GeoMx® TCR Profiling Add-On

Gene Expression Add-On to HuWTA or CTA

Add the ability to spatially profile expression of different T Cell Receptor (TCR) Variable and Joining regions to your GeoMx DSP Human Whole Transcriptome Atlas (HuWTA) or Cancer Transcriptome Atlas (CTA) assay. Spatially quantify changes in TCR diversity in response to cancer, infectious disease, autoimmunity, organ rejection, and therapeutic treatment within distinct tissue compartments or cell type populations within tissue sections.

Product Highlights

- Add an additional dimension to your HuWTA or CTA experiments with the TCR Profiling Add-On
- Collect spatial expression data on 146 Human T Cell Receptor segments, including T Cell Receptor Variable and Joining regions across Alpha, Beta, Gamma, and Delta chains
- Customize with up to 400 additional targets to assay additional T cell biology content, non-coding RNA, synthetic DNA, or exogenous genes
- Overlapping content with the nCounter® TCR Diversity Panel allows for paired sample studies

Panel Content

The TCR Profiling Add-On assay for GeoMx DSP contains probes for 146 Variable and Joining segments across all four Human TCR receptor loci Alpha, Beta, Gamma, and Delta plus 50 negative control targets and 6 positive T cell controls. Combined with the GeoMx HuWTA or CTA assays which contain probes for TCR Constant regions and key markers of T Cell phenotype and activation status, the TCR Profiling Add-On is a powerful tool that enables you to fully understand the adaptive T cell immune response to different diseases and/or therapeutic treatment.

Chain Type	Variable Regions, V	Joining Regions, J	Constant Regions, C
Alpha	TRAV 40 genes	TRAJ 46 genes	TRAC, TRBC, TRGC, and TRDC are included in GeoMx HuWTA and CTA
Beta	TRBV 40 genes	TRBJ 4 genes	
Beta	TRGV 5 genes	TRGJ 4 genes	
Beta	TRDV 3 genes	TRDJ 4 genes	

Applications

The GeoMx TCR Profiling Add-On can used in combination with the HuWTA or the CTA to spatially profile in FFPE or fresh frozen tissue the effect of disease onset/progression and/or treatment response/vaccination for any number of application areas:

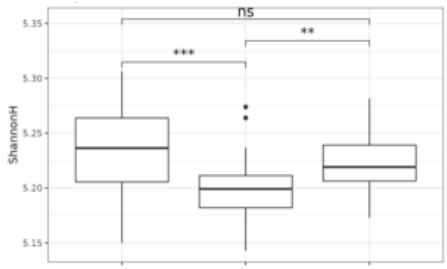
- Understanding the effect of CAR-T cells or engineered T cells on the T cell adaptive immune response to cancer
- Monitoring the effect of vaccination or the impact of disease resolution on the T cell response to infectious disease
- Studying the impact of T cell mediated organ rejection in solid organ transplantation
- Using spatial localization of T cell receptor diversity as a potentially predictive or prognostic biomarker for disease progression, severity, or treatment response

Data Analysis

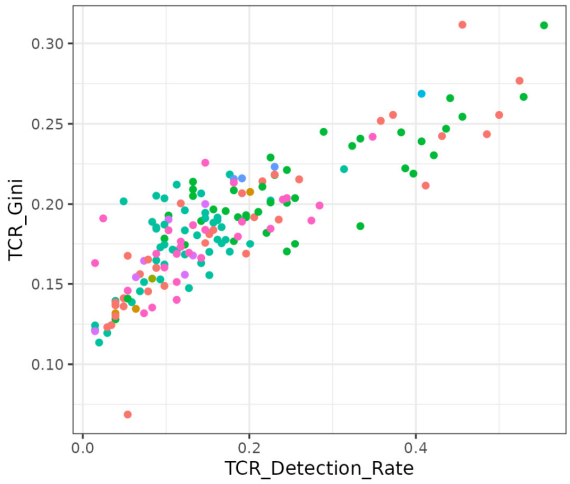
A GeoMx® DSP DA Plug-in is available at product launch, and a BioConductor vignette will be released in Fall 2023. These data analysis packages will enable researchers to QC and normalize their data by panel, calculate limit of quantification (LOQ) per area of illumination (AOI) per panel, and calculate commonly used TCR-specific diversity statistics like Shannon entropy and Gini coefficient (Figure 1A and 1B). These analysis methods will help researchers to evaluate the expression of the Variable and Joining segments of the Alpha, Beta, Gamma, and Delta chains included in the panel.

Researchers will also be able to generate heatmaps, volcano plots, and see spatial distribution of TCR-related targets. The below spatial image shows clearly that TCR Variable Region expression changes based on spatial context, and there is higher expression of the TRBV6-2 segment in CD68-rich regions (Figure 1C).

A.



B.



C.

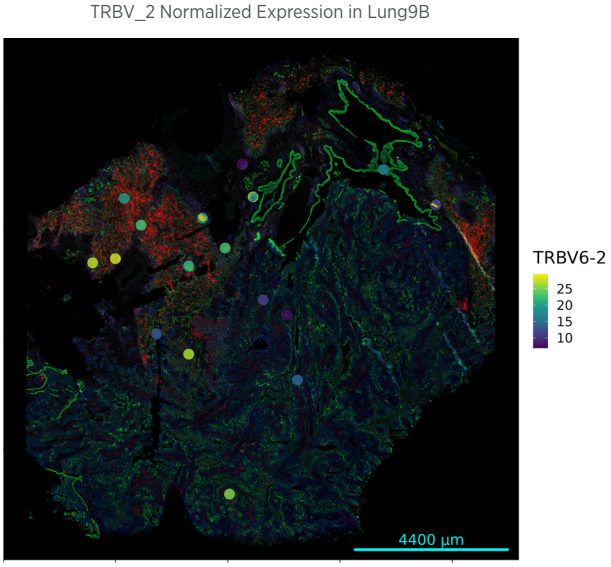


Figure 1: Examples of a A) Shannon entropy plot and B) Gini coefficient plot that can be generated using TCR Profiling Add-on data. C) Spatial image generated using the SpatialOmicsOverlay package showing differences in TCR expression with spatial context.

Ordering Information

Gene Expression Panels arrive ready-to-use and generally ship within 24 hours following purchase.

Product	Product Description	Quantity	Catalog Number
GeoMx Human TCR Profiling Add-On Probes for NGS *Compatible with Illumina Systems*	GeoMx RNA Add-On assay to Human WTA or CTA containing probes for 146 Variable and Joining segments across all four Human TCR receptor loci Alpha, Beta, Gamma, and Delta plus 50 negative control targets. Includes RNA probes for Illumina NGS readout. Must be run with Human WTA or CTA.	4 slides	GMX-RNA-NGS-ADD-TCR-4
GeoMx Human TCR Profiling Add-On Probes for NGS *Compatible with Illumina Systems Auto*	GeoMx RNA Add-On assay to Human WTA or CTA containing probes for 146 Variable and Joining segments across all four Human TCR receptor loci Alpha, Beta, Gamma, and Delta plus 50 negative control targets. Includes RNA probes for Illumina NGS readout and formulated for use with the Bond RX Research Stainer from Leica Biosystems. Must be run with Human WTA or CTA.	4 slides	GMX-RNA-NGS-ADD-AutoTCR-4
Must run TCR Profiling Add-On with:			
GeoMx Whole Transcriptome Atlas Human RNA Probes for NGS *Compatible with Illumina Systems*	RNA Probe set that targets 18,000+ transcripts for human protein coding genes plus ERCC negative controls to profile the whole transcriptome. Excludes uniformative high expressing targets such as ribosomal subunits. Includes RNA probes designed for Illumina NGS readout with the Seq Code library prep.	4 slides	GMX-RNA-NGS-HuWTA-4
GeoMx Human Whole Transcriptome Atlas Human RNA Probes for NGS *Compatible with Illumina Systems Auto*	RNA Probe set that targetsfor human protein coding genes plus ERCC negative controls to profile the whole transcriptome. RNA probes designed for Illumina NGS readout with the Seq Code library prep and formulated for use with the Bond RX Research Stainer from Leica Biosystems.	12 slides	GeoMx-NGS-RNA-AutoWTA-Hs-12
GeoMx Cancer Transcriptome Atlas Human RNA for NGS *Compatible with Illumina Systems*	RNA panel including 1834 targets plus controls for human immune response, tumor biology, and microenvironment. Includes RNA probes for Illumina NGS readout.	4 slides	GMX-RNA-NGS-CTA-4
GeoMx Cancer Transcriptome Atlas Human RNA for NGS *Compatible with Illumina Systems Auto*	RNA panel including 1834 targets plus controls for human immune response, tumor biology, and microenvironment. Includes RNA probes for Illumina NGS readout and formulated for use with the Bond RX Research Stainer from Leica Biosystems.	12 slides	GeoMx-NGS-RNA-AutoCTA-Hs-12

Selected Panel References

1. Jost L. Entropy and diversity. Oikos. 2006;113(2): 363-375
2. Introduction to SpatialOmicsOverlay (nanostring.com)

To view the annotated gene list for the GeoMx® TCR Profiling Add-On visit nanostring.com/geomx-tcr-profiling-add-on

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