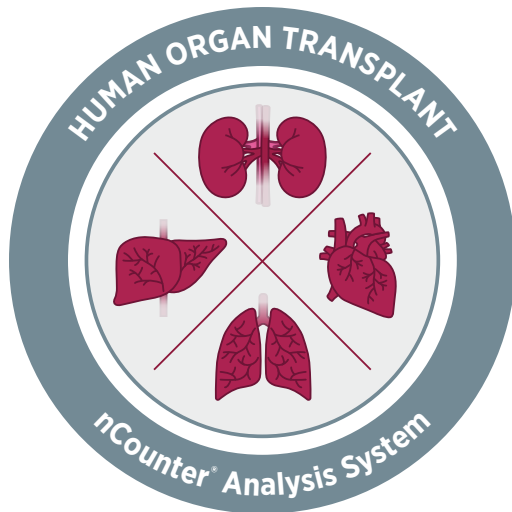


# nCounter<sup>®</sup> Human Organ Transplant Panel

## Gene Expression Panel

Organ Rejection • Immune Response • Tissue Damage

Comprehensively profile the immune response to transplanted tissue and the pathways behind organ rejection. Analyze gene expression of hundreds of genes to identify biomarkers for rejection, uncover the mechanisms behind tissue damage, and monitor toxicities brought on by immunosuppressive drugs. Develop signatures for rejection pre- and post-transplant to better understand and improve transplant efficiency.



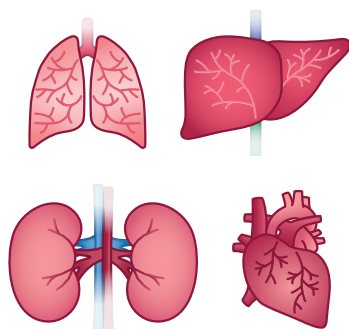
### Product Highlights

- Profile 770 genes across 37 annotated pathways
- Monitor the immune response to transplanted tissue and analyze pathways involved in immunosuppression
- Identify biomarkers for organ rejection and tissue damage for kidney, heart, liver and lung
- Understand mechanisms behind drug-induced toxicity
- Detect BK Polyomavirus, Cytomegalovirus, and Epstein-Barr virus
- Quantify the relative abundance of 14 different immune cell types

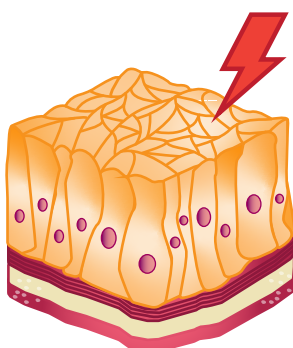
Feature	Specifications
Number of Targets	770 (Human), including internal reference genes
Standard Input Material (No amplification required)	25 ng–300 ng
Sample Material - Low Input	As little as 1 ng with nCounter RNA Low Input Kit (sold separately)
Sample Type(s)	Cultured cells/cell lysates, sorted cells, FFPE-derived RNA, total RNA, fragmented RNA, PBMCs, Whole Blood/Plasma
Customizable	Add up to 55 unique genes with Panel Plus
Time to Results	Approximately 24 hours
Data Analysis	nSolver™ Analysis Software (RUO) and the ROSALIND® Platform

## Key Applications with the nCounter Human Organ Transplant Panel

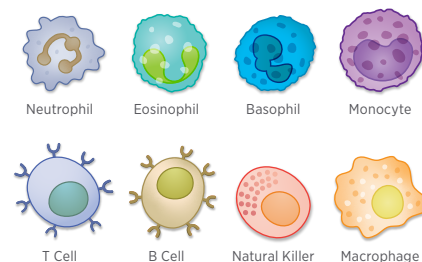
### Organ Rejection



### Tissue Damage



### Immune Response



- Identify different stages of rejection, including hyperacute, accelerated, acute, and chronic organ rejection
- Develop signatures for active organ rejection
- Monitor post-transplant organ health
- Understand mechanisms of immunosuppressive drug-induced toxicity
- Profile innate and adaptive immune response
- Detect viral infections
- Potentially predict risk of rejection

## Human Organ Transplant Panel Functional Annotations

Functional annotations for different pathways and processes were assigned to the genes in the Human Organ Transplant Panel. The pathways and processes that are included in this panel provide a comprehensive view of transplant immunology and organ rejection.

Annotation		
Adaptive Immune System	Inflammasomes	TGF-beta Signaling
Angiogenesis	Innate Immune System	Th1 Differentiation
Apoptosis & Cell Cycle Regulation	Lymphocyte Trafficking	Th17 Differentiation
Autophagy	MAPK	Th17 Mediated Biology
B-Cell Receptor Signaling	Metabolism	Th2 Differentiation
Cell-ECM Interaction	MHC Class I Antigen Presentation	Tissue Homeostasis
Chemokine Signaling	MHC Class II Antigen Presentation	TNF Family Signaling
Complement System	mTOR	Toll Like Receptor Signaling
Cytokine Signaling	NF-kappaB Signaling	Treg Differentiation
Cytosolic DNA Sensing	NLR Signaling	Type I Interferon Signaling
Cytotoxicity	Oxidative Stress	Type II Interferon Signaling
Epigenetics & Transcription	T-Cell Checkpoint Signaling	
Hematopoiesis	T-Cell Receptor Signaling	

## Viral Detection

Solid organ and hematopoietic transplant recipients are at increased risk for developing complications from opportunistic viral infections and may even inherit a viral infection from the donor. Knowing if a viral infection is present can be essential to understanding both the immune response and the potential impact of immunosuppressive treatments. Included in the Human Organ Transplant panel are probes specific for the detection of BK Polyomavirus, Cytomegalovirus (CMV) and Epstein-Barr virus (EBV)

Virus	Gene(s) Detected
BK Polyomavirus	VP1, Large T Antigen
CMV	UL83
EBV	LMP2

## NHP Compatibility

Probes included in the Human Organ Transplant Panel have been confirmed to have high homology with non-human primates, providing a valuable tool for translational comparative studies using both human and non-human samples.

### Homology with Cynomolgus Monkey

% Identity	# Genes
>95%	682
>90%	730
>85%	740
>80%	743

## Immune Cell Profiling Feature

Genes included in the Human Organ Transplant Panel provide unique cell profiling data to measure the relative abundance of 14 different human immune cell types<sup>1</sup>. The table below summarizes each cell type represented by gene content in the panel, as qualified through biostatistical approaches and selected literature in the field of immunology.

### Relative Cell Type Abundance

Cell Type	Associated Human Genes
B cells	BLK, CD19, FAM30A, FCRL2, MS4A1, TNFRSF17, PNO, SPIB, TCL1A
CD45	PTPRC
CD8T cells	CD8A, CD8B
Cytotoxic Cells	CTSW, GNLY, GZMA, GZMB, GZMH, KLRB1, KLRD1, KLRK1, PRF1, NKG7
Dendritic Cells	CCL13, CD209, HSD11B1
Exhausted CD8	CD244, EOMES, LAG3, PTGER4
Macrophages	CD163, CD68, CD84, MS4A4A

Cell Type	Associated Human Genes
Mast cells	MS4A2, TPSAB1, CPA3, HDC, TPSB2
Neutrophils	CSF3R, S100A12, CEACAM3, FCAR, FCGR3A, FCGR3B, FPR1, SIGLEC5
NK CD56dim cells	IL21R, KIR_Inhibiting_Subgroup_2, KIR3DL1, KIR3DL2
NK Cells	NCR1, XCL2, XCL1
T cells	CD3D, CD3E, CD3G, CD6, SH2D1A, TRAT1
Th1 Cells	TBX21
Treg	FOXP3

<sup>1</sup> Danaher P. et al. Gene expression markers of Tumor Infiltrating Leukocytes JITC 2017

## nSolver™ Analysis Software

NanoString offers advanced software tools that address the continuous demands of data analysis and the need to get simple answers to specific biological questions easy. Genes included in the Human Organ Transplant panel are organized and linked to various advanced analysis modules to allow for efficient analysis of the 30 pathways involved in transplant immunology.

## ROSALIND® Platform

ROSALIND is a cloud-based platform that enables scientists to analyze and interpret differential gene expression data without the need for bioinformatics or programming skills. ROSALIND makes analysis of nCounter data easy, with guided modules for:

- Normalization
- Individual Pathway Analysis
- Gene Set Analysis
- Quality Control
- Differential Expression

nCounter customers can access ROSALIND at: [rosalind.bio/nanostring](https://rosalind.bio/nanostring)

## Ordering Information

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

Product	Product Description	Quantity	Catalog Number
nCounter Human Organ Transplant Panel	Includes 760 genes; 10 internal reference genes for data normalization	12 Reactions	XTCSO-HOT1-12
nCounter Analysis System Master Kit Reagents and Cartridges	Reagents, cartridges, and consumables necessary for sample processing on the nCounter Analysis System	12 Reactions	NAA-AKIT-012
nCounter SPRINT Cartridge 1 Cartridge, 12 lanes	Sample Cartridge for nCounter SPRINT System	12 Reactions	SPRINT-CAR-1.0
nCounter SPRINT Reagent Pack	nCounter SPRINT Reagent Pack containing Reagents A, B, C, and Hybridization Buffer	192 Reactions	SPRINT-REAG-KIT

## Selected Panel References

1. Danaher, P et al. Gene Expression Markers of Tumor Infiltrating Leukocytes. *J Immunother Cancer*. 2017;21(5):18.
2. Reeve, J et al. Generating automated kidney transplant biopsy reports combining molecular measurements with ensembles of machine learning classifiers. *Am J Transplant*. 2019;1-13.
3. Wu, H et al. Single-Cell Transcriptomics of a Human Kidney Allograft Biopsy Specimen Defines a Diverse Inflammatory Response. *J Am Soc Nephrol*. 2018;29:2069-80.

**For more information, please visit [nanostring.com/human-organ-transplant](https://nanostring.com/human-organ-transplant)**

## Bruker Spatial Biology

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