Comprehensive and Reproducible Immune Repertoire Profiling

Immune Repertoire 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 responses (Fig 1). Profiling the TCR and BCR variable regions using RT-PCR and NGS provides critical data for the discovery of novel, disease-associated immunity biomarkers.

The DriverMap™ iRP Assay Difference

The DriverMap iRP Assay amplifies a larger complement of clonotypes than SMART 5'-RACE and other multiplex PCR immune profiling approaches. Since it is PCR-based, it is also able to generate comprehensive profiles from very small samples. The DriverMap iRP Assay outperforms traditional technologies in several distinct ways:

- **Improved Immune Repertoire Coverage:** Starting with the same amount of total RNA, the DriverMap iRP Assay identifies three-fold more clonotypes than the conventional SMART-based TCR assay (Fig 2). Moreover, reproducibility in triplicate RNA samples is significantly higher with the DriverMap iRP assay (Fig 3).
- **Robust Results with Small Samples:** Due to the low level of non-specific background products, the DriverMap iRP Assay allows you to generate CDR3 profiling data from 10 ng to 1 ug of total RNA isolated directly from whole blood. SMART technology is limited to use for immune profiling of PBMC RNA due to high background levels. Furthermore, robust profiling data has been generated from just 30 ul of dried whole blood collected using a microsampling technology.
- **Uniform and Unbiased CDR3 Amplification:** DriverMap iRP technology generates a more uniform, unbiased amplification of CDR3 regions when compared to SMART technology as shown by unique molecular identifier (UMI) analysis (Fig 4). The DriverMap iRP assay amplifies shorter (300-400 bp) CDR3 fragments rather than full-length 700-800 bp V(D)J regions and so the amplification is more uniform and consistent.

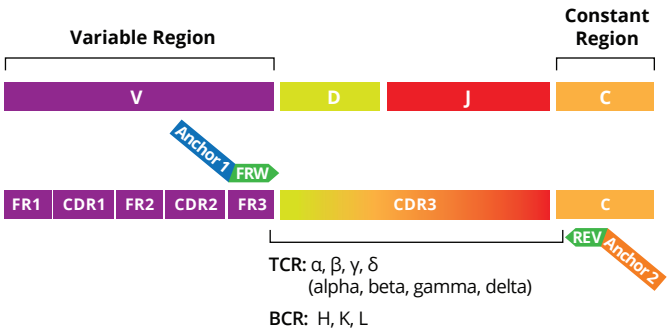

Figure 1

General structure of mRNA for different TCR (alpha, beta, gamma, delta) and BCR (heavy, kappa, lambda) chains and positions of the forward and reverse PCR primers to amplify the multiple CDR3 chains in a multiplex RT-PCR reaction.

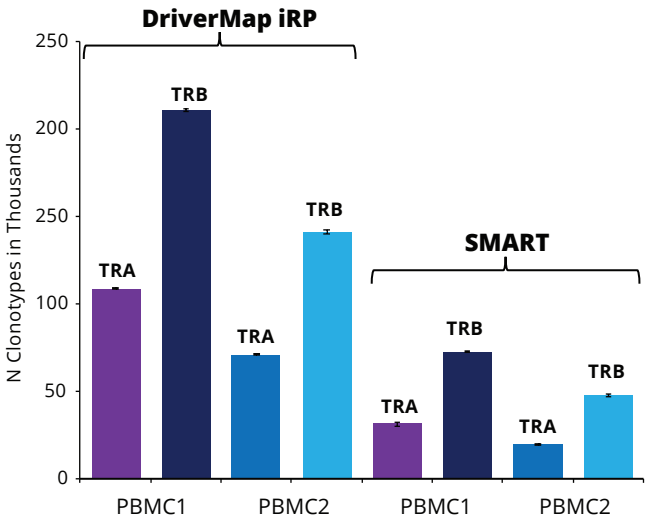

Figure 2

Comparison of unique TCR clonotypes detected by DriverMap iRP vs SMART Technology. Both assays were run with 50 ng total RNA isolated from PBMC cells. DriverMap iRP detects ~3X more TCR clonotypes.

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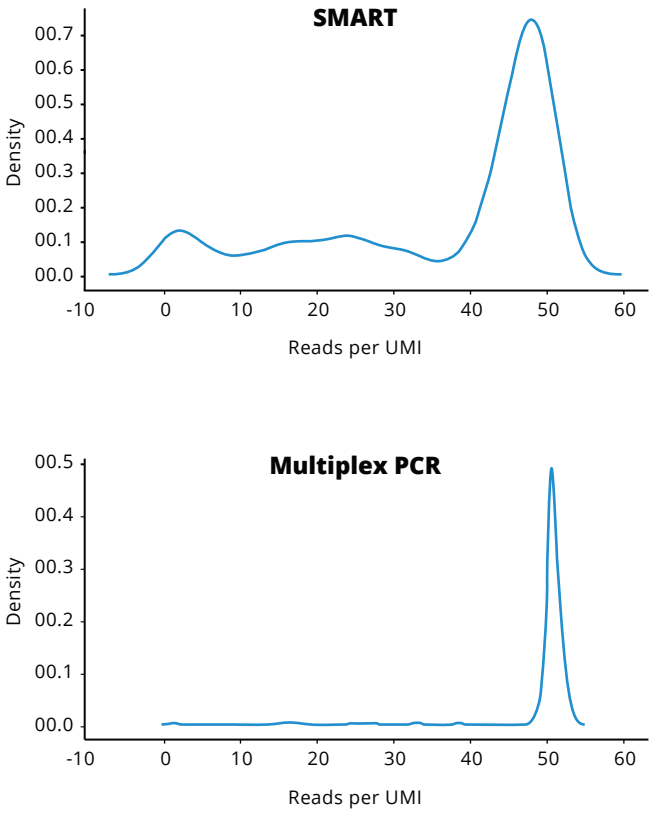

Figure 4

Analysis of TCR transcript UMIs from DriverMap iRP and SMART assays. The DriverMap iRP assay produces a very consistent ratio of UMIs vs. reads for each transcript, whereas the SMART-based assay has a much less consistent ratio. With DriverMap iRP, amplification across all the transcripts was very consistent.

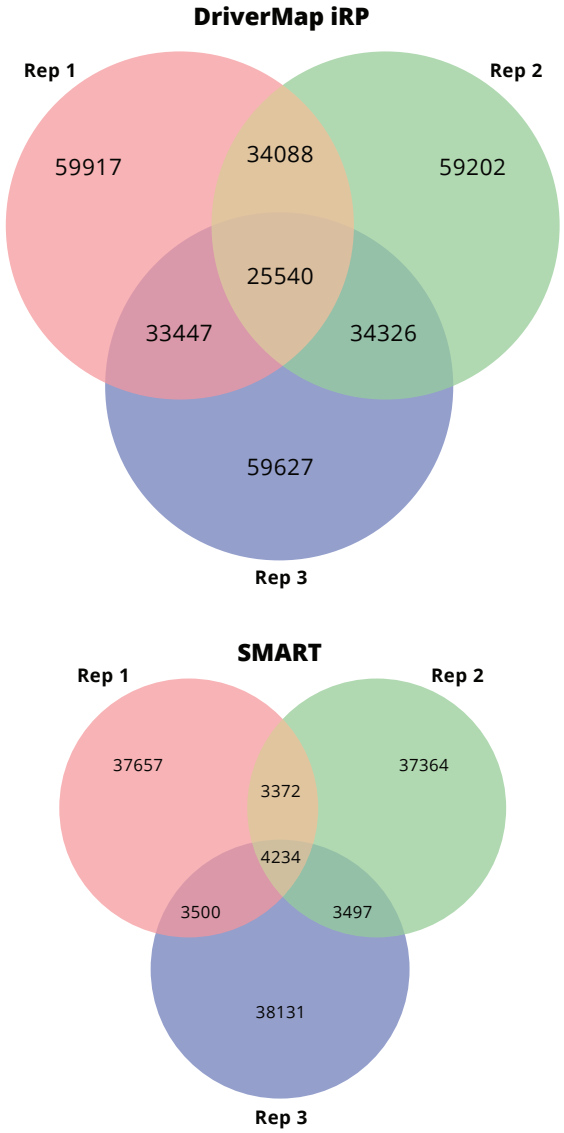

Figure 3

*Comparison of the overlap and total number of all detected TRB **clonotypes** across triplicate parallel assays using DriverMap iRP and SMART immune profiling assays run with 50 ng of PBMC total RNA. NGS depth/replicate ~25M reads.*

What is the DriverMap iRP Assay?

Cellecta's DriverMap Immune Repertoire Profiling (iRP) Assay is a single, multiplex RT-PCR reaction that simultaneously amplifies all TCR and BCR CDR3 regions using a set of 300 experimentally validated PCR primers to yield Illumina-compatible NGS libraries. Moreover, the DriverMap iRP assay is designed to specifically amplify only functional CDR3 RNA molecules, in comparison with SMART® 5'-RACE and DNA-based multiplex PCR technologies which also amplify non-functional pseudogenes.

Combining Immune Repertoire and Gene Expression Profiling

Both of Cellecta's targeted **DriverMap iRP** and **DriverMap Gene Expression** Assays have the same workflow and ability to generate data from small quantities of total RNA. Both immune repertoire and gene expression profiles can be efficiently processed in parallel from the same total RNA samples. As a result, it is possible to obtain both phenotypic cell typing data and immune repertoire profiles from the same samples.

Get Early Access to Immune Repertoire Profiling (iRP)

Cellecta is currently offering an **Early Access Program for the DriverMap Immune Repertoire Profiling Assay.** If you have blood, PBMC, or similar samples that you would like to have analyzed, please contact us at **collaborate@cellecta.com** for more information.

Are you interested in TCR/BCR repertoire profiling? Contact us at collaborate@cellecta.com

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