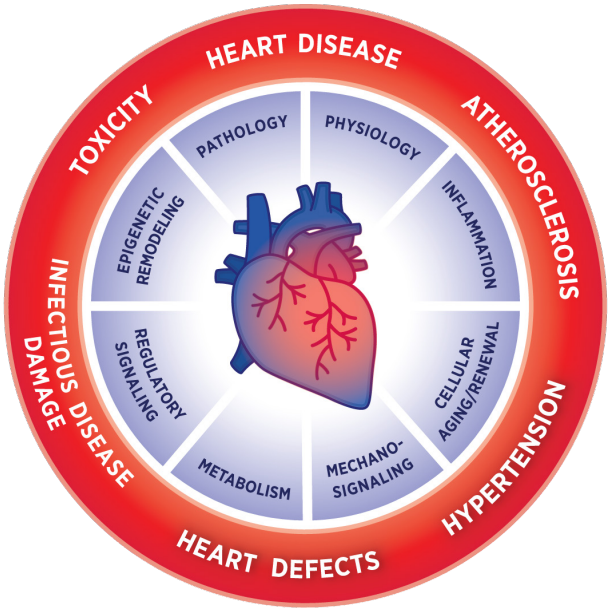
nCounter® CVD Pathophysiology Panel

Gene Expression Panel - Cardiovascular Disease (CVD)

Heart Disease • Arteriosclerosis • Hypertension • Cardiotoxicity • Regenerative Medicine

Rapidly advance your cardiovascular research with molecular insights that provide quick, actionable results. Explore how cardiovascular disfunction contributes to heart disease, hypertension and arteriosclerosis. Study the cardiotoxic effects of immune therapies or assess the role of aging and cell renewal in cardiac regenerative medicine.



Product Highlights

- Directly profile 800 genes across 50 pathways involved in CVD pathophysiology
  - Cardiovascular Pathology
  - Cardiovascular Physiology
  - Vascular Inflammation
  - Cellular Aging & Renewal
  - Metabolism
  - Mechano Signaling
  - Regulatory Signaling
  - Epigenetic Remodeling
- Measure cardiotoxicities resulting from therapeutic treatment
- Study the MOA of approved CVD drugs
- Explore cardiomyocyte recovery and regeneration
- Quantify the presence and relative abundance of 16 cell types present in cardiac tissue
- Compatible with a variety of sample types including blood, cardiac tissue, organoids, stem cells, engineered cell lines, explants, and organs on a chip
- Generate data in 24 hours with less than 30 minutes hands on time and simple data analysis

Feature	Specifications
Number of Targets	800 (Human and Mouse), including 10 internal reference genes for data normalization.
Sample Input - Standard (No amplification required)	25-300 ng
Sample Input - Low Input	As little as 1 ng with nCounter Low Input Kit and Primer Pools (sold separately)
Sample Type(s)	Blood, cardiac biopsies, xenografts, cultured cells/cell lysates, FFPE-derived RNA, total RNA, fragmented RNA
Customizable	Add up to 55 unique genes with Panel-Plus or up to 10 custom protein targets
Time to Results	Approximately 24 hours
Data Analysis	nSolver™ Analysis Software (RUO), Advanced Analysis for cell profiling, ROSALIND® platform

Key Applications with the nCounter CVD Pathophysiology Panel

Heart Disease/Hypertension /Arteriosclerosis

What molecular characteristics contribute to cardiovascular disease?

Study key pathways involved in cardiovascular pathology, physiology and pathway signaling.

Understand the impacts of lipid metabolism and metabolic disorders on CVD.

Explore the role of epigenetic remodeling enzymes in the initiation and progression of CVD.

Cardiotoxicity

How can cardiotoxicity be avoided?

Characterize the effects of immune response, inflammation, and immunomodulatory pathways on cardiac function.

Explore the cardiotoxic effects of immune therapies.

Assess novel drug targets for efficacy in the context of approved drug MOAs.

Regenerative Medicine

How can regenerative medicine help treat cardiovascular disease?

Uncover the roles of cellular aging, senescence and renewal on CVD.

Understand the relative abundance of cardiac specific cell types and their impact on gene expression pathways in regenerative tissue cultures.

Panel Themes

The CVD Pathophysiology Panel includes annotations across 8 functional themes related to cardiovascular disfunction and disease. Pathway coverage is outlined in the table below.

Cardiovascular Pathology

- Atherosclerosis
- Cardiac Hypertrophy
- Cardiomyopathy
- Foam Cell Formation
- Ischemia
- Myocarditis
- Thrombosis
- Hemostasis
- Endocarditis
- Pericarditis
- Hypertension

Cardiovascular Physiology

- Angiotensin System
- Cardiac Muscle Contraction
- Cardiac Electrophysiology
- GABAergic Signaling
- Vascular Smooth Muscle Contraction
- Vasopressin System
- Cardiac Morphogenesis
- ER Stress

Cardiovascular Inflammation

- eNOS Activation
- IL-1 Signaling
- IL-6 Signaling
- Other Cytokine Signaling
- Immune Cell Infiltration
- JAK-STAT Signaling
- mTOR Signaling
- NF-kappaB Signaling
- PI3K-AKT Signaling
- PPAR Signaling
- TLR Signaling
- TNF Signaling
- Checkpoint Signaling

Cellular Aging & Renewal

- Apoptosis
- Autophagy
- Cell Cycle
- Senescence & Quiescence
- Telomere Maintenance

Metabolism

- Fatty Acid Metabolism
- Glucose Metabolism
- Hypoxia Response
- Lipid Metabolism
- Cholesterol Metabolism
- Lipoprotein Clearance
- Oxidative Stress Response

Mechano Signaling

- ECM Remodeling
- Hippo Signaling
- Integrin Signaling
- Rho ROCK Signaling

Regulatory SIgnaling

- Calcium Signaling
- EGFR Signaling
- MAPK Signaling
- Notch Signaling
- TGF-beta Signaling
- VEGF Signaling
- Wnt Signaling

Epigenetic Remodeling

- Histone Modifications
  - Acetyl Transferases
  - Deacetylases
  - Methyl Transferases

Cardiac Cell Profiling Feature

Genes included in the CVD Pathophysiology Panel provide unique cell profiling data to measure the relative abundance of 16 different cardiac cell types. The table below summarizes the genes included in each cell type signature, as qualified through biostatistical approaches and selected literature in the field of cardiovascular disease

Cell Type	Associated Human Genes
Cardiomyocytes (Atrial, Ventricular)	FHL2, MYL4, MYL7
Fibroblasts	DCN, PDGFRA
Endothelial Cells	CDH5, PECAM1, VWF
Mesothelial Cells	BNC1, MSLN
Vascular Smooth Muscle Cells	MYH11
Pericytes	ABCC9, KCNJ8
Neuronal Cells	NRXN1, PLP1
Adipocytes	FASN, GPAM, LEP
T Cells (Th1, CD45, CD8, Tregs)	PTPRC, CD8A, CD8B, CD3D, CD3E, CD3G, CD6, TBX21, FOXP3
Cytotoxic Cells	CTSW, GNLY, GZMA, GZMB, GZMH, KLRB1, KLRK1, NKG7, PRF1
NK Cells	KIR3DL1, NCR1, XCL1/2
Macrophages	CD163, CD68, CD84, MS4A4A
Dendritic Cells	CCL13, CD209
Neutrophils	CSF3R, FCGR3A/B, FPR1
Mast Cells	CPA3, HDC, MS4A2
B Cells	CD19, MS4A1, SPIB, TNFRSF17

Customization with Panel Plus

Customize your research project by adding up to 55 user-defined genes of interest with nCounter Panel Plus. Panel Plus capacity enables researchers to address content specific to their cardiovascular research areas of interest. Expand on pathways and core themes of the panel or include infectious disease content (i.e. COVID).

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 easily. Genes included in the CVD Pathophysiology Panel are annotated to allow for efficient analysis of relevant pathways.

Analysis Modules available for CVD Pathophysiology:

- Normalization
- Quality Control
- Individual Pathway Analysis
- Cell Profiling
- Differential Expression
- Gene Set Analysis
- Built-in compatibility for Panel Plus and Protein analysis

ROSALIND

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 / Quality Control / Individual Pathway Analysis Differential Expression / Gene Set Analysis
- nCounter customers can access ROSALIND free of charge at https://www.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 CVD Pathophysiology Panel	800 genes, including 10 internal reference genes for data normalization. Codeset Only.	12 Reactions	XT-HSCVD-12
nCounter® Mouse CVD Pathophysiology Panel	800 genes, including 10 internal reference genes for data normalization. Codeset only.	12 Reactions	XT-MSCVD-12
nCounter® Human CVD Pathophysiology Panel Standard	Standard containing a pool of synthetic DNA oligonucleotides that correspond to the target sequence of each of the unique probe targets in the panel.	12 Reactions	PSTD-H-CVD-12
nCounter® Mouse CVD Pathophysiology Panel Standard	Standard containing a pool of synthetic DNA oligonucleotides that correspond to the target sequence of each of the unique probe targets in the panel.	12 Reactions	PSTD-M-CVD-12
Low RNA Input Kit	Kit for use with all Low RNA Input Primer Pools	48 Reactions	LOW-RNA-48
nCounter® Master Kit Reagents and Cartridges	Reagents, cartridges, and consumables necessary for sample processing on nCounter MAX and FLEX Systems	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. Litviňuková, M. et al. Cells of the adult human heart. Nature 588, 466–472 (2020).
2. Ferrucci, L. & Fabbri, E. Inflammageing: chronic inflammation in ageing, cardiovascular disease, and frailty. Nat Rev Cardiol 15, 505–522 (2018).
3. Fung, G., Luo, H., Qiu, Y., Yang, D. & McManus, B. Myocarditis. Circulation Research 118, 496–514 (2016).
4. Liu, Y. et al. RNA-Seq identifies novel myocardial gene expression signatures of heart failure. Genomics 105, 83–89 (2015).
5. Sweet, M. E. et al. Transcriptome analysis of human heart failure reveals dysregulated cell adhesion in dilated cardiomyopathy and activated immune pathways in ischemic heart failure. BMC Genomics 19, 812 (2018).

For more information visit nanostring.com/CVD

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