Comprehensive Adaptive Immune Receptor Profiling for All Immune Cell Types

Immune Receptor Profiling is a powerful tool for characterizing adaptive immune responses to cancer, auto-immune and infectious diseases, allergies, vaccinations, and therapeutic treatments. The unique sequences of the T-cell and B-cell receptors (TCRs and BCRs), and antibody variable regions (CDR3) that recognize foreign antigens define the individual differences in adaptive immune response. Profiling the TCR and BCR variable regions using RT-PCR and NGS can provide critical data for the discovery of novel, disease-associated immunity biomarkers.

What is the DriverMap™ AIR Profiling Assay?

The DriverMap™ Adaptive Immune Receptor (AIR) profiling assay is the only assay on the market that profiles **all 7 TCR/BCR isoforms (TRA, TRB, TRG, TRD, IGH, IGK, IKL) starting from DNA or RNA** (Fig 1).

- **Start from all immune sample types:** The assay is compatible with various sample types: whole blood or PBMC, cancer biopsies and tissue samples without need of rRNA, mitochondrial or globin depletion (Fig 2).

- **Profile small samples directly from lysed cells:** The DriverMap AIR protocol is based on hybridization of gene-specific primers with target RNA. The assay is run directly from immune cells starting from DNA or RNA of purified immune cells, FFPE, tumor biopsies or whole blood microsamples (30 µl). (Fig 2)

- **Obtain more quantitative repertoire coverage:** Starting with the same amount of total RNA, the DriverMap AIR assay robustly detects more overlapping clonotypes in replicate samples than other RNA-based immune receptor profiling methods. For example, the DriverMap AIR RNA assay detects three-fold more clonotypes than the conventional SMART®-based 5'-switch oligo TCR assay (Fig 3).

- **Identify antigen-activated clonotypes:** By using both the DriverMap AIR-DNA and AIR-RNA assays on the same sample, activated subsets of TCR & BCR clonotypes may be identified. (Fig 4)
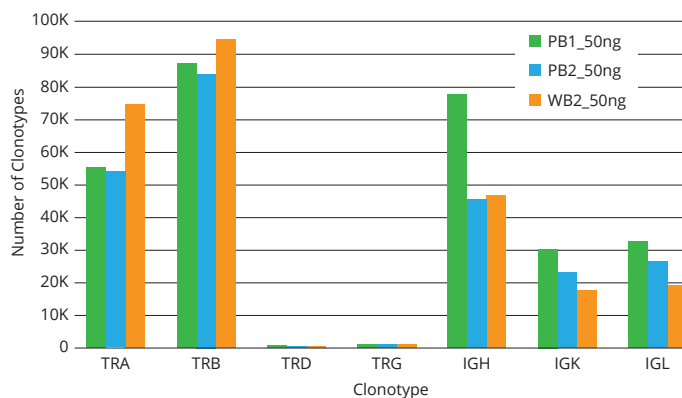

Figure 1

The number of clonotypes for 7 TCR/BCR chains detected from 50ng of PBMC and whole blood RNA samples in triplicate.
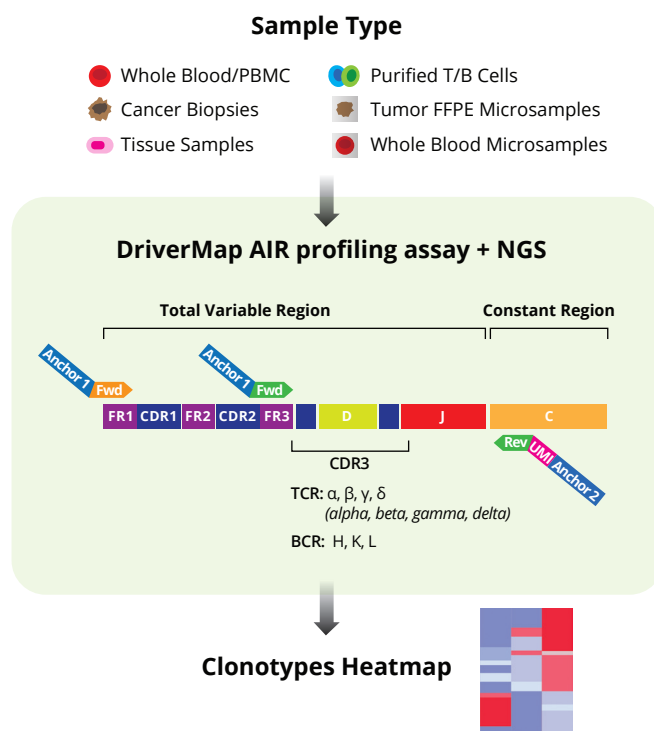

Figure 2

DriverMap AIR profiling assay works with various sample types with 10 ng – 1 µg of total RNA using multiplex RT-PCR reaction and NGS profiling to provide quantitative clonotype analysis.

Choose the Assay that Best Fits Your Needs

· **DriverMap AIR-RNA assay** comprehensively profiles full-length or CDR3 receptor regions from limited numbers of cells. The sensitive, RT-PCR based method allows for the detection of low-frequency or rare TCR & BCR clonotypes.

· **DriverMap AIR-DNA assay** provides a more quantitative measurement of the cells containing each CDR3-specific clonotype, enabling the measurement of clonal expansion in T-and B-cells.

Detection of Antigen-Activated Clonotypes from Profiling DNA and RNA Samples

TCR and BCR profiling of both DNA and RNA from the same sample enables detection of antigen-activated clonotypes, providing important insight into the immune response (Fig 4). Activation of the adaptive immune response has resulted in significant up-regulation of TCR and BCR transcription in antigen-specific clonotypes (e.g. ~1,000-fold increase for plasma B cells). The resulting profile may suggest new therapeutic and diagnostic strategies.

Integrating AIR Profiling Data with Immunophenotyping of Immune cells

The DriverMap technology platform allows you to generate both AIR and targeted expression profiles for 300+ key T/B cell subtyping and activation marker genes from the same cell sample (immune cell fractions or single-cells). As a result, **you can obtain both phenotypic cell typing data and immune receptor profiles from the same samples.**

Conclusion

When compared to other immune receptor profiling options available to researchers today, the **DriverMap Adaptive Immune Receptor (AIR) Profiling Assay is the most complete, sensitive and straightforward way** to obtain insights into your immune cell samples.

DriverMap AIR-RNA and AIR-DNA Profiling Assays are available as a kit or service. **Learn more at cellecta. com/DriverMapAIR**
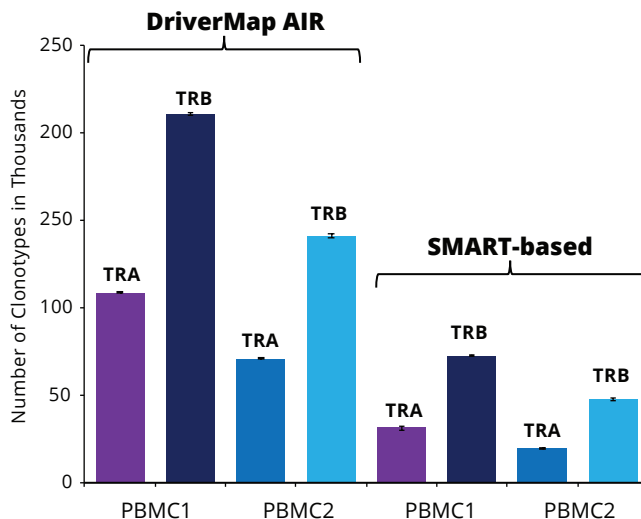

Figure 3

Comparison of TCR clonotypes detected by DriverMap AIR vs SMART assay. Both assays were run with 50 ng of total RNA isolated from PBMC. The DriverMap AIR assay detects ~ 3X more TCR clonotypes than the SMART assay.
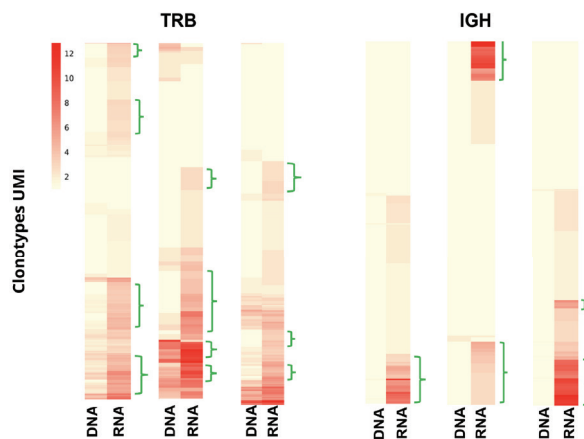

Figure 4

Heatmaps show the activation of specific TRB and IGH clonotypes across multiple samples in metastatic tumor biopsies. Data is normalized for DNA and RNA, where each horizontal lane represents a distinct clonotype. Green brackets indicate clonotypes highly expressed in RNA but not in DNA, indicating highly up-regulated receptor clones in the RNA sample compared to the DNA. However, some DNA regions are also up-regulated, indicating a higher copy number of cells (DNA) clonotypes in the tumor samples.

Get Early Access and Introductory Pricing to Cellecta's DriverMap AIR Profiling Service

Cellecta is currently offering an **Early Access Program for the DriverMap Adaptive Immune Receptor (AIR) Profiling Assay.** If you have blood, PBMC, or other immune cell samples that you would like to have analyzed, please contact us at **collaborate@cellecta.com** for more information.