



Cytek® Northern Lights™ System

Say Hello to a New Reality

Meet Cytek® Northern Lights™:

A new flow cytometry system that shifts the paradigm in what scientists expect to see in performance from an affordable three-laser system.

The Cytek® Northern Lights™ system incorporates the same groundbreaking technologies as its older sister, the Cytek® Aurora system. Like the Cytek® Aurora system, its optical design and unmixing algorithm give scientists remarkable flexibility, enabling the use of a wide array of new fluorochrome combinations without reconfiguring the system for each application. The state-of-the-art optics and low-noise electronics provide excellent sensitivity and resolution. Flat-top laser beam profiles, combined with a uniquely designed fluidics system, translate to outstanding performance at high sample flow rates.

The end result is a system that sits in a sweet spot for scientists that have budgeted for a one to three laser system, but desire the ability to run panels of higher complexity.

SpectroFlo® software offers an intuitive workflow from quality control to data analysis with technology-enabling tools that simplify running applications.

The Cytek team has reimaged what you should expect from an affordable cytometer and has delivered an instrument that brings the benefits of full spectrum cytometry to more scientists.

➤ High Value

Reconfigurable from one laser and nine colors to three lasers and 24 colors, there is a Cytek® Northern Lights™ system configuration to fit your needs.

➤ Remarkable Sensitivity

Sensitivity redefined using state-of-the-art optics and low-noise electronics.

Superb resolution of dim and rare populations, even in high complexity panels and high flow rates.

➤ Easy, Flexible, and Intuitive

One configuration for all assays - no need to change optical filters.

Use any commercially available fluorochrome excited by the onboard lasers.

Intuitive software with familiar workflow.

➤ Low Cost of Ownership

Fewer lasers to run more colors.

Low maintenance lasers, more fluorochrome choice, one configuration, and up to 24 colors per sample equates to **greater cost savings and less setup time between experiments.**

Application Flexibility For More Users

The revolutionary technologies on board the Cytek® Northern Lights™ system enable capabilities usually seen in much pricier systems. With its onboard 100mW 405nm laser (available on select configurations) and highly sensitive violet side scatter detector, particles nearing 100nm in size can be analyzed. The Cytek® Northern Lights™ system opens the door to a wide variety of small particle applications. For those challenging applications involving highly autofluorescent particles, let the software's autofluorescence extraction tool bring new levels of resolution.

Small Particle Detection

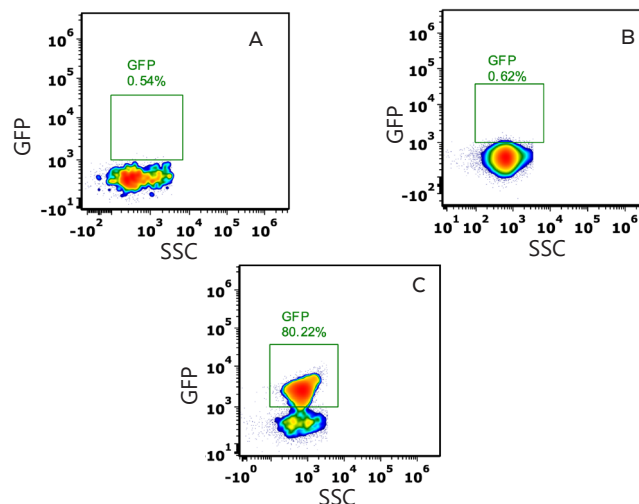
Example: ViroFlow

Murine Leukemia Virus (MLV-124 nm ±14 nm) genetically engineered to express superfolder GFP (sfGFP) as a fusion protein with the viral envelope glycoprotein.

The plots on the right show:

- A) Buffer only
- B) MLV with no sfGFP (MV-M-Zero)
- C) MLV with sfGFP-Env (MV-M-sfGFP)

All samples were run on a three-laser Cytek® Northern Lights™ system using violet SSC as a threshold trigger. Virus reference particles were provided by ViroFlow Technologies (www.viroflowtechnologies.com).

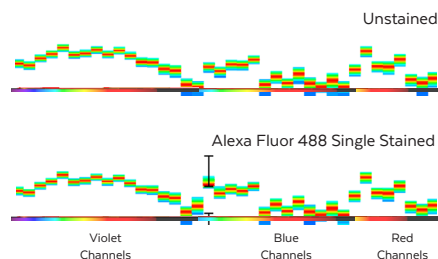


Data analyzed using FCS Express™ 6 by De Novo Software.

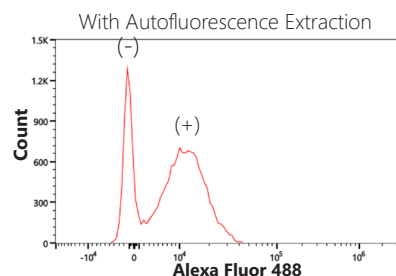
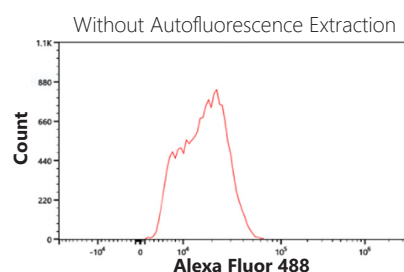
Autofluorescence Extraction

Example: PrimeFlow™ RNA Assay

Human U937 cells were subjected to the PrimeFlow™ RNA Assay. The cells underwent a series of hybridization steps to label mRNA for HMBS, a low expressed gene (~10 copies/cell), with Alexa Fluor® 488. The sample was run on the Cytek® Northern Lights™ system and analyzed using SpectroFlo® software with two different strategies, one with autofluorescence extraction and one without.



Spectrum plots of unstained and Alexa Fluor 488 stained cells acquired on the Cytek® Northern Lights™ system. Note that the two spectra heavily overlap.



Due to high autofluorescence, separation of negative and positive signals was marginal (upper histogram). Autofluorescence extraction greatly improved the resolution of the two cell populations (lower histogram).

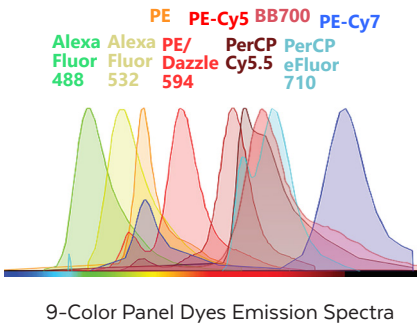
PrimeFlow™ is a trademark of Thermo Fisher Scientific.

The Power of Full Spectrum Cytometry

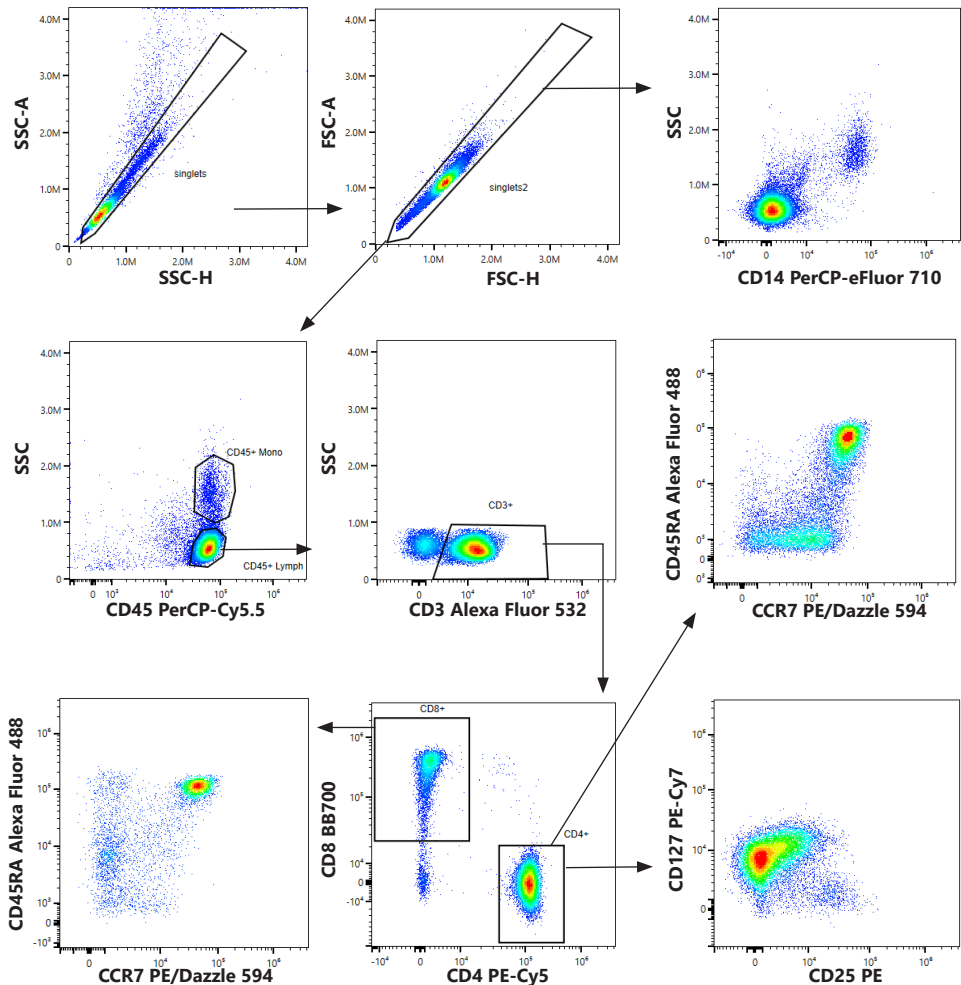
9-Color Blue Laser Panel

Peripheral blood mononuclear cells (PBMCs) were thawed, stained, washed, and analyzed on a one-laser Cytek® Northern Lights™ system. In this nine color blue laser excitable dyes panel, monocytes and several CD4 T cell and CD8 T cell subsets were easily identified. Markers and fluorochromes used in this assay are summarized in the table below.

SPECIFICITY	FLUOROCROME
CD45RA	Alexa Fluor® 488
CD3	Alexa Fluor® 532
CD25	PE
CCR7	PE/Dazzle™ 594
CD4	PE-Cy™5
CD45	PerCP-Cy™5.5
CD8	BD Horizon™ BB700
CD14	PerCP-eFluor® 710
CD127	PE-Cy™7



Full spectrum cytometry opens a wide range of new possibilities. The Cytek® Northern Lights™ system allows scientists to run complex multicolor experiments with as few as one or two lasers. The unique optical system enables the use of dyes with highly overlapping peak emissions without sacrificing resolution, translating to more flexibility in dye choice. Only one configuration is used for all applications, saving time in experimental setup, and minimizing the chance for experimental error. Experiments on the following pages are examples of what is possible with the Cytek® Northern Lights™ system:



24 Colors With Three Lasers...Is it Possible?

The optical design combined with the unmixing capability in SpectroFlo® software allows greater fluorochrome choice, panel flexibility, and easy setup without having to change filters. The three-laser configuration provides outstanding multi-parametric data for a wide array of applications. Markers and fluorochromes in a 24-color panel designed for identification of circulating cell subsets in human peripheral blood are summarized in the table below:

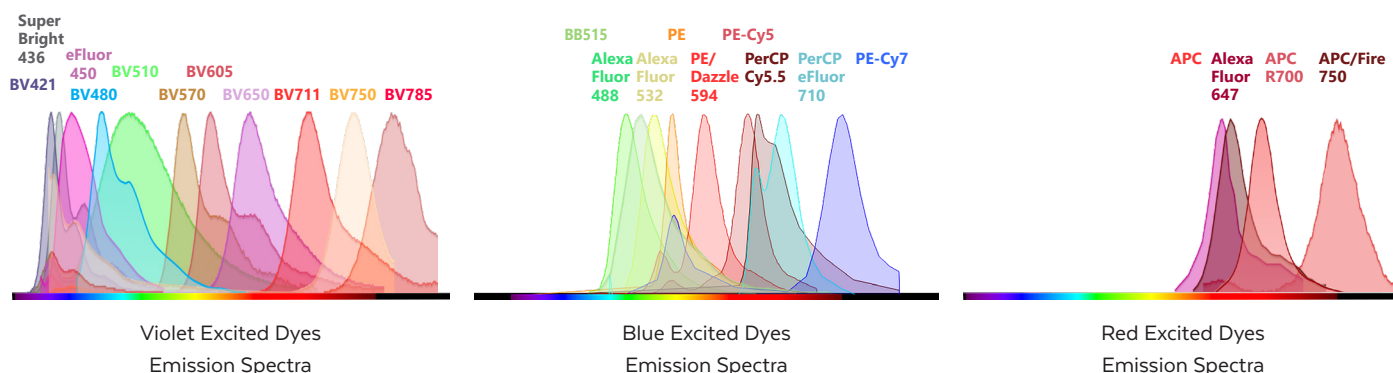
SPECIFICITY	FLUOROCHROME	SPECIFICITY	FLUOROCHROME	SPECIFICITY	FLUOROCHROME
CCR7	Brilliant Violet 421™	CD11c	BD Horizon™ BB515	CD27	APC
CD19	Super Bright 436	CD45RA	Alexa Fluor® 488	CD123	Alexa Fluor® 647
CD16	eFluor® 450	CD3	Alexa Fluor® 532	CD127	BD Horizon™ APC R700
TCR γδ	BD Horizon™ BV480	CD25	PE	HLA DR	APC/Fire™ 750
CD14	Brilliant Violet 510™	IgD	PE/Dazzle™ 594		
CD8	Brilliant Violet 570™	CD95	PE-Cy™5		
CD1c	Brilliant Violet 605™	CD11b	PerCP-Cy™5.5		
PD-1	Brilliant Violet 650™	CD38	PerCP-eFluor® 710		
CD56	Brilliant Violet 711™	CD57	PE-Cy™7		
CD4	Brilliant Violet 750™				
CD28	Brilliant Violet 785™				

24-COLOR DATA



On the next page, this 24-color panel is demonstrated in a healthy donor using a whole blood lyse wash sample preparation.

The 24-Color Panel Includes Many Highly Overlapping Dyes:

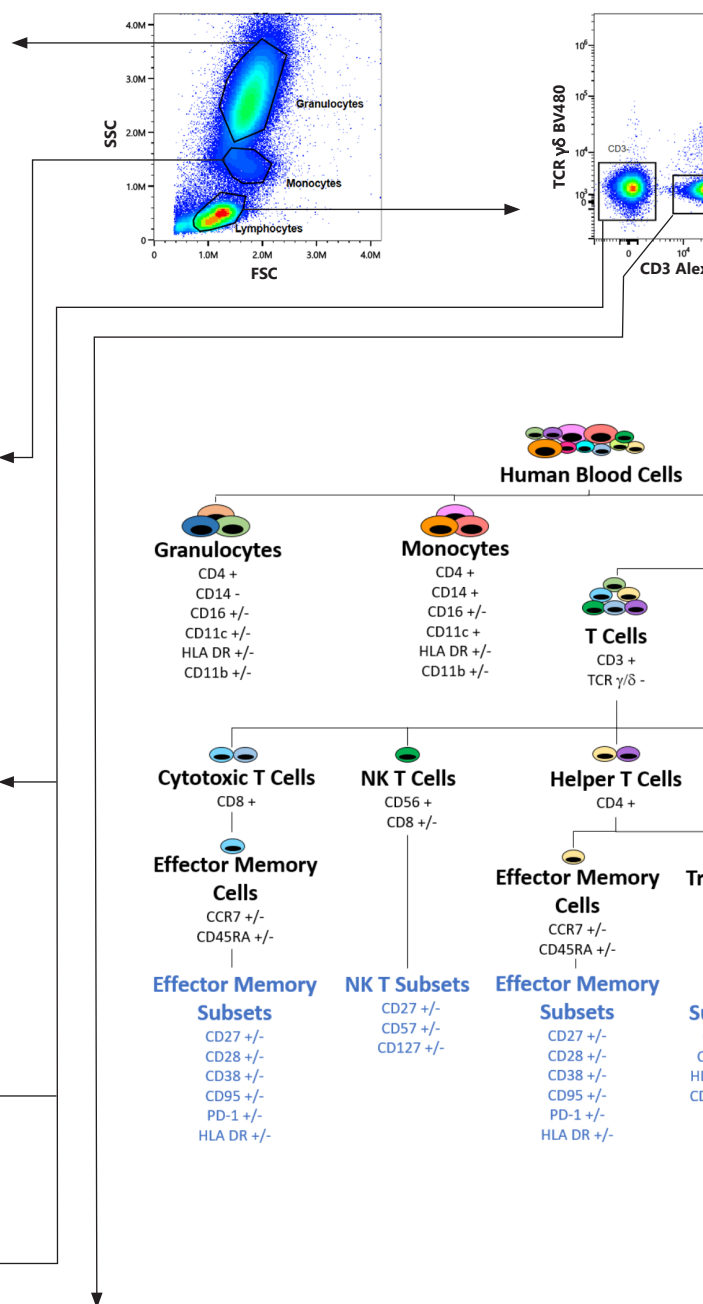
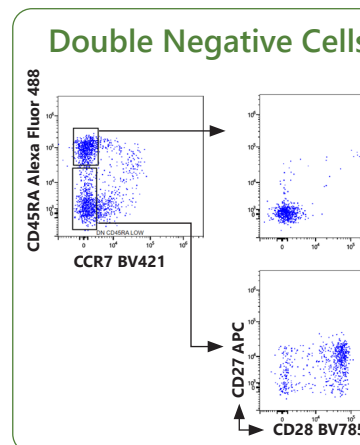
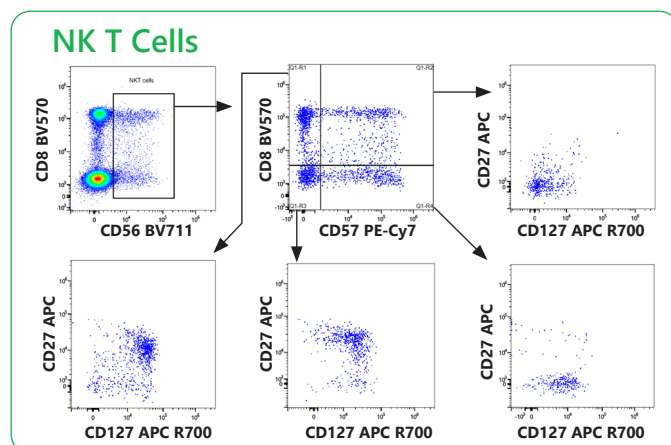
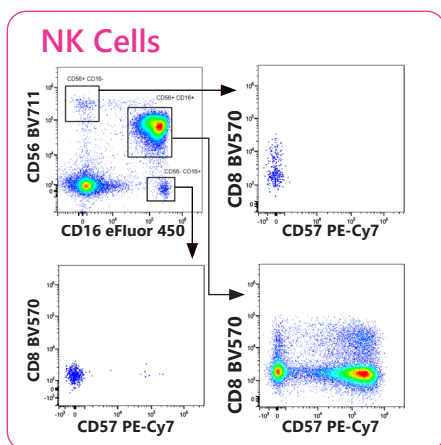
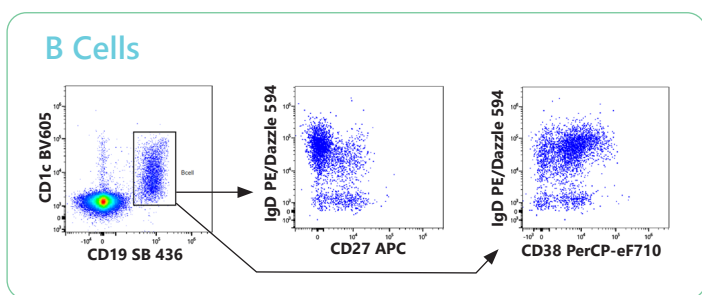
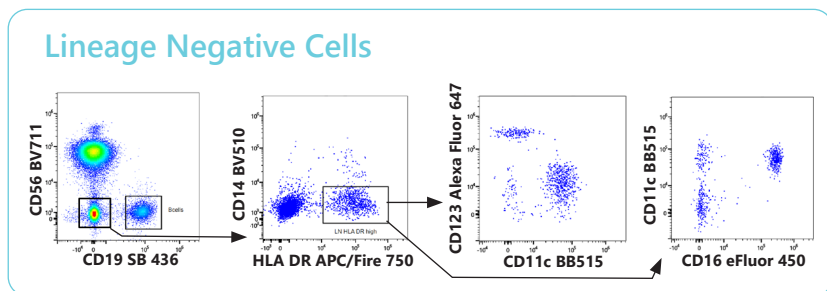
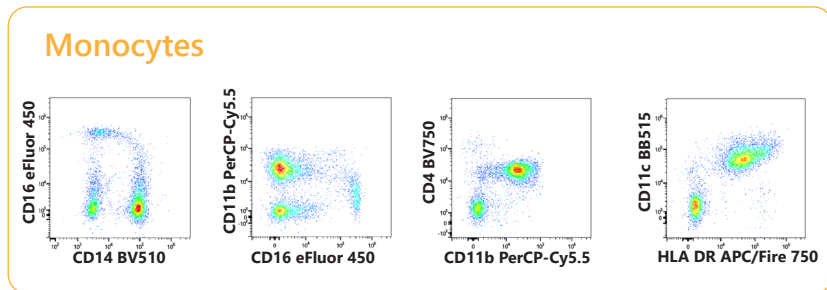
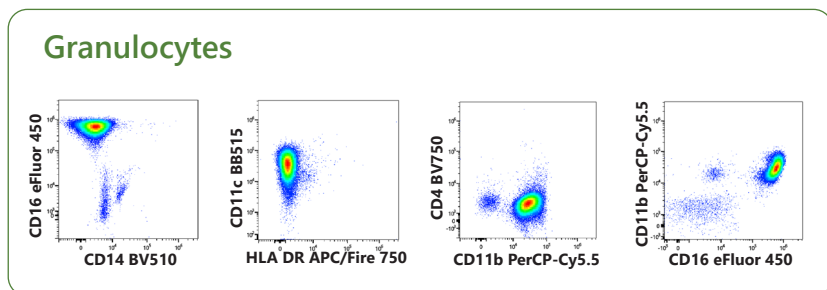


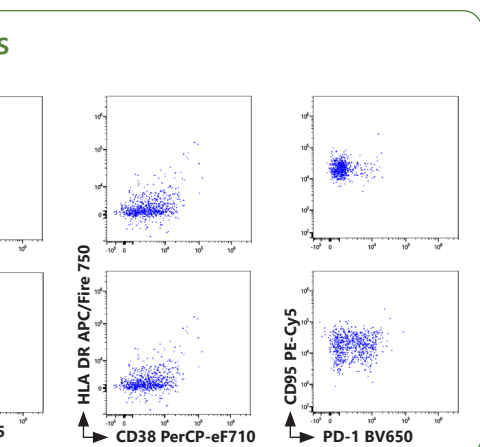
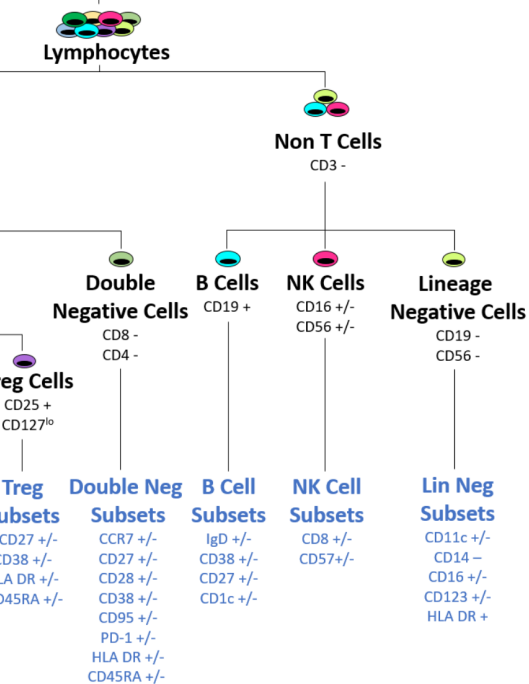
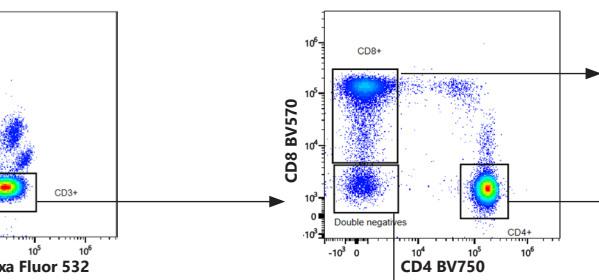
APC/Fire™ and PE/Dazzle™ are the trademarks and property of BioLegend, Inc.
Brilliant Violet™ is a trademark of Sirigen Group Ltd.
BD Horizon™ and Brilliant Blue (BB) are trademarks of BD Biosciences.
Alexa Fluor®, eFluor®, and Super Bright are trademarks of Thermo Fisher Scientific.
Cy® and CyDye® are registered trademarks of GE Healthcare

Allophycocyanin (APC) conjugates: US Patent No. 5,714,386
PE-Cy7: US Patent Number 4,542,104.
APC-Cy7: US Patent Number 5,714,386.
Trademarks are the property of their respective owners.

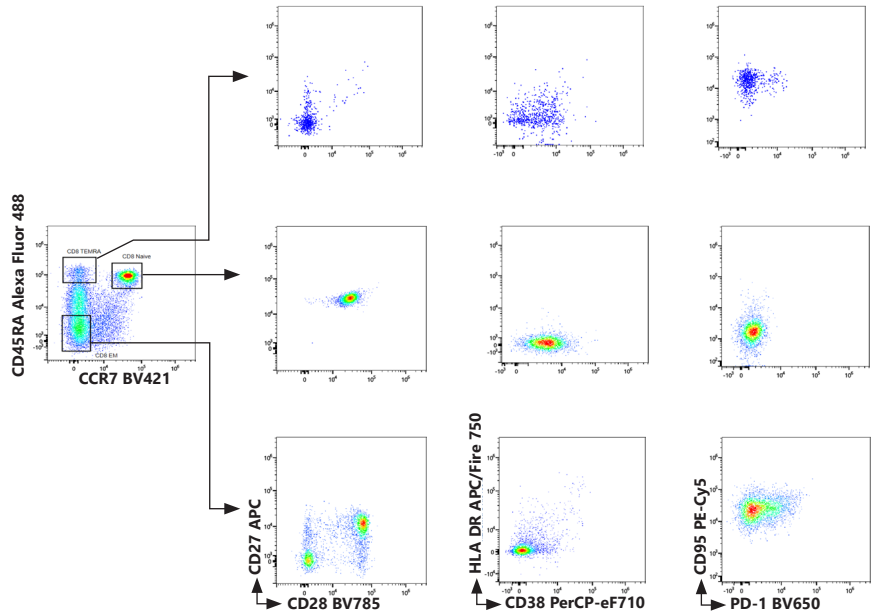
A New Reality:

3 Lasers, 24 Colors, Unparalleled Resolution

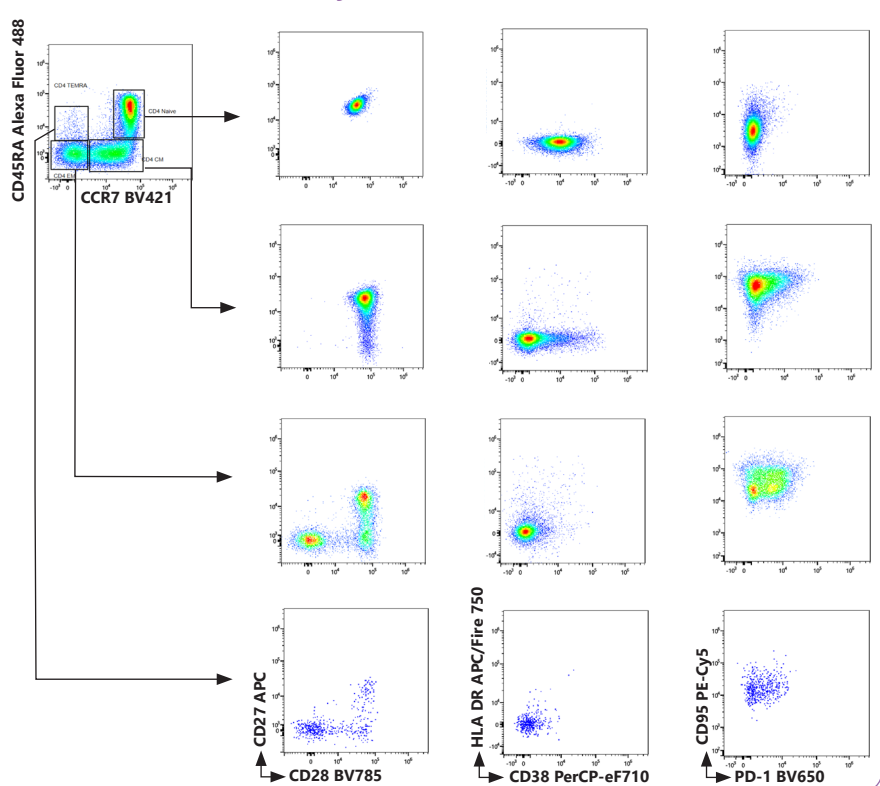




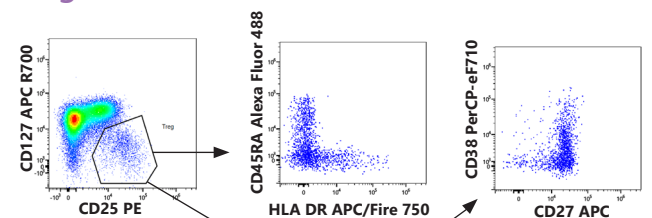
CD8+ Effector Memory Cells



CD4+ Effector Memory Cells



Treg Cells



Fluorescent Proteins and Challenging Dye Combinations

The detection of some fluorescent protein or fluorochrome combinations by conventional flow cytometry presents a challenge due to high amounts of spectral overlap (Figures 1, 4). The Cytek® Northern Lights™ system addresses this challenge by using differences in full emission spectra signatures across all lasers to clearly resolve these combinations, even if the populations are co-expressed (Figures 2, 3, 5 and 6).

Example 1: GFP and YFP

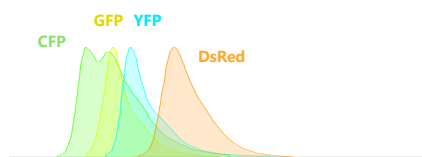


Figure 1: Spectrum plots from a conventional spectrum viewer shows heavy overlap between GFP and YFP.

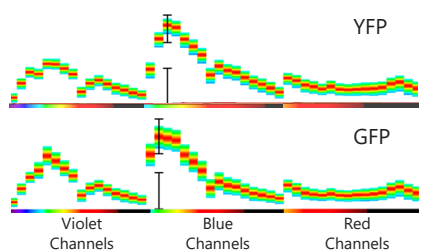


Figure 2: Spectrum plots from the Cytek® Northern Lights™ system show distinct signatures across three lasers.

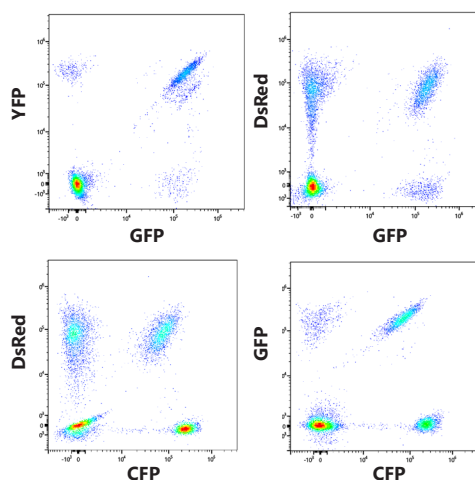


Figure 3: Sp2/O cells were transfected with GFP, YFP, CFP and/or DsRed (alone or in combination) and run on the Cytek® Northern Lights™ system (plots are gated on FSC vs SSC). Each population is clearly identified.

Example 2: Qdot 705 and BV711

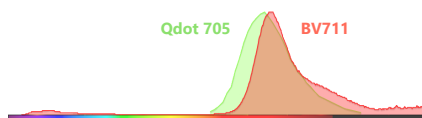


Figure 4: Spectrum plots from a conventional spectrum viewer shows heavy overlap between Qdot 705 and BV711.

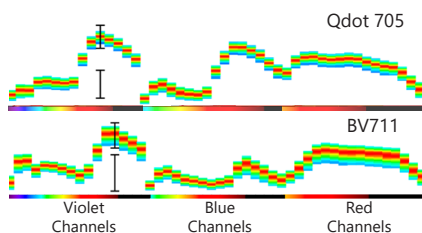


Figure 5: Spectrum plots from the Cytek® Northern Lights™ system show distinct signatures for Qdot 705 and BV711.

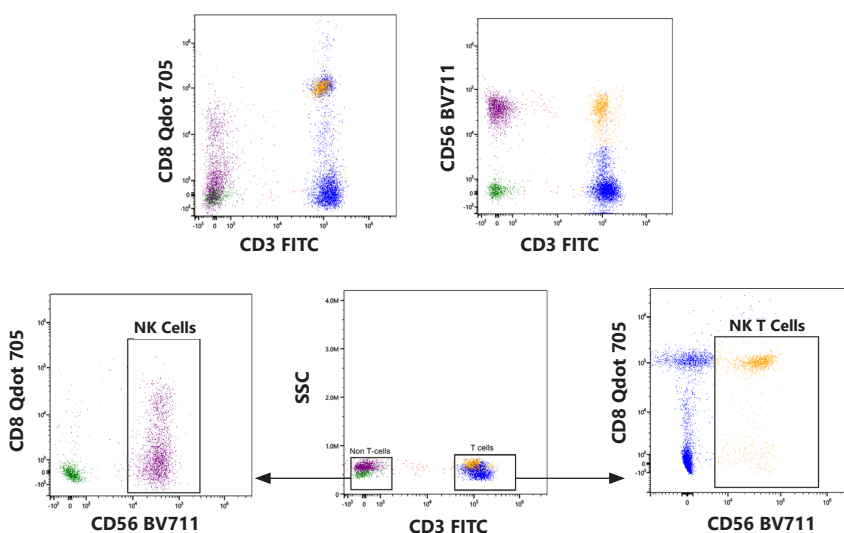


Figure 6: Normal human whole blood was stained, lysed, washed, and analyzed on the Cytek® Northern Lights™ system. Subsets of NK and NK T cells that co-express CD56 BV711 and CD8 Qdot 705 were easily identified.

Get to Know Our New Automated Sample Loader (ASL)



Meet the ASL

The ASL offers more versatility when running your samples at high-throughput. In addition to acquisition from 96-well plates, the ASL is compatible with 96-deep well plates and 40 tube-racks. For each carrier type, Cytek has provided preset mixing speeds and frequencies, which are also fully customizable to meet your individual experimental requirements. The ASL is designed to streamline experimental workflows and integrates seamlessly into the Cytek® Northern Lights™ system.

➤ Reliable and flexible

Reliable acquisition from 96-well plates, 96-deep well plates, and 40-tube racks to improve lab productivity.

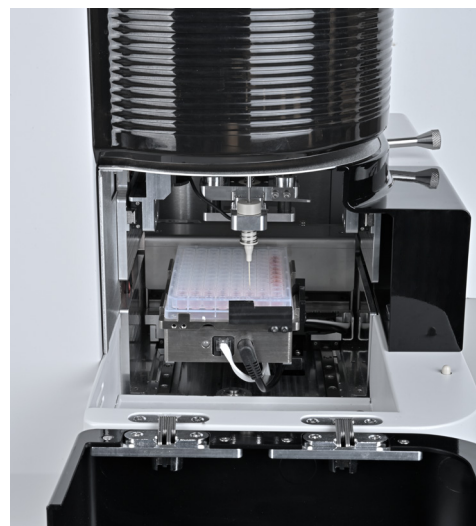
Flexible and effortless transition from plates to tubes in a matter of seconds.

➤ Low carryover, high throughput

Three throughput modes optimized for 40-tube racks and for each plate type.

➤ User customizable modes

Fully customizable with different mix speeds and timing to fit a variety of applications and workflow.



SpectroFlo® Software Guided Workflows

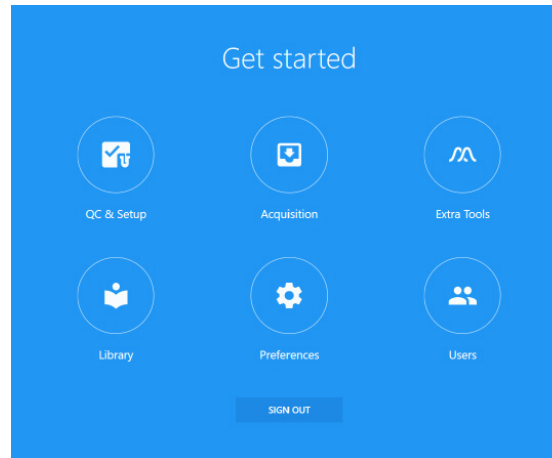
The SpectroFlo® software offers an intuitive workflow from quality control (QC) to data analysis with technology-enabling tools that simplify running any application.

QC and Setup:

Run Daily QC to monitor instrument performance and add reference controls.

Library:

Add or remove experiment templates, worksheet templates, fluorochrome information, QC bead information, and more.



Extra Tools:

Unmix data using controls from different experiments or apply virtual filters to your data.

Users:

For administrative controls.

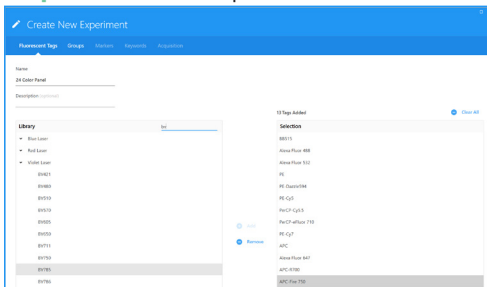
Preferences:

Customize the software appearance. Set default plot sizes, text sizes and fonts, gate colors, print layout, statistics table options, and more.

Experiment Workflow:

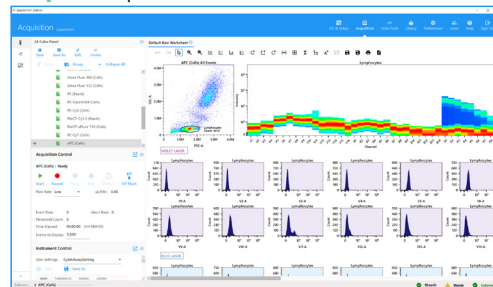
From the Acquisition menu, you can start a new experiment and get to your data in four simple guided steps.

Step 1: Create Your Experiment



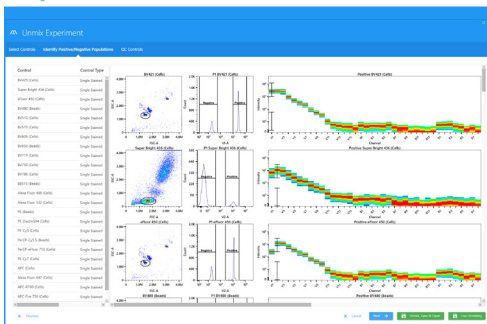
Create your experiment, choose fluorochromes, and add labels, tubes, worksheets, and stopping criteria in this guided workflow.

Step 2: Acquire Your Tubes



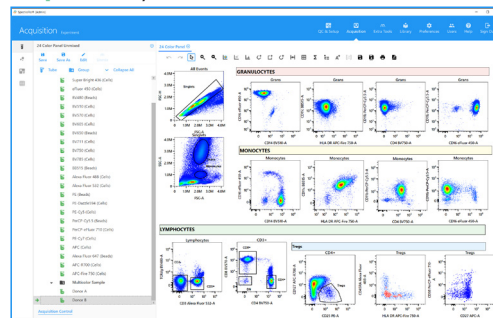
Load and run your tubes.

Step 3: Unmix Your Data



Visualize your reference control spectra with the unmixing wizard.

Step 4: Analyze Your Unmixed Data



Create an analysis worksheet and save it as a template to reuse and share with others.

Specifications

Optics

EXCITATION OPTICS

OPTICAL PLATFORM

Fixed optical assembly configured with one to three spatially separated laser beams. Laser delays are automatically adjusted during instrument QC.

LASERS

One laser configuration: 488 nm: 50 mW

Two laser configuration (B/R):

488 nm: 50 mW, 640 nm: 80 mW

Two laser configuration (V/B):

405 nm: 100mW, 488 nm: 50 mW

Three laser configuration:

405 nm: 100 mW, 488 nm: 50 mW, 640 nm: 80 mW

BEAM GEOMETRY

Flat-top laser beam profile with narrow vertical beam height.

EMISSION OPTICS

EMISSION COLLECTION

Fused silica cuvette coupled to high Numerical Aperture (NA) lens for optimum collection efficiency to optical fibers.

FORWARD AND SIDE SCATTER DETECTION

FSC: High-performance semiconductor detector with 488 nm bandpass filter.

SSC: Two high-performance semiconductor detectors with 405 nm and 488 nm bandpass filter. Note: 405 nm side scatter only applies to systems with the violet 405 nm laser.

NOTE: 405 nm side scatter only applies to systems with the violet 405 nm laser.

FLUORESCENCE DETECTORS

Proprietary high sensitivity Coarse Wavelength Division Multiplexing (CWDM) semiconductor array per laser enabling more efficient spectrum capture in the 420-829 nm range. No filter changes required for any fluorochrome excited by the 405 nm, 488 nm, and 640 nm lasers.

STANDARD OPTICAL CONFIGURATION

Violet detector module (only available in three laser configurations): 16 channels uneven spaced bandwidth from 420-829 nm.

Blue detector module: 14 channels uneven spaced bandwidth from 498-829 nm.

Red detector module: 8 channels uneven spaced bandwidth from 652-829 nm.

Fluidics

SAMPLE FLOW RATES

Low: 15 μ L/min, Medium: 30 μ L/min, High: 60 μ L/min, Plate high-throughput mode: 100 μ L/min

FLUIDIC MODES

Long clean, SIT flush, Purge filter, Clean flow cell

MANUAL SAMPLE INPUT FORMATS

12x75mm polystyrene and polypropylene tubes

STANDARD FLUIDIC RESERVOIRS

4L fluid container set with level-sensing provided.

Compatible with 20L sheath and waste cubitainers.

VOLUMETRIC SENSOR

Volumetric measurement during sample recording enables calculation of counts per μ L for any gated population without the need for counting beads.

PLATE LOADER OPTIONS: ASL AND AMS

Plate stage temperature: 4-30°C (AMS only)

HIGH THROUGHPUT SPEED

ASL: 27 min for 96-well plate

AMS: 35 min for 96-well plate

INPUT COMPATIBILITY

ASL: 96-well plate, 96-deep well plate,

40-tube rack (12 x 75 mm)

AMS: 96-well plate only

PLATE LOADER CARRYOVER

Default mode: $\leq 0.3\%$, Low Carryover mode: $\leq 0.1\%$,

High Throughput mode: $\leq 1\%$

Performance

FLUORESCENCE LINEARITY

FITC $R^2 \geq 0.995$ / PE $R^2 \geq 0.995$

FORWARD AND SIDE SCATTER

RESOLUTION

Performance is optimized for resolving lymphocytes, monocytes, and granulocytes.

SIDE SCATTER RESOLUTION

Capable of resolving 0.2 μ m beads from noise. Violet SSC detectors, together with a Flat-Top laser beam profile with narrow vertical beam height, helps support detection of small particles.

CARRYOVER

$< 0.1\%$ in manual tube mode.

DATA ACQUISITION RATE

35,000 events/sec

Three-laser system

Software

SPECTROFLO® SOFTWARE

Developed with multicolor assays in mind.

Streamlined workflows for experiment setup, data acquisition, and file export.

Automated QC module.

Live unmix during sample acquisition.

Extract autofluorescence from samples.

FCS 3.1 data file standards.

Electronics

SIGNAL PROCESSING

Digital signal processing with automatic window gate adjustment.

22-bit 6.5 log decades.

Threshold using any single parameter or combination of parameters.

PULSE SHAPE PARAMETERS

Pulse Area and Height for every parameter. Width for scatter parameters and one fluorescence parameter for each laser.

Workstation

Workstation specifications may vary between laser configuration

COMPUTER SPECIFICATIONS

Operating system: Windows® 11 Pro 64-bit

Processor: Intel® Core™ i7-10700 processor or equivalent

RAM: 16 GB

Hard drive: 1 TB SSD and 2TB SSD (secondary)

Video processor: NVIDIA® GeForce

MONITOR

32" UHD 4K Monitor

Installation Requirements

Dimensions (W x D X H)

INSTRUMENT DIMENSIONS

Without loader: 54 x 52 x 52 cm

With loader: 58 x 62 x 52 cm

INSTRUMENT WEIGHT

Instrument weight (3 lasers): 61 kg

Loader weight: 13 kg

RECOMMENDED WORKSPACE

165 x 76 x 132 cm

Room Requirements

POWER

100-140 VAC, 15 A or 200-250 VAC, 10 A

HEAT DISSIPATION

500W with all solid-state lasers

TEMPERATURE

15-28°C

HUMIDITY

20%-85% relative non-condensing

AIR FILTERING

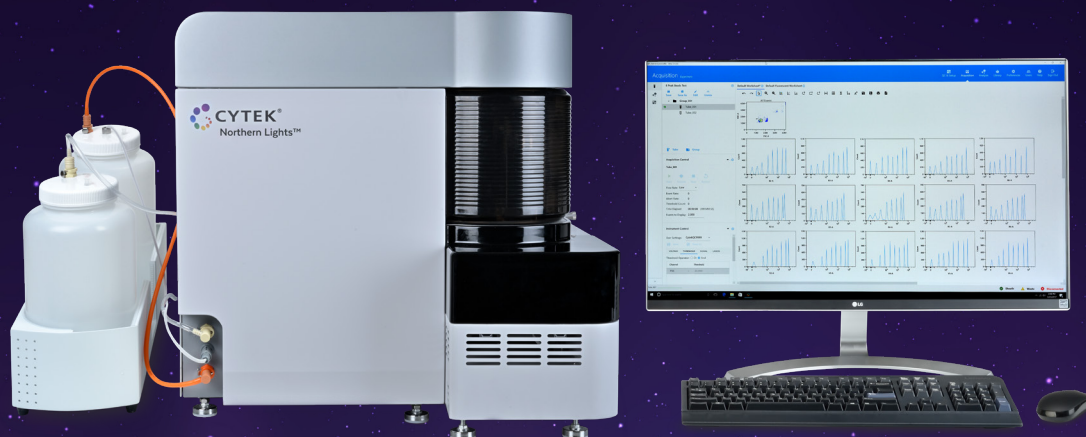
No excessive dust or smoke

LIGHTING

No special requirements

Regulatory Status

For Research Use Only. Not for use in diagnostic or therapeutic procedures.



Cytek Biosciences is dedicated to enhancing our customers' user experience. The Cytek® Northern Lights™ system is backed by our world-class service and support team that can provide phone or field-based assistance. Various levels of maintenance options are available to meet your needs now, and in the future.

For more information, email us at:
sales@cytekbio.com or call 1-877-922-9835

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International Innovation Park
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