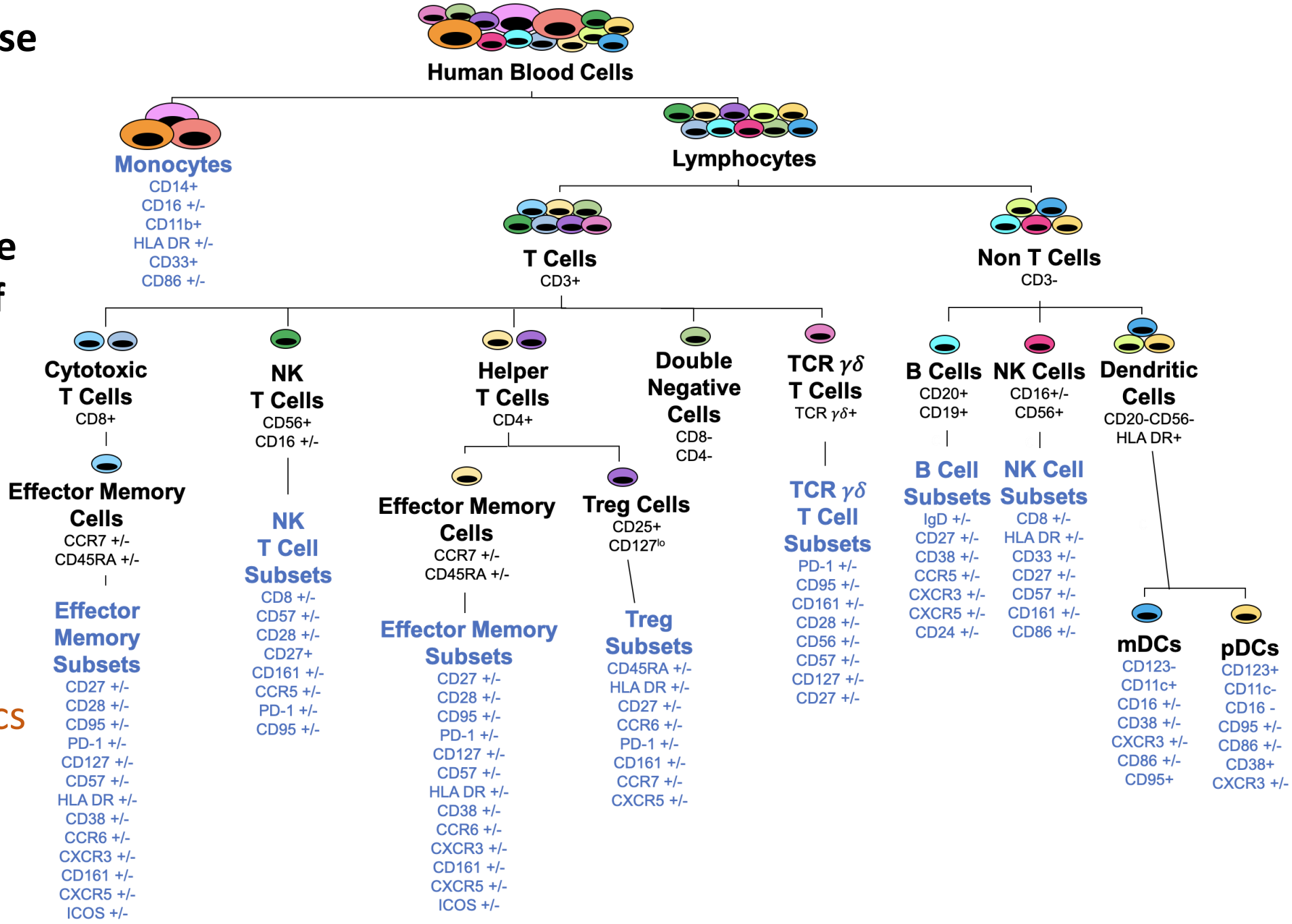


We need to assay these proteins in a single measurement

+

identify and measure other biomarkers of disease

- For basic and translational research
- For clinical trials
- For clinical diagnostics



HIV: a problem even when virus is undetectable

Despite successful viral suppression via anti-retroviral therapy, HIV+ individuals have an elevated risk of Serious Non-AIDS (SNA) events:

- cardiovascular atherosclerosis
- neurocognitive degeneration
- diabetes mellitus
- cancer
- osteoporosis
- liver (cirrhosis)
- frailty
- pneumonia

Diseases associated with normal aging

SNAs afflict older HIV+ individuals at higher rates than the age-matched general population

AIDS Patient Care STDS, 2013. 27(1): p. 5-16.

SNAs occur at younger ages in HIV+ vs uninfected controls

Clin Infect Dis, 2011. 53(11): p. 1120-6.

Do HIV+ individuals age earlier or differently?

Whether HIV causes SNAs through the same mechanism(s) as normal aging or through other processes is unclear...

Our Previous Work Implicate **γδ** T cells as Inflammatory Driver in HIV, Aging

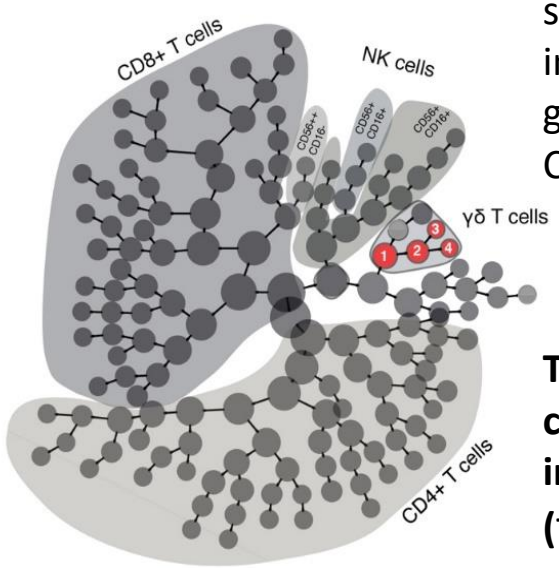
Multivariate Computational Analysis of Gamma Delta T Cell Inhibitory Receptor Signatures Reveals the Divergence of Healthy and ART-Suppressed HIV+ Aging

Anna C. Belkina[1,2], Alina Starchenko[3], Katherine A. Drake[4], Elizabeth A. Proctor[3], Riley M. F. Pihl[1], Alex Olson[5], Douglas A. Lauffenburger[3], Nina Lin[5†] and Jennifer E. Snyder-Cappione[1,6*†]

16-color immunophenotyping (PBMCs)
OMIP-037 (Belkina et al, 2017)

16 markers of inflammation in plasma

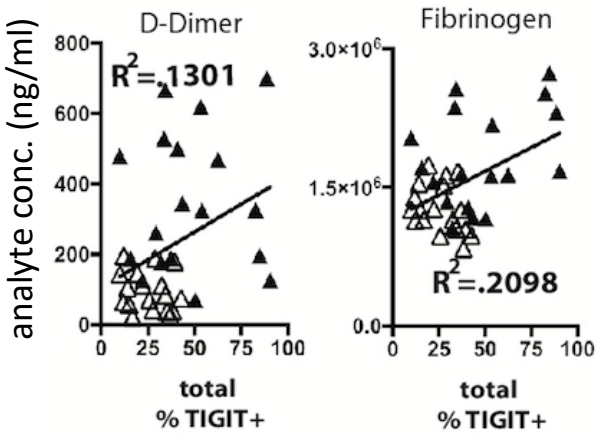
CITRUS algorithm:
TIGIT

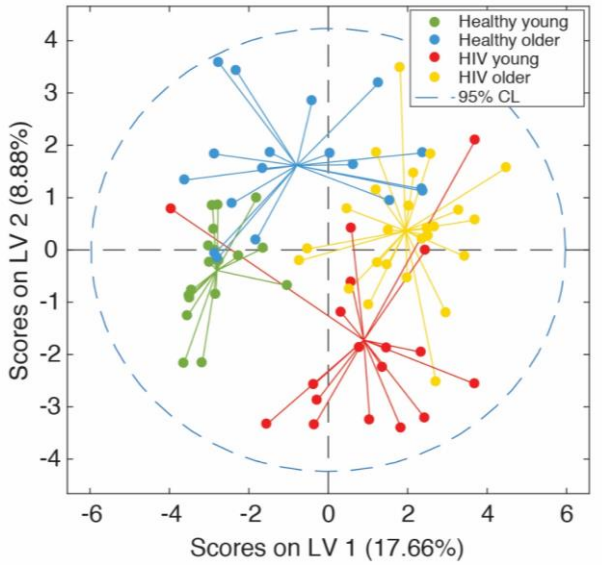


TIGIT on γδ T cells stratified subjects into HIV+ vs HIV- groups with 89% CV accuracy

TIGIT: druggable checkpoint inhibitor (tiragolumab)

% TIGIT+ γδ T cells tracked with plasma inflammatory markers



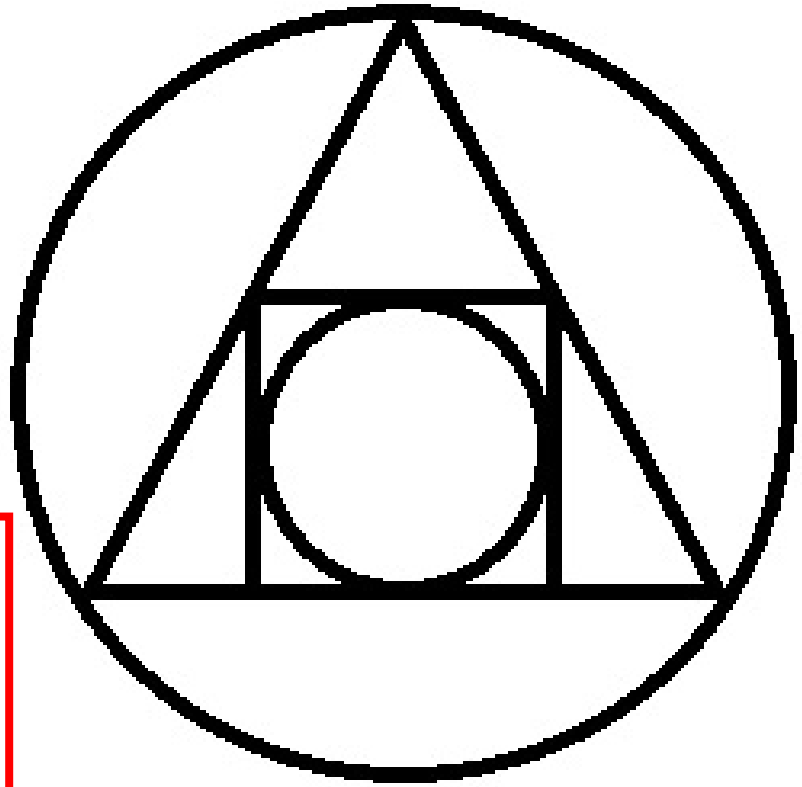


IR signatures on γδ T cells and plasma markers stratify 4 groups of subjects in a PLS-DA multivatriate model

Multiparameter analysis of immune cells

Reagents

to distinguish multiple analytes simultaneously



We switched to CYTEK spectral platform to generate larger datasets with better signal resolution

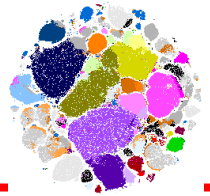
Instrumentation

to detect multiple reagents

We use CYTEK spectral unmixing with integrated signal standardization + our own algorithmic tools

Data analysis tools

to evaluate the results



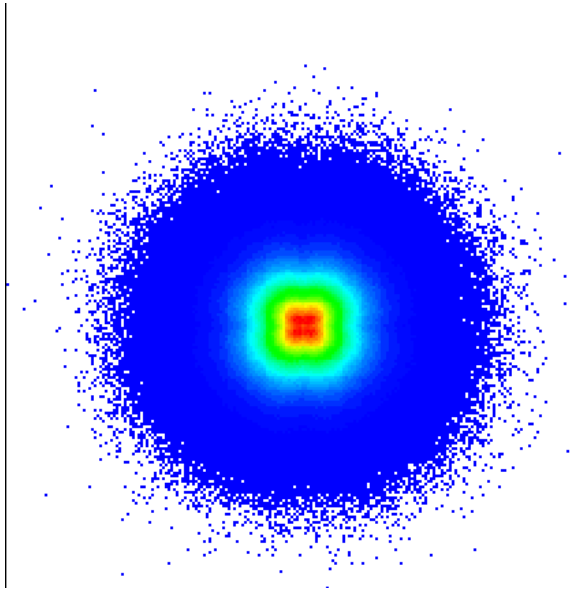
opt-SNE algorithm enables high quality visualization of **mega-scale** datasets and serves as our staple tool for high parameter data analysis

nature COMMUNICATIONS

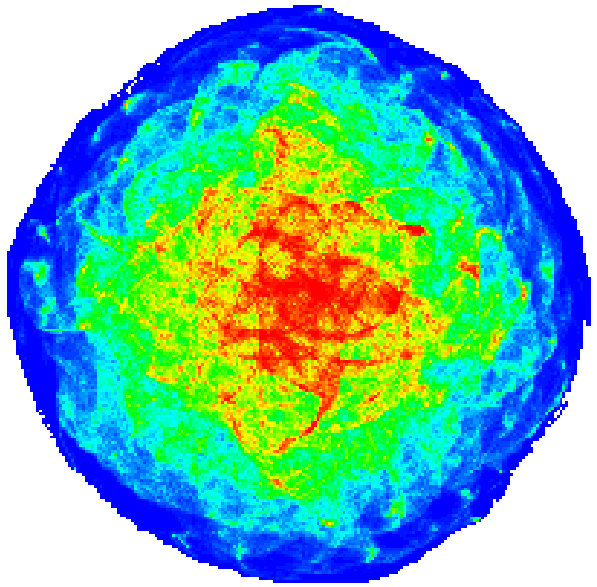
Automated optimized parameters for t-distributed stochastic neighbor embedding improve visualization and allow analysis of large datasets

Anna C. Belkina, Christopher O. Ciccolella, Rina Anno, Richard Halpert, Josef Spidlen, Jennifer E. Snyder-Cappione

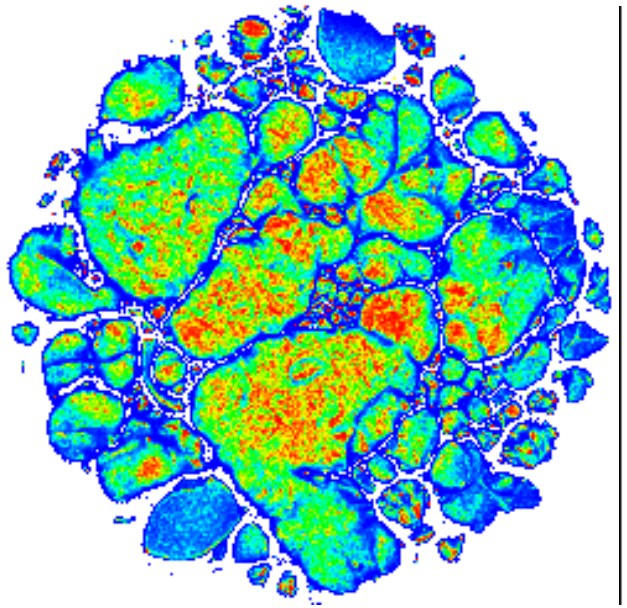
"Standard" t-SNE

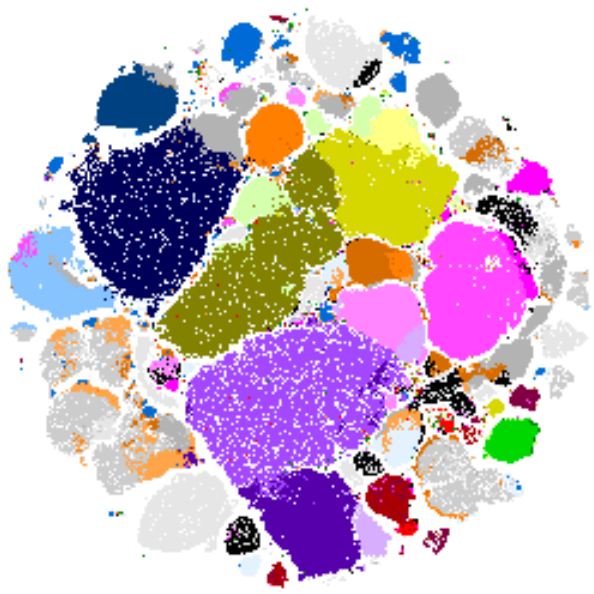


't-SNE for large data'



opt-SNE algorithm

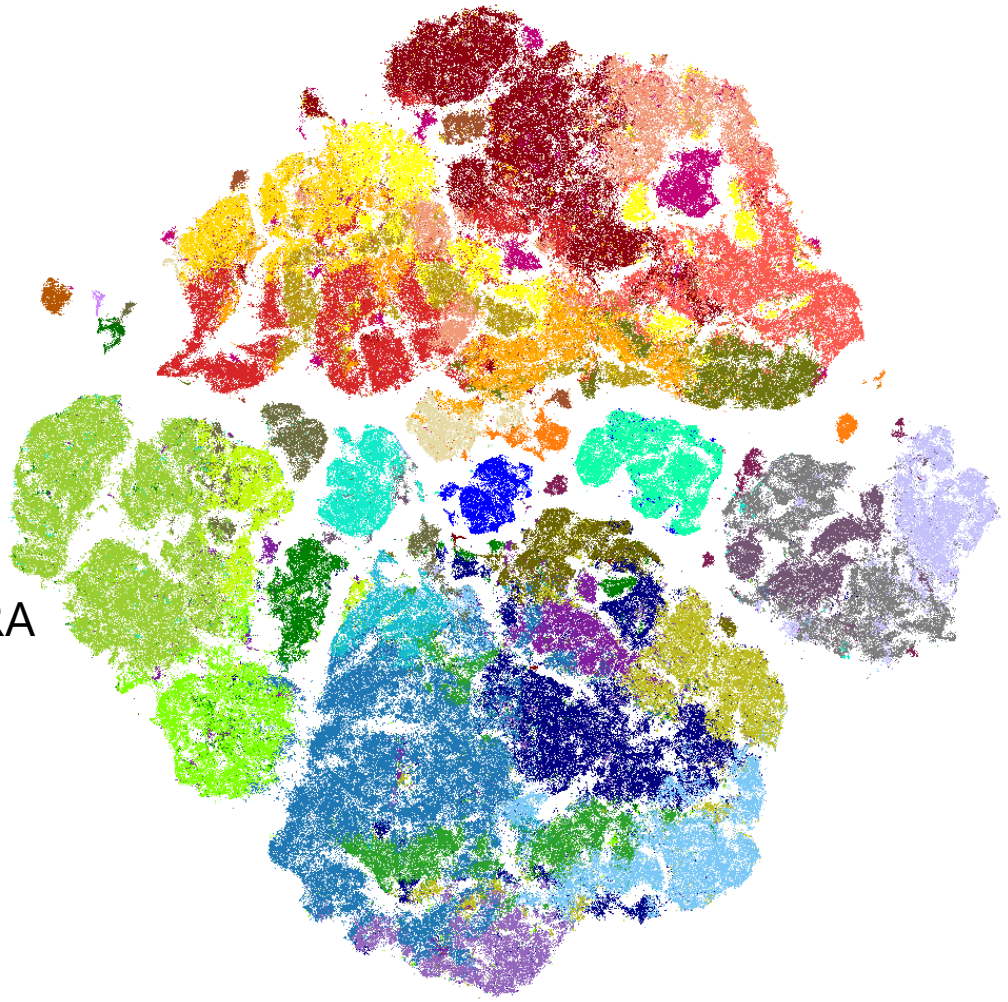




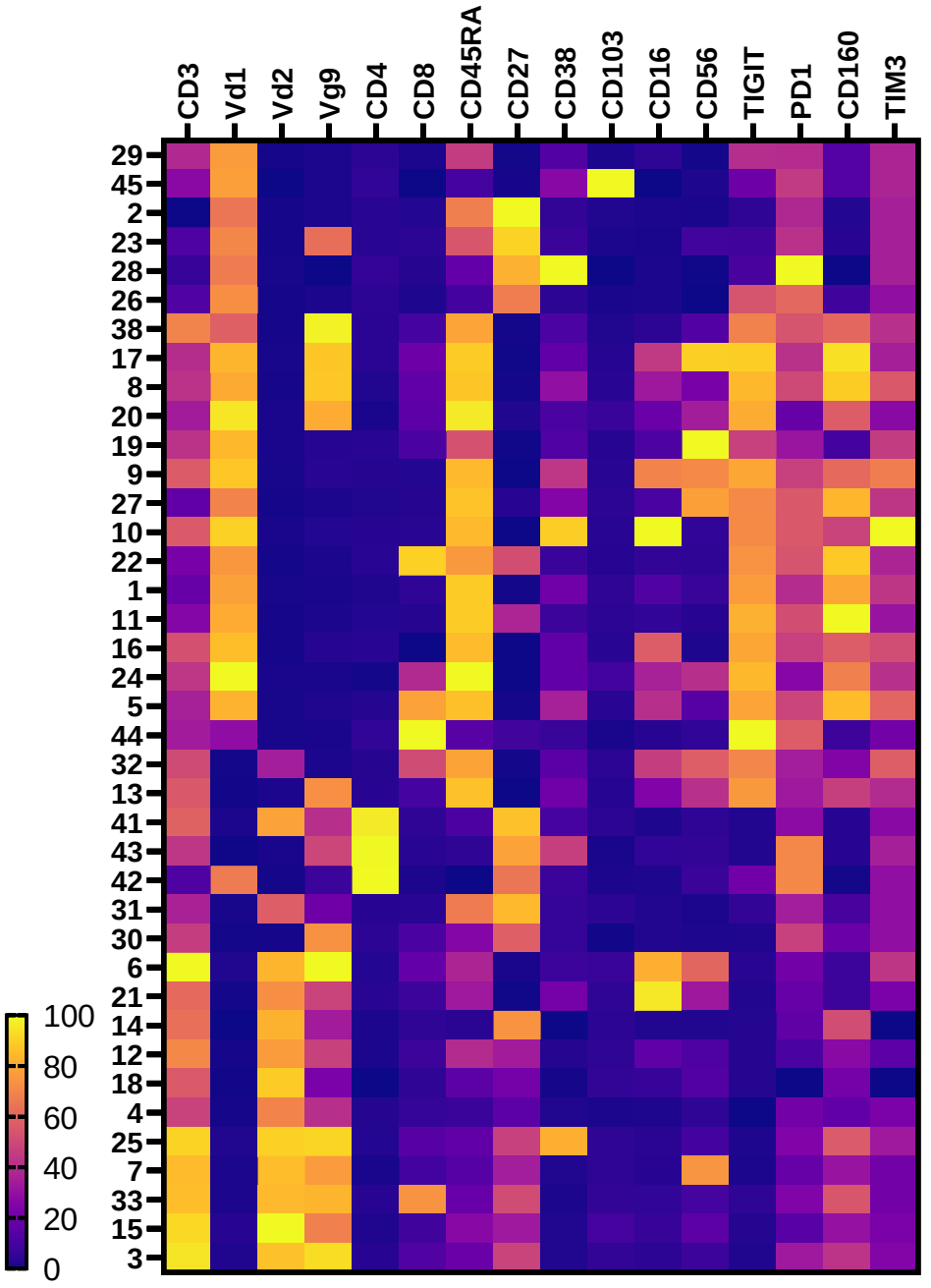
Spectral analysis reveals dramatic diversity of γδ T cells in HIV, Aging

opt-SNE algorithm integrates the spectral data

Vδ1
Vδ2
Vγ9
CD3
CD4
CD8
CD27
CD16
CD56
CD45RA
CD38
CD160
CD103
TIM-3
TIGIT
PD-1



γδ T cell data from 96 subjects contain
40 distinct clusters / subtypes



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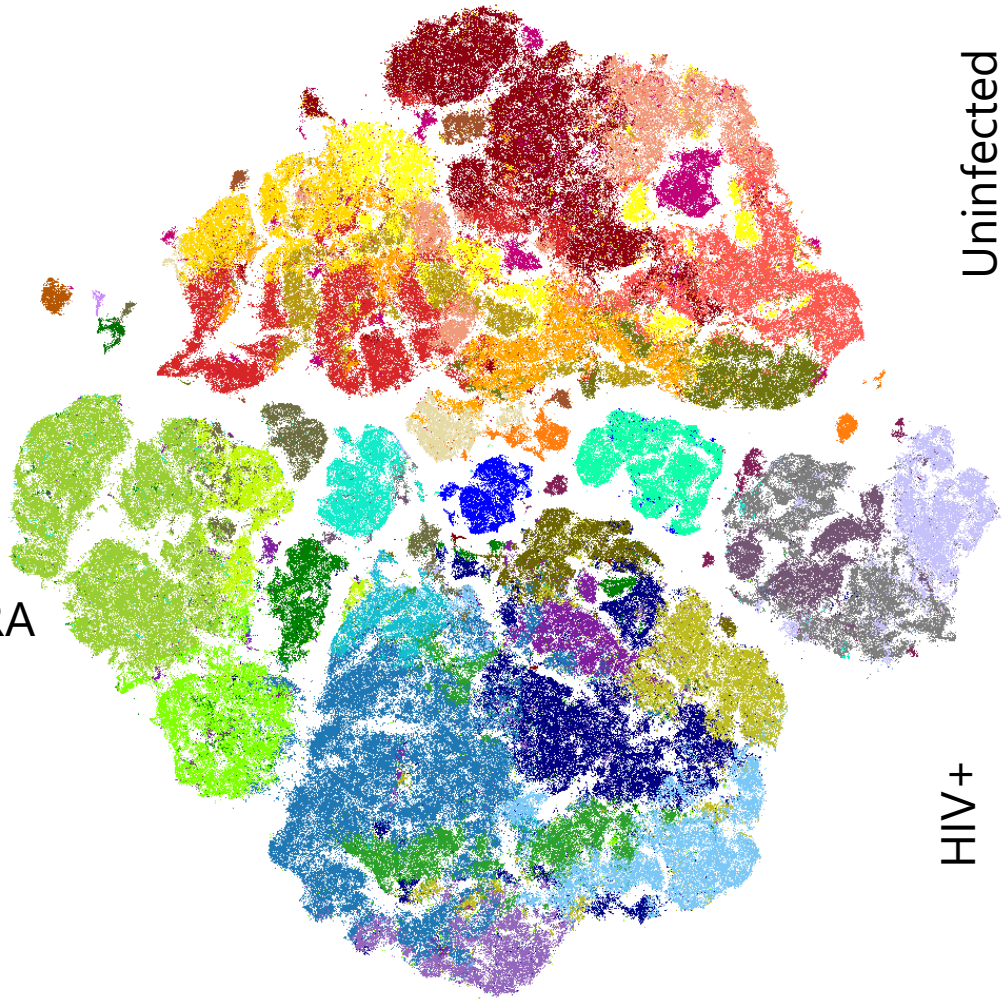

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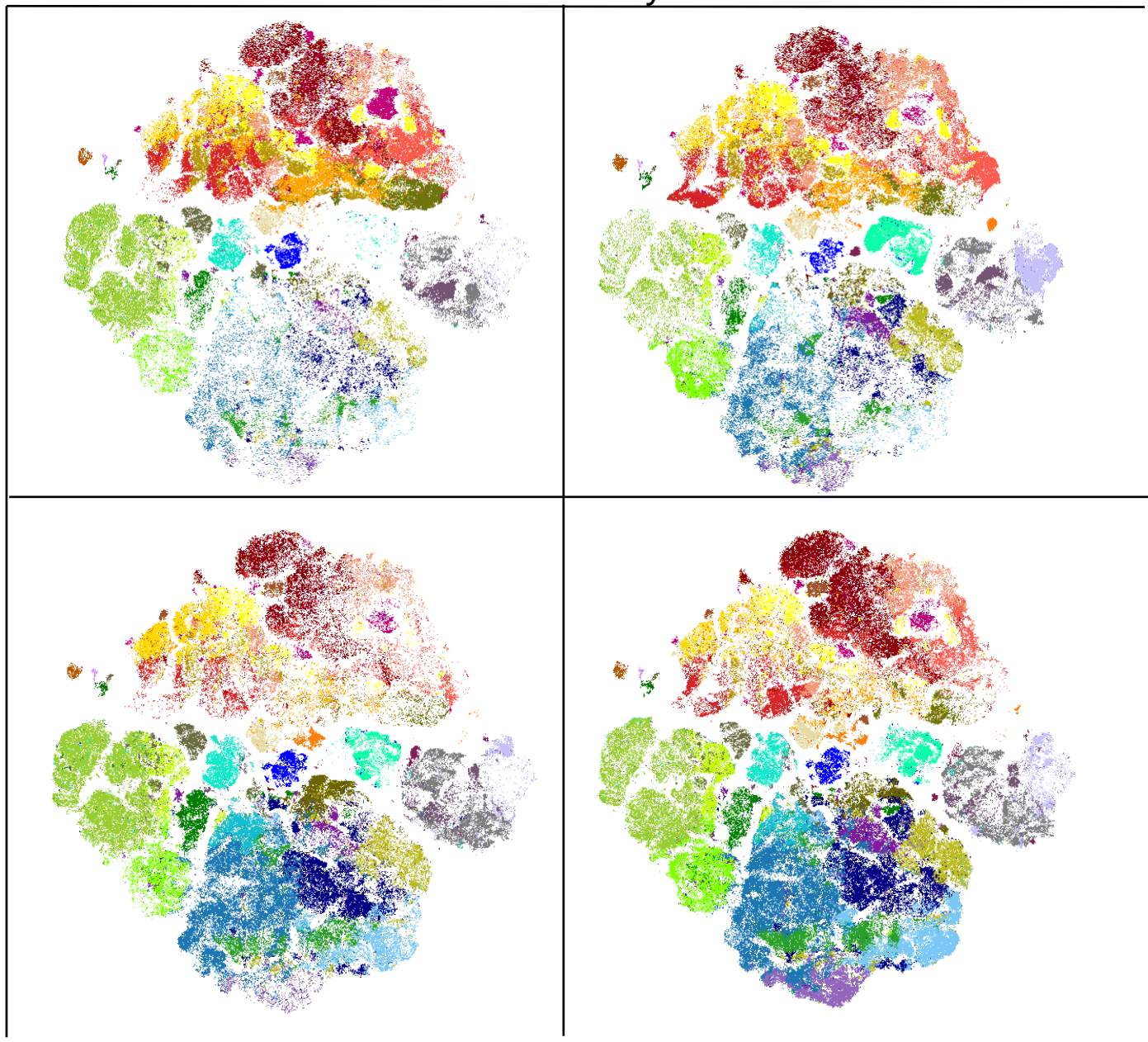
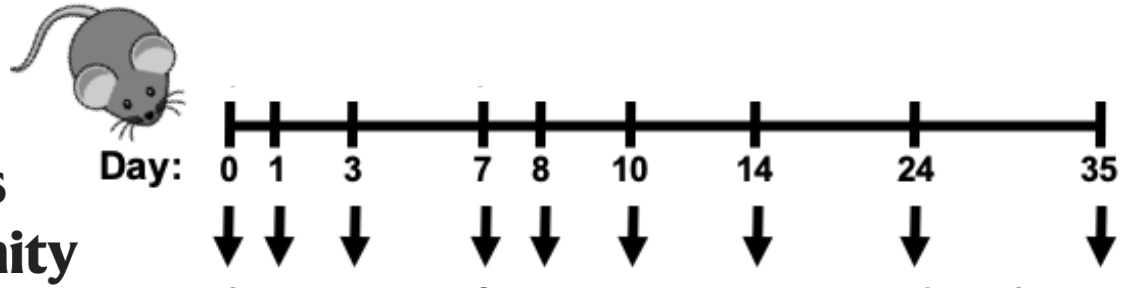


Mapping the landscape of the lung in pneumococcal pneumonia

nature COMMUNICATIONS

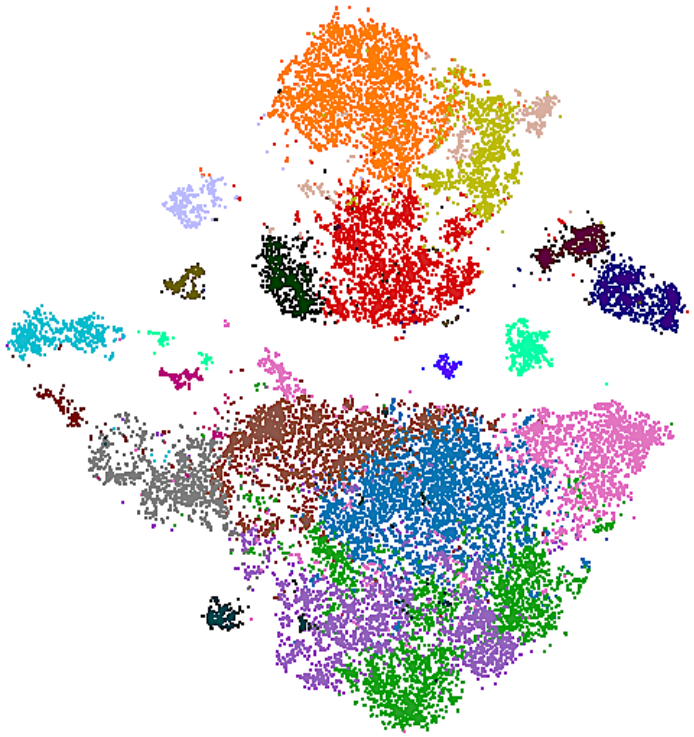
Antigen presentation by lung epithelial cells directs CD4$^+$ T_{RM} cell function and regulates barrier immunity

Shenoy et al, 2022



Watch recovery from pneumonia & development of immunity

Epithelial cells



T and B lymphocytes

- **Spectral fingerprints of lung cells are generated on Cytek Aurora**
- **Measurement stability over multiple timepoints - critical for this project**

- **Recovery from pneumonia induces development of tissue resident memory CD4+ TRM cells, BRM cells, and antibody secreting plasma cells.**

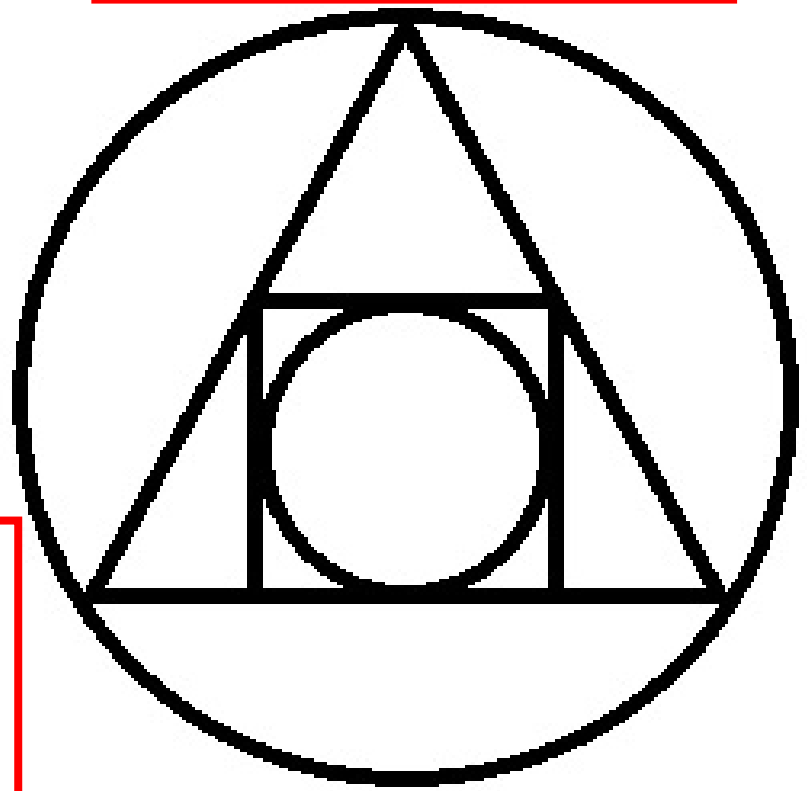
Multiparameter measurements on immune cells

Moving forward, full spectrum cell analysis is the method of choice for single cells cell characterization.

CYTEK spectral platform has become a *de facto* default tool for spectral cell analysis

Reagents
to distinguish multiple analytes simultaneously

CYTEK customizable standardized panels allow reproducible and easy-to-implement assays



Instrumentation
to detect multiple reagents

Data analysis tools
to evaluate the results

CYTEK®
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Investor and Analyst Day

The Aurora Analyzer in Oncology

Dr. Franklin “Buddy” Fuda, UTSW

June 22, 2022

Buddy Fuda

Professor of Pathology

Division of Hematopathology

Director of Clinical Flow Cytometry

University of Texas Southwestern Medical Center Dallas, Tx

Disclosures

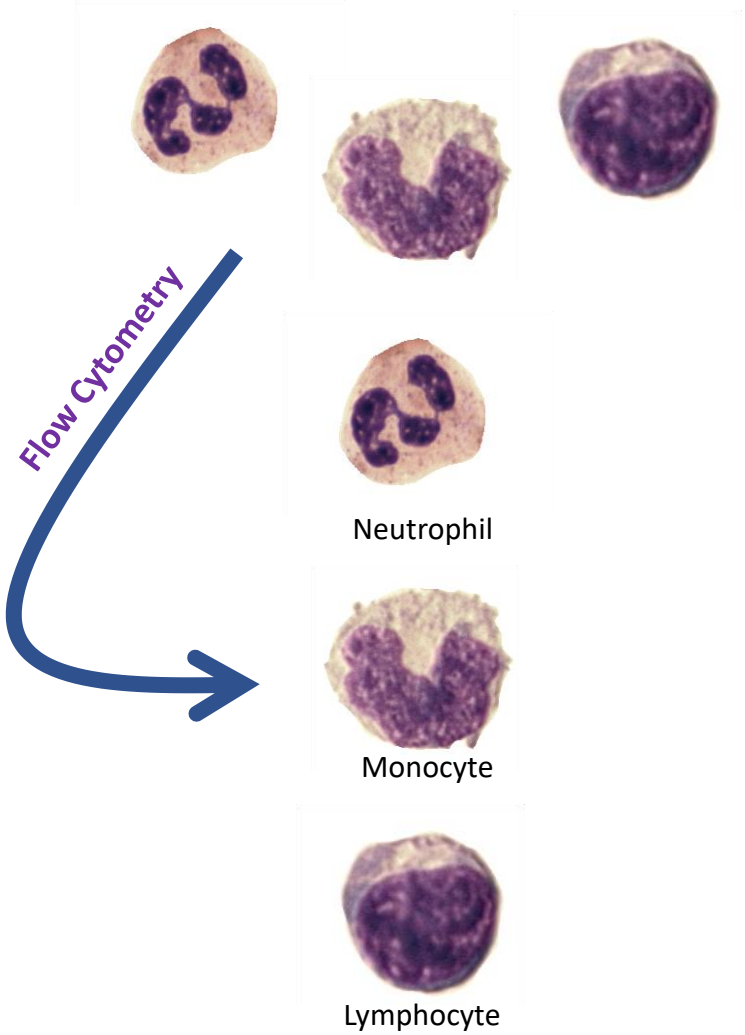
- I have no actual or potential conflicts of interest in relation to this presentation or program.

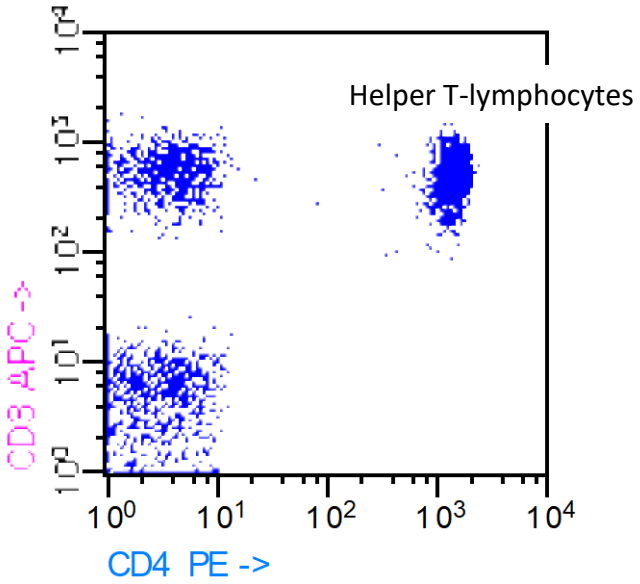
My Background

- 20 Years in Clinical Practice
- Hematopathology and Flow Cytometry at the University of Texas Southwestern Medical center (UTSW)
  - Director of two clinical flow cytometry laboratories and one immunology laboratory
  - One of the largest university labs in the county
  - Wide range of patient demographics with high variety of disease
  - Continued in the tradition of excellence set forth by experts in the field such as Louis Picker, Steven Kroft and Nitin Karandikar
  - Expertise in comprehensive and detailed analysis with a unique approach using various software programs including cluster analysis with Cytopaint
  - Used as a reference laboratory for regional laboratories on particularly difficult cases
- Collaborated with other flow cytometry experts on essential projects such as ConTexFlo (10-year effort across 7-13 labs) building “standardized” screening tubes for high parameter testing
- Actively involved member, contributor and inspector on international education committees, quality standards committees, and regulatory committees for clinical flow cytometry

Clinical Flow Cytometry

Immunophenotype





Normal Cell Populations

vs

Cancer Cell Populations

Leukemias and Lymphomas

How are Laboratories Graded?

All Institutions

1. Sensitivity and Accuracy of Diagnosis
2. Operating Expenses
3. Turn Around Time

Academic Institutions

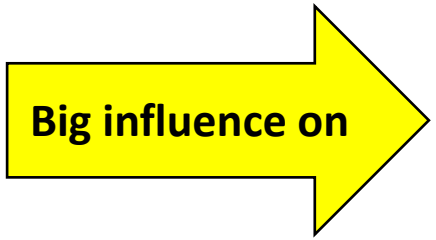
1. Sensitivity and Accuracy of Diagnosis
2. Operating Expenses
3. Turn Around Time
4. Expertise in Field
    1. Publications
    2. National Prominence

Setting Our Goals

Correct Resources Impact Outcomes

Resources

1. **Instruments**
   - Performance
   - Reliability/Downtime (Service)
2. **Reagents**
   - Performance
   - Supply
   - Shipping Times
3. **Vendor Application Support**
   - Training
   - Knowledge of Clinical Market
4. **Vendor Customers Service**



Outcomes

Quality of Product

Efficiency of Operation

Correct Resources

Resources

1. **Instruments**
   - **Performance**
   - **Reliability/Downtime (Service)**
2. **Reagents**
   - **Performance**
   - **Supply**
   - **Shipping Times**
3. **Vendor Application Support**
   - **Training**
   - **Knowledge of Clinical Market**
4. **Vendor Customers Service**

✓ **Cytek**

Customer service company ✓

Flow Cytometry Focused ✓

Jeep Enthusiast

Match my passion

~~Chrysler dealership~~

Four Wheel Parts

Flow Cytometry Systems
The Hardware/Instruments

Numbers Game

Markers matter!

The more per tube
- The more powerful the test
- The more cost effective the test

Conventional Clinical Flow Cytometer
Up to 12 colors

Conventional Research Flow Cytometer
Up to 30 colors

Dirty!

Conventional Flow Cytometer Reality

Most Clinical Labs
6-8 colors

Highest Expertise
10-14 colors

Cytek

High Parameter Testing
Up to 40 markers

Clean!

Flow Cytometry Systems
The Hardware/Instruments

Conventional Flow Cytometer

Porthole Windows

FARM

COW!

Examples: Operating Expense Comparisons

Fewer Tubes = $$$

Example 1 – Peripheral Blood screen

	Conventional	Cytek
Unique Markers	17	17
Tubes	2	1
Total Markers Run	19	17
Redundant Markers	2	0
Unbillable Markers	2	0
Cost Savings	-	1 tube (2 Markers) ~50%

Example 2 – Peripheral Blood Mycosis Fungoides Panel

	Conventional	Cytek
Unique Markers	20	20
Tubes	3	1
Total Markers Run	27	20
Redundant Markers	7	0
Unbillable Markers	7	0
Cost Savings	-	2 tube (7 Markers) ~75%

Example 3 – Lymphoid/Myeloid Bone Marrow Screen

	Conventional	Cytek
Unique Markers	28	28
Tubes	4	2
Total Markers Run	38	29
Redundant Markers	10	1
Unbillable Markers	10	1
Cost Savings	-	2 tube (9 Markers) ~100%

Example 4 – Acute Myeloid Leukemia Panel

	Conventional	Cytek
Unique Markers	31	31
Tubes	6	2
Total Markers Run	47	32
Redundant Markers	19	1
Unbillable Markers	19	1
Cost Savings	-	4 tube (18 Markers) ~200%

Turn Around Time Acquisition Faster On Cytek

Fewer tubes = Faster

- Less Resource Consumption
- Faster patient results

Routine sensitivity each tube – 3 minutes

Panel	Acquisitions Minutes per panel Conventional	Acquisition Minutes per panel Cytek	Acquisition Time Savings	Acquisition Time Savings across 1,000 patients
Peripheral Blood screen	6	3	100%	50 hours
Peripheral Blood Mycosis Fungoides Panel	9	3	200%	100 hours
Lymphoid/Myeloid Bone Marrow Screen	12	6	200%	100 hours
Acute Leukemia Panel	18	6	300%	200 hours

Routine analysis each tube – 3 minutes

Panel	Analysis Minutes per panel Conventional	Analysis Minutes per panel Cytek	Analysis Time Savings	Analysis Time Savings across 1,000 patients
Peripheral Blood screen	6	3	100%	50 hours
Peripheral Blood Mycosis Fungoides Panel	9	3	200%	100 hours
Lymphoid/Myeloid Bone Marrow Screen	12	6	200%	100 hours
Acute Leukemia Panel	18	6	300%	200 hours

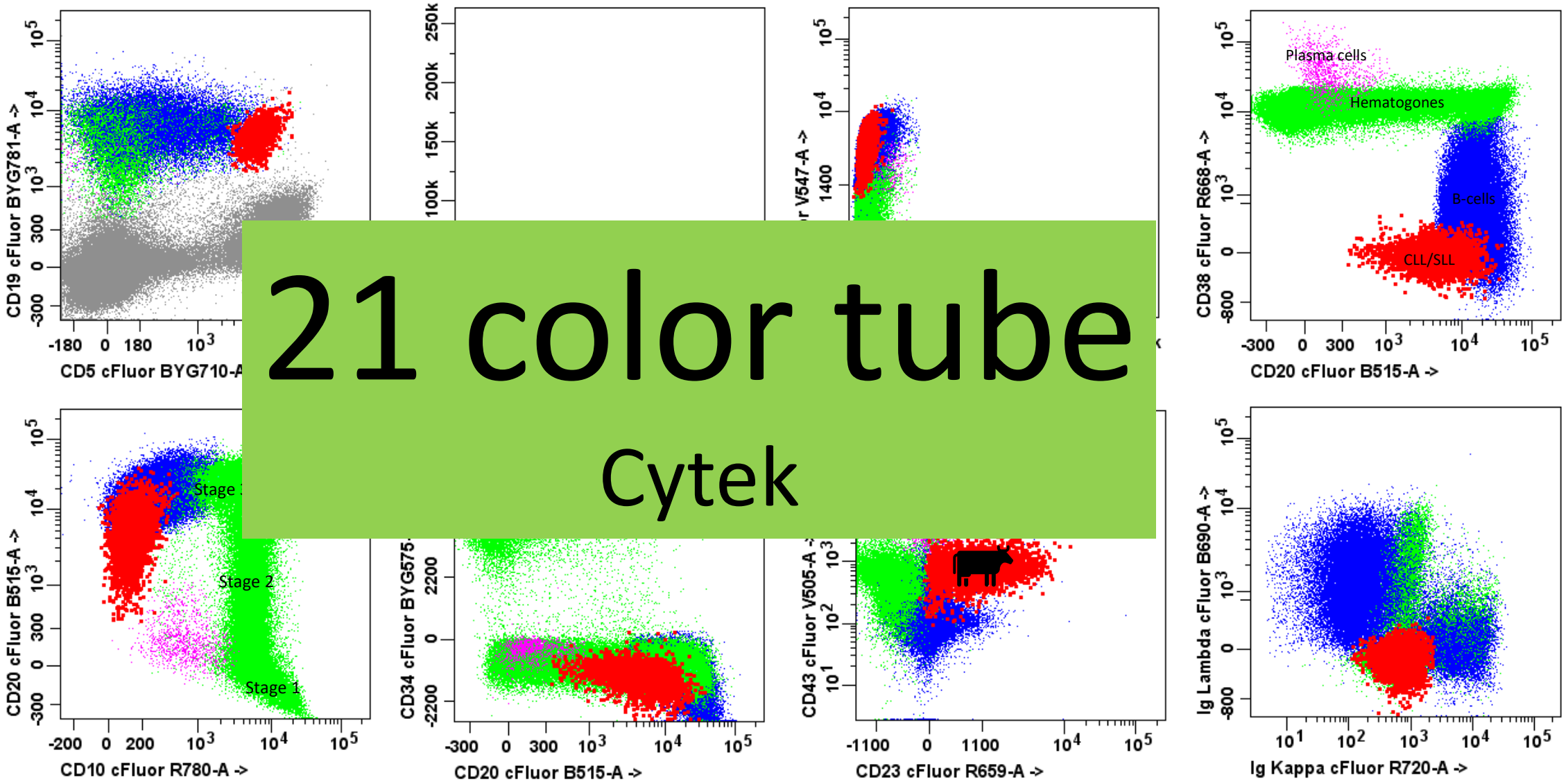
Faster Turn Around Times

- Increased productivity
  - Flow cytometry lab
  - Hematopathology work up
- Improved patient care
  - Earlier diagnosis
  - Earlier induction of treatment
- More cost-effective patient care
  - More specific therapeutic approach
  - Reduced duration of inpatient hospital care

Cytek system
"No-brainer"

But, does it actually work?

True Testament
What does the data look like in complex tissue?
Can I identify a minute malignant population?



21 color tube

Cytek

Chronic Lymphocytic Leukemia/Small Lymphocytic lymphoma (CLL/SLL)

CLL/SLL = 0.001%

CD5(+), CD10(-), CD19(+), CD20(dim +), CD23(+), CD34(-), CD38(-), CD43(+), CD45(+), surface kappa(dim +), surface lambda(-)

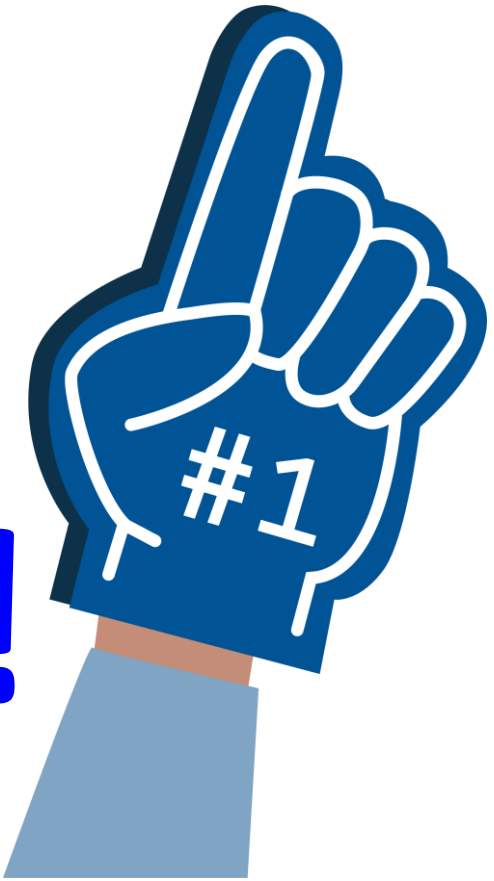
Successful Operation

Academic Institutions

1. Accuracy of Diagnosis
2. Operating Expenses
3. Turn Around Time
4. Expertise in Field
    1. Publications
    2. National Prominence

Achieve our goals

FAN!

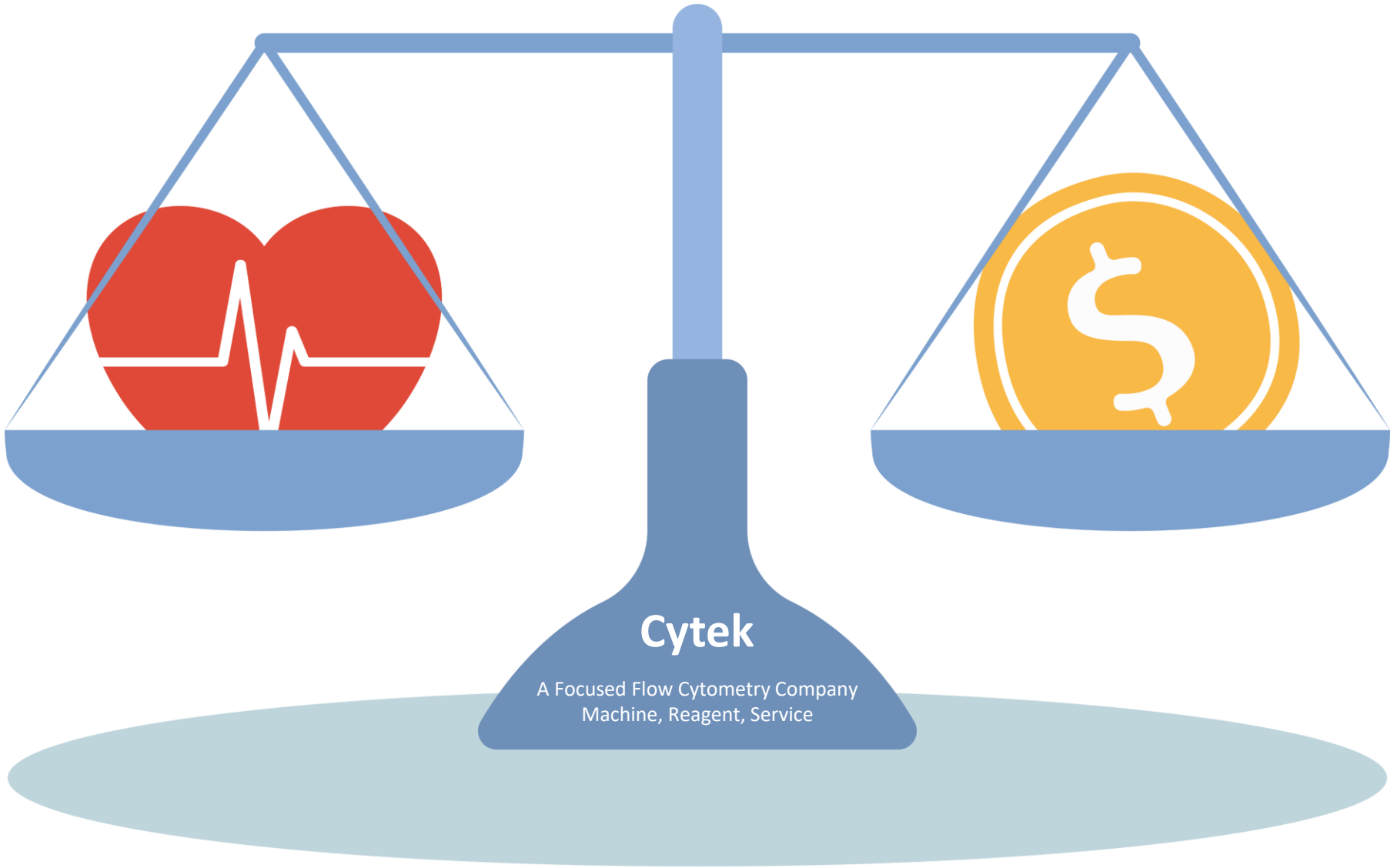


What’s that mean for Flow Cytometry

- Cytek revolutionizes flow cytometry
  - Unleashes the full potential of artificial intelligence
  - Simplifies the technical component
  - Opens new horizons for research and clinical practice
  - Meets new challenges brought about through advancements in clinical therapeutics

What’s that mean for Cytek

- It takes the market share
  - Reference laboratories and University Laboratories
    - Will switch to the latest technology
  - Private practice and small laboratories
    - Will establish in-house labs
      - Flow cytometry is a high revenue generator
      - Capture the professional component but outsource the technical component
      - Technical component is where most revenue lies
      - Cytek simplifies the technical component
- Out of the gate Early
  - Builds a bond
    - Superior product
    - Superior customer service
    - Longevity of relationship


Cytek
A Focused Flow Cytometry Company
Machine, Reagent, Service

CYTEK®
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Investor and Analyst Day
Break

June 22, 2022

CYTEK®
TRANSCEND THE CONVENTIONAL

Investor and Analyst Day

Cytek Technologies and Products

Dr. Ming Yan, Chief Technology Officer
Mark Herberger, Sr. Director Marketing

June 22, 2022

Unmet Needs: High Dimensional Cell Analysis

The complexity of the immune system requires to detect and purify

- the combinations of expressing numerous proteins,
- the functionally distinct cell subsets.

To correlate a given immune response to disease and treatment

Functional Assays

- Metabolomics
- Cytokine assays
- Proliferation
- Apoptosis/cell killing

High Dimensional Immune Characterization

- Infectious Disease
- Tumor
- Vaccine response
- CAR-T

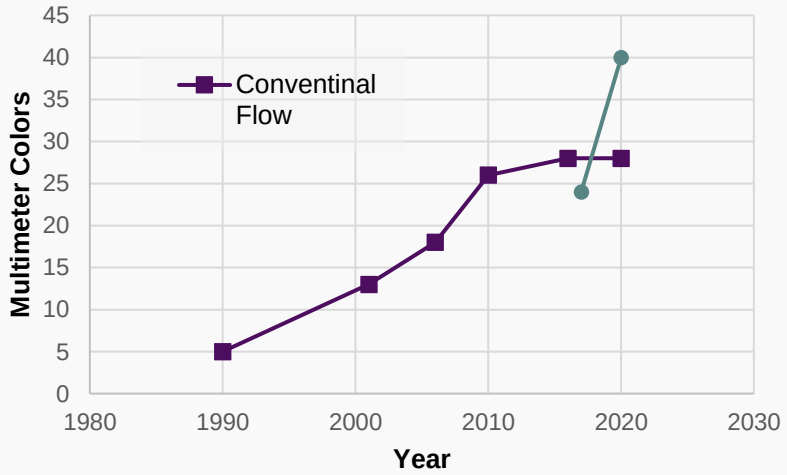
High Content/High Throughput Clinical Assays

- HD and Automated MRD
- HD and Automated L&L

Nanoparticles

- Vaccine delivery
- Immunotherapy
- Environmental biology

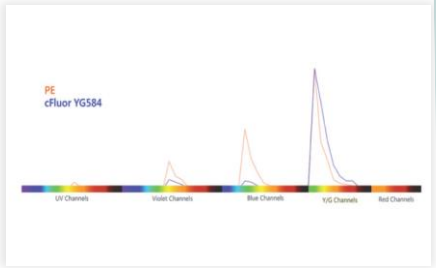
Trend of Multiparameter Cell Analysis

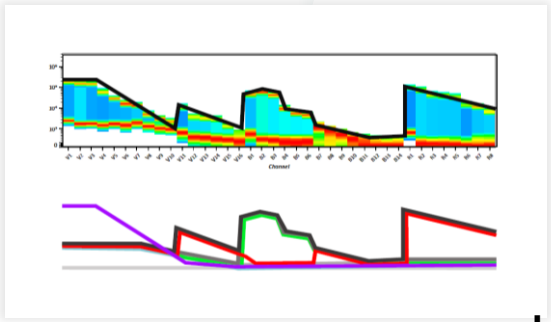


Advancing Cell Analysis with Our Unique FSP Technology

Conventional

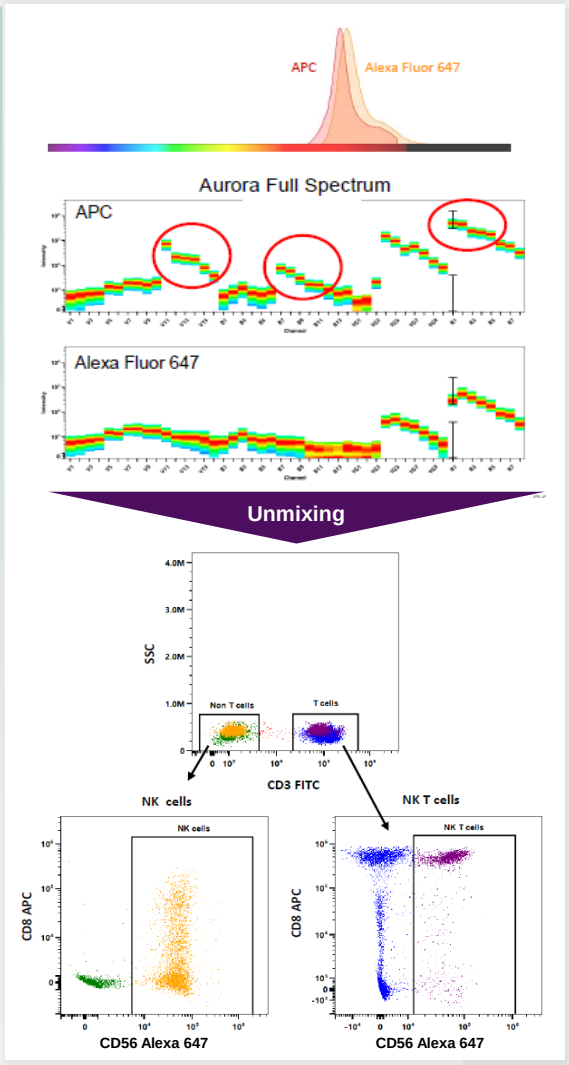
Cytek's FSP Technology





Unmixing algorithm

ENTIRE emission spectrum is captured across the different module & stitched together to create a spectral signature that combines emission information of fluorochrome excited by all onboard lasers



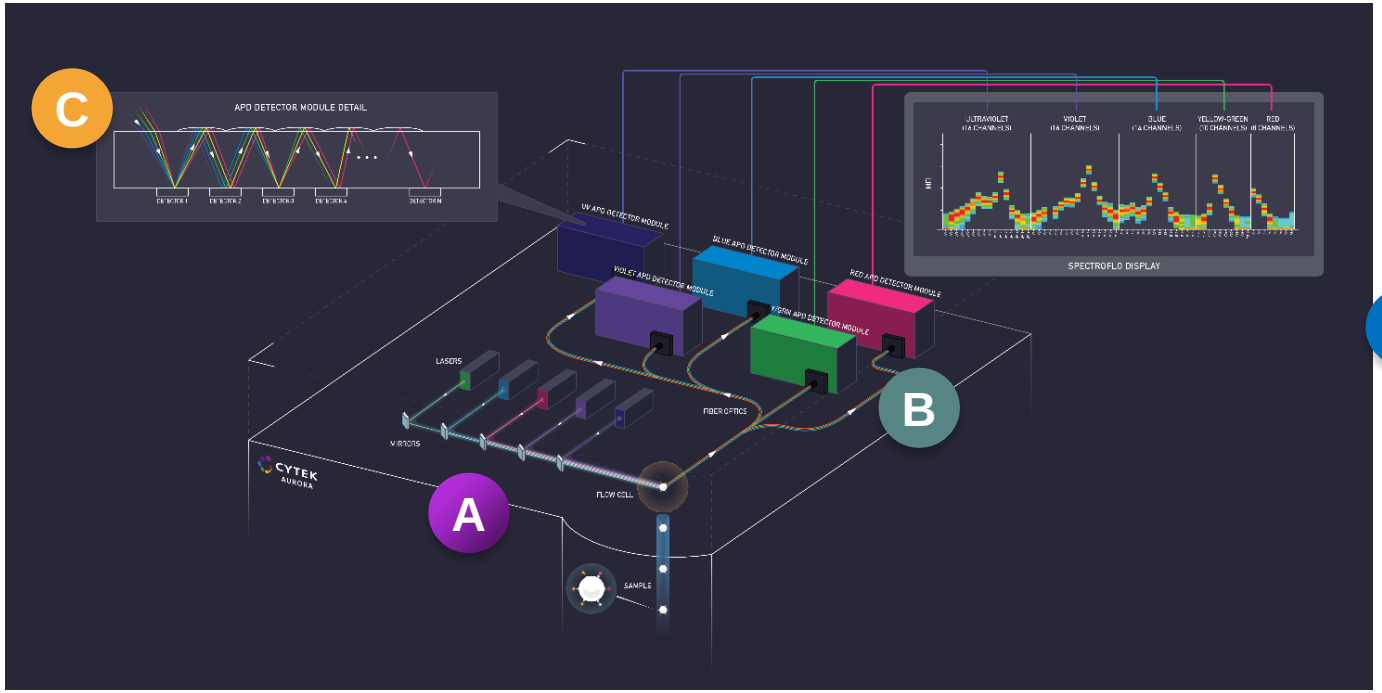
Our FSP platform was purpose-built to advance the next generation of cell analysis by **delivering deep insights, high throughputs and ease of use**

FSP technology enables **high sensitivity and high throughput without compromising data quality**

Allows **use of many dyes simultaneously with optimal resolution**, which is not possible with conventional cytometers

FSP is **able to extract autofluorescence** to enhance resolution

Our FSP Technology is Powered by Patented Innovative Designs



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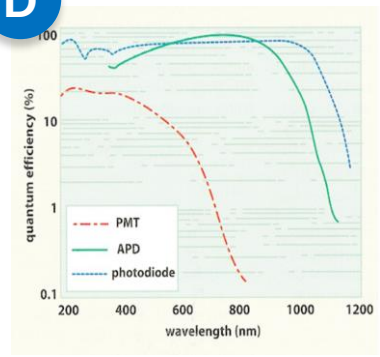


A The fluorescence spectrum from each laser source is collected from multiple laser excitation

B The fluorescence from each laser source is collected by each corresponding detector array module

C Use of APD detectors maximizes sensitivity and enables broad wavelength responses

D The combination of our patented optical design with APD detectors yields high-resolution data at an optimized signal-to-noise ratio

Maximize Resolution & Accuracy | **Optimized Signal-to-Noise Ratio** | **High Resolution** | **Valuable Insights**

CYTEK TRANSCEND THE CONVENTIONAL

Cytek’s Core Instruments: Analyzer to Sorter

Aurora

>40 Colors from 3-5 Lasers

Biopharma, CROs, Large Academic Labs

High-End Market

Northern Lights

>24 Colors from 1-3 Lasers

Individual Researchers & Clinical Labs

Entry-Level Market

Aurora Cell Sorter

>40 Colors from 3-5 Lasers

Biopharma, CROs, Large Academic Labs

High-End Market

High-Throughput & Compact

Flexible & Intuitive

Ultra-Sensitive

Valuable Insights

We Provide an End-to-End Platform of FSP Solutions

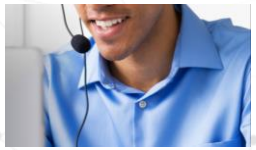
Instruments

Aurora

Northern Lights

Cell Sorter

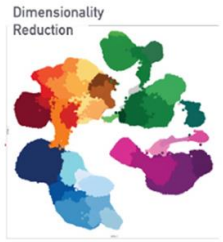
Automatic sample loader



Violet		Blue		Red	
Specificity	Fluorochrome	Specificity	Fluorochrome	Specificity	Fluorochrome
CD3	cFluor V420	CD8	cFluor B515	CD127	cFluor R659
CD14	cFluor V450	CCR7	cFluor BYG575	CD16	cFluor R668
CD45	cFluor V547	IgD	cFluor BYG667	CD56	cFluor R720
		CD45RA	cFluor B690	CD4	cFluor R780
		CD19	cFluor BYG710	Viability	ViaDye Red
		CD25	cFluor BYG781	CD27	cFluor R840

Services & Application Support

Reagents and Kits



Data Acquisition and Analysis Software

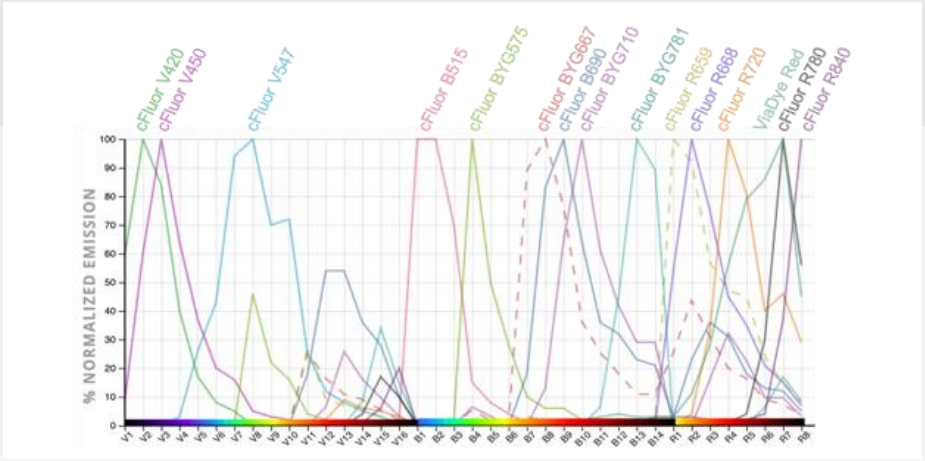
Cytek' FSP Platform versus Other Technologies

	CYTEK TRANSCEND THE CONVENTIONAL	Conventional Flow Cytometry	Spectral Flow Cytometry	Mass Cytometry
Biomarkers / Parameters (>40 biomarkers)[1]	✓	✗	✗	✓
Sensitivity (nanoparticle detection)	✓	✓	✗	✗
Throughput (>30K cell/second)	✓	✓	✓	✗
Footprint (<150K cm^3)	✓	✓	✗	✗
Sorting Capability	✓	✓	✗	✗
Cost : Performance[2]	✓	✗	✗	✗

1. Based on peer-reviewed publications
2. Cost-to-Performance reflects performance based on accessible biomarkers, sensitivity, throughput and sorting capabilities, relative to costs associated with instruments, consumables, time, labor and ability to upgrade over time

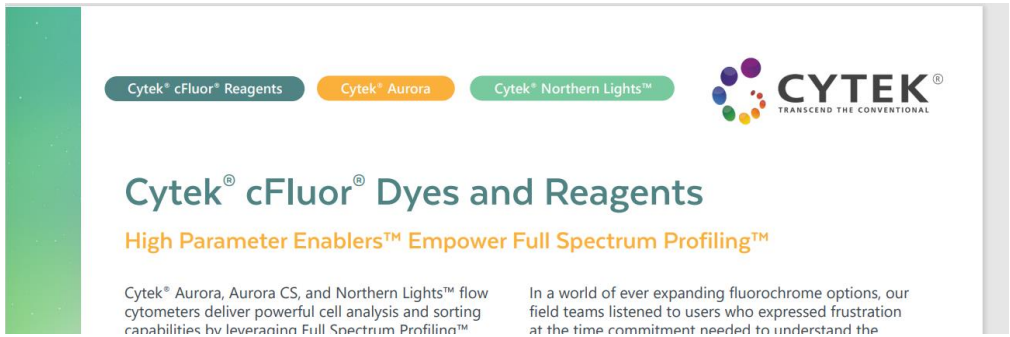
Our FSP Technology Provides a Significant Reagents Sales Opportunity

- Cytek developed a set of spectral unique dyes based on full spectrum cytometry
  - About 28 cFluor dyes with high parameter enablers have been commercialized
  - We market cFluor 14 & 25 colors immunoprofiling kit
- Fluorescence spectrum of Cytek cFluor dyes can be stored in the instruments for ease of use and bundling with instruments
- Spectral unique dye – high parameter enabler
- Function assay dye



		Laser	cFluor
		Violet	**cFluor V420**
		Violet	**cFluor V450**
		Violet	cFluor V500
		Violet	cFluor V570
		Violet	cFluor V620
		Blue	cFluor B518
		Blue	**cFluor B532**
		Blue	**cFluor B548**
		Blue	cFluor BYG575
		Blue	cFluor BYG610
		Blue	cFluor BYG628
		Blue	cFluor BYG666
		Blue	cFluor BYG676
		Blue	cFluor BYG680
		Blue	**cFluor BYG710**
		Blue	cFluor BYG781
		Yellow Green	**cFluor YG584**
		Red	cFluor R659
		Red	cFluor R667
		Red	**cFluor R685**
		Red	**cFluor R720**
		Red	cFluor R780
		Red	cFluor R810
		Violet	ViaViolet
		Red	ViaRed

Reagents & Kits Portfolio



Our reagents are **fluorochrome conjugated antibodies** used to identify cells of interest

Our multi-color cFluor immunoprofiling kits and optimized multicolor immunofluorescence panel **provide users with ready-to-use antibodies and protocols**

Class 1 single-color reagents currently sold in China with clinical studies **underway for 6-color TBNK reagents for potential Class 3 registration**

CD-IVD single-color reagents & 6-color TBNK reagents **self certified in Q2 for EU customers**

Cytek Bioinformatics Program Objectives

Make it easier to do Flow: Easier for new customers to get started, and advanced users to scale to **larger and more complex** experiments.

Accelerates reagent and instrument pull-through. Powerful and easy-to-use software gives **faster** time-to-insight and answers **more** scientific questions.

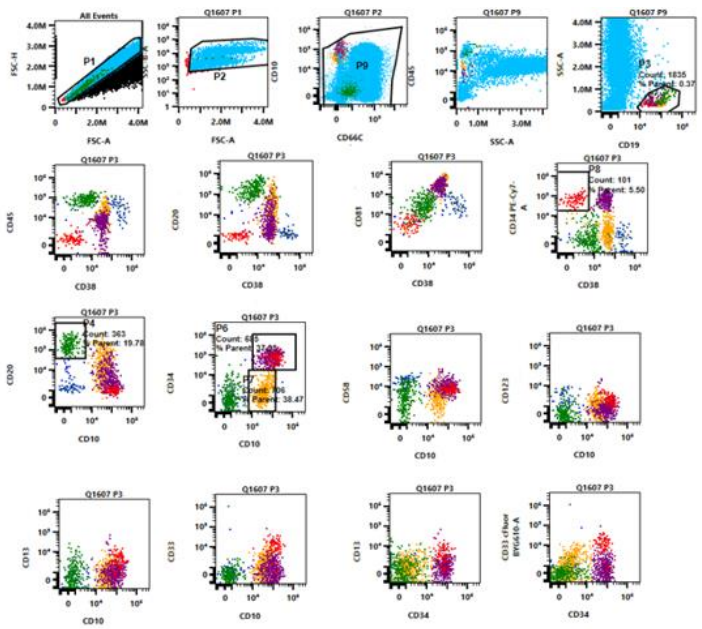
Enables better understanding of our customers' needs: Our software gives us **deeper insights** into customers' use cases and applications.

Enhances and accelerates product development. We use the same software as our customers, aligning us with customer needs and reducing time-to-market.

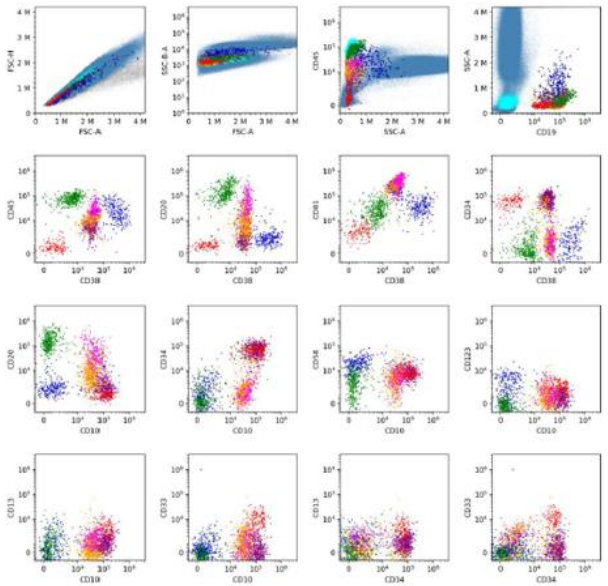
Cytek AI Expected to Speed Up the Clinical Adoption

Collaboration of AI machine learning on automatic diagnosis of B-ALL MRD

Increased accuracy with less laboratory time – Greater simplicity



Manual Analysis with SpectroFlo



AI Analysis

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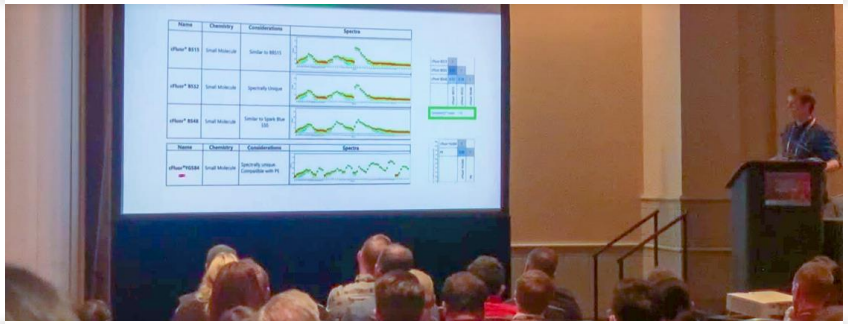
Seamless Workflow to the Clinician with Immediate Data Read

Advancing Technology through Collaborations

Dr. Sylvain Simon of Fred Hutch
Cyto 2022 Talk



A 59-marker panel to decipher immune cell perturbations in immunotherapy-treated patients

Multiple site collaboration in L&L MRD diagnosis and monitoring

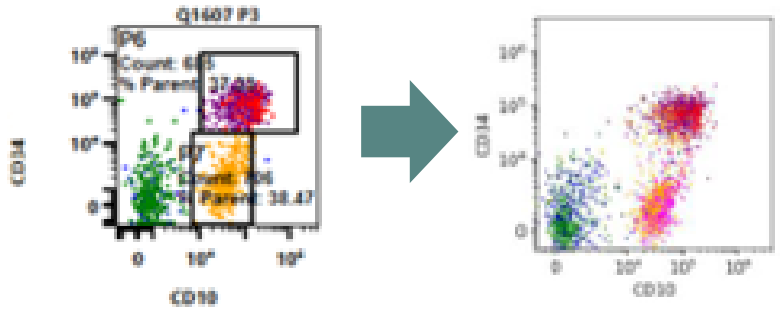
Multiple sites nano-particle standardization

- NIH
- University Ottawa
- Cytek Bethesda

Team

CYTEK
TRANSCEND THE CONVENTIONAL

AI on clinical data analysis



Cytek’s Value Proposition to the Clinical Market

FSP

Advanced flow cytometry for disease screening, diagnosis and monitoring

Benefits

- More informative antibodies in 1 tube
- Eliminates redundant reagents
- Optimizes use of smaller amounts of patient specimen
- Identifies tiny populations of abnormal cells
- Explore new cell maturation pathways and cell subtypes
- Improves overall laboratory efficiency
- Lowers costs

Cytek Supporting Laboratory Developed Test (LDT) Worldwide

Project	Panels	Number of cFluors
Cytek 20-color MRD kit	20C AML MRD	20
Conversion of BD Canto L&L panels to NL-CLC	10 panels, screening and diagnosis. Tested in >300 samples	16 cFluors
Broad range of LDT panels	23C MM, 23C ALL-CS, 16C ALL-IC, 22C L&L screening panel, AML CAR-T target panel	15-17 cFluors
Formal clinical study on two MRD panels: NL-CLC vs. Canto Testing AI data analysis	14C BLL MRD 20C AML MRD	14 cFluors
20C AML panel for publication to promote cFluor	20C AML MRD panel	17 cFluors
Custom reagent projects	Assorted IO, Immunology, infectious disease	Varies due to clone and dye access
Evaluating AI algorithm for AML MRD diagnosis and analysis	AML MRD diagnosis	>15 cFluors

Next-Gen Clinical Flow Cytometry – Key Focus Points

Next Generation Flow Cytometry: completely operator independent - removing bias, daily performance variability, and individual operators' variability. Result: improved results & data quality

Instrument

- Characterization & Initialization
- Easy set up
- Optimization and standardization

Automation

- Cocktail & Assay Preparation
- Consistent construction, incubation, and sample processing times
- Constant temperature control and minimized light exposure

Data Acquisition

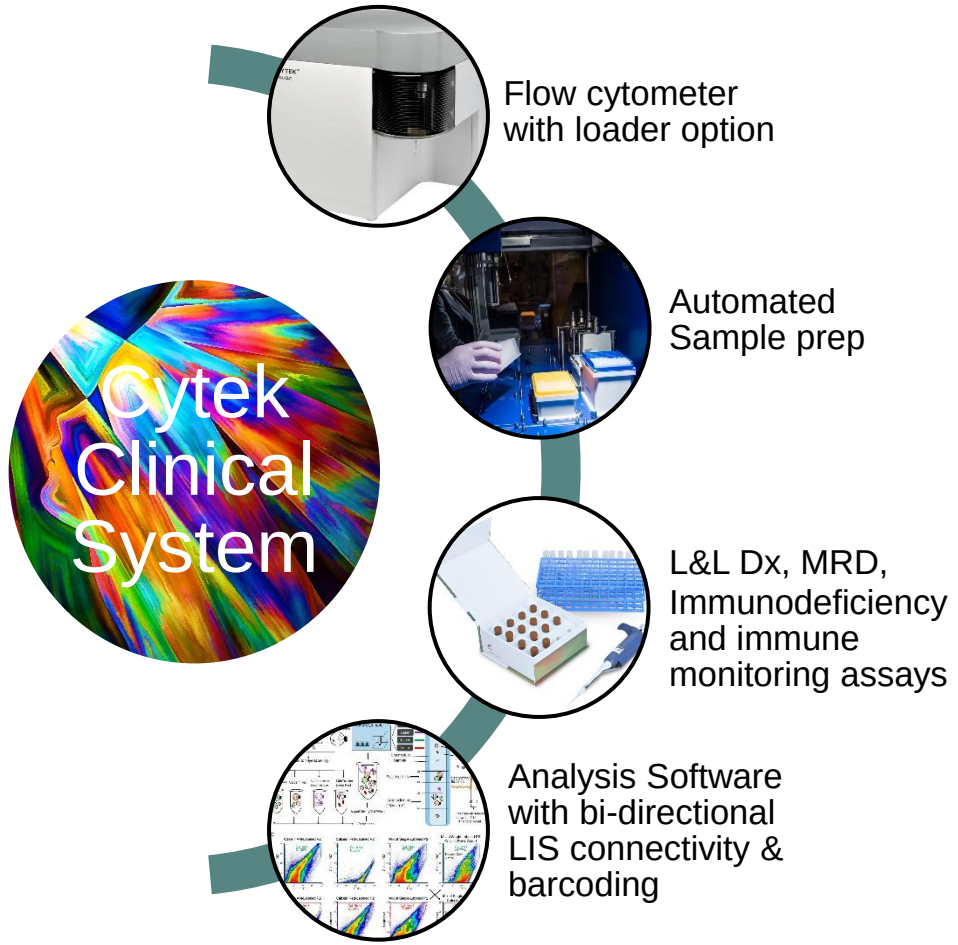
- Standardization & QC verification
- Assay & Acquisition worksheets
- Adjustment of acquisition gates

Data Analysis & Reporting

- Cluster determination & visualization
- Reporting & Database export
- Cross-discipline data integration & correlation

System Solutions Under Development at Cytek

- Advanced Instrumentation
- Automated processing
- Panels based on innovative cFluor reagents
- Application driven menu
- Automatic data analysis



CYTEK®
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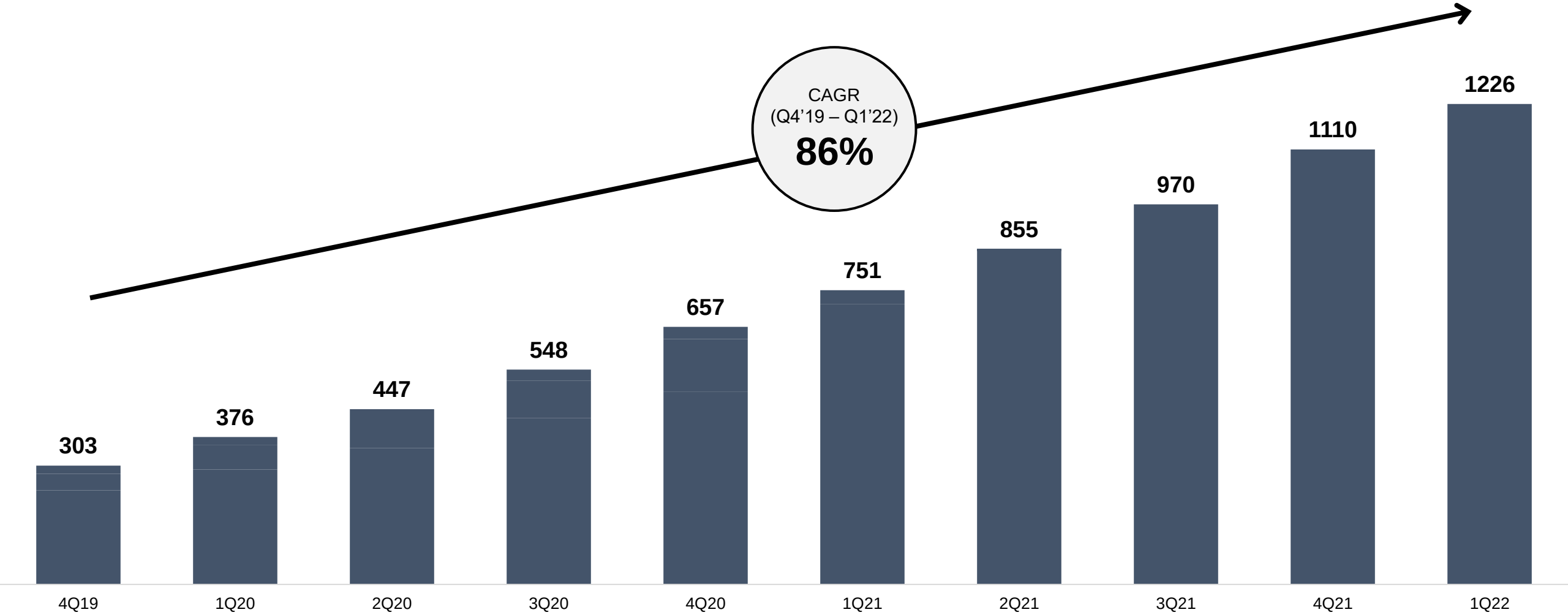
Investor and Analyst Day
Key Financial Review

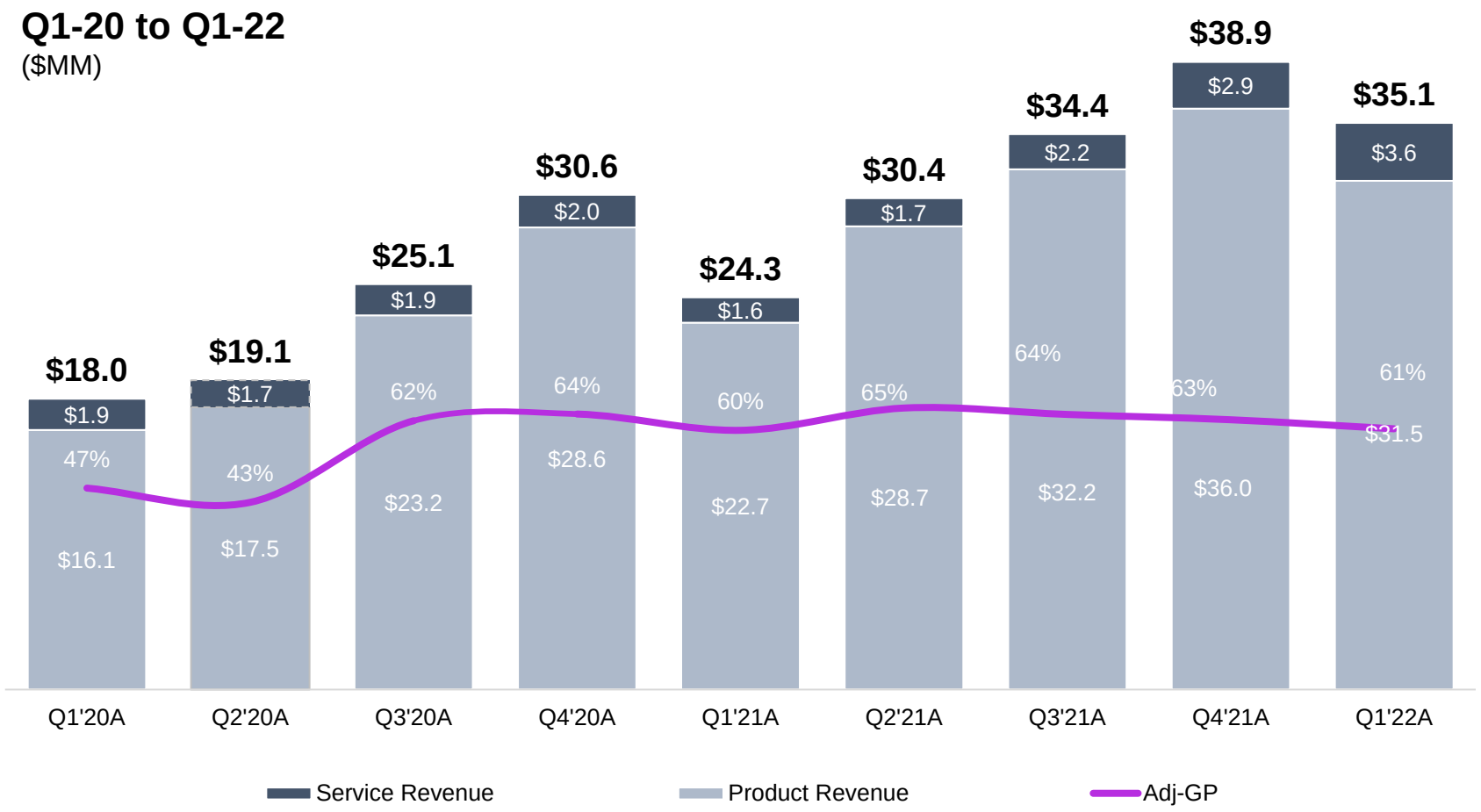
Patrik Jeanmonod, CFO

June 22, 2022

Strong and Growing Base of Instrument Placements



Quarterly Revenue and Adjusted Gross Margin %

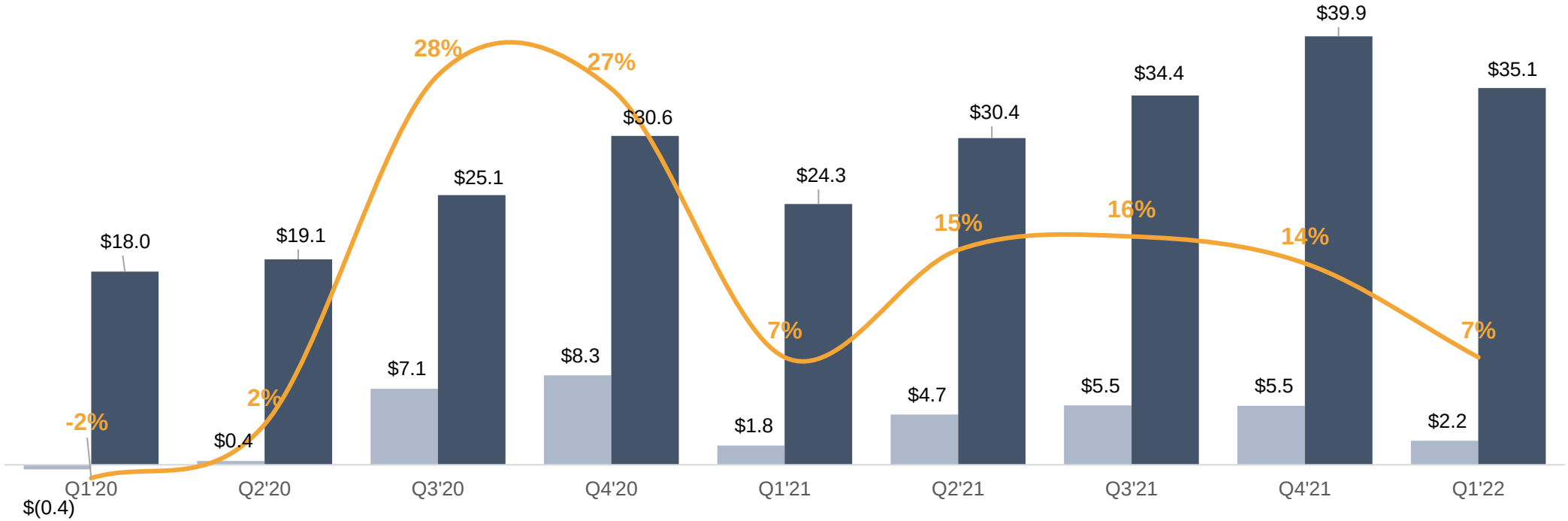


Q1-2022 Review

- Revenue $35.1 million or + 44% YoY
- Cytek added another 116 instruments now total base at 1,226
- Service revenue has more than doubled from the prior year on more instruments coming off warranty
- Adjusted GP margin 61% compared to 60% in the first quarter of 2021

Reconciliation of Non-GAAP figures are in the appendix

Revenue & Adj. EBITDA

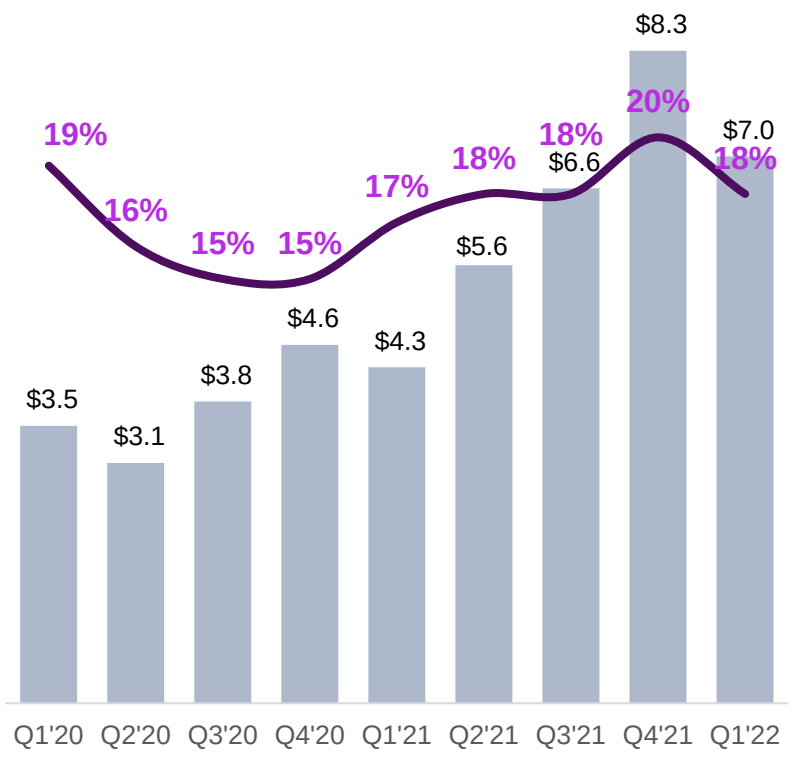


	Q1’20	Q2’20	Q3’20	Q4’20	Q1’21	Q2’21	Q3’21	Q4’21	Q1’22
Adj. EBITDA	$(0.4)	$0.4	$7.1	$8.3	$1.8	$4.7	$5.5	$5.5	$2.2
Tot. Revenue	$18.0	$19.1	$25.1	$30.6	$24.3	$30.4	$34.4	$39.9	$35.1
A-EBITDA %	-2%	2%	28%	27%	7%	15%	16%	14%	7%

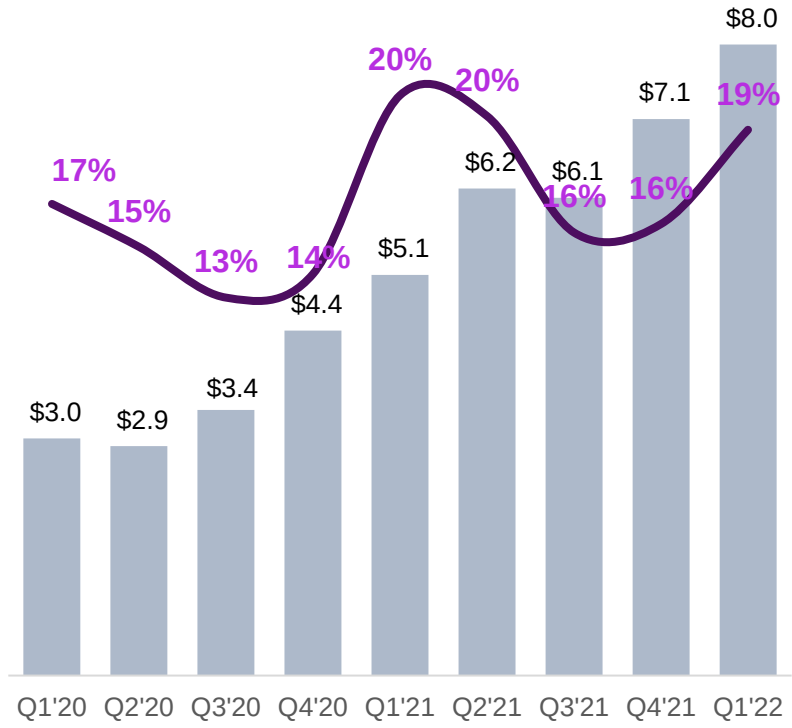
Tot Revenue A-EBITDA %

Operating Expenses

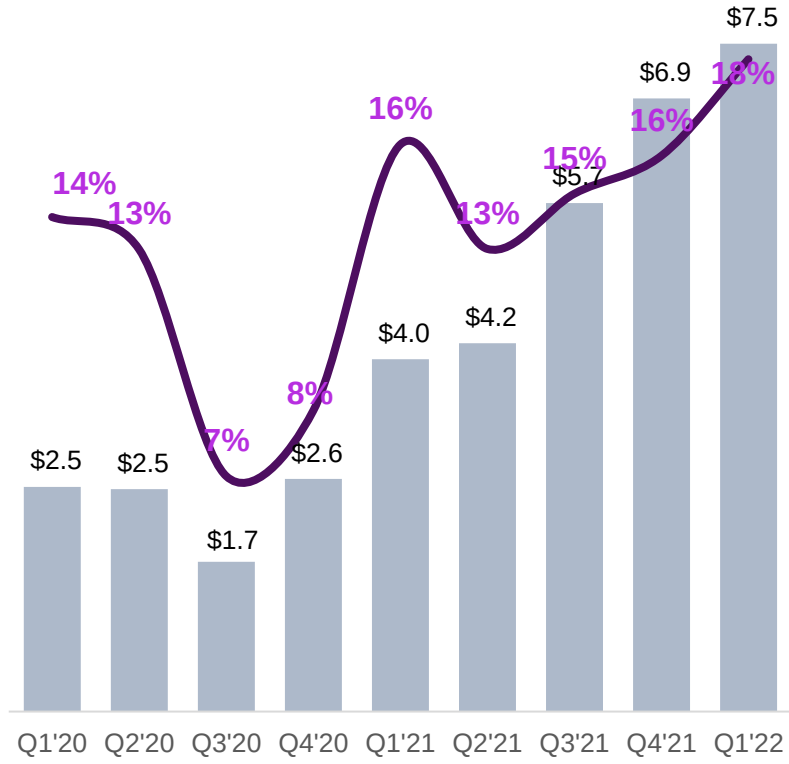
S&M Expenses
($MM)



R&D Expenses
($MM)



G&A Expenses
($MM)



Cytek Operating Stats

Non-GAAP Target Operating Model

($ in thousands)

	1Q2020	2Q2020	3Q2020	4Q2020	1Q2021	2Q2021	3Q2021	4Q2021	1Q2022
Gross Margin %	47%	43%	62%	64%	60%	65%	64%	63%	61%
S&M %	19%	16%	15%	15%	17%	18%	18%	20%	18%
R&D %	17%	15%	13%	14%	20%	20%	16%	16%	19%
G&A %	14%	13%	7%	8%	16%	13%	15%	16%	18%
Adj. EBITDA Margin %	-2%	2%	28%	27%	7%	15%	16%	14%	7%

Key Improvement Drivers

Gross Margin

- Shift in product mix with higher margin reagents becoming a greater share of total revenue
- Benefit from economies of scale as Company grows
- Leverage global manufacturing capabilities

S&M

- Increased publications improve brand recognition and lowers customer acquisition costs
- Improved variable costs to retain and service customers at scale

R&D

- Lower cost to develop new products by leveraging existing FSP platform
- Talent diversification in other lower cost locations
- Lower fixed costs to operate at scale

G&A

- Improved operating costs through system automation
- Talent diversification in other lower cost locations

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Reconciliation of Non-GAAP figures are in the appendix

Top Line Growth with Improved Operating Efficiencies

Support 4 pillars strategy – with focus on top line growth, GP margin improvement and increased A-EBITDA $ value and as percent of total revenues

Discipline in cost management

Capex investment to support long term Cytek worldwide growth

Re-affirming prior 2022 revenue guidance closer to the high end of the range $160 - $168m

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Investor and Analyst Day

Business Strategy & Conclusions

Dr. Wenbin Jiang, CEO

June 22, 2022

Cytek’s Four Business Pillars

Instruments

- Performance
- Intelligence
- Ease of use
- Compact
- Lowest cost

Applications

- Enabler
- Panels/kits
- Flexibility
- Functionality/Purposes
- Volume/repeating

Bioinformatics

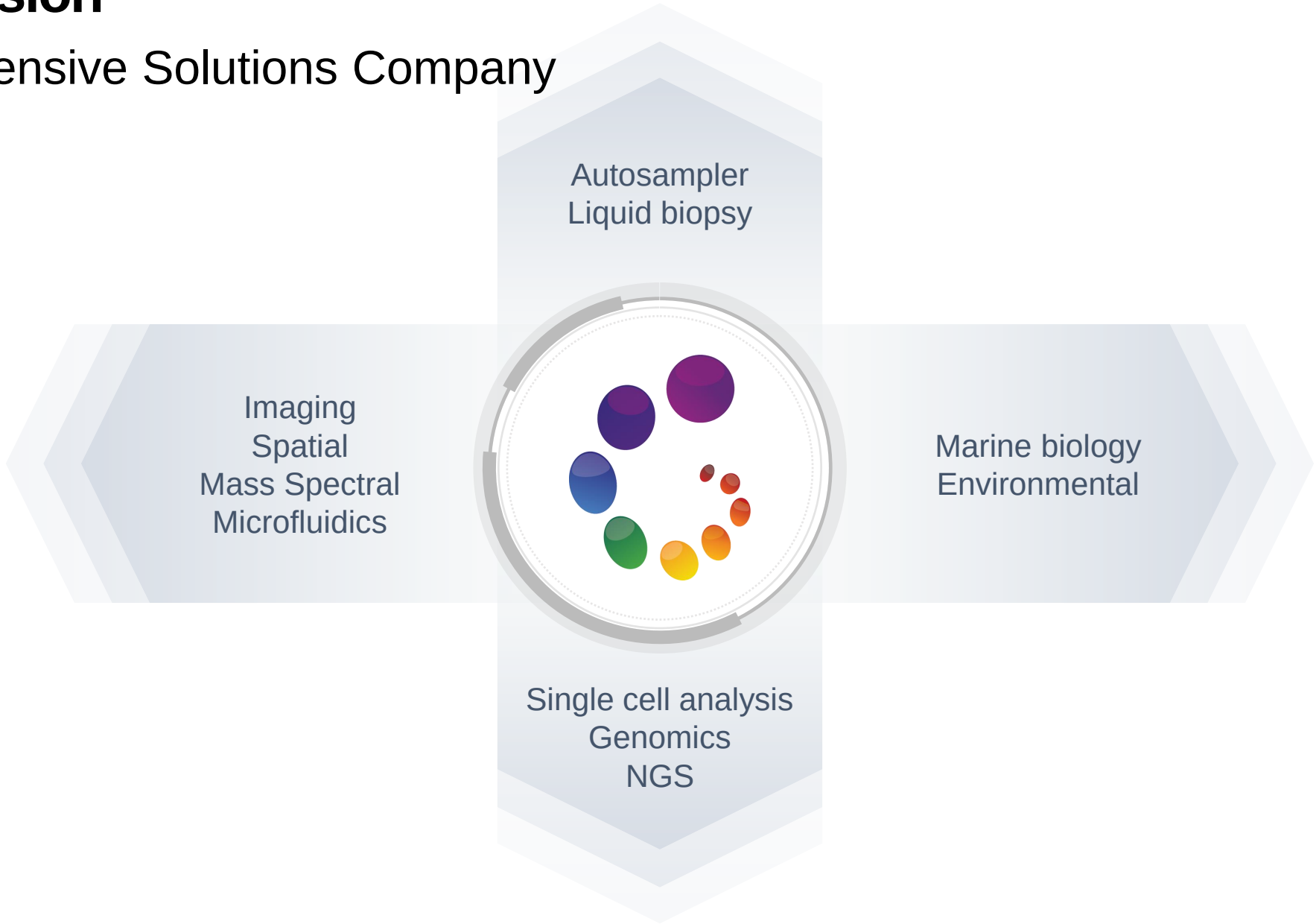
- Storage
- Analysis
- Optimization
- Management
- Exchanges

Clinical

- Regulatory
- LDT
- Menu
- AI
- Standardization

Cytek Vision

Comprehensive Solutions Company



Cytek's Operational and Shareholder Goals

Commitment to
Shareholder Value Creation

Capital Efficiency

Operational Excellence

Maximize Free Cash Flow

Maintain **Positive EBITDA**

Execution Speed

Smart **Acquisitions,**
Licenses and **Joint Ventures**

Why Invest In Cytek - Investment Thesis

Transformative Platform Technology
Driving Growth & Expansion with strong global adoption rate

The most **competitive innovator in Cell Analysis –** fastest growth in the industry

Strong **Balance Sheet** and **Cash Flow Positive**

Attractive **Valuation**

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Investor and Analyst Day
Thank you!

June 22, 2022

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Appendixes

June 22, 2022

Note: Fiscal Quarter

Non-GAAP Adjusted GP Reconciliation

($ in thousands)

Non-GAAP Adjusted Gross Profit Reconciliation

($ in thousands)

	FY20A	FY21A	1Q2020	2Q2020	3Q2020	4Q2020	1Q2021	2Q2021	3Q2021	4Q2021	4Q2022
GAAP Gross Profit	**51,710**	**79,144**	**8,375**	**8,270**	**15,615**	**19,450**	**14,487**	**19,745**	**21,276**	**23,636**	**20,177**
Adjustments											
Amortization of Acquisition-Related Intangible Assets	0	237	0	0	0	0	0	0	0	237	337
Stock-Based Compensation Expense	232	1,508	29	40	38	125	112	120	559	717	708
Non-GAAP gross profit	51,942	80,888	8,404	8,310	15,653	19,574	14,599	19,864	21,835	24,589	21,221
Revenue	92,839	127,950	17,988	19,137	25,095	30,619	24,272	30,408	34,376	38,893	35,064
Non-GAAP gross profit %	**56%**	**63%**	**47%**	**43%**	**62%**	**64%**	**60%**	**65%**	**64%**	**63%**	**61%**

Note: Fiscal Quarter

Non-GAAP Adjusted EBITDA

($ in thousands)

Non-GAAP Adjusted EBITDA Reconciliation

($ in thousands)

	FY19A	FY20A	FY21A	1Q2020	2Q2020	3Q2020	4Q2020	1Q2021	2Q2021	3Q2021	4Q2021	1Q2022
Net Income	**(16,827)**	**19,411**	**3,027**	**(839)**	**8,111**	**6,539**	**5,600**	**101**	**2,671**	**1,420**	**(1,165)**	**(2,158)**
Adjustments												
Depreciation and Amortization	309	578	1,241	105	161	179	133	169	194	194	685	1,470
Provision for (Benefits from) Income Tax	534	(4,982)	2,921	198	(7,914)	387	2,348	50	597	655	1,619	(1,144)
Interest Income	(711)	(110)	(49)	(86)	(15)	(3)	(5)	(10)	(9)	(12)	(19)	(18)
Interest Expense	1	333	1,741	0	1	2	330	375	433	442	492	590
Foreign currency exchange loss (gain), ne	(32)	(463)	1,481	104	(79)	(137)	(350)	663	135	388	295	422
Litigation Settlement	20,019											
Loss on Lease Exit Cost							347				347	
Acqisition Related Expenses							229				229	
Stock-Based Compensation Expense	269	611	6,586	105	109	125	271	456	667	2,455	3,008	3,837
Adjusted EBITDA	3,561	15,379	17,525	(411)	373	7,091	8,327	1,804	4,688	5,542	5,491	2,998
Revenue	57,883	92,839	127,950	17,988	19,137	25,095	30,619	24,272	30,408	34,376	38,893	35,064
Adjusted EBITDA % of Revenue	*6%*	*17%*	*14%*	*-2%*	*2%*	*28%*	*27%*	*7%*	*15%*	*16%*	*14%*	*7%*

Overview of Our Key Business Components

Revenue Components	Background
Instruments	• Our instrument revenue primarily consists of sales of our Aurora and Northern Lights and Cell Sorter systems, instrument accessories, such as loaders • We offer multiple versions of our Aurora and Northern Lights and Cell Sorter systems with different price points based on the number of lasers integrated in the systems • We also derive revenue from sales of our conventional flow cytometry system, which is available for sale in China • We recognize product revenue when control of the instrument is transferred to the customer
Reagents / Applications	• We currently offer and are developing an additional range of kits and single vial reagents for both the Clinical and RUO (human & mouse) markets. • As a full flow cytometry solutions provider, we are aggressively expanding our reagent offering of kits, single vial reagents, and paid panel design, support, and validation services to meet our customers' needs and to drive the continued and expanded adoption of our superior technology into both the Clinical and RUO markets.
Software	• Our software is integrated into our instruments free of charge
Services	• Our service revenue primarily consists of post-warranty service contracts, installations and repairs which are recognized over time • Post-warranty service contracts are recognized ratably over the term of the contract and installations and repair services are recognized as they are delivered to the customer