BD Rhapsody™ Onco-BC Targeted Panel

Targeted breast cancer gene panel for single-cell analysis

- Validated gene panel focuses on human breast cancer biology

- Targeted approach drives experimental efficiency

- Reproducible assay empowers variety of experimental applications

Breast cancer biology is complex due to variable gene expression, cellular heterogeneity, and variation among patients. To address this complexity, the BD Rhapsody™ Onco-BC Targeted Panel provides a streamlined assay for single-cell research of breast cancer, using the BD Rhapsody Single-Cell Analysis System. By focusing on genes and markers most relevant to breast cancer biology, the assay requires fewer sequencing reads, and reduces time and sequencing costs associated with a whole transcriptome sequencing approach.
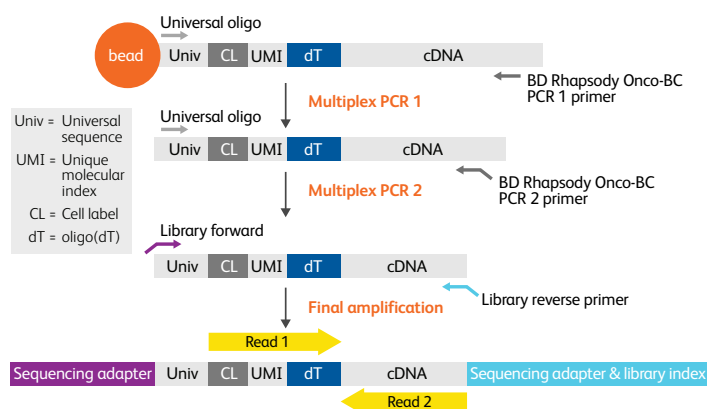

Figure 1. cDNA synthesis and library construction chemistry with the BD Rhapsody Onco-BC Targeted Panel.

Panel designed by scientists, for scientists

The customizable and validated BD Rhapsody Onco-BC Targeted Panel was created from collaborations with clinical oncologists. The panel content combines data from experimental and database sources, chosen to include genes with known involvement in cancer progression, proliferation, epithelial-to-mesenchymal transition (EMT) and cancer stem cells. Including PAM50 genes aids molecular subtyping of breast cancer cells[1], while immunophenotyping and stromal cell markers enable comprehensive surveys of the complex tumor microenvironment.

Tailored libraries for targeted sequencing

The BD Rhapsody Onco-BC Targeted Panel is designed for the BD Rhapsody system, and uses multiplex PCR for detecting up to 389 genes. After cells are lysed in the BD Rhapsody Cartridge, beads hybridized with mRNA are magnetically retrieved for cDNA synthesis. Primers included in the BD Rhapsody Onco-BC Targeted Panel and BD Rhapsody Supplemental Panel are used for several rounds of gene-specific, nested PCR for library construction. Final PCR products for sequencing contain adapters, a cell label, a unique molecular index (UMI), and up to 400 bp of the 3' end of a target gene. Assay products may be sequenced on Illumina® MiniSeq, MiSeq, NextSeq, HiSeq2500 and HiSeq4000 sequencers.

Your target genes, delivered your way

Researchers may select up to 100 additional genes for analysis, with the 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 Onco-BC Targeted Panel for library preparation.

Remarkable panel performance—single-cell suspensions from a metastatic breast cancer sample

In the following example, cryopreserved single-cell suspensions from a disaggregated metastatic breast cancer patient sample were sorted using the BD FACSAria™ system to enrich for live cells. 4,409 cells derived from a lymph node metastasis were profiled using the BD Rhapsody system. Fifteen cell types were detected, including four subpopulations of breast cancer cells and a diverse tumor microenvironment of stromal and major immune cell types. Because the analysis focused on just five percent of the transcriptome, the amount of sequencing is drastically lowered.

Table 1: Example genes by category

Pathway	# of genes in panel
Cell adhesion	23
Cell cycle	44
Chemokine/chemokine receptor, cytokine/cytokine receptor	53
Signal transduction	56
Oncogenes, tumor suppressors	10
Tumor immunity, immune checkpoint, immune cell activation	24
Surface antigen	32
Other*	147

* Angiogenesis; cell death; complement system; structural; transport; DNA repair; epithelial-to-mesenchymal transition; hormone receptor; immunoglobulin; lncRNA; metabolism; multi-drug resistance; protease; transcription factor

Learn more about the power of targeted single-cell analysis

The BD Rhapsody Onco-BC Targeted Panel brings single-cell analysis within reach of all breast cancer researchers, by combining increased sequencing efficiency with a flexible approach to your projects. Contact us to find out how the BD Rhapsody panel can help you further the understanding of breast cancer biology.

Table 2: BD Rhapsody Onco-BC Targeted Panel metrics

Total reads recommended per cell	
For cell type identification	2K
Direct comparison across samples	20K
# of genes in panel	389

A

Analysis of a metastatic breast cancer sample

- (1) B (23.2%)
- (2) BrCa (8.6%)
- (3) BrCa (CD74 high) (4.1%)
- (4) BrCa (ESR1 low) (7.1%)
- (5) BrCa (proliferating cancer stem cell) (6.2%)
- (6) CD4 Effector T (4.6%)
- (7) CD8 Cytotoxic T (18.0%)
- (8) Effector T (6.6%)
- (9) Gamma Delta T (3.2%)
- (10) Myeloid (3.1%)
- (11) NK/NKT (0.6%)
- (12) Naive T (12.0%)
- (13) Plasma (0.6%)
- (14) Stroma (0.1%)
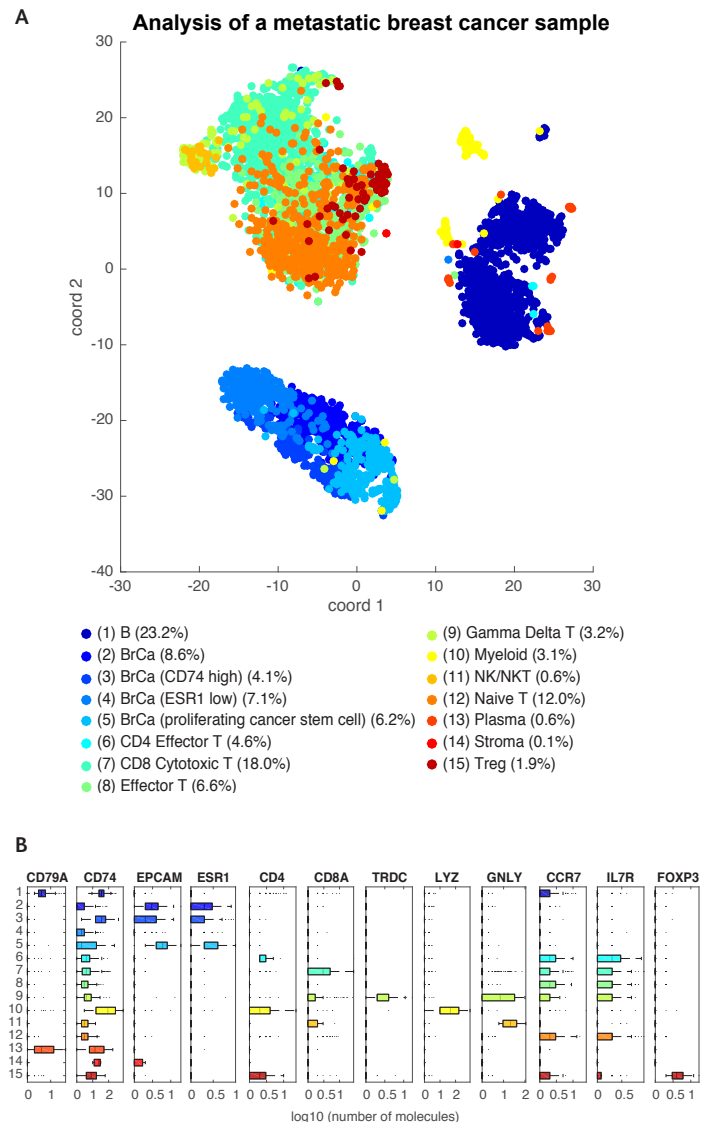- (15) Treg (1.9%)

B

Figure 2. Example data from analysis of a lymph node containing metastatic BrCa cells using the BD Rhapsody Onco-BC Targeted Panel. (a) tSNE projection of 4,409 cells annotated by cell type and (b) box plots of marker gene expression for each major cell type show complex tumor heterogeneity.

1. Parker JS, Mullins M, Cheang MCU, et al. Supervised Risk Predictor of Breast Cancer Based on Intrinsic Subtypes. *Journal of Clinical Oncology*. 2009;27(8):1160-1167.

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