



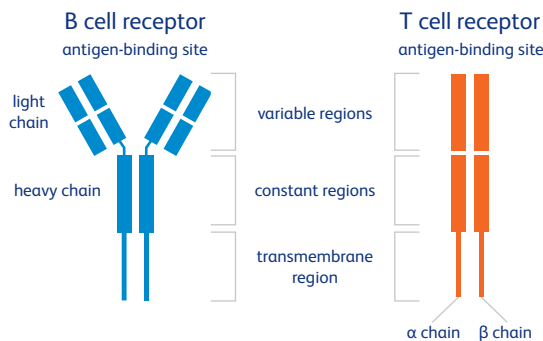
# BD Rhapsody™ TCR/BCR Multiomic Assay Kit

A full-length T cell and B cell receptor  
profiling tool for single-cell studies

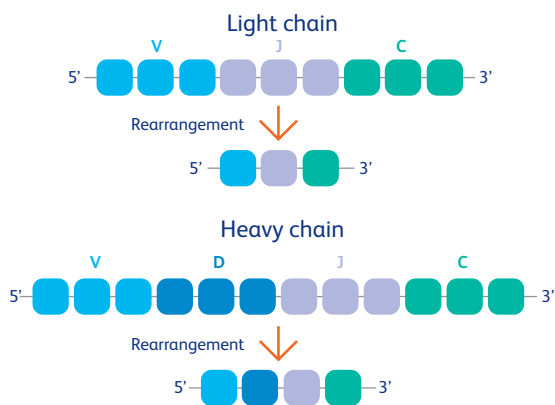
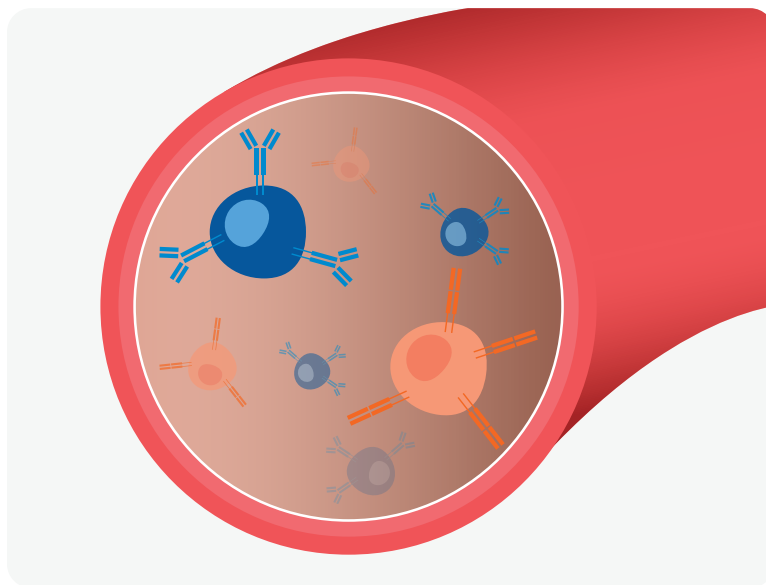


# Profile full-length B cell and T cell receptors in combination with cell surface protein staining and targeted or whole transcriptome mRNA analysis

The immune system is extraordinary and incredibly complex, consisting of numerous cell types that interact and work together to defend an organism against foreign infectious or damaging agents. Understanding the immune landscape and the role these cell types play in defending and balancing the challenges faced from the external environment is crucial when gaining insight into the events at play.



B cell receptors (BCR) and T cell receptors (TCR) are key molecules that play a large role in the adaptive immune system, responsible for recognizing and binding specific antigens.



Broad coverage of antigen specificity requires highly diverse TCR and BCR repertoires, which are generated by recombination of the variable (V), diversity (D), and joining (J) gene segments in individual cells, as well as somatic hypermutation of BCR. This diversity can make profiling of specific TCR and BCR sequences challenging and typically requires analysis at the single-cell level.

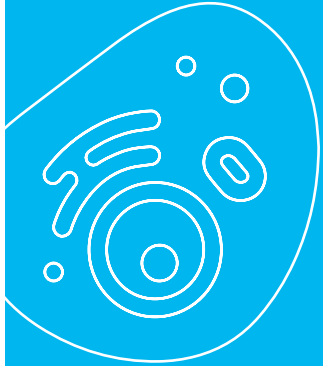
**Understand the intricacies of your cellular populations by assembling the full-length TCR and BCR sequences in combination with RNA and cell surface protein characterization at single-cell resolution**

The BD Rhapsody™ TCR/BCR Multiomic Assay Kit is a full multiomics solution that enables scientists to get a comprehensive understanding of immune cell function, providing critical insight for immunology and immuno-oncology applications.

## Applications of Interest

- Screen for antigen-specific cells in response to infectious diseases
- Profile the immune repertoire of tumor infiltrating lymphocytes
- Vaccine research
- Understand transplant rejection or tolerance
- Discover biomarkers for immunotherapy
- Pinpoint and characterize new approaches for cell therapies

# Confidence in every run with the BD Rhapsody™ TCR/BCR Multiomic Assay




## Multiomics enabled

Full-length B cell and T cell receptor profiling is compatible with BD Rhapsody™ Single-Cell Analysis System offerings including:

- BD Rhapsody™ Targeted Amplification Kit using the BD Rhapsody™ Immune Response Panel
- BD Rhapsody™ Whole Transcriptome Analysis Amplification Kit
- BD® AbSeq Immune Discovery Panel
- BD® Abseq Antibody-Oligonucleotides

**Easily design your experiments with validated protocols and products and find everything you need from your trusted partner**




## Full-length assay

Single-cell level analysis of full-length B and T cell receptors including framework regions 1–4 and CDR regions 1–3.


**Uncover clonal diversity and function of full-length V(D)J sequences for T and B cells at the single-cell level.**

- **Understand clonotype information from cell type of interest**
- **Gain insight into basic biology of these clonotypes and their disease states**
- **Profile TCR and BCR being expressed in disease states and clonotype expansion**



## 3' gene expression enabled with V(D)J expression


**Compare data across multiple experiments with and without V(D)J**



## Detection of rare cell types

Rare cell type profiling including gamma delta T cells

**Unveil distinct characteristics of rare cell populations that contribute to the role and function of other cell types or a disease state**



## Sample multiplexing

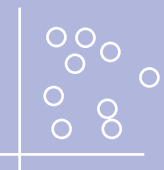
Multiple samples can be multiplexed in one workflow

**Increase sample throughput and save cost, minimize batch effects and reduce time to discovery**



## Save on sequencing costs

Recommended sequencing depth of BCR and TCR libraries is 5,000 reads per cell



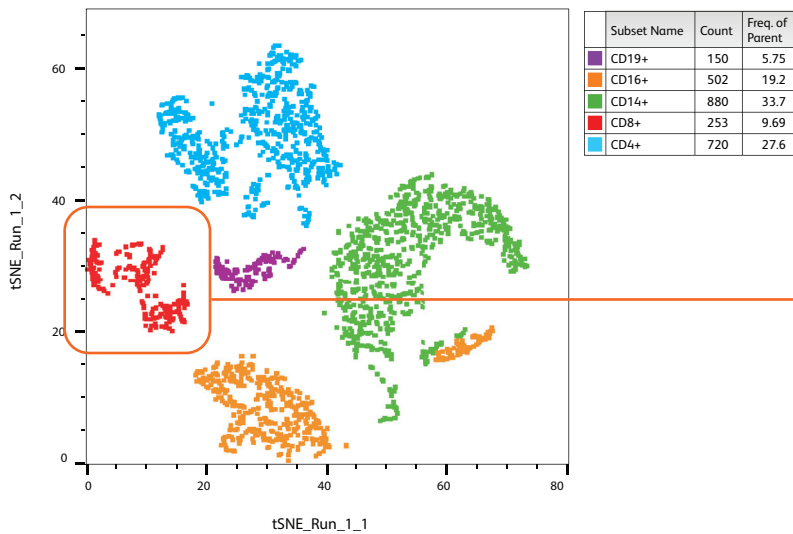
## Confidence in your data to answer biological questions

High specificity and sensitivity of V(D)J chain detection

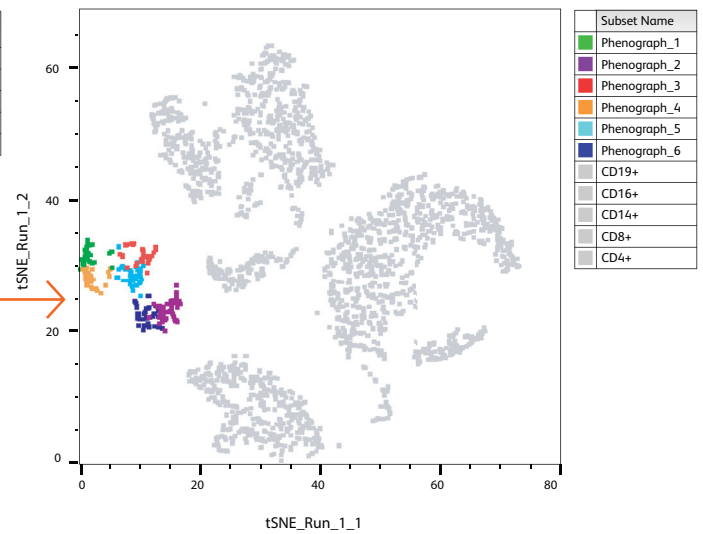
# A single workflow profiling TCR and BCR designed to work alongside targeted or WTA and protein analysis for multiplexed samples

In this study, we simultaneously analyzed TCR, BCR, whole transcriptome gene expression as well as cell surface proteins in two multiplexed samples. Resting PBMCs, stained with the BD® AbSeq Immune Discovery Panel (IDP) + 4 BD® AbSeq Antibody drop-ins, were multiplexed with enriched T cells from a different donor, stained with a 15-plex BD® AbSeq Panel.

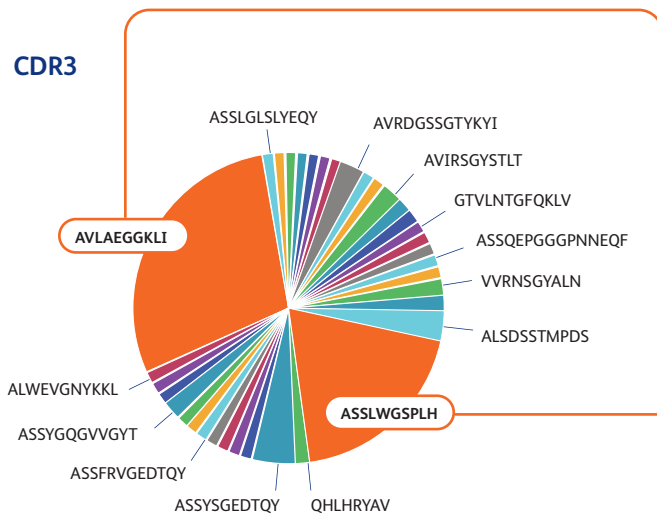
**Step 1:** Using both protein and gene expression a tSNE plot was generated and protein markers were used to identify cell populations



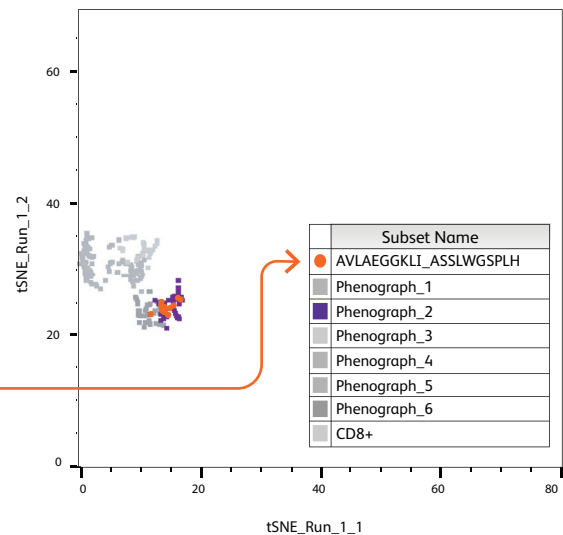
**Step 2:** An unsupervised analysis (phenograph) was performed on CD8+ cells where six clusters were identified



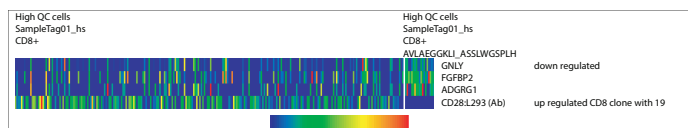
**Step 3:** Frequencies of unique clonotypes within clusters were reported



**Step 4:** The highest frequency clonotype was overlaid on the tSNE plot and identified within cluster two



**Step 5:** Using AbSeq and WTA information, differential gene and protein expression analysis of cells with the most frequent clonotype vs the rest of the population was performed



**Step 6:** Cell IDs and chain information were obtained from pipeline output files

Cell index	Chain type	CDR3 translation dominant
54044	TCR_Alpha	AVLAEGGKLI
54044	TCR_Beta	ASSLWGSPLH
123296	TCR_Alpha	AVLAEGGKLI
123296	TCR_Beta	ASSLWGSPLH
123563	TCR_Alpha	AVLAEGGKLI
123563	TCR_Beta	ASSLWGSPLH
147961	TCR_Alpha	AVLAEGGKLI
147961	TCR_Beta	ASSLWGSPLH

**Step 7:** VDJ and C gene information were determined for the clonotype of interest

Cell index	Chain type	V gene dominant	D gene dominant	J gene dominant	C gene dominant	Full-length	Productive
54044	TCR_Alpha	TRAV20*01		TRAJ23*01	TRAC	TRUE	TRUE
54044	TCR_Beta	TRBV27*01	TRBD1*01	TRBJ1-6*02	TRBC1	TRUE	TRUE
123296	TCR_Alpha	TRAV20*01		TRAJ23*01	TRAC	TRUE	TRUE
123296	TCR_Beta	TRBV27*01	TRBD1*01	TRBJ1-6*02	TRBC1	TRUE	TRUE
123563	TCR_Alpha	TRAV20*01		TRAJ23*01	TRAC	TRUE	TRUE
123563	TCR_Beta	TRBV27*01	TRBD1*01	TRBJ1-6*02	TRBC1	TRUE	TRUE
147961	TCR_Alpha	TRAV20*01		TRAJ23*01	TRAC	TRUE	TRUE
147961	TCR_Beta	TRBV27*01	TRBD1*01	TRBJ1-6*02	TRBC1	TRUE	TRUE

**Step 8:** Full-length sequence of the clonotype was obtained (nucleotide sequence also available) from pipeline output

Cell index	VDJ translation trimmed
54044	EDQVTSPEALRLQEGESSLNCSYTVSGLRGLFWYRQDPGKGPFLFTLYSAGEEKEKERLKATLTKKESFLHITAPKPEDSATYLCAVLAEGGKLIFGQGTELSVKP
54044	EAQVTQNPRYLITVTGKGLTVTCSQNMNHEYMSWYRQDPGLGLRQIYYSMNVEVTDKGDVPEGYKVS RKEKRNFP LILESPNQTSLYFCASSLWGSPLHFGNGTRLTVT
123296	EDQVTSPEALRLQEGESSLNCSYTVSGLRGLFWYRQDPGKGPFLFTLYSAGEEKEKERLKATLTKKESFLHITAPKPEDSATYLCAVLAEGGKLIFGQGTELSVKP
123296	EAQVTQNPRYLITVTGKGLTVTCSQNMNHEYMSWYRQDPGLGLRQIYYSMNVEVTDKGDVPEGYKVS RKEKRNFP LILESPNQTSLYFCASSLWGSPLHFGNGTRLTVT
123563	EDQVTSPEALRLQEGESSLNCSYTVSGLRGLFWYRQDPGKGPFLFTLYSAGEEKEKERLKATLTKKESFLHITAPKPEDSATYLCAVLAEGGKLIFGQKELSVKP
123563	EAQVTQNPRYLITVTGKGLTVTCSQNMNHEYMSWYRQDPGLGLRQIYYSMNVEVTDKGDVPEGYKVS RKEKRNFP LILESPNQTSLYFCASSLWGSPLHFGNGTRLTVT
147961	EDQVTSPEALRLQEGESSLNCSYTVSGLRGLFWYRQDPGKGPFLFTLYSAGEEKEKERLKATLTKKESFLHITAPKPEDSATYLCAVLAEGGKLIFGQGTELSVKP
147961	EAQVTQNPRYLITVTGKGLTVTCSQNMNHEYMSWYRQDPGLGLRQIYYSMNVEVTDKGDVPEGYKVS RKEKRNFP LILESPNQTSLYFCASSLWGSPLHFGNGTRLTVT

TCR alpha

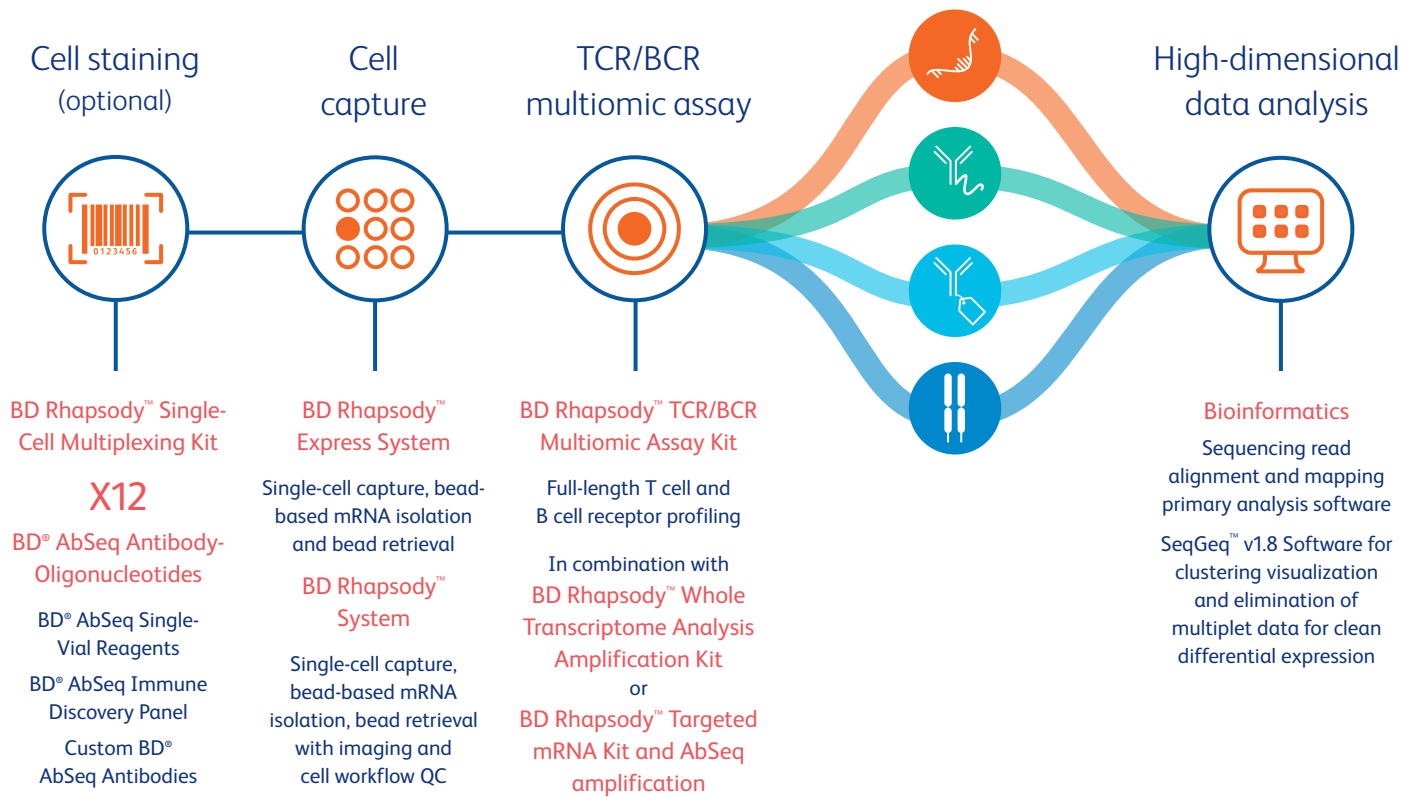
EDQVTSPEALRLQEGESSLNCSYTVSGLRGLFWYRQDPGKGPFLFTLYSAGEEKEKERLKATLTKKESFLHITAPKPEDSATYLCAVLAEGGKLIFGQGTELSVKP


TCR beta


EAQVTQNPRYLITVTGKGLTVTCSQNMNHEYMSWYRQDPGLGLRQIYYSMNVEVTDKGDVPEGYKVS RKEKRNFP LILESPNQTSLYFCASSLWGSPLHFGNGTRLTVT

● FR1 ● CDR1 ● FR2 ● CDR2 ● FR3 ● CDR3 ● FR4

# The BD Rhapsody™ TCR/BCR Multiomic Assay Kit is part of the broad portfolio of reagents, instruments and software designed to support your single-cell research



 Targeted RNA-seq/Whole transcriptome amplification

 Protein expression analysis

 Sample multiplexing

 TCR/BCR repertoire analysis

Utilize our expertise and insights for your single-cell experiments. Reach out to your local BD sales representative or contact our help desk [scmix@bdscomix.bd.com](mailto:scmix@bdscomix.bd.com) to learn more about using the BD Rhapsody™ TCR/BCR Multiomic Assay.





 BD Rhapsody

## Ordering Information

Assay kit	
Description	Cat. no.
BD Rhapsody™ TCR/BCR Multiomic Assay Kit for Targeted mRNA Analysis*	665828
BD Rhapsody™ TCR/BCR Multiomic Assay Kit for Whole Transcriptome Analysis	665829
Suggested companion products	
BD Rhapsody™ Single-Cell Analysis System	633701
BD Rhapsody™ Express Single-Cell Analysis System	633702
BD® AbSeq Single-Vial Reagents	Contact for more info
BD® AbSeq Immune Discovery Panel	625970
BD® Immune Response Panel	633750
BD® Human Single-Cell Multiplexing Kit	633781
Custom BD® AbSeq Antibodies	Contact for more info

\*Additional primer panel is required

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