
# BD Rhapsody™ Single-Cell Analysis System and BD Rhapsody™ Express Single-Cell Analysis System

BD

# A robust, high-throughput microwell based single-cell partitioning system for reliability in single-cell workflows

The BD Rhapsody™ Single-Cell Analysis System allows high-throughput capture of multiomic information from single cells using a simple cartridge workflow and a multitier barcoding system. The resulting captured information can be used to generate various types of next-generation sequencing (NGS) libraries. NGS libraries are sequenced and analyzed to provide high-dimensional resolution of single cells.

## Trust the BD Rhapsody™ System with your precious samples

### Microwell technology

- No sample loss due to clogging of channels
- No electronics, portable
- 575 µL cells suspension loading volume

### Visual workflow QC

Confidence with every experiment

Up to **80** % cartridge capture rate
for certain cell types

Low multiplet rate
2–3% @ 10,000 cell load
8–10% @ 40,000 cell load

### Broad range of cell throughput

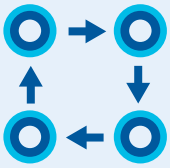
**100–40,000** cells per cartridge

### Capture and analyze fragile cells

Granulocytes, neutrophils, CAR-T cells, stem cells, tumor xenograft-derived cells, myeloma, T cells, NK cells and more

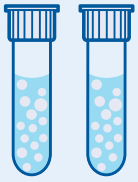
### Minimal batch effects*

Consistent, reliable results with technical, biological, site-to-site and user-to-user replicates



### High correlation with flow data

The same trusted BD antibodies for flow and single-cell multiomics



### Subsample beads

Flexibility with experimental design, tool to measure reliability, work with collaborators

### Archive beads

Equivalent data obtained from fresh beads and beads stored for several months

*Results may vary based on sample type and experimental conditions.

# Simple, streamlined workflow for success with your experiments

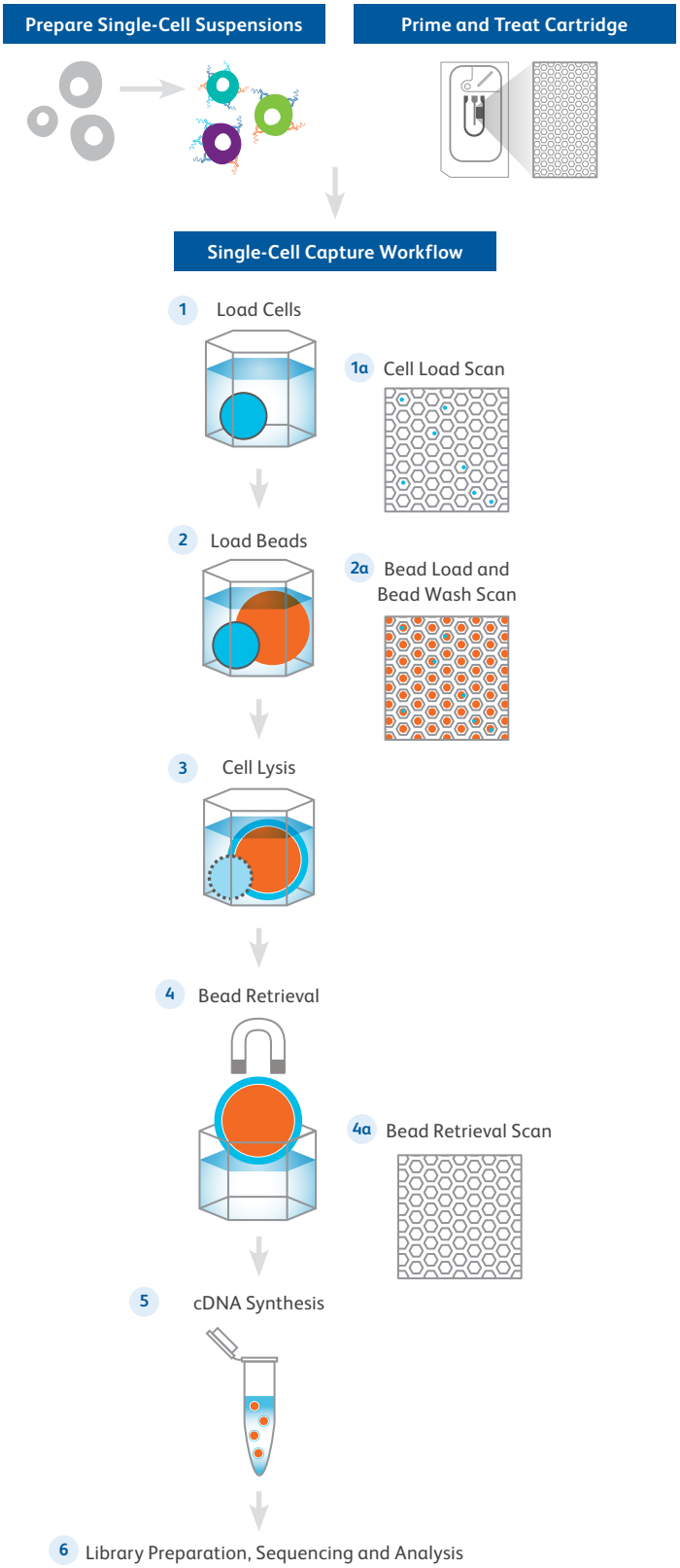



**Figure 1. The BD Rhapsody™ System workflow**

## Prepare Single-Cell Suspensions

- Cells can be stained with the BD® Single-Cell Multiplexing Kit and/or BD® AbSeq Ab-Oligos

## Prime and Treat Cartridge

- Automated pipettes for fluidic exchanges

## Single-Cell Capture Workflow

### 1 Load Cells

- Load 575 µL cell suspension
- Clogging of channels are not a concern as there are no microfluidic channels
- Gentle settling of cells by gravity allows capture of fragile cells
- The BD Rhapsody™ Cartridge contains >220,000 partitions for capture of up to 40,000 cells at a low multiplet rate

#### 1a Cell Load Scan

- Estimate the number of viable cells captured and the cell multiplet rate

### 2 Load Beads

- Geometry and dimension of the microwell prevents bead multiplets

#### 2a Bead Load and Bead Wash Scan

- Estimate the number of wells with a viable cell and a bead
- Measure cell retention rate to assess if cells have been lost

### 3 Cell Lysis

- Strong lysis buffers ensure complete lysis of cells

### 4 Bead Retrieval

- Easy, efficient magnetic retrieval of beads

#### 4a Bead Retrieval Scan

- Confirm complete retrieval of beads

### 5 cDNA Synthesis

- Multiple bead washes remove contaminants and allow for more effective reverse transcription
- Beads can be archived or subsampled for more experimental flexibility

### 6 Library Preparation, Sequencing and Analysis

- Bioinformatics solutions including the BD Rhapsody™ Analysis Pipelines and SeqGeq™ Software provide a complete end-to-end single-cell solution

# High cell capture and low multiplet rate across cell inputs

| Desired number of cells | Live cells loaded** | Viable cells captured in well with a bead | Capture rate |
|---|---|---|---|
| 40,000* | 52,352 | 43,432 | 0.83 |
| 20,000* | 26,176 | 22,949 | 0.88 |
| 10,000* | 13,088 | 11,789 | 0.90 |

*Mix of PBMC, Jurkat, Ramos and THP1 cells

**BD Rhapsody™ Scanner hemocytometer count

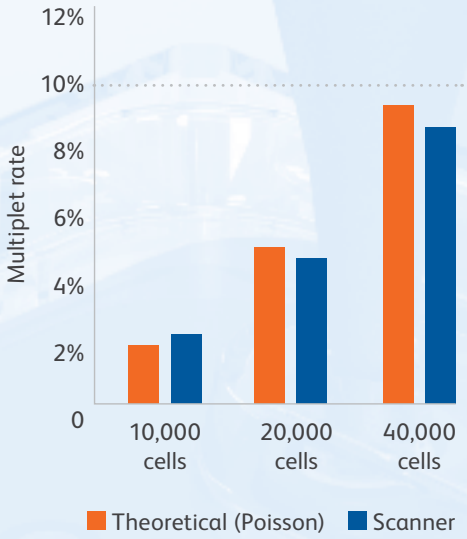
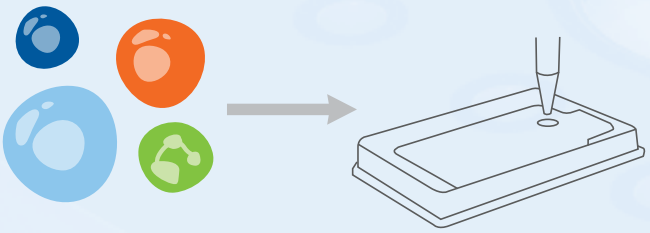



**Figure 2. A mix of PBMCs, Jurkat, Ramos and THP1 cells were loaded at 10,000, 20,000 or 40,000 cells per cartridge**

Cell capture rates were high and multiplet rates were low at all cell load concentrations. Results may vary based on cell type and isolation method.

# Cell types with disparate size and morphology recovered in similar proportion to input concentration



Neutrophils (10–14 µm)
K562 (16 µm)
Jurkat (11 µm)
BT549 (20 µm)

*Neutrophils isolated using negative magnetic enrichment

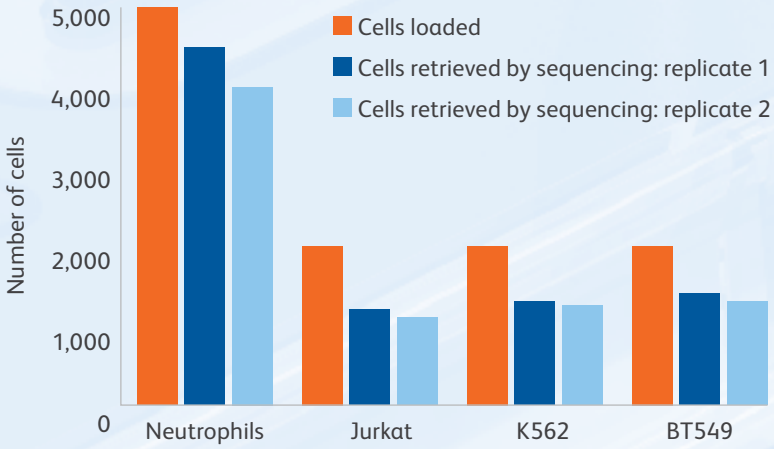



**Figure 3. Large, medium and small cells along with neutrophils were loaded into the cartridge at a given ratio (11,000 cells loaded at 2.5 neutrophils: 1 Jurkat: 1 K562: 1 BT549)**

The ratio of cells recovered from sequencing was compared, revealing that the cell types were recovered in similar proportions to those loaded into the cartridge despite different cell sizes, including neutrophils. Furthermore, cells were recovered in matched input ratios at sequencing indicating faithful capture of cells of different sizes and morphologies.

# Confidence in every experiment with visual workflow QC

The BD Rhapsody™ Scanner can be used to provide quality control measures at different stages of the workflow, such as cell capture rate and cell multiplet rate, by direct imaging. Scanner metrics can confirm quality of input cell sample and success of each step of the cartridge workflow; assess viability of cells until cells are lysed; and provide a reliable estimate of the number of cells retrieved by sequencing. This information gives users the power to change course and troubleshoot experiments, if necessary, before expensive downstream sequencing. These metrics allow users to track performance of workflows day to day or between various study sites.

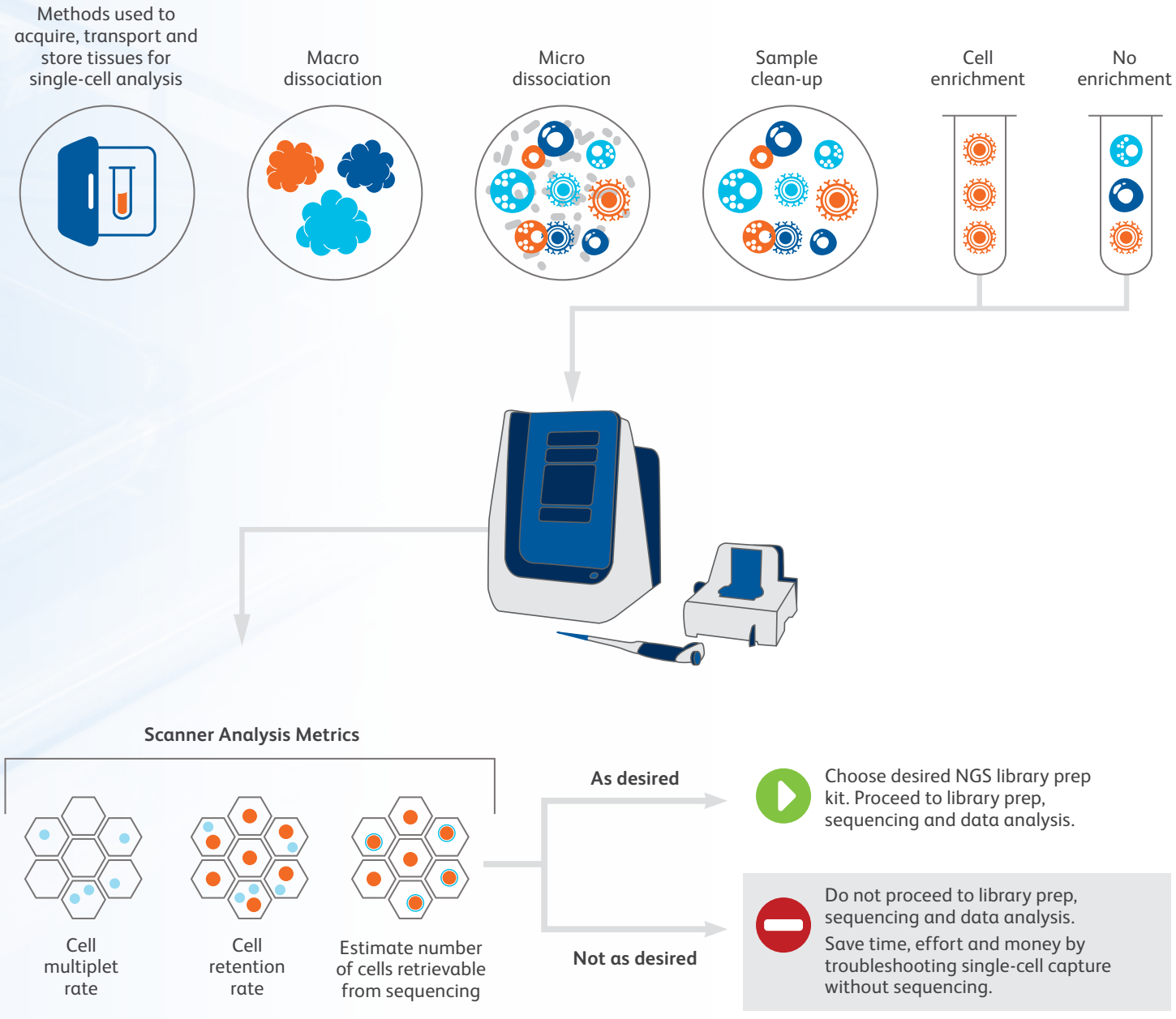
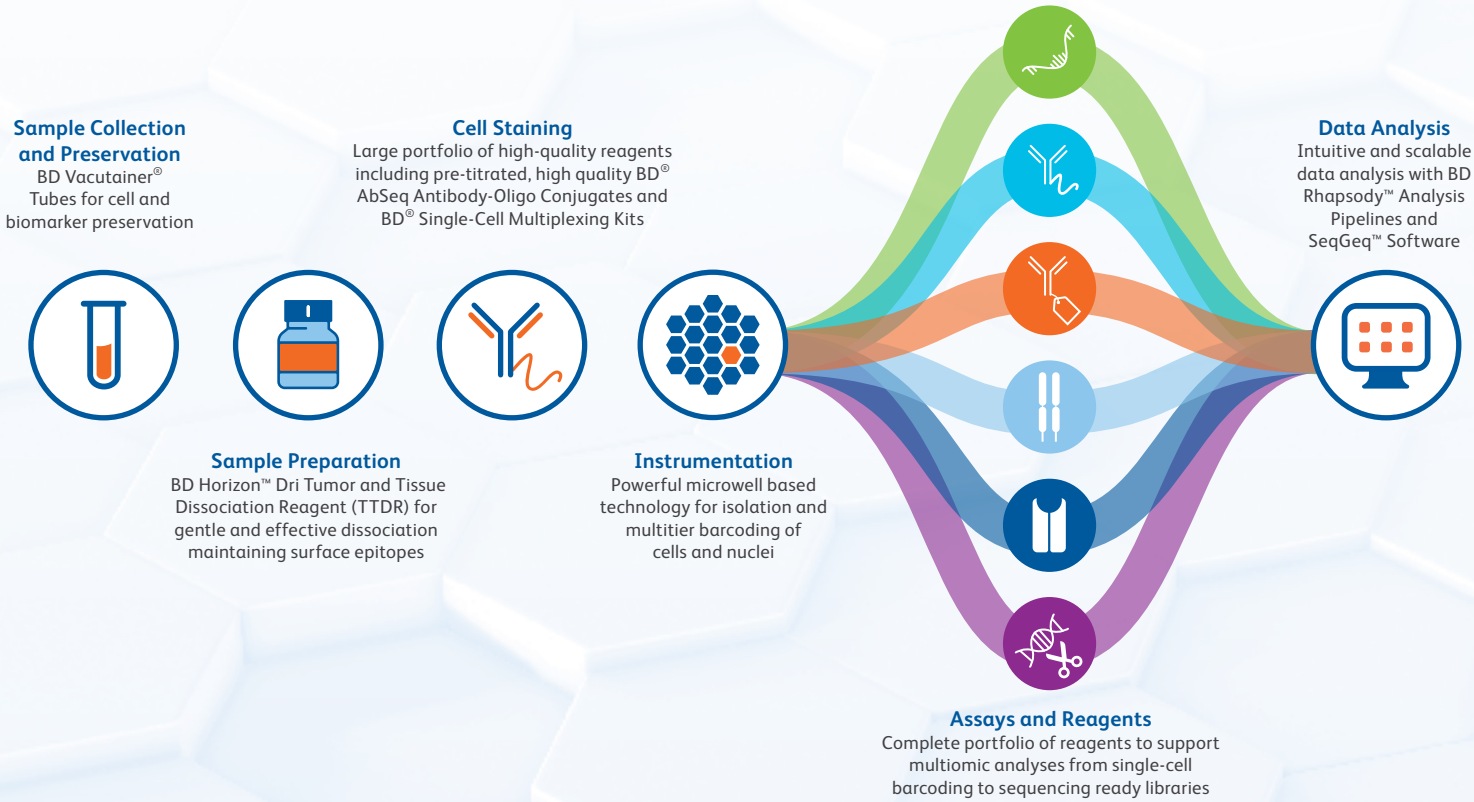



**Figure 4. Assess single-cell capture without sequencing**

To perform single-cell workflows, tissue samples must be processed into single-cell suspensions. The effect of single-cell preparation methods on viability, cell multiplet rates and cell capture can be quickly assessed using the BD Rhapsody™ Scanner without having to spend time and money on large sequencing experiments.

# A complete single-cell multiomics solution from your trusted partner in flow cytometry

From reagents required for cell multiplexing and staining to assays and bioinformatics tools, streamlined protocols and technical support, BD provides the tools you need to accelerate your discoveries using single-cell multiomic analysis.




## Optimized reagents and dedicated expertise

BD Rhapsody™ System reagents are designed and validated to work together so researchers can focus on addressing biological questions rather than spending time on removing technical hurdles to multiomic analyses.

BD® AbSeq Assays use the same antibodies that have been well studied in flow cytometry, allowing researchers to establish ground-truth and rapidly extend understanding of biological systems.

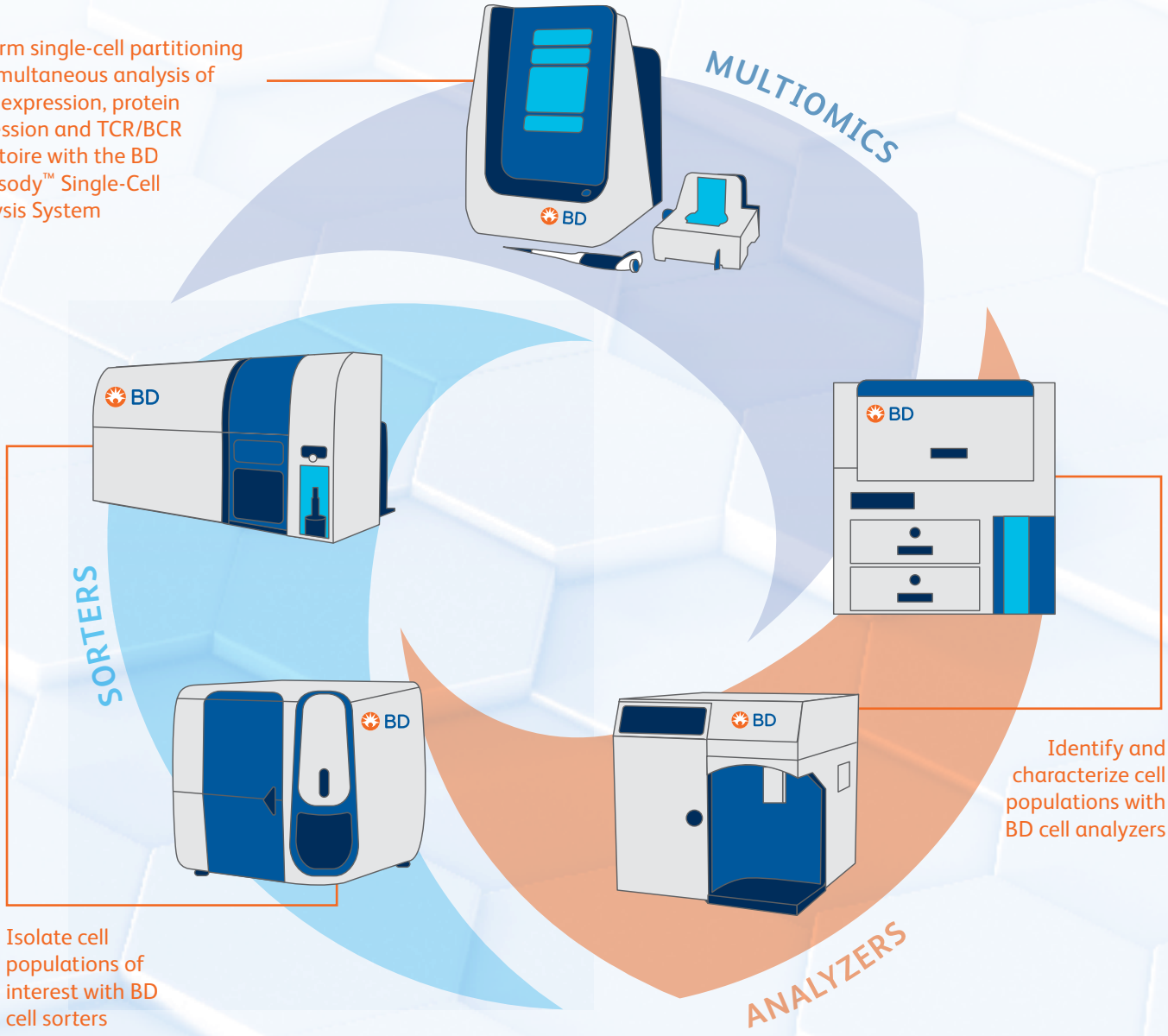
We continue to expand the breadth of our assay and reagent portfolio to support novel multiomic analyses. Our knowledgeable and dedicated, customer service team is available to provide assistance on all aspects of multiomic analyses.

- Targeted RNA-Seq/Whole Transcriptome Amplification
- Protein Expression Analysis
- Sample Multiplexing
- TCR/BCR Repertoire Analysis
- Antigen Specific T Cell Identification
- CRISPR Screening

# A continuous ecosystem for high-dimensional biology research

BD Biosciences flow cytometry instruments have enabled researchers to successfully conduct flow cytometry analysis for over 45 years. The BD Rhapsody™ System extends this capability and facilitates the analysis of thousands of genes and proteins simultaneously at the single-cell level.

Characterize cell populations with a high-parameter flow cytometry panel on a BD cell analyzer, transfer the same panel to a BD cell sorter for isolation of cell populations of interest, and perform further in-depth multiomic analysis of sorted cells on the BD Rhapsody™ System using the same well-characterized antibodies. Seamlessly harness data from one BD platform to the next to accelerate biological discoveries.



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