The ZE5 Cell Analyzer offers the speed and enhanced reproducibility to enable new approaches as well as improvements on current protocols. The technology facilitates deeper characterization of cell populations and superior rare event analysis timelines. Offering significant expansion of capabilities over traditional flow cytometers, the ZE5 Cell Analyzer can advance flow cytometry for numerous applications.

**Unmatched speed and stability**

The ZE5 Cell Analyzer combines improved speed, enhanced electronics, and a cell laser transit time that is up to five times faster (Figure 1) than other systems to create a unique and indispensable cell analysis system for any lab. The ZE5 Analyzer can run at high speeds without compromising data quality due to enhanced fluidics that deliver a stable flow rate of up to 3.5 μl/sec. To match this rapid flow rate, the ZE5 Cell Analyzer’s faster laser transit time creates a shorter pulse width, which is then sampled two times more frequently than comparable systems. The increased sampling rate, coupled with fast, low-noise electronics, results in a tighter coefficient of variation (CV) and higher-resolution data (Figure 2).

The speed of the ZE5 Cell Analyzer enables more in-depth investigation and more specific analysis in applications such as identification of specific cell subsets undergoing apoptosis, real-time activation and proliferation of cells due to immune or drug response, or detection of cells in different stages of the cell cycle.
Analyze rare cell populations you could not study before

The ZE5 Cell Analyzer makes rare cell sorting possible with more detectors, greater speed, and minimal electronic noise levels.

More detectors
With up to five lasers and 30 detectors, the ZE5 Cell Analyzer easily improves upon standard assays, supports new panels, and is an excellent aid in difficult-to-study rare cell analysis. The option for multiple spatially separated lasers facilitates the study of highly complex samples. Numerous detectors expand options and allow for larger panels, enabling critical data acquisition of whole samples. No longer do samples need to be split, which increases the sensitivity of measurement.

Speed and stability
The blend of speed and stability found in the ZE5 Cell Analyzer is well suited for rare event analysis. In order to measure a cell found at a frequency of $1 \times 10^5$ cells, 40 million events need to be analyzed to collect 400 positive events (Figure 3). The analysis of 40 million events with a typical flow cytometer running 10,000 events per second is estimated at 150 minutes (2.5 hours) for a single sample. The ZE5 Cell Analyzer can acquire the same amount of data in less than 10 minutes. At 100,000 events per second, the ZE5 enables rapid and thorough analysis and characterization of even the rarest cell populations.

Minimal electronic noise
Low electronic noise allows identification of dim populations faster by increasing sensitivity of detection and incorporating higher resolution. The ZE5 Analyzer has less electronic noise on the low end than the BD FACSymphony Analyzer, which makes it easier to identify these dim populations (Figure 4).

Fig. 3. Fast acquisition for rare cells. Time to collect 400 positive events of a rare population ($1 \times 10^5$ cells) is plotted versus the speed of acquisition (events per second). Collecting 40 million events with a typical flow cytometer takes 150 minutes (2.5 hours) for a single sample. The ZE5 Cell Analyzer can acquire data at up to 100,000 events per second.

Fig. 4. Reduced noise for easier detection. Two-peak beads (Spherotech) were run on a ZE5 Cell Analyzer and BD FACSymphony Cell Analyzer (BD Biosciences). FlowJo Software was used to determine the median and robust SD for the peak at each voltage and for FITC. ZE5 Cell Analyzer (- - - -), BD FACSymphony Analyzer (- - - -).
**Study small samples with ease**

The ZE5 Cell Analyzer has small particle detection capability (FSC from the 405 nm laser), permitting analysis of difficult-to-study samples such as exosomes, which are generally smaller than 250 nm (Figure 5). Exosomes are extracellular vesicles (EVs) that have been implicated in intracellular communication and are a key area of interest in disease research. Conventional exosome analysis using flow cytometry can require manual hardware adjustments of crucial steps reduces potential contamination, thus removing a primary source of data variation (Figure 6), and provides you results you can trust.

**Obtain better reproducibility with no carryover**

Conventional flow cytometry requires manual washing of the probe between samples to reduce sample to sample carryover. The ZE5 Cell Analyzer automates this activity with its flying collar wash feature that automatically washes the probe between samples. Automation of crucial steps reduces potential contamination, thus removing a primary source of data variation (Figure 6), and provides you results you can trust.
Get great resolution and reproducibility
The low-noise electronics on the ZE5 Cell Analyzer also contribute to great resolution and consistent, reproducible data even at the high speeds only the ZE5 Cell Analyzer can achieve (Figure 7).

Fig. 7. Robust reproducibility. Whole blood was lysed and stained with CD45-Alexa Fluor 488/CD3-BV421/CD8-APC-Cy7. 20,000 events were acquired per run to evaluate various population percentages over multiple event rates.

Publish, don't re-run experiments
The ZE5 instills confidence in results and enables quicker experiment to publication time. With reduced carryover, faster speed of acquisition, and multiple parameters, the ZE5 Cell Analyzer supports the robust exploration of novel assays while improving the quality and reproducibility of ongoing experiments.

FACSymphony is a trademark of Becton Dickinson and Company. FlowJo is a trademark of FlowJo, LLC. Alexa Fluor is a trademark of Life Technologies Corporation. Cy is a trademark of GE Healthcare.