BD Rhapsody™ Immune Response Targeted Panel (Human)

Targeted human immune gene panel for the BD Rhapsody Single-Cell Analysis System

- Validated panel focuses on genes relevant to phenotyping human immune cells

- Targeted sequencing approach requires dramatically fewer reads than a 3' whole transcriptome sequencing approach

- Reproducible assay empowers numerous applications

The human immune system is an intricate defense network of organs and cell types that protect against pathogens, environmental antigens and cancer. The immune response consists of complex interactions among several cell types. These cells are involved in surveillance and recognition of foreign pathogens or cells, secretion and recruitment of inflammatory signals, coordination and expansion of specific adaptive immune cells, and maturation of adaptive cells for immune memory and antibody production. Understanding how these processes function normally and in instances of dysregulation are fundamental to understanding such diseases as inflammation, infection and cancer.
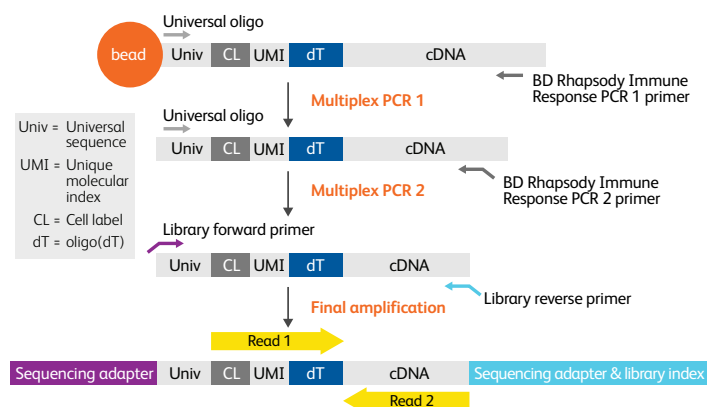
The BD Rhapsody™ Immune Response Panel (Human) is an assay for single-cell research of the human immune system with the BD Rhapsody Single-Cell Analysis System. The panel allows for more cost efficient cellular phenotyping of single cells. Researchers interested in immunology, translational research, or drug development gain a powerful tool to identify, explore and understand human immune cell function.

Expertly designed panels give you the right genes

Drawing from BD's 40 years of experience in immunology, the panel content was chosen to comprise relevant phenotypic markers, including those routinely used in FACS analysis. Panel genes include those involved in cytokine and chemokine secretion, interleukin signaling and transcription factors involved in cell differentiation and maturation. Panel content was specifically developed to amplify transcripts most relevant to immune-cell function, rather than constitutively expressed genes (e.g. ribosomal genes). This focused approach to sequencing dramatically improves assay efficiency compared to a whole transcriptome assay. Targeted approaches save both sequencing costs and analysis time, allowing researchers to better utilize resources for other immune studies.

Tailored libraries for more targeted sequencing

The BD Rhapsody Immune Response Targeted Panel (Human) utilizes multiplex PCR for detecting 399 genes chosen for profiling human immune cells. After cells are lysed in the BD Rhapsody Cartridge, beads containing captured mRNA are

Figure 1. cDNA synthesis and library construction chemistry using the BD Rhapsody Immune Response Targeted Panel (Human).

magnetically retrieved for cDNA synthesis. Included primers are used for several rounds of gene-specific nested PCR for library construction. The final PCR amplification products for sequencing contains sequencing adapters, a cell label, unique molecular index (UMI) and up to 400 bp of the 3' end of the target gene. Assay products can be sequenced on Illumina MiSeq, NextSeq, HiSeq2500 and HiSeq4000 sequencers.

Your target genes, delivered your way

For exploring genes beyond the panel, the BD Rhapsody Immune Response Targeted Panel (Human) allows customization by adding user-defined genes. Select up to 100 additional genes as a BD Rhapsody Supplemental Panel. Using BD's primer design software, primers for supplemental gene targets are designed to be compatible with pre-designed base panels. Supplemental primers are shipped to you and combined with the BD Rhapsody Immune Response Targeted Panel (Human) for library preparation.

Expression profiling of the single cell

To show the performance of the BD Rhapsody Immune Response Targeted Panel (Human), 3,201 cryopreserved donor-isolated PBMCs were profiled using the BD Rhapsody system. Major cell groups that comprise peripheral blood mononuclear cells are readily observable. The BD Rhapsody Immune Response Targeted Panel (Human) provides resolution of naïve, effector and memory CD4+ and CD8+ T-cell subsets, distinguishes between plasma cells producing different antibody isotypes, and identifies rare subpopulations like regulatory T cells and gamma delta T cells.

Table 1: Example genes by category

Pathway	# of genes in panel
CD marker	52
Cell type-specific marker	44
Chemokine/chemokine receptor, cytokine/cytokine receptor	60
Immunoglobulin	14
Interleukin	33
Other*	196

* Apoptosis regulator; cell adhesion; cell cycle; complement protein; effector molecule; enzyme, G-protein coupled receptor; growth factor; immune checkpoint; immune receptor; immunoglobulin; integrin; kinase; metabolism; MHC class I or II; NK-cell receptor; nuclear receptor; stress response; toll-like receptor; transcription factor; transporter

Table 2: BD Rhapsody Immune Response Targeted Panel (Human) metrics

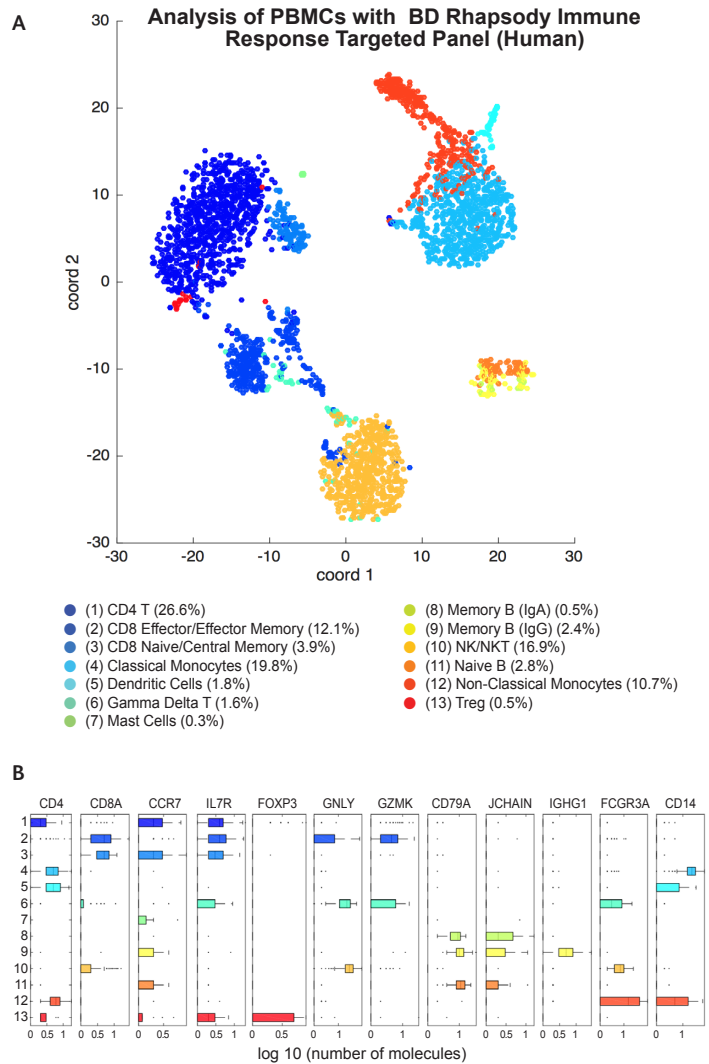| Total reads recommended per cell	
For cell type identification	2K
For direct comparison across samples	20K
# of genes in panel	399

Figure 2. Example data of the BD Rhapsody Immune Response Targeted Panel (Human). (a) tSNE projection of 3,201 PBMCs, annotated by cell type. (b) Box plots of marker gene expression for each major cell type.

Learn more about the power of targeted single-cell analysis

The BD Rhapsody Immune Response Panel (Human) shows validated, reproducible and reliable dissection of human immune response cell subsets, useful for exploring cell types in a wide variety of applications. Contact us to learn what this panel and the BD Rhapsody system can do for your research.