BD Rhapsody™ HT Single-Cell Analysis System

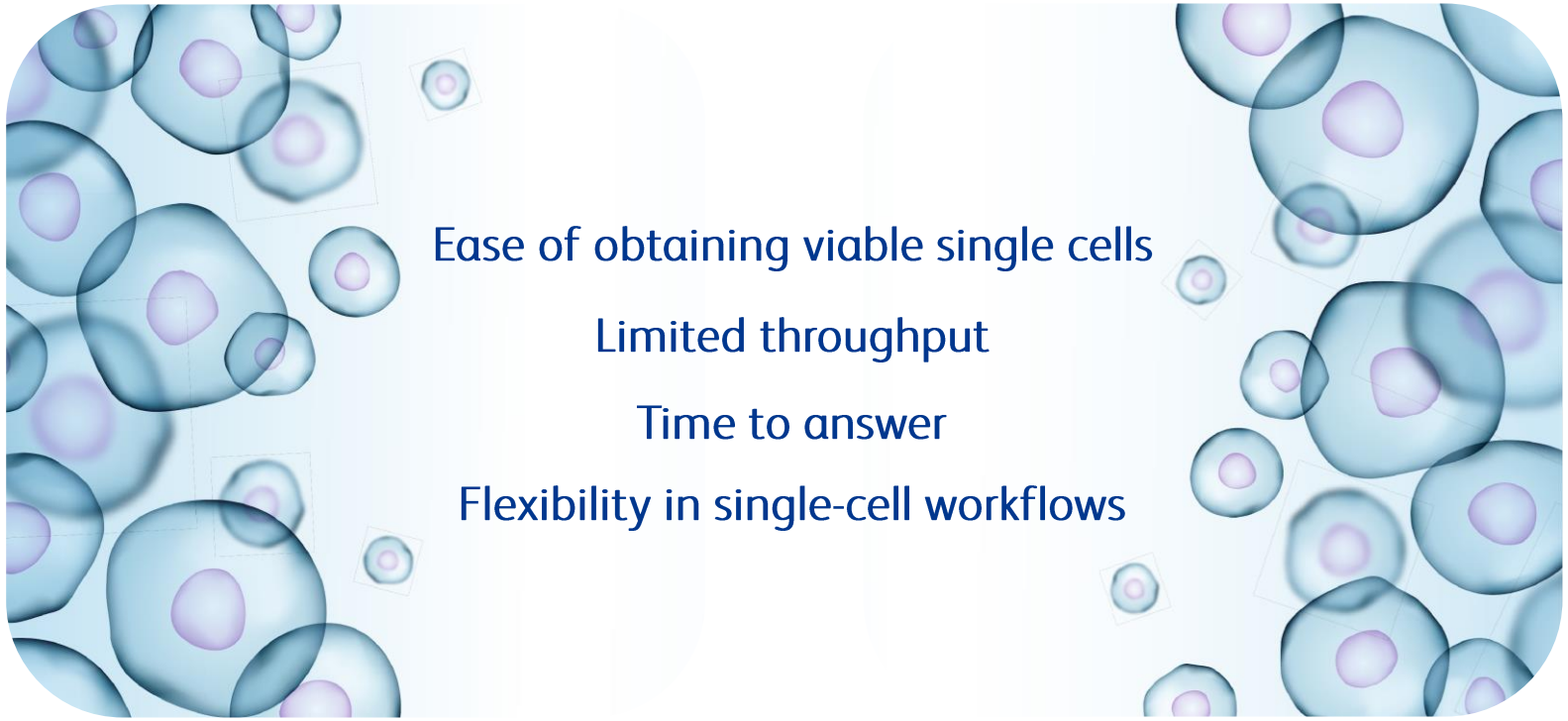
Fast track single-cell research without compromise

BD

Contents

Overview single-cell analysis

There are many factors that complicate the process of obtaining high-quality cellular information from hundreds of thousands of single cells:



Accelerate your single-cell research by gentle capture of a wide range of cell types with a higher-throughput system that uses a simple and streamlined workflow, without compromise to data quality

A complete single-cell multiomics solution

Instruments

BD Rhapsody™ HT Single-Cell Analysis System

Powerful microwell-based technology for isolation and multitier barcoding of cells and nuclei

Assays and reagents

BD Rhapsody™ Assays and Reagents

Support multiomic analysis from single-cell barcoding to sequencing ready libraries

- Sample multiplexing
- CITE-seq and protein expression
- Whole transcriptome or targeted gene expression
- Immune repertoire profiling

Data Analysis with BD Rhapsody™ Analysis Pipelines

BD Rhapsody™ HT Single-Cell Analysis System

See how it works

Answer your biological questions and have confidence in every experiment with the BD Rhapsody™ HT Single-Cell Analysis System

Microwell-based single-cell capture

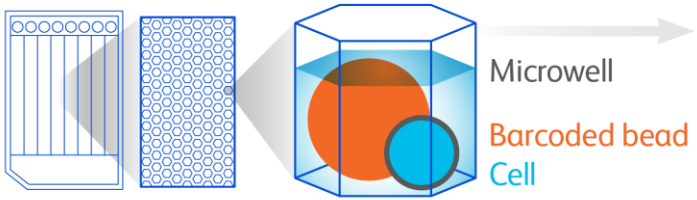
Stable multitier barcoding system

Visual workflow QC

Microwell-based single-cell capture

Load cells and beads

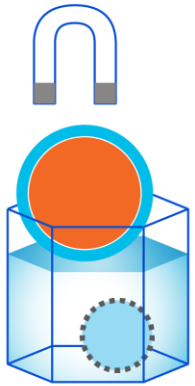
Pair ONE cell with ONE barcoded bead in microwell



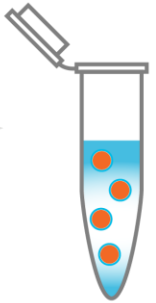
Lyse cells

Lyse cell to hybridize mRNA onto barcoded capture oligos on bead

Retrieve beads

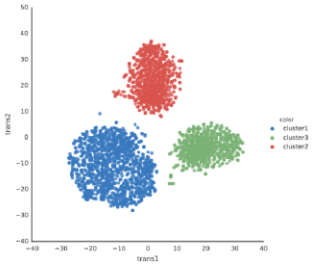


Synthesize cDNA



Analyze data

Library preparation, sequencing and data analysis



Gentle microwell technology

No sample loss due to clogging of channels

High cell capture and low multiplet rate

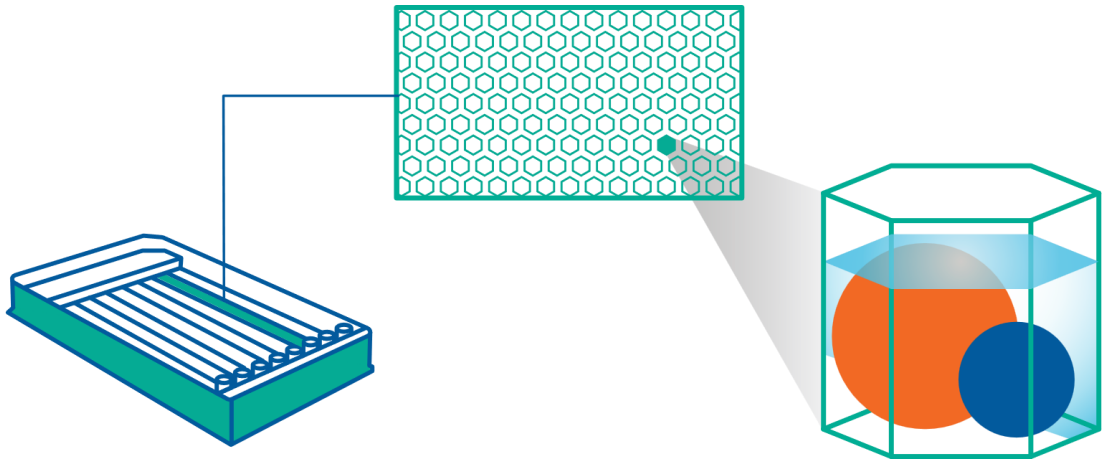
Million-cell studies now possible with capture of >320,000 cells per cartridge

Recover cells with disparate size and morphology, including fragile cell types

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
55,000*	57,749	45,412	0.79
25,000*	26,256	20,977	0.80
10,000*	10,506	8,410	0.80

*Mix of PBMC, Jurkat, Ramos and THP1 cells
**BD Rhapsody™ Scanner hemocytometer count



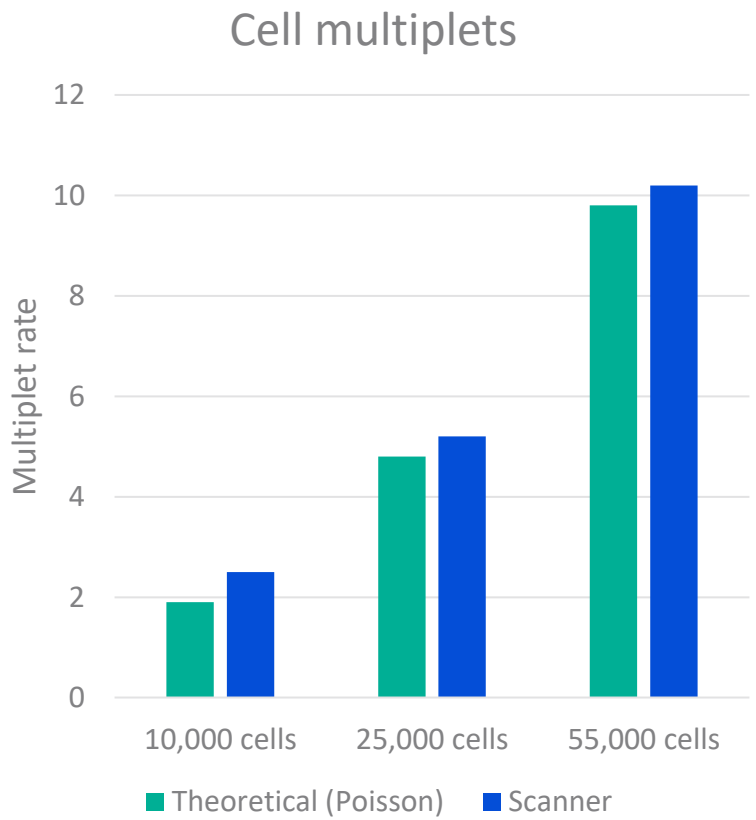
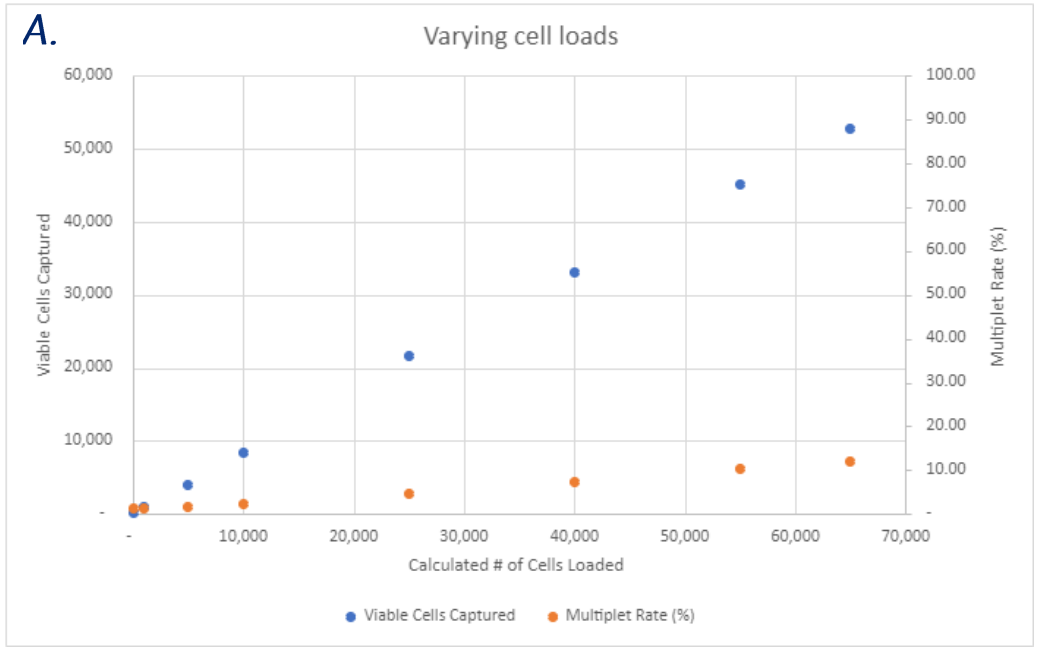
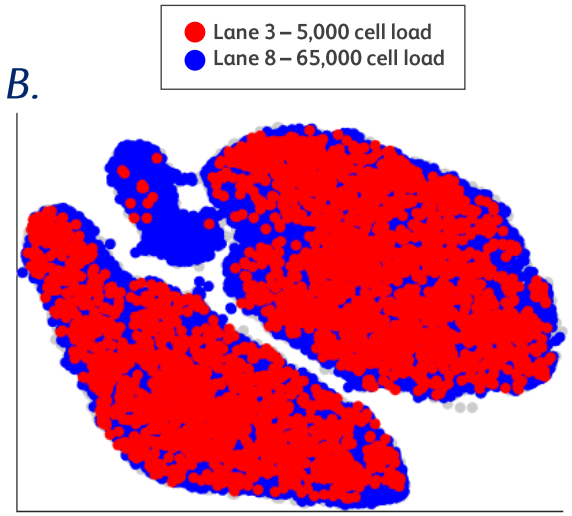


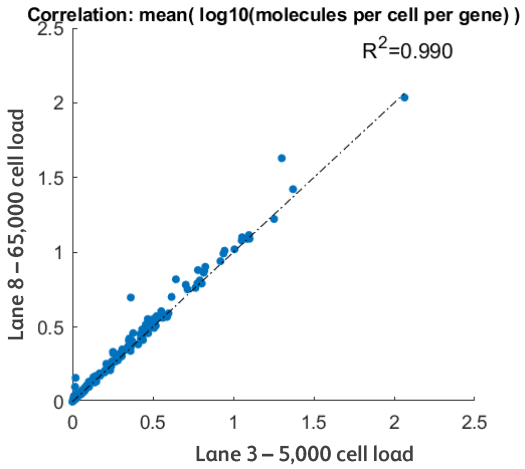
Figure Legend: Four cell types (PBMCs, Jurkat, Ramos and THP1) were pooled and loaded in duplicate at 10,000, 25,000 or 55,000 cells per lane on an 8-lane cartridge. Cell capture rates were high and multiplet rates were low at all cell load concentrations. The BD Rhapsody™ Scanner provides a measure of actual multiplet rate for cells loaded onto each lane in the 8-lane cartridge. Capture rates from the scanner were recorded up to 80%. The mutiplet rate for 55,000 cell input was 10.2%. Results may vary based on cell type and isolation method.

Broad range of cell input per lane

Varying cell loads: 100 cells to 65K cells per lane, with up to 80% capture







No batch effect between varying cell loads on different lanes

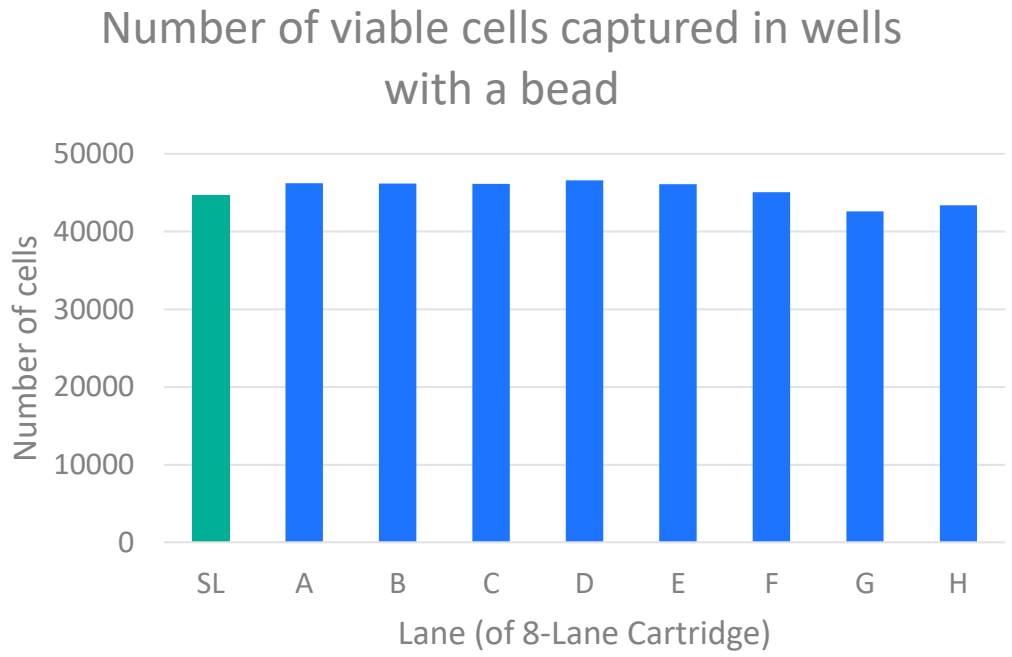
Multiplet rate follows Poisson rates

Figure Legend: Two cell types (Jurkat and Ramos) were pooled at 1:1 ratio. Each lane on an 8-lane cartridge was loaded with 100, 1 000, 5 000, 10 000, 25 000, 40 000, 55 000 and 65 000 cells, respectively. ***A.***Viable cells captured correspond to the increasing number of cells loaded and multiplet rates were low at all cell load concentrations. The BD Rhapsody™ Scanner provides a measure of actual multiplet rate for cells loaded onto each lane in the 8-lane cartridge. ***B – C.*** No batch effect was observed, and the correlation of gene expression was high between the 5 000 and 65 000 cell loads using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs). Results may vary based on cell type and isolation method.

Million cell studies now possible

>40K cells per lane or >320K viable cells captured across 8 lanes

A.



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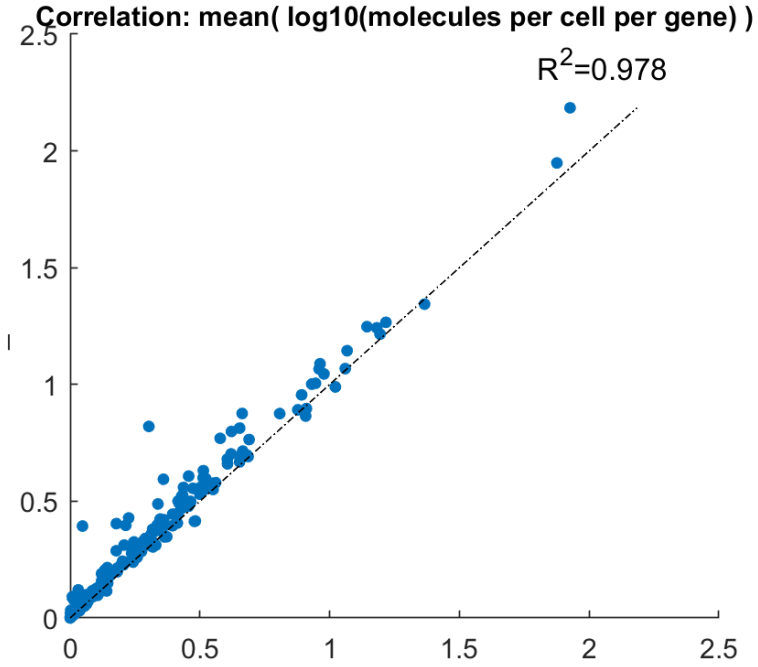
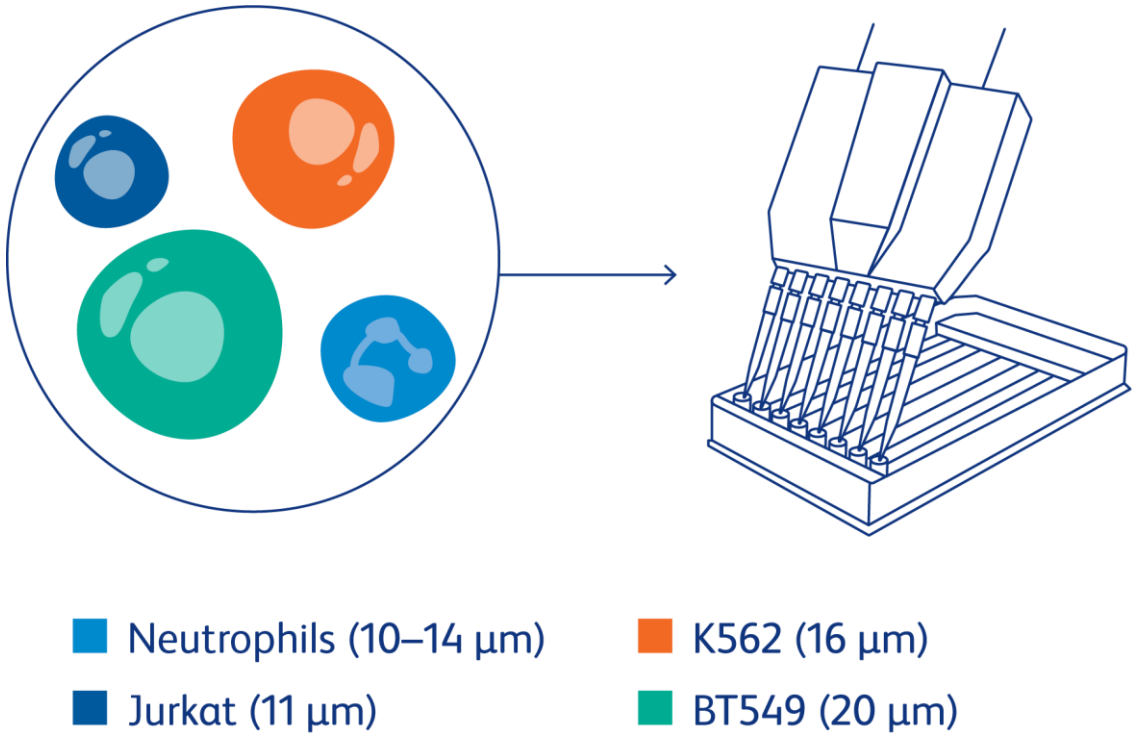


- Up to 80% capture rate (for certain cell types)
- Multiplet rate comparable to single-lane BD Rhapsody™ Express System
- Less than 0.5% cell label collision enabled by higher diversity beads.
- NO batch effect: High gene expression correlation between lanes and with single-lane BD Rhapsody™ System

Figure Legend: Two cell types (Jurkat and Ramos) were pooled and stained with sample tag and loaded at 55,000 cells per lane on an 8-lane cartridge versus a single-lane cartridge. ***A.*** The throughput of the 8-lane cartridge is upwards of 320,000 cells or greater than 40,000 cells per lane. The BD Rhapsody™ Scanner provides the number of viable cells captured in wells with a bead in the 8-lane cartridge, showing up to 80% capture rate. ***B.*** In addition, there is high gene expression correlation across lanes when compared to single-lane cartridge.

Recover cells with disparate size and morphology, including fragile cell types



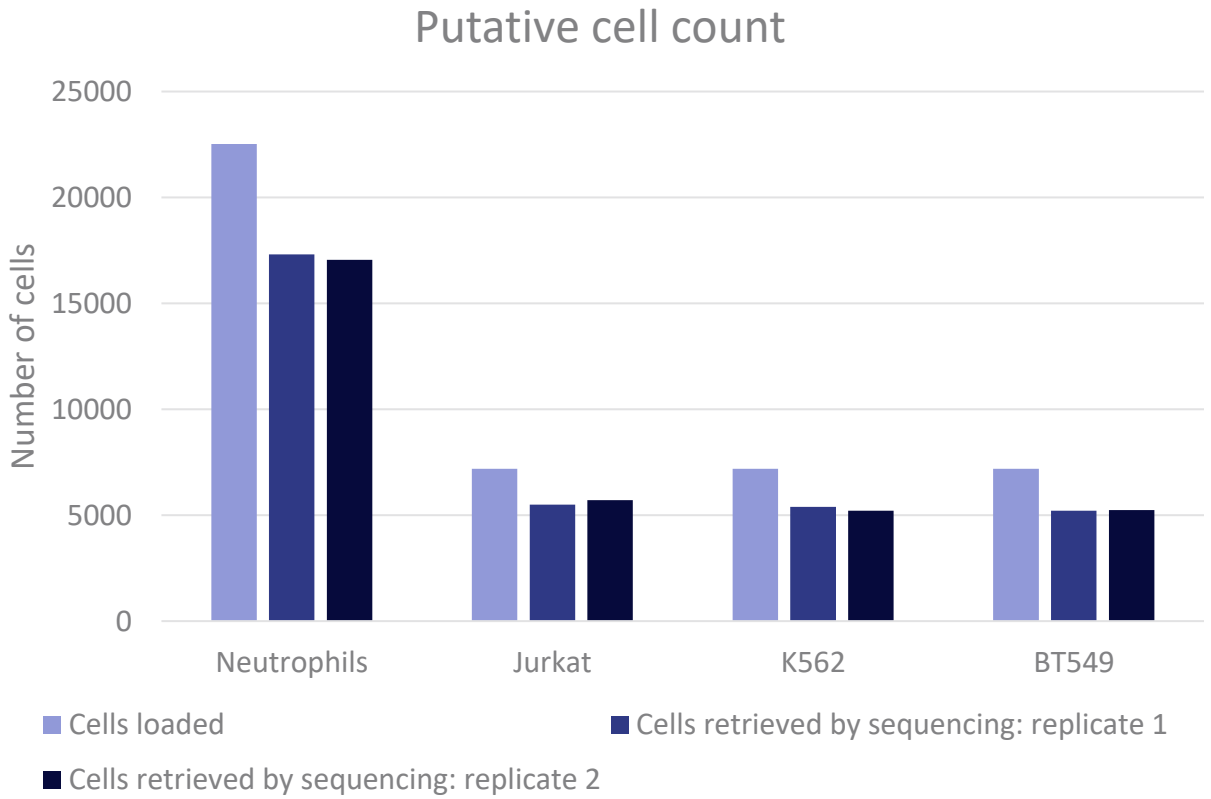
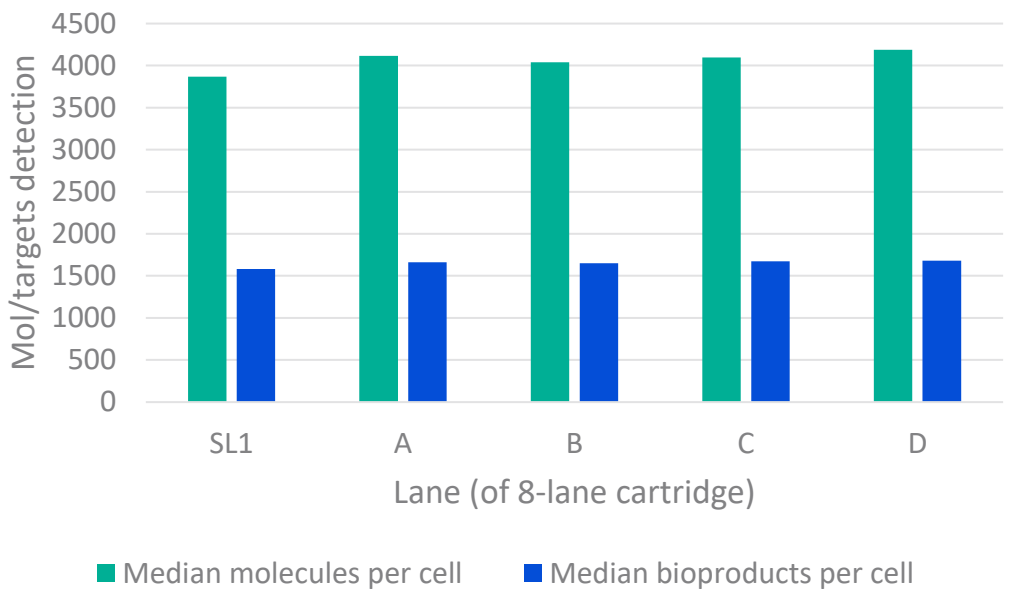


Figure Legend: Large, medium and small cells were loaded into duplicate lanes of a BD Rhapsody™ 8-Lane Cartridge. Jurkat, K562 and BT549 cells were loaded at a given ratio (1:1:1), and neutrophils were loaded separately. The ratio of cells recovered from sequencing was compared, revealing that the cell 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.

Comparable WTA sensitivity across lanes in an 8-lane cartridge with biological and instrument-to-instrument replicates

A.



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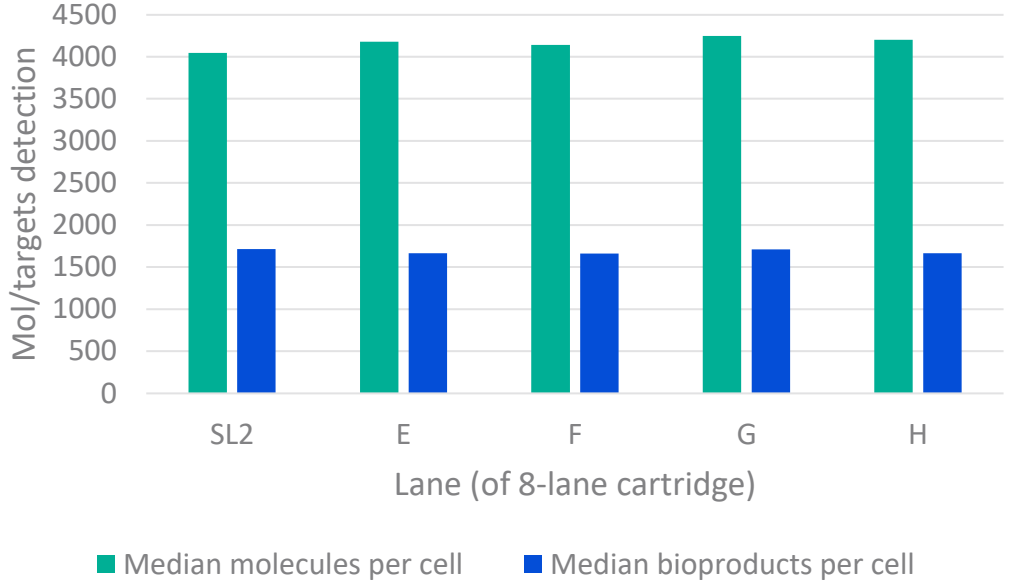
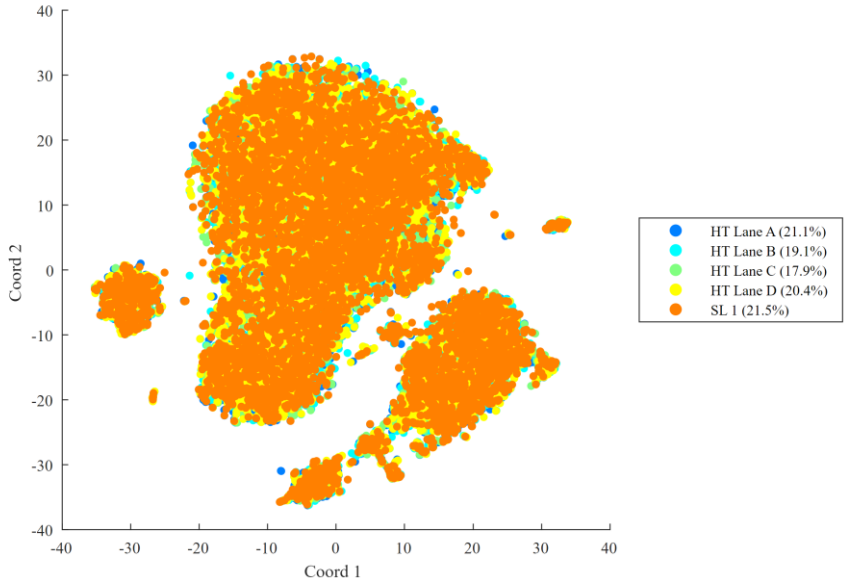


WTA assay sensitivity with regards to mol and target (i.e., gene) detection is comparable between the HT (8-lane cartridge) lanes and the corresponding SL control. Note that sequencing depth ranged from ~9,100–9,600 reads per cell.

Figure Legend: ***A.*** 20,000 cells per lane from a single PBMC donor were loaded into four lanes (A–D) in a BD Rhapsody™ 8-Lane Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System . ***B.*** A second set of cells from the same PBMC donor were loaded at 20,000 cells per lane into four lanes (E–H) of a different 8-lane cartridge and cell capture was performed on a different BD Rhapsody™ HT Xpress System. WTA libraries were prepared from subsampled beads at 6,000 cells. All BD Rhapsody™ 8-Lane Cartridge results were compared to a BD Rhapsody™ Single-Lane Cartridge control.

Minimal batch effects across lanes in an 8-lane cartridge with biological and instrument-to-instrument replicates

A.



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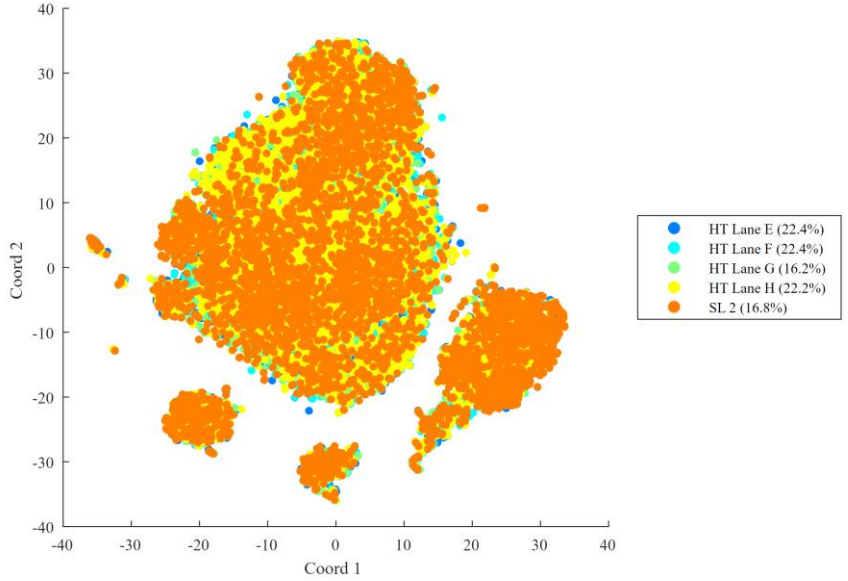
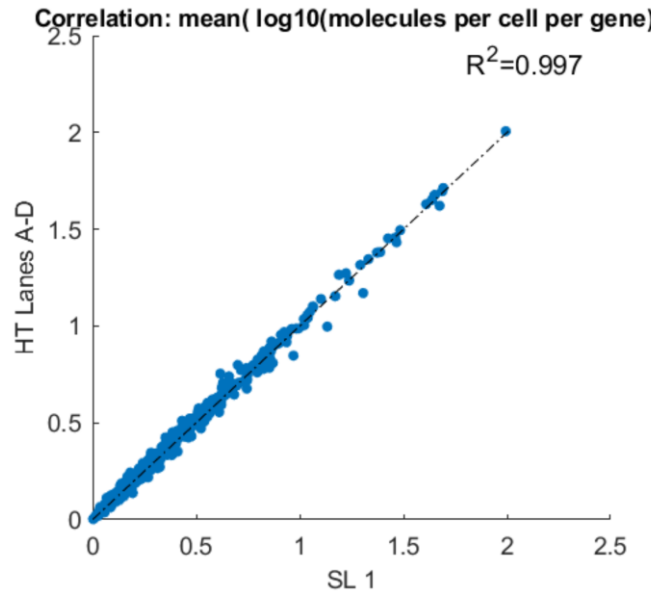


- NO batch effect with HT (8-lane cartridge) samples A–D compared to SL1
- NO batch effect with HT (8-lane cartridge) samples E–H compared to SL2

Figure Legend: ***A***. 20,000 cells per lane from a single PBMC donor were loaded into four lanes (A–D) in a BD Rhapsody™ 8-Lane Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System. ***B***. A second set of cells from the same PBMC donor were loaded at 20,000 cells per lane into four lanes (E–H) of a different 8-lane cartridge and cell capture was performed on a different BD Rhapsody™ HT Xpress System. WTA libraries were prepared from subsampled beads at 6,000 cells. All BD Rhapsody™ 8-Lane Cartridge results were compared to a BD Rhapsody™ Single-Lane Cartridge control.

High gene correlation expression across lanes in an 8-lane cartridge with biological and instrument-to-instrument replicates

A.



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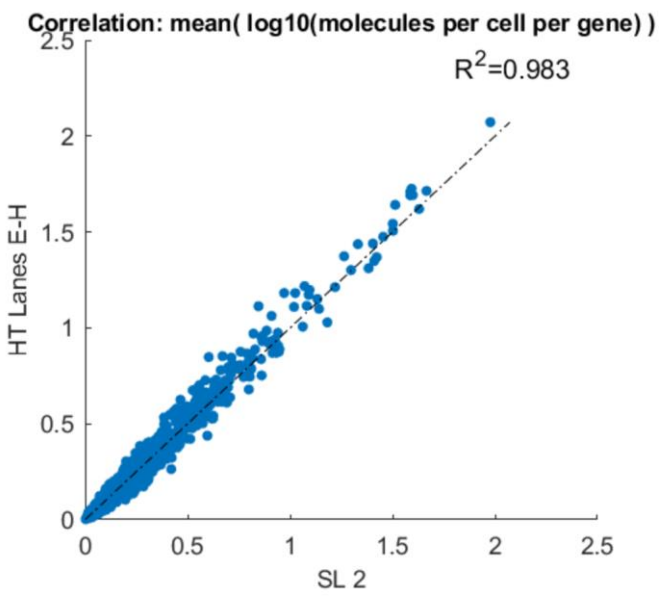
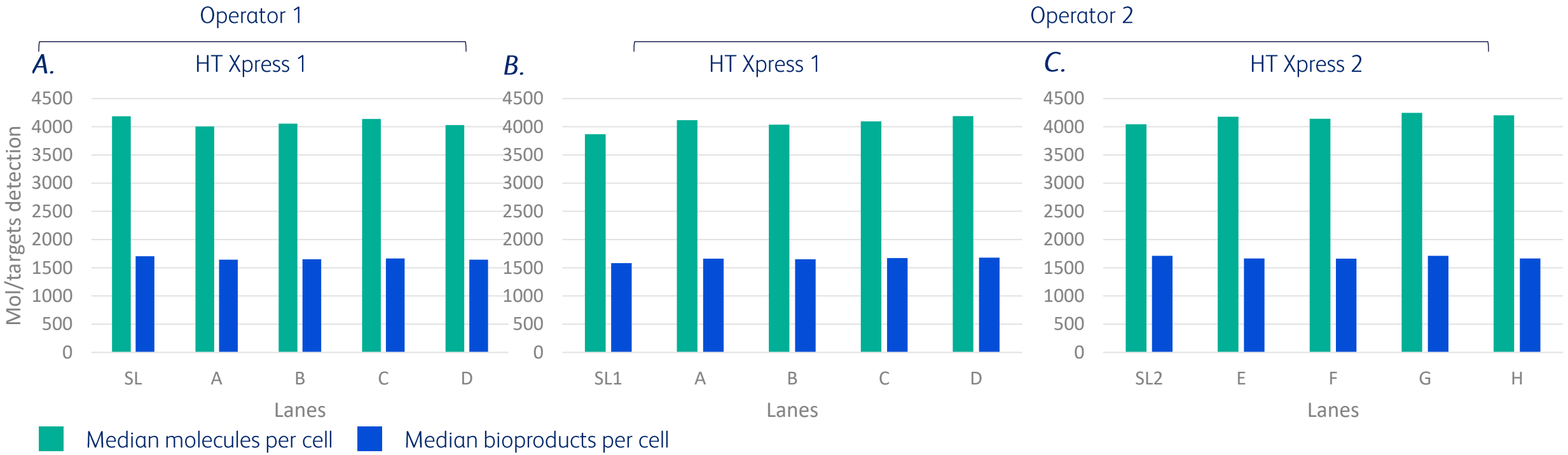


- Gene correlation expression between SL1 and HT (8-lane cartridge) samples A–D is $R^2 = 0.997$
- Gene correlation expression between SL2 and HT (8-lane cartridge) samples E–H is $R^2 = 0.983$

Figure Legend: ***A***. 20,000 cells per lane from a single PBMC donor were loaded into four lanes (A–D) in a BD Rhapsody™ 8-Lane Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System. ***B***. A second set of cells from the same PBMC donor were loaded at 20,000 cells per lane into four lanes (E–H) of a different 8-lane cartridge and cell capture was performed on a different BD Rhapsody™ HT Xpress System. WTA libraries were prepared from subsampled beads at 6,000 cells. All BD Rhapsody™ 8-Lane Cartridge results were compared to a BD Rhapsody™ Single-Lane Cartridge control.

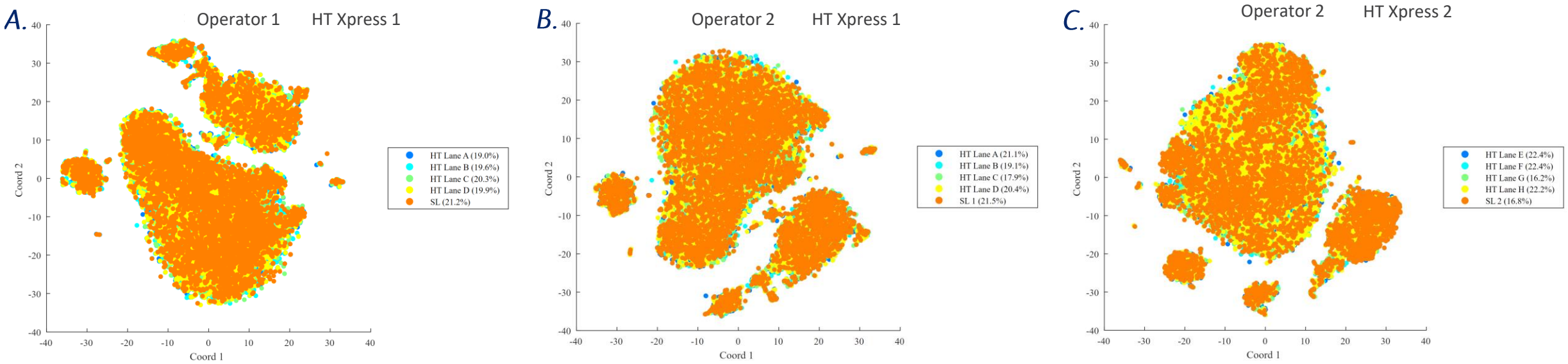
Comparable WTA sensitivity across lanes in an 8-lane cartridge with biological, instrument-to-instrument and user-to-user replicates



WTA assay sensitivity with regards to mol and target (i.e., gene) detection is comparable between the HT (8-lane cartridge) lanes and the corresponding SL control. Note that sequencing depth ranged from ~9100–9600 reads per cell.

Figure Legend: ***A.*** 20,000 cells per lane from a single PBMC donor were loaded into four lanes (A–D) of a BD Rhapsody™ 8-Lane Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System by operator 1. ***B.*** A second set of cells from the same PBMC donor were loaded by operator 2 at 20,000 cells per lane into four lanes (A–D) of a different 8-lane cartridge and cell capture was performed on the same BD Rhapsody™ HT Xpress System used by operator 1. *C.* A third set of cells from the same PBMC donor were loaded by operator 2 at 20,000 cells per lane into four lanes (E–H) of a third 8-lane cartridge and cell capture was performed on a different BD Rhapsody™ HT Xpress System than the experiment run on lanes A–D. WTA libraries were prepared from subsampled beads at 6,000 cells. All BD Rhapsody™ 8-Lane Cartridge results were compared to a BD Rhapsody™ Single-Lane Cartridge control.

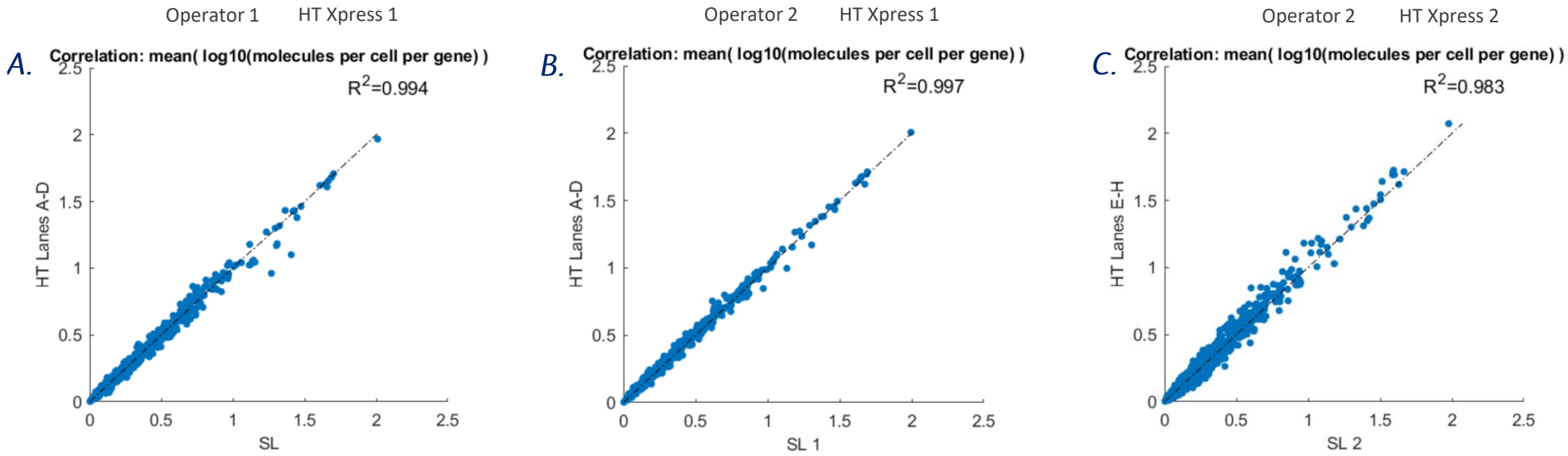
Minimal batch effects across lanes in an 8-lane cartridge with biological, instrument-to-instrument and user-to-user replicates



- Operator #1: NO batch effect with HT (8-lane cartridge) samples A–D compared to SL
- Operator #2: NO batch effect with HT (8-lane cartridge) samples A–D compared to SL1
- Operator #2: NO batch effect with HT (8-lane cartridge) samples E–H compared to SL2

Figure Legend: *A*. 20,000 cells per lane from a single PBMC donor were loaded into four lanes (A–D) of a BD Rhapsody™ 8-Lane Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System by operator 1. *B*. A second set of cells from the same PBMC donor were loaded by operator 2 at 20,000 cells per lane into four lanes (A–D) of a different 8-lane cartridge and cell capture was performed on the same BD Rhapsody™ HT Xpress System used by operator 1. *C*. A third set of cells from the same PBMC donor were loaded by operator 2 at 20,000 cells per lane into four lanes (E–H) of a third 8-lane cartridge and cell capture was performed on a different BD Rhapsody™ HT Xpress System than the experiment ran on lanes A-D. WTA libraries were prepared from subsampled beads at 6,000 cells. All BD Rhapsody™ 8-Lane Cartridge results were compared to a BD Rhapsody™ Single-Lane Cartridge control.

High gene correlation expression across lanes in an 8-lane cartridge with biological, instrument-to-instrument and user-to-user replicates



- Operator 1: Gene correlation expression between SL and HT (8-lane cartridge) samples A - D is $R^2 = 0.994$
- Operator 2: Gene correlation expression between SL1 and HT (8-lane cartridge) samples A - D is $R^2 = 0.997$
- Operator 2: Gene correlation expression between SL2 and HT (8-lane cartridge) samples E - H is $R^2 = 0.983$

Figure Legend: *A*. 20,000 cells per lane from a single PBMC donor were loaded into four lanes (A–D) of a BD Rhapsody™ 8-Lane Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System by operator 1. *B*. A second set of cells from the same PBMC donor were loaded by operator 2 at 20,000 cells per lane into four lanes (A–D) of a different 8-lane cartridge and cell capture was performed on the same BD Rhapsody™ HT Xpress System used by operator 1. *C*. A third set of cells from the same PBMC donor were loaded by operator 2 at 20,000 cells per lane into four lanes (E–H) of a third 8-lane cartridge and cell capture was performed on a different BD Rhapsody™ HT Xpress System than the experiment ran on lanes A–D. WTA libraries were prepared from subsampled beads at 6,000 cells. All BD Rhapsody™ 8-Lane Cartridge results were compared to a BD Rhapsody™ Single-Lane Cartridge control.

Increase your experimental power with sample multiplexing using the BD® Flex Single-Cell Multiplexing Kits

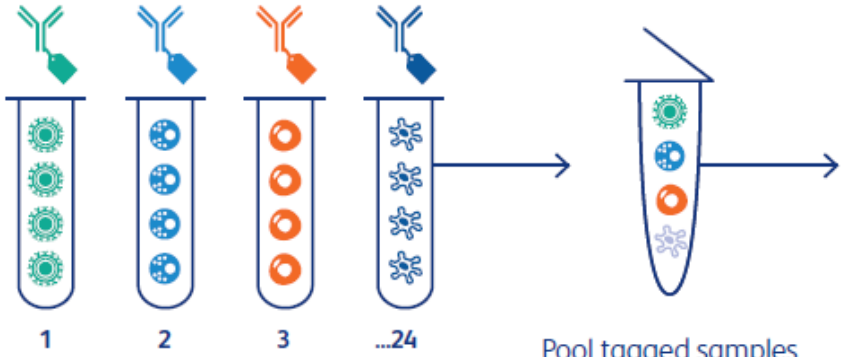
Maximize sample throughput of your single-cell experiments with multiplexing capabilities using the BD antibody-based sample multiplexing tags, allowing combination of up to 24 unique sample tags

Broad sample type compatibility (species and target agnostic)

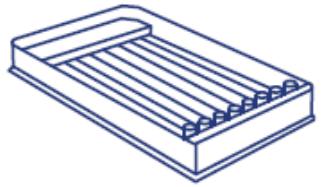
Reduces experimental costs with high multiplexing capabilities

Compatible with all BD Rhapsody™ Single-Cell Assays

Tag each single-cell suspension with up to 24 unique sample tags with broad species and cell type compatibility



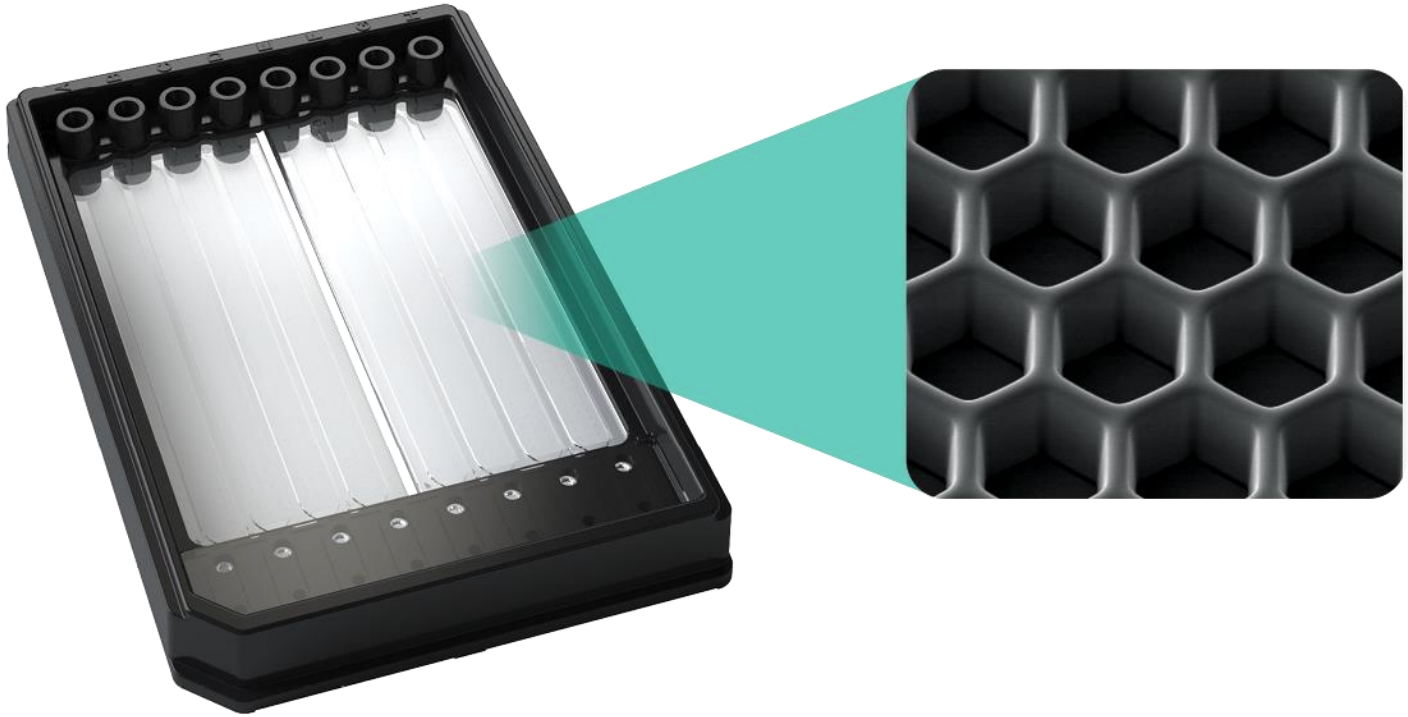
Pool tagged samples



Load up to eight lanes in a BD Rhapsody™ 8-Lane Cartridge

See our datasheet
BD® Flex Single-Cell Multiplexing Kits (BD® Flex SMK)
A flexible sample muiltiplexing tool for every single-cell study on the BD Rhapsody™ Single-Cell Analysis System

Flexible cartridge design



Flexible cartridge design

Up to 8 tests per cartridge

>267,000 microwells per lane

320-µL cell suspension loading volume

Load up to 55,000 cells per lane

Run more or different types of experiments

Process samples together or on different days

Flexibility with partial use of the BD Rhapsody™ 8-Lane Cartridge

Example 1: **Partial use of same cartridge** across multiple days shows high gene expression correlation

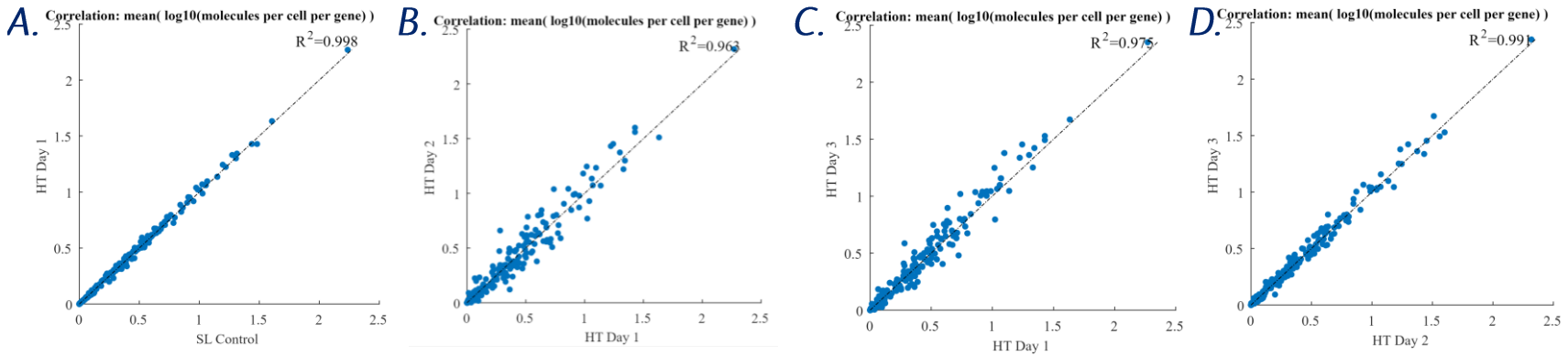
Use 1–8 lanes at a time and re-use remaining lanes at a different time for the same or different assay.

8-Lane Cartridge (HT)

Day1- Lanes 1,2

Day2- Lanes 3,4,5

Day3- Lanes 6,7,8



Differential gene expression analysis $R^2 \geq 0.95$

BD Rhapsody™ HT Cartridge, resealable pouch, and desiccant bag

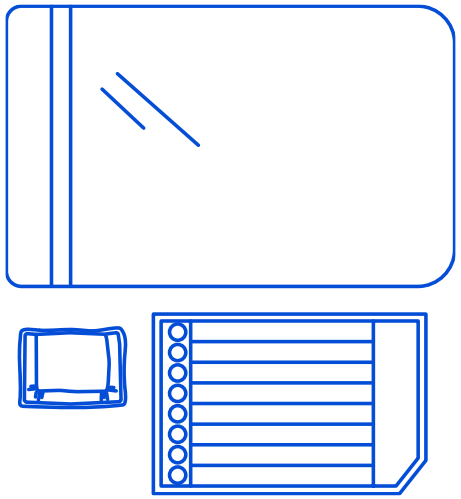


Figure Legend: Two cell types (Jurkat and Ramos) were pooled at 1:1 ratio. Lanes 1 and 2 were loaded with 20 000 cells on Day 1, Lanes 3–5 on Day 2, and Lanes 6–8 on Day 3. Targeted and SMK libraries were prepared from subsampled beads at 3 500 cells using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs) and BD® Single-Cell Sample Multiplexing Kit. ***A.*** Assay performance of the Day 1 samples on the 8-lane cartridge was compared with a single-lane cartridge control. ***C-D.*** The assay performance on the lanes used on different days were also compared. No batch effect was observed, and the correlation of gene expression was high between the single lane and the 8-lane cartridge, and lane-to-lane variability was minimal. Results may vary based on cell type and isolation method.

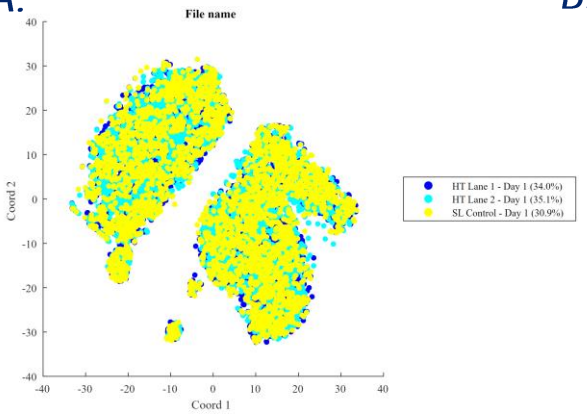
Flexibility with partial use of the BD Rhapsody™ 8-Lane Cartridge

Example 2: Prolonged stability of partially used cartridges up to 4 months.
Day 1 and 7 on different lanes show tight correlation with single-lane control

Day 1: Targeted + SMK assay, Lanes 1,2
1:1 Jurkat/Ramos Cells

Day 7: WTA+Abseq assay, Lanes 3,4
PBMCs

A.



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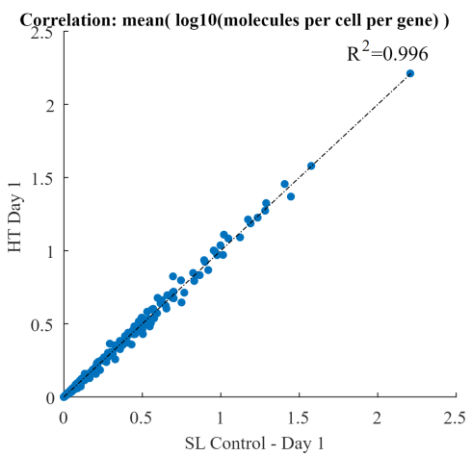
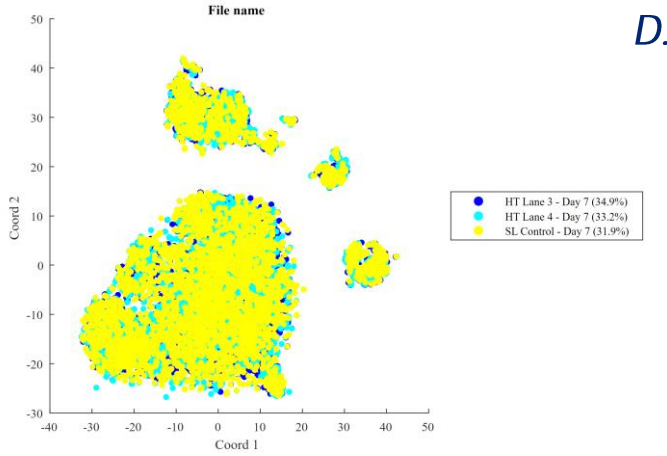


C.



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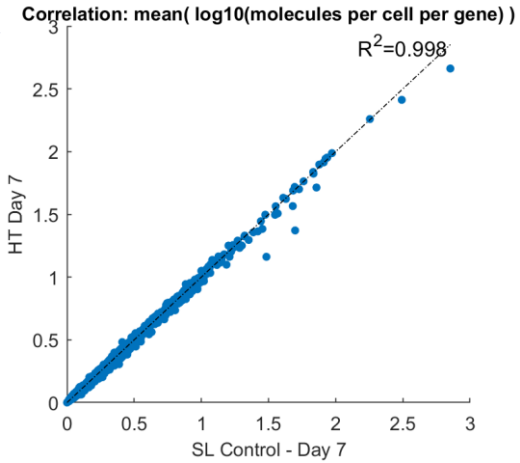


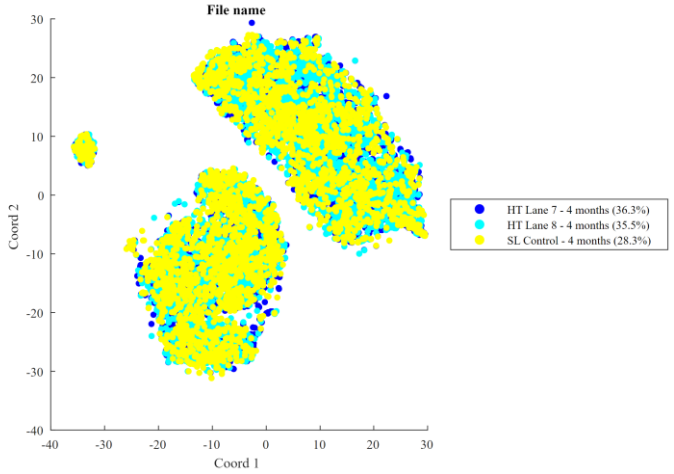
Figure Legend: Lanes 1 and 2 were loaded with 20 000 cells consisting of Jurkat and Ramos cells at 1:1 ratio on Day 1, Lanes 3 and 4 were loaded with 20 000 cells from a single PBMC donor on Day 7, and Lanes 7 and 8 were loaded with 20 000 cells consisting of Jurkat and Ramos cells at 1:1 ratio at four months storage of the partially used cartridge. Targeted and SMK libraries were prepared from subsampled beads at 3 500 cells on Day 1 and 4-month storage using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs) and BD® Single-Cell Sample Multiplexing Kit. ***A-B***. Assay performance of the Day 1 samples on the 8-lane cartridge was compared with a single-lane cartridge control. ***C-D***. WTA and AbSeq (10-plex) were prepared from subsampled beads at 3 500 cells on Day 7 storage using the BD Rhapsody™ WTA Amplification Kit. No batch effect was observed, and the correlation of gene expression was high between the single lane and the 8-lane cartridge, and lane-to-lane variability was minimal. Results may vary based on cell type and isolation method.

Flexibility with partial use of the BD Rhapsody™ 8-Lane Cartridge

Example 2: Prolonged stability of partially used cartridges up to 4 months. 4-month storage show tight correlation with single lane control

4 months: Targeted + SMK assay, Lanes 7,8
1:1 Jurkat/Ramos Cells

A.



B.

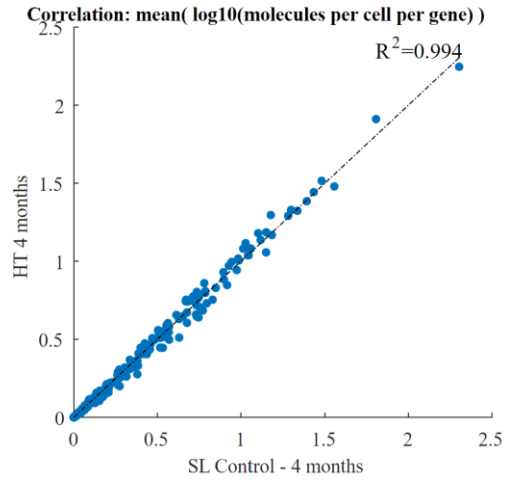
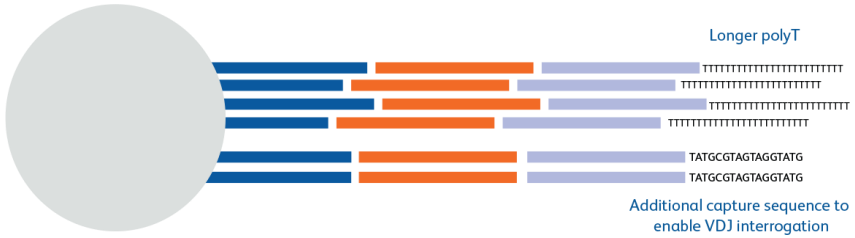
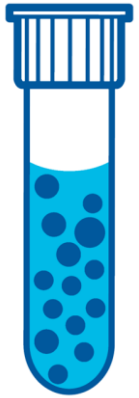


Figure Legend: Lanes 1 and 2 were loaded with 20,000 cells consisting of Jurkat and Ramos cells at 1:1 ratio on Day 1, Lanes 3 and 4 were loaded with 20,000 cells from a single PBMC donor on Day 7, and Lanes 7 and 8 were loaded with 20,000 cells consisting of Jurkat and Ramos cells at 1:1 ratio at four months storage of the partially used cartridge. Targeted and SMK libraries were prepared from subsampled beads at 3,500 cells on Day 1 and 4-month storage using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs) and BD® Single-Cell Sample Multiplexing kit. ***A-B***. Assay performance of the Day 1 samples on the 8-lane cartridge was compared with a single-lane cartridge control. Targeted and SMK (4-plex) were prepared from subsampled beads at 3,500 cells on month four storage using the BD Rhapsody™ WTA Amplification Kit. No batch effect was observed, and the correlation of gene expression was high between the single-lane and the 8-lane cartridge, and lane-to-lane variability was minimal. Results may vary based on cell type and isolation method.

Stable multitier barcoding system





Capture cellular information

One cell capture bead design for all BD Rhapsody™ Assays

Subsample and archive beads

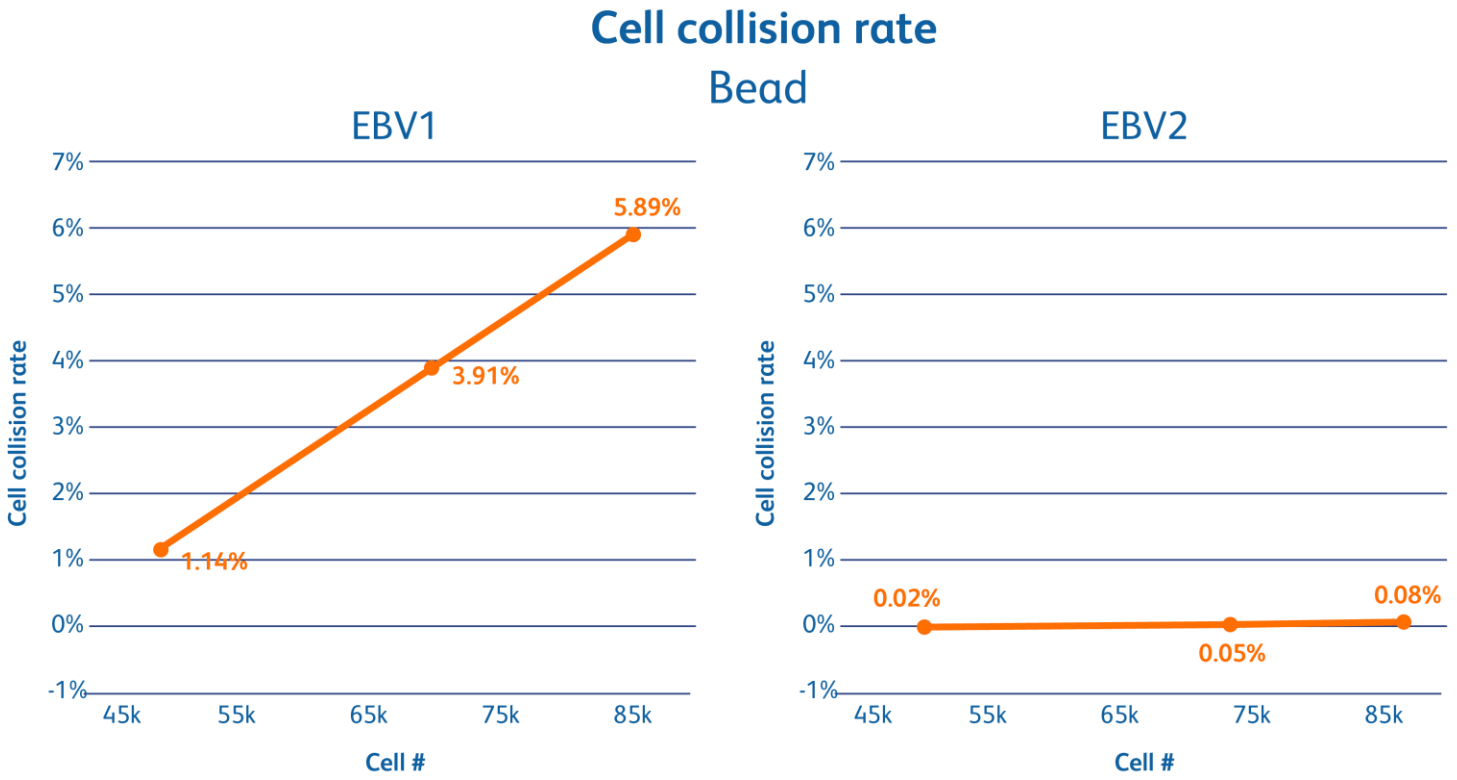
Low cell label collision with >56 million diverse cell labels

3' and 5' capture capabilities for gene expression and immune repertoire profiling

Collaborate

Subsample and archive beads for flexibility with experimental design and working with collaborators

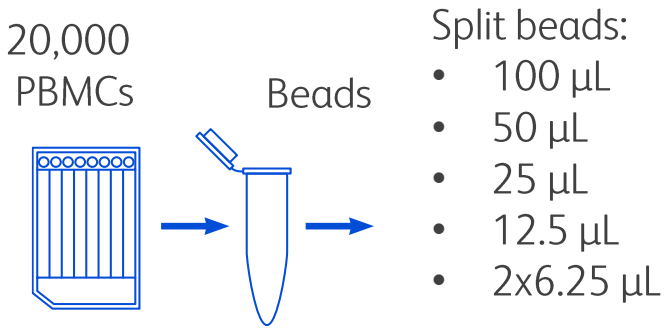
Increased cell label diversity decreases cell label collision rate with high cell input



Bead	Cell #	Cell label collision rate
EBV1	49,646	1.14%
	70,103	3.91%
	85,095	5.89%
EBV2	49,915	0.02%
	73,080	0.05%
	86,145	0.08%

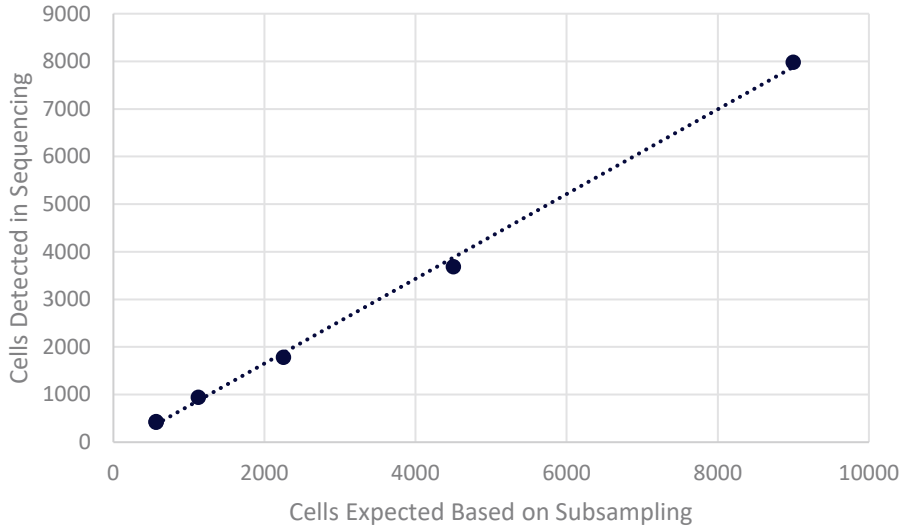
Figure Legend: Jurkat and Ramos cell lines were loaded into eight lanes of a BD Rhapsody™ Cartridge and cell capture was performed on a BD Rhapsody™ HT Xpress System. BD Rhapsody™ Enhanced Cell Capture Beads v2 were loaded into four lanes, and BD Rhapsody™ Enhanced Cell Capture Beads v1 were loaded into another four lanes. Targeted and SMK libraries were prepared, and cell label collision rate was determined by comparing the number of cell labels overlapping across lanes for each BD Rhapsody™ Enhanced Cell Capture Bead version.

Expected number of cells seen after bead subsampling



Split beads:

- 100 µL
- 50 µL
- 25 µL
- 12.5 µL
- 2x6.25 µL



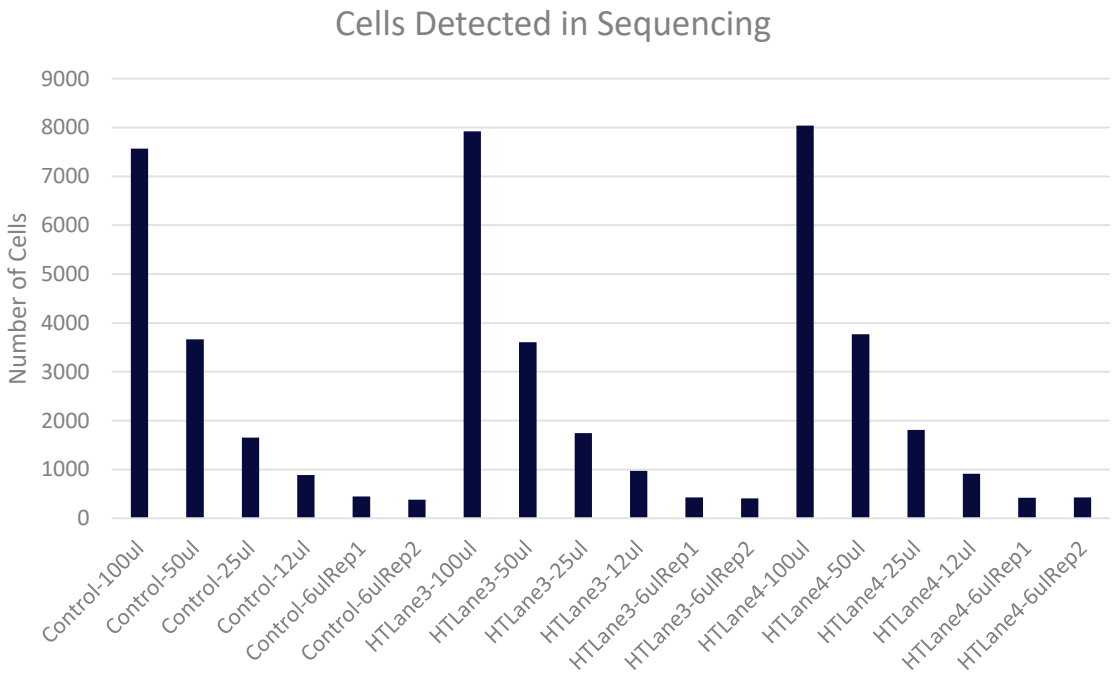
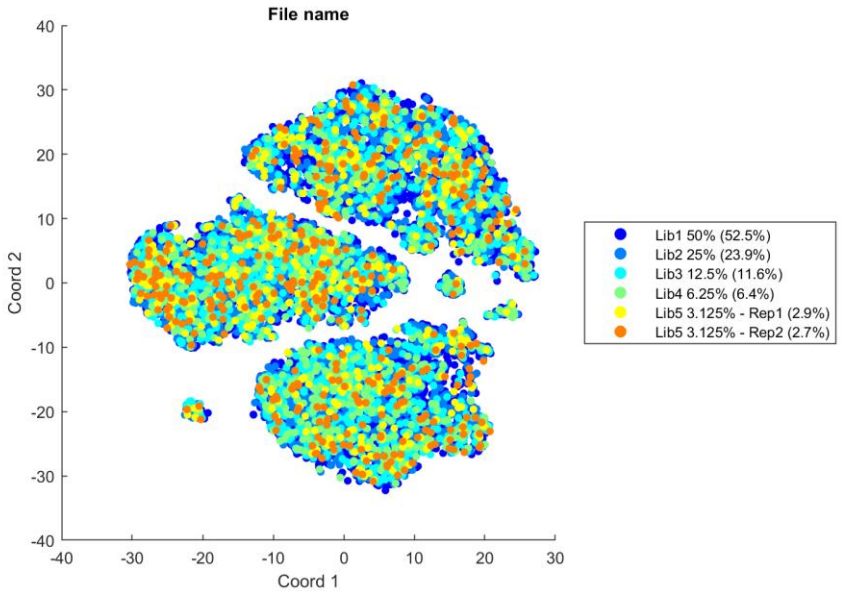


Figure Legend: Large, medium and small cells were loaded into duplicate lanes of a BD Rhapsody™ 8-Lane Cartridge. Jurkat, K562 and BT549 cells were loaded at a given ratio (1:1:1). Beads after cDNA synthesis were sub-sampled at different volumes (i.e., 100 µL, 50 µL, 25 µL, 12.5 µL and 6.25 µL). The putative cell numbers detected after sequencing using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs) correspond with the expected cell recovery. No batch effect was observed, and correlation of gene expression was high between the samples tested.

High correlation and no batch effect observed with bead subsampling

A.



B.

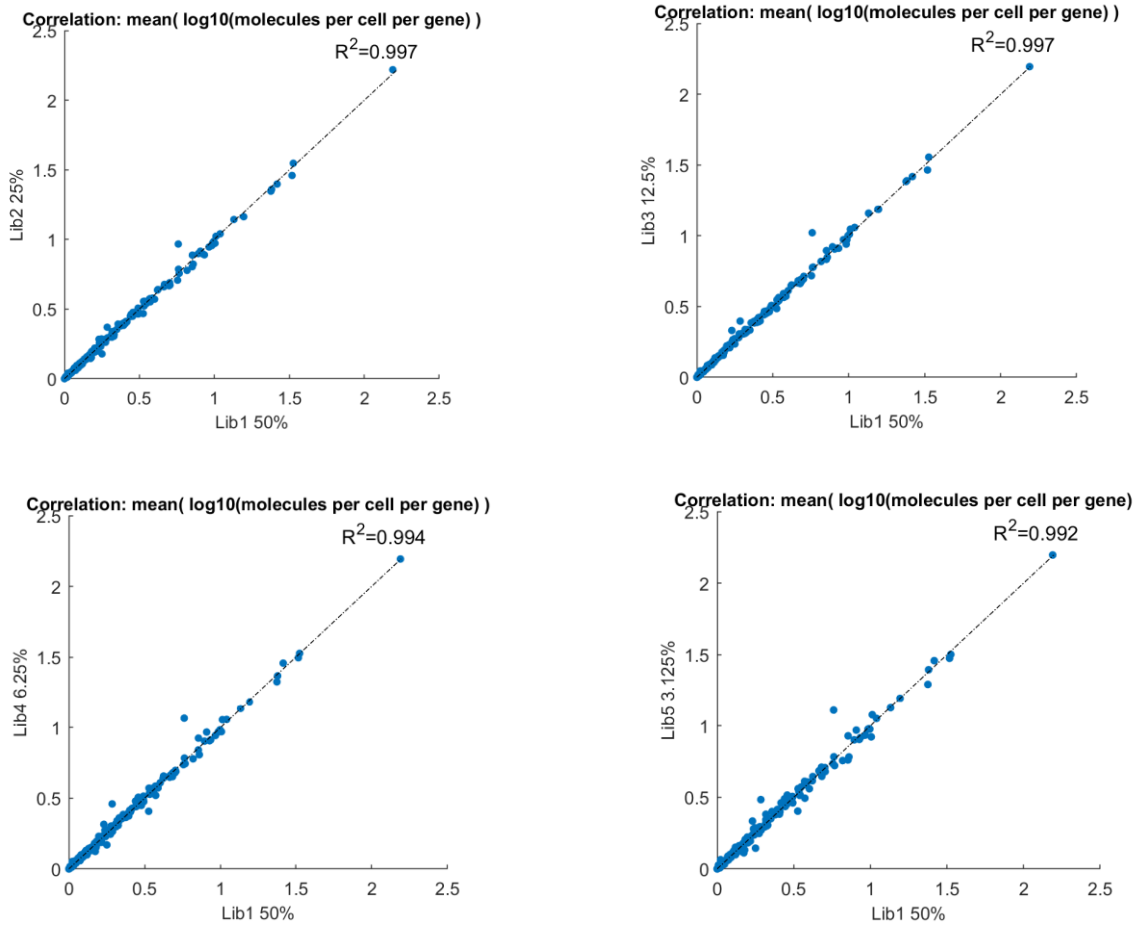
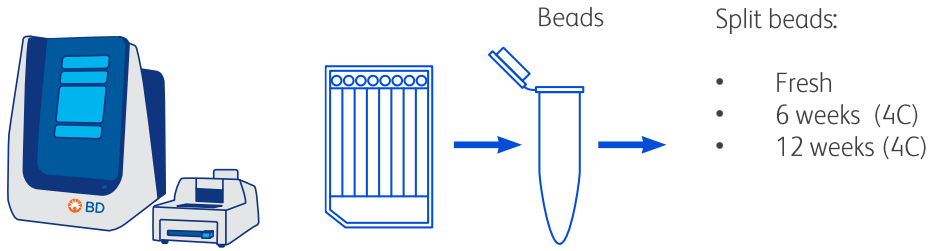
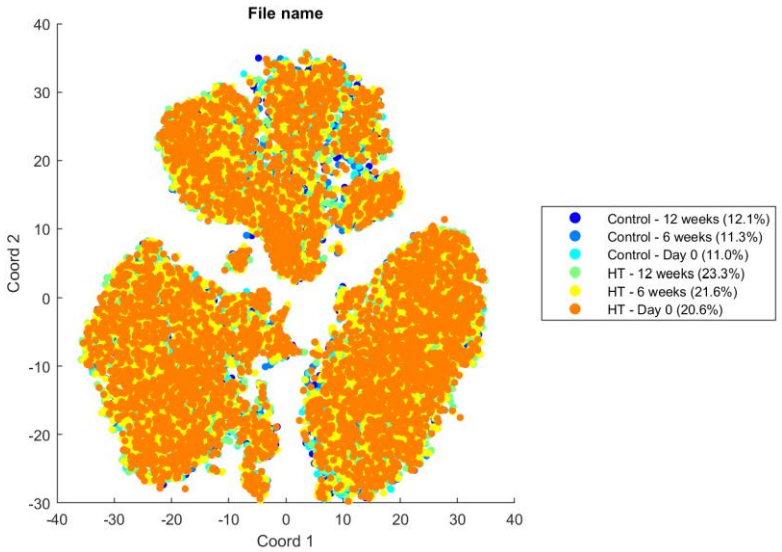


Figure Legend: Large, medium and small cells were loaded into duplicate lanes of a BD Rhapsody™ 8-Lane Cartridge. Jurkat, K562 and BT549 cells were loaded at a given ratio (1:1:1). Beads after cDNA synthesis were sub-sampled at different volumes (i.e., 100 µL, 50 µL, 25 µL, 12.5 µL and 6.25 µL). The putative cell numbers detected after sequencing using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs) correspond with the expected cell recovery. ***A***. No batch effect was observed, and ***B***. correlation of gene expression was high between the samples tested.

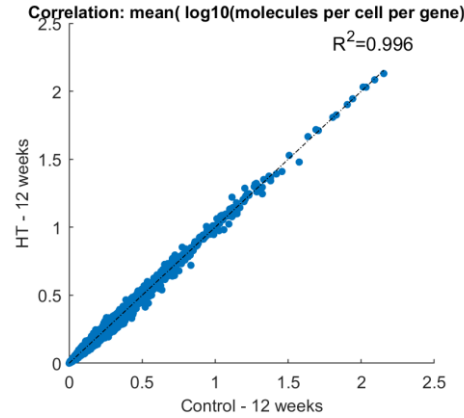
Equivalent data obtained from stored beads

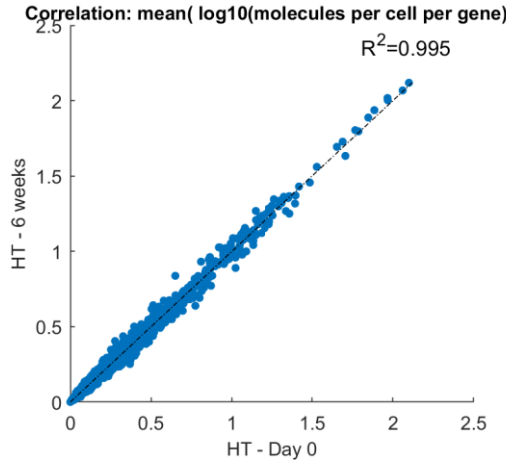


A.



B.





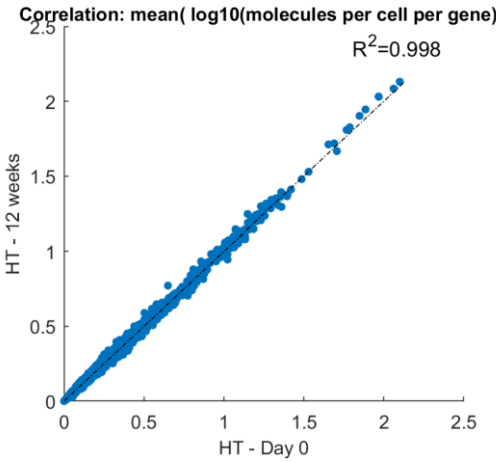
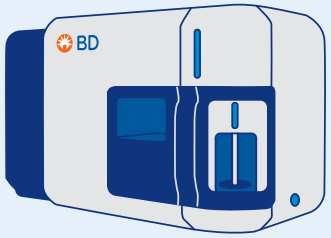


Figure Legend: Large, medium and small cells were loaded into duplicate lanes of a BD Rhapsody™ 8-Lane Cartridge. Jurkat, K562 and BT549 cells were loaded at a given ratio (1:1:1). Beads were stored after cDNA synthesis and libraries using the BD Rhapsody™ WTA Kit were prepared after 6 and 12 weeks compared to control libraries prepared with no storage. ***A.*** No batch effect was observed, and ***B.*** correlation of gene expression was high between the samples tested.

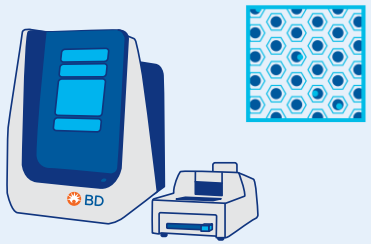
Flexible and collaborative sample processing with BD Rhapsody™ Enhanced Cell Capture Beads

Prepare single-cell suspensions



- BD FACS™ Sorters
- BD flow antibodies
- BD Rhapsody™ Single-Cell Mutliplexing Kit
- BD® AbSeq Antibody-Oligonucloetides

Capture single cells



- BD Rhapsody™ HT Xpress System
- BD Rhapsody™ HT Single-Cell Analysis System

Synthesize cDNA

- BD Rhapsody™ cDNA Kit

NGS library prep

Move forward and prepare single-cell NGS libraries with the BD Rhapsody™ WTA, Targeted and TCR/BCR Amplification Kits.

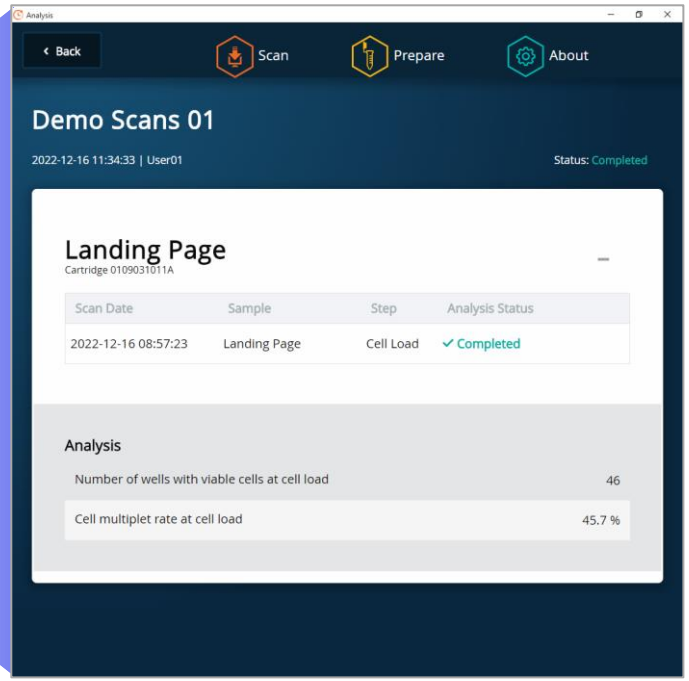
Store

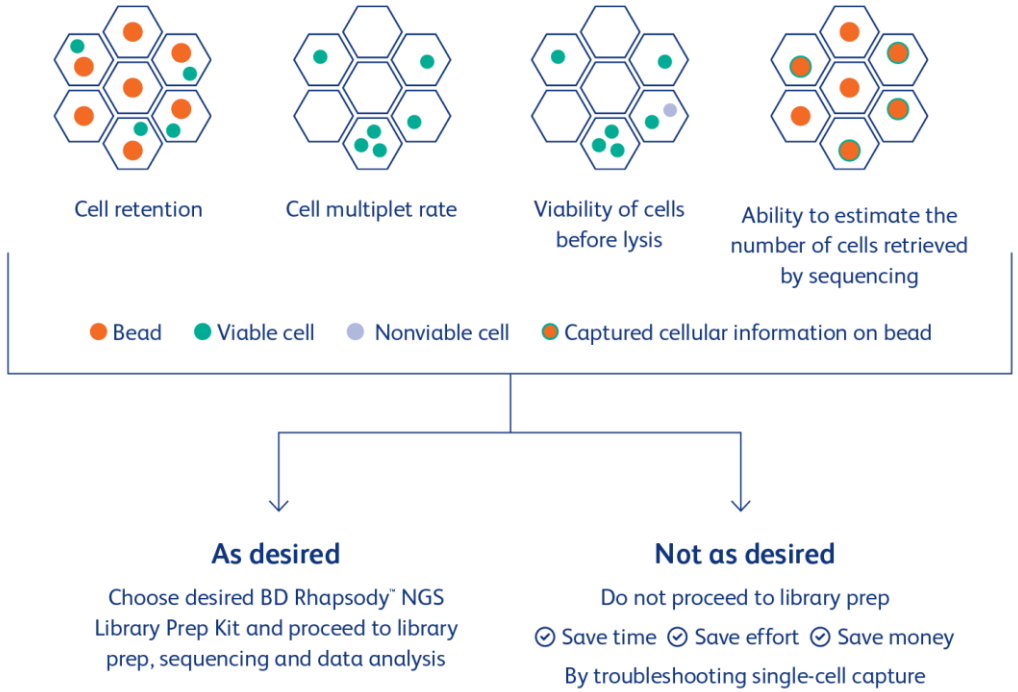
Store the BD Rhapsody™ Enhanced Cell Capture Beads with the covalently bound cDNAs at 4 °C for up to 12 weeks.

Transport

Transport the BD Rhapsody™ Enhanced Cell Capture Beads with the covalently bound cDNAs at 4 °C to a squencing provider or Core facility.

Visual workflow QC





Visual workflow QC

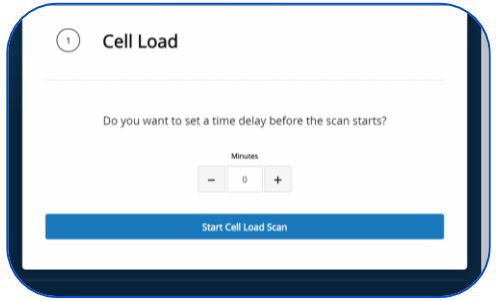
Make real-time decisions before sequencing

Be certain about your cell capture with every single-cell experiment

Save time and cost on expensive downstream sequencing

Intuitive user interface for a multi-sample workflow

The BD Rhapsody™ Scanner can be used to provide quality control measures at different stages of the workflow by direct imaging through an intuitive user interface for a multi-sample workflow.



Experimental setup – Enter sample and experiment information to track samples through single-cell workflow

Scan and status – Watch the status of the lanes being scanned in real time

Multi-sample selection – Allow users to select and name up to eight lanes for processing through the cartridge scan workflow

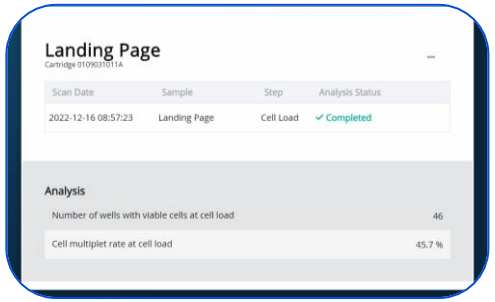


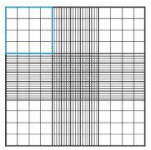
Image analysis – Review the scanner quality metrics and make informed decisions on whether to proceed with library prep

BD Rhapsody™ HT Single-Cell Analysis System workflow

BD Rhapsody™ Express System

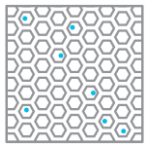
BD Rhapsody™ Scanner

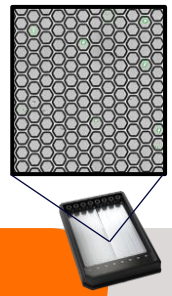
Sample QC:
Cell conc. and
Cell viability
(Hemocytometer)



Load cells into BD Rhapsody™ Cartridge

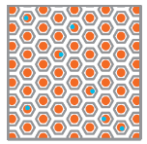
Workflow QC:
single cells captured
multiplets

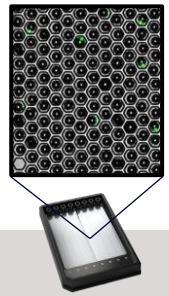




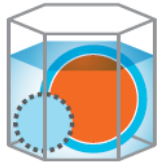
Load barcoded beads into the BD Rhapsody™ Cartridge

Workflow QC:
% microwells with bead

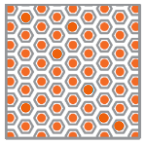


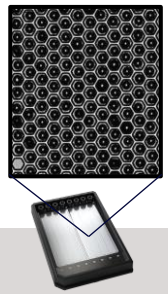


Lyse cells, mRNAs and BD® AbSeq Assay tags bind to beads

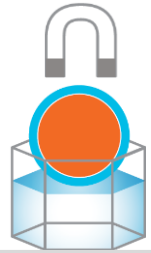


Workflow QC:
% microwells with bead

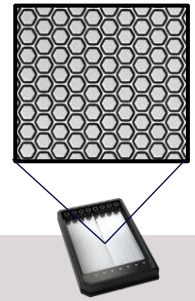




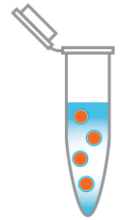
Bead retrival



Workflow QC
residual beads

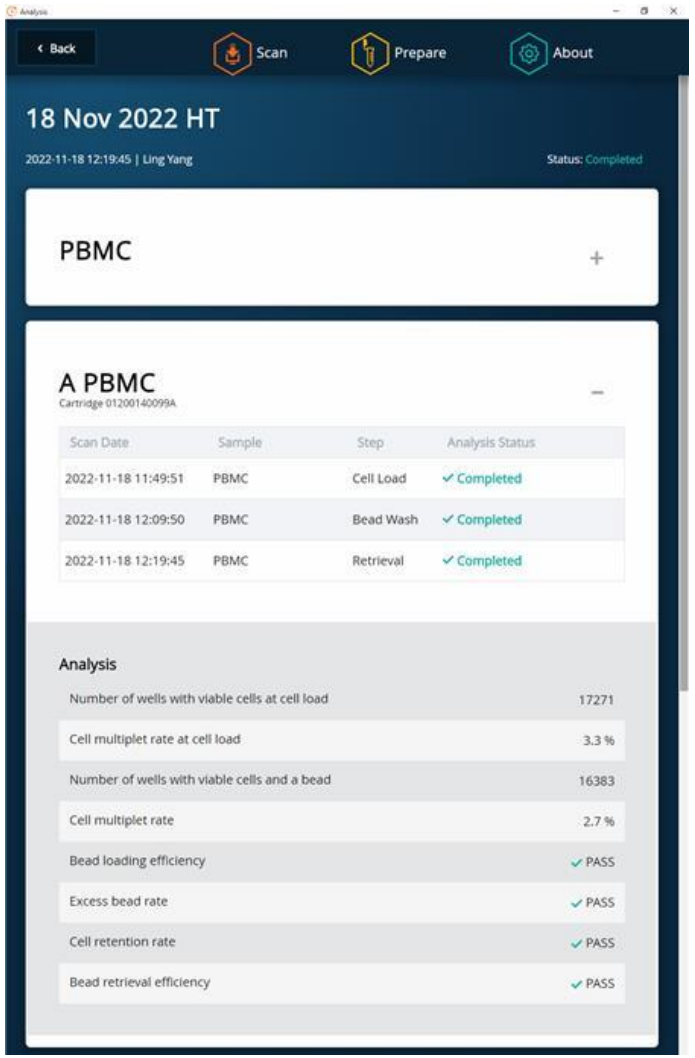


cDNA synthesis, NGS library prep



Scanner report

Analysis application and metrics at every step



Scanner metric	Use
Number of wells with viable cells at cell load	Provides a preliminary estimate of the number of wells with viable cells captured
Cell multiplet rate at cell load	Provides a measure of cell clumping
Number of wells with viable cells and a bead	Provides an estimate of the number of wells with viable cells captured with beads
Cell multiplet rate	Provides an estimate of the occurrence of multiple cells captured by the same bead in a well
Bead loading efficiency	Indicates if the cartridge is significantly underloaded with beads
Excess bead rate	Indicates the percentage of the beads that are not in wells
Cell retention rate	Indicates if a significant number of cells initially loaded into wells are lost or died during the workflow prior to cell lysis
Bead retrieval efficiency	Indicates if the number of beads retrieved is significantly lower than expected

High correlation of scanner metrics with cells recovered by sequencing

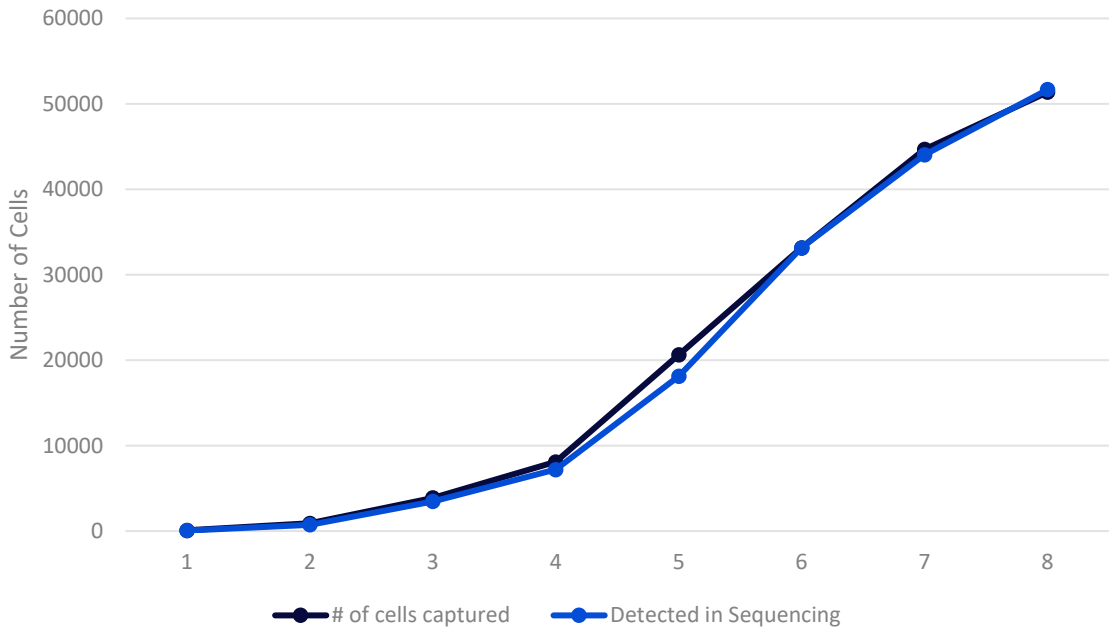


Figure Legend: Two cell types (Jurkat and Ramos) were pooled at 1:1 ratio. An 8-lane cartridge was loaded with 100, 1,000, 5,000, 10,000, 25,000 and another 8-lane cartridge was loaded with 40,000, 55,000 and 65,000 cells. The number of cells captured reported by the BD Rhapsody™ Scanner correspond to the number of putative cells detected after sequencing libraries using the BD Rhapsody™ Targeted Kit with the BD Rhapsody™ Immune Response Panel (Hs) at different cell load concentrations. Results may vary based on cell type and isolation method.

Configurations and pricing

BD Rhapsody™ HT Single-Cell Analysis System

- Recommended for users new to single-cell workflows, developing protocols or working with novel cell types or complex cell systems
- Powerful single-cell capture system with visual workflow QC

BD Rhapsody™ HT Xpress System

- Recommended for experienced users working with well-established sample preparation methods and standard cell types
- The same powerful single-cell capture system without visual workflow QC

Configurations and pricing

Base Items	Cat. No.	Retail Price (USD)
BD Rhapsody™ HT Xpress Package*	666625	$15,000
BD Rhapsody™ Scanner	633701	$54,450
TOTAL		$69,450

Optional Items	Cat. No.	Retail Price (USD)
BD Rhapsody™ Scanner Upgrade Kit	666627	$5,000
BD Rhapsody™ P1200-µL Pipette - HTX	5000066148	$1,500
BD Rhapsody™ P8x1200-µL Pipette - HTX	500066280	$2,500
Hamilton™ 60-mL Waste Reservoirs	666626	$140

*Includes BD Rhapsody™ P8x1200-µL Pipette – HTX and Hamilton™ 60mL Waste Reservoirs

BD Rhapsody™ Reagent Kits

Companion Product	Cat. No.	Retail Price (USD)
BD Rhapsody™ Targeted mRNA AbSeq Kit 8 Pack	666619	$9,975
BD Rhapsody™ WTA Reagent Kit 8 Pack	666620	$9,975
BD Rhapsody™ TCR/BCR Multiomics Assay 8 Pack	666621	$9,975
BD Rhapsody™ TCR/BCR Multiomic Assay for Targeted 8 Pack	666622	$12,375
BD Rhapsody™ TCR/BCR Multiomic Assay for WTA 8 Pack	666623	$12,375
BD Rhapsody™ Mouse TCR/BCR Multiomic Assay 8 Pack	666741	$9,975
BD Rhapsody™ Mouse TCR/BCR Multiomic Assay for Targeted 8 Pack	666742	$12,375
BD Rhapsody™ Mouse TCR/BCR Multiomic Assay for WTA 8 Pack	666743	$12,375

For a complete list of required materials, reagents, consumables and equipment, refer to the BD Rhapsody™ System Single-Cell Capture and cDNA Synthesis Single-Cell Protocol

BD Rhapsody™ Reagents

Reagent	Cat. No.
BD Rhapsody™ Enhanced Cartridge Reagent Kit	664887
BD Rhapsody™ 8-Lane Cartridge	666262
BD Rhapsody™ cDNA Kit	633773
BD Rhapsody™ Targeted mRNA & AbSeq Amplification Kit	633774
BD Rhapsody™ WTA Amplification Kit	633801
BD Rhapsody™ TCR/BCR Amplification Kit, Human	665345
BD Rhapsody™ TCR/BCR Amplification Kit, Mouse	666282

For a complete list of required materials, reagents, consumables and equipment, refer to the BD Rhapsody™ System Single-Cell Capture and cDNA Synthesis Single-Cell Protocol

BD Rhapsody™ System companion products

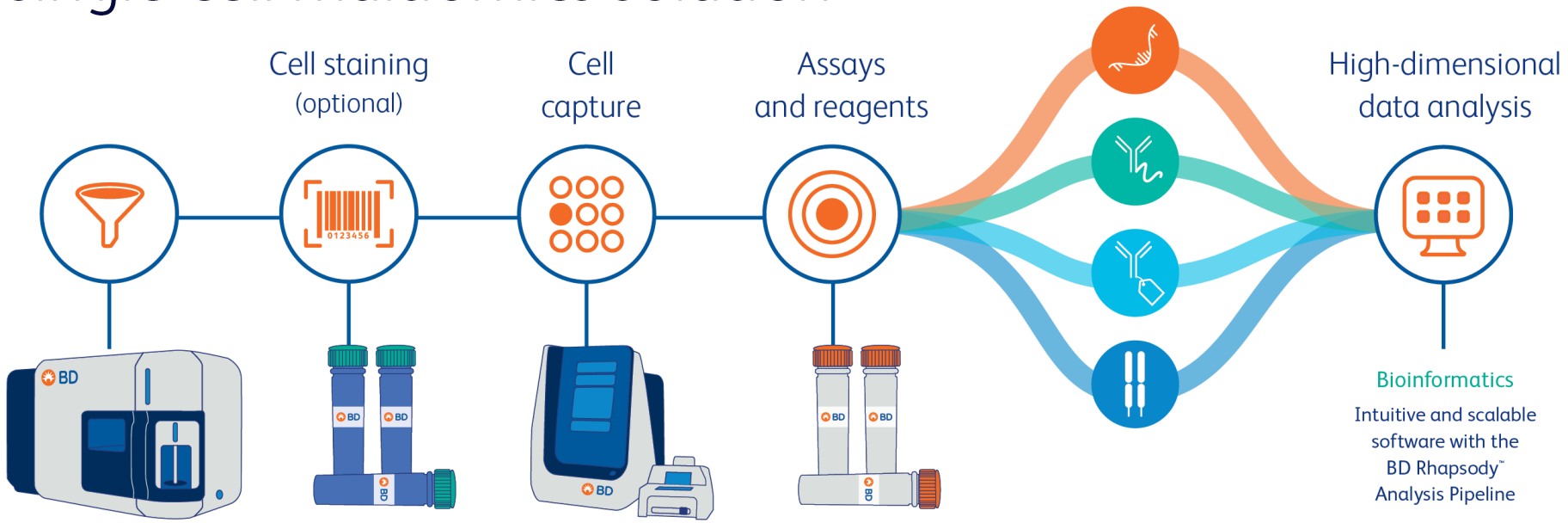
Companion Product	Cat. No.
BD® AbSeq Single Vial Reagent	Contact for more info
BD® AbSeq Immune Discovery Panel	625970
BD® Immune Response Panel	633750
BD® Human Single-Cell Multiplexing Kit	633781
BD® Mouse Single-Cell Multiplexing Kit	633793
BD® Flex Single-Cell Multiplexing Kit A	633849
BD® Flex Single-Cell Multiplexing Kit B	633850
BD® Flex Single-Cell Multiplexing Kit C	633851
BD® Flex Single-Cell Multiplexing Kit D	633852
BD® Custom AbSeq Antibodies	Contact for more info

For a complete list of required materials, reagents, consumables and equipment, refer to the BD Rhapsody™ System Single-Cell Capture and cDNA Synthesis Single-Cell Protocol

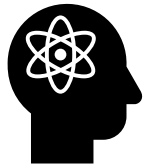
Technical specifications

	BD Rhapsody™ HT Xpress System	BD Rhapsody™ Scanner
Size and Weight		
Size W x L x H	26 cm x 36.9 cm x 20.9 cm (10.24 in x 14.5 in x 8.22 in)	45 cm x 59.9 cm x 69.4 cm (17.7 in x 23.4 in x 27.3 in)
Weight	5.7 kg (12.7 lbs.)	58 kg (128 lbs.)
Operation		
Temperature	20–25 °C (68–77 °F)	
Humidity	30–50% R.H., non-condensing	
Power Requirements		
Input	NA	100–240 ± 10% VAC, 50–60 ± Hz, 240 W
Output	NA	100–240 VAC, 50/60 Hz

A complete single-cell multiomics solution


Cell staining
(optional)
Cell
capture
Assays
and reagents
High-dimensional
data analysis
BD
BD
BD

Supporting you with your single-cell experiments



Getting help from single-cell experts

Visit us at scomix.bd.com to view our resource library, learning center and FAQs or to file a ticket for help

In need of instrument technical support

BD technical service support is here to help with instrument support. Contact us **by phone** at 877.232.8995, prompt 2, then prompt 1, 5 a.m. to 5 p.m. PT or **online** at bdbiosciences.com/en-us/support/contact-us to fill out a Service Web Form

Ordering the BD Rhapsody™ HT Single-Cell Analysis System

To request a quote or place and order, visit bdbiosciences.com or contact your local BD sales representative

BD Rhapsody™ HT Single-Cell Analysis System components

BD Rhapsody™ 8-Lane Cartridge

- Partial use cartridge
  - 320-µL cell suspension loading volume
- Microwell technology
  - 267,000 microwells per lane
  - Load 100–440K cells per cartridge
- Sample multiplexing
  - Run up to 192 samples per cartridge with BD® Flex SMK

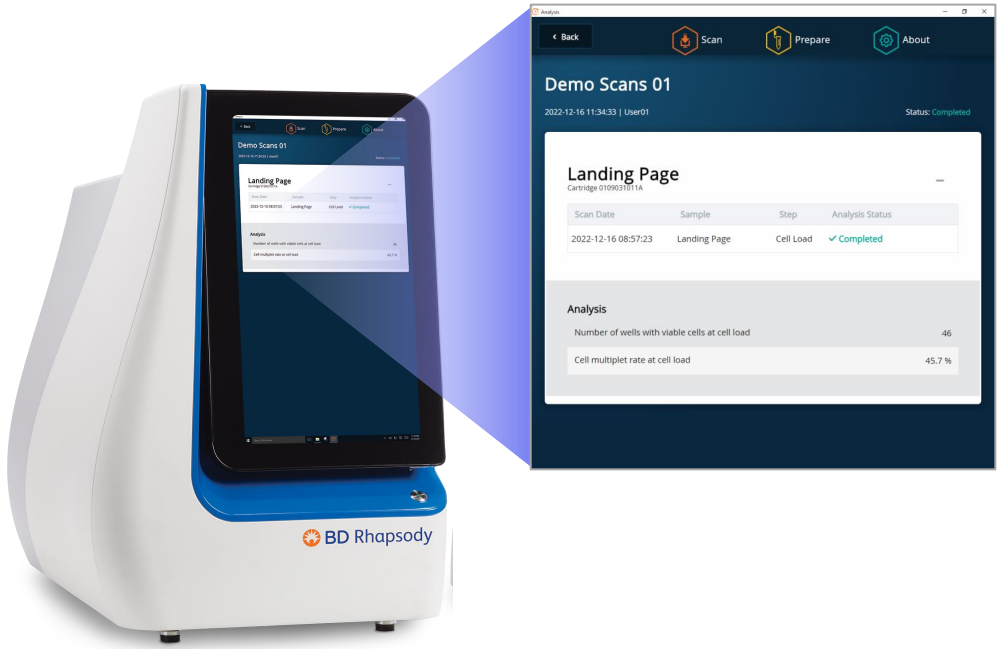
BD Rhapsody™ HT Xpress System

- Performs all steps of the cell capture workflow
- Fits on standard lab bench
- Accommodates the 8-lane cartridge

BD Rhapsody™ HT Single-Cell Analysis System components

BD Rhapsody™ System pipettes

- Multichannel pipette specific to the 8-lane cartridge
- Automated volume and flow rates
- Specialized OEM product from Gilson
- Cannot use the old pipette in one lane due to modified flow rates



BD Rhapsody™ Scanner

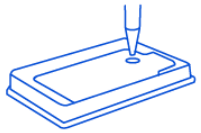
- Baseplate upgrade
  - Supports both single-lane and 8-lane cartridges
- Software upgrade
  - New user interface for multi-sample workflow
  - Supports both single and 8-lane cartridges
  - Improved image analysis
  - Optimized scan time reduction
- Field upgradeable

BD Rhapsody™ Single-Lane vs 8-Lane Cartridge

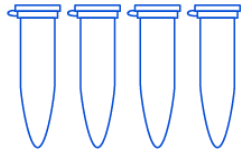
Instruments	BD Rhapsody™ HT Xpress System	BD Rhapsody™ Express System
Description	A high-throughput system with flexible capture and analysis of multiomic information from hundreds to hundreds of thousands of single-cells	Standard throughput system for capture and analysis of multiomic information from hundreds to thousands of single-cells
Technology	Microwell (>267K per lane)	Microwell (220K per lane)
Consumable	BD Rhapsody™ 8-Lane Cartridge (partial use)	BD Rhapsody™ Single-Lane Cartridge (single use)
Cell throughput (input)	100 to 55,000 per lane (100 - 440,000 per cartridge)	100 to 40,000
Sample throughput (with multiplexing)	24 samples per lane (192 samples per cartridge)	24 samples
Cell capture rate	Up to 80%	Up to 80%
Workflow (cell capture)	Manual <1 hour (8 lanes) 17 pipetting steps	Manual <1 hour (single-lane) 17 pipetting steps
Barcoding system	BD Rhapsody™ Enhanced Cell Capture Beads v2	BD Rhapsody™ Enhanced Cell Capture Beads v2
Assay compatibility	• BD® Rhapsody™ Single-Cell Multiplexing Kits • BD® AbSeq Assays • BD Rhapsody™ Targeted mRNA or Whole Transcriptome Amplification Kits • BD Rhapsody™ TCR/BCR Multiomic Assays	• BD® Rhapsody™ Single-Cell Multiplexing Kits • BD® AbSeq Assays • BD Rhapsody™ Targeted mRNA or Whole Transcriptome Amplification Kits • BD Rhapsody™ TCR/BCR Multiomic Assays

Workflow timing for one test in a BD Rhapsody™ Single-Lane Cartridge

Prepare cartridge
14 min

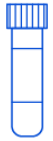


Cell labeling (optional)
Time varies



Cell staining and counting
25 min

Stain with Calcein AM and DRAQ7™



20 min

Count cells

3 min

Review results on scanner

Single-cell capture
50 min

Prep/load cells and prepare cell capture beads

16 min

Image on scanner **Cell load**

4 min

Load beads and image on scanner **Bead Load**

7 min

Perform two bead washes and image on scanner **Bead Wash**

6 min

Lyse and retrieve beads

4 min

Image on scanner **Retrieval**

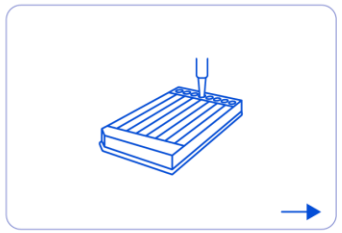
3 min

Wash cell capture beads

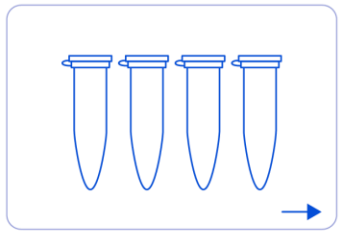
10 min

Workflow timing for eight tests in a BD Rhapsody™ 8-Lane Cartridge

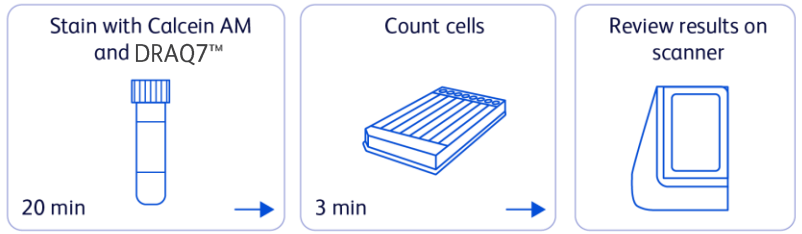
Prepare cartridge
10-15 min



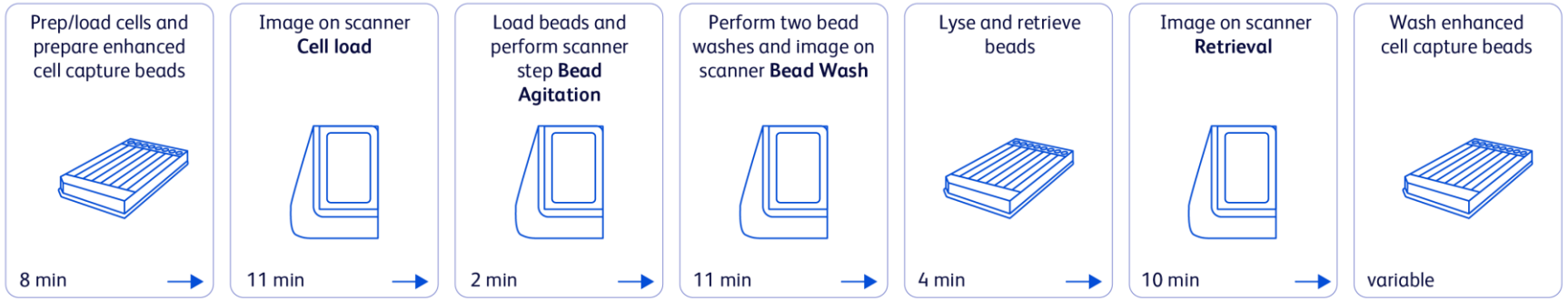
Cell labeling (optional)
Time varies



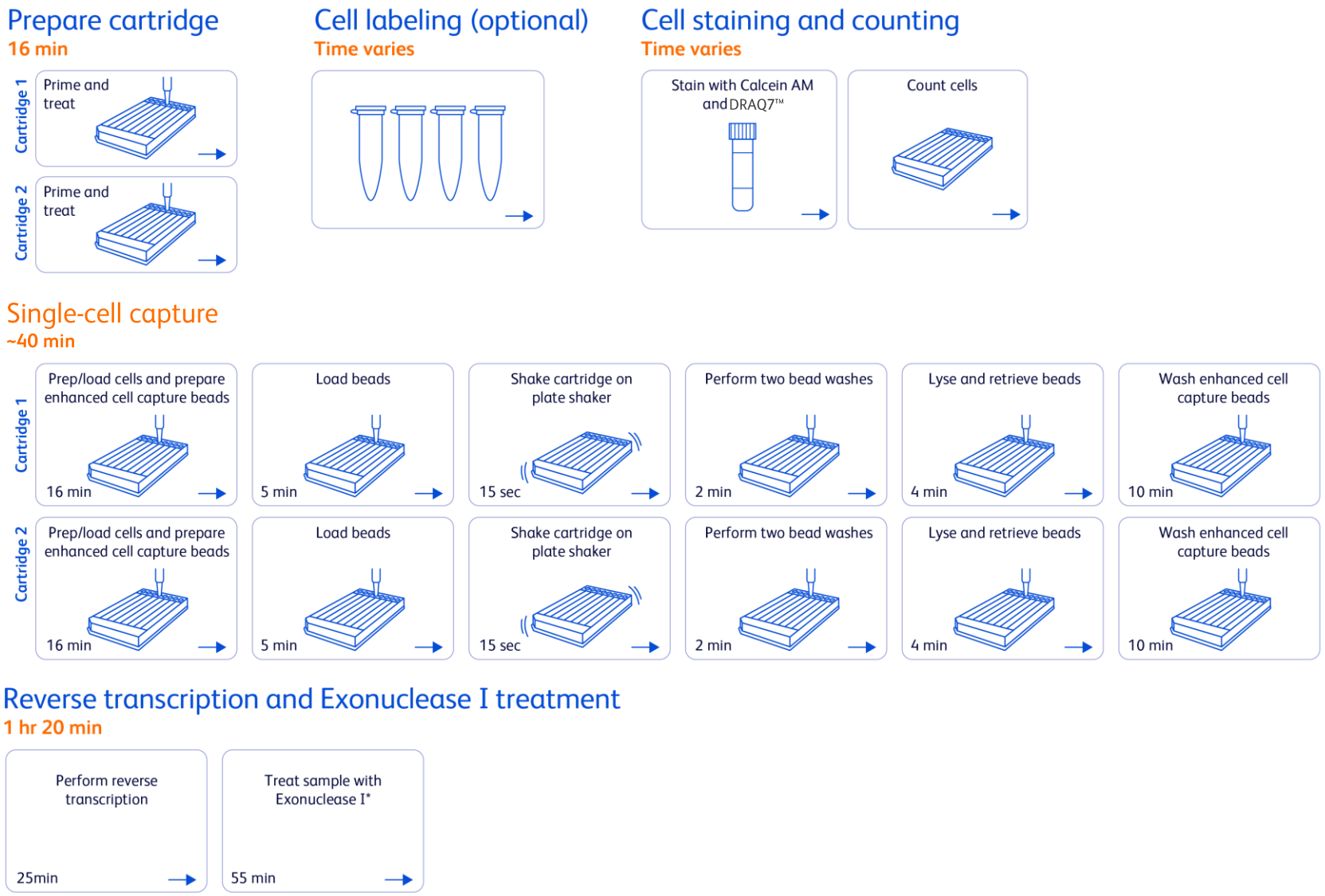
Cell staining and counting
25 min



Single-cell capture
52 min



Running two BD Rhapsody™ 8-Lane Cartridges in parallel



BD Rhapsody™ HT Single-Cell Analysis System Resources

Brochures

BD Rhapsody™ HT Single-Cell Analysis System

User Guides

BD Rhapsody™ HT Xpress System User Guide

BD Rhapsody™ HT Single-Cell Analysis System User Guide

BD Single-Cell Multiomics Analysis Setup User Guide

BD Single-Cell Multiomics Bioinformatics Handbook

Data Sheets

BD Rhapsody™ HT Single-Cell Analysis System Data Sheet

BD® Flex Single-Cell Multiplexing Kits (BD® Flex SMK)

Protocols

Single-Cell Capture and cDNA Synthesis with the BD Rhapsody™ HT Xpress System

Single-Cell Capture and cDNA Synthesis with the BD Rhapsody™ HT Single-Cell Analysis System

BD® Flex SMK Only Staining

BD® Flex SMK + 1-40, 41-100 plex AbSeq Staining Protocol

Installation and Safety Guides

BD Rhapsody™ HT Xpress System Safety Guide

BD Rhapsody™ HT Single-Cell Analysis System Installation and Maintenance Guide

BD Rhapsody™ Scanner Safety Guide

BD Rhapsody™ Software Installation Guide