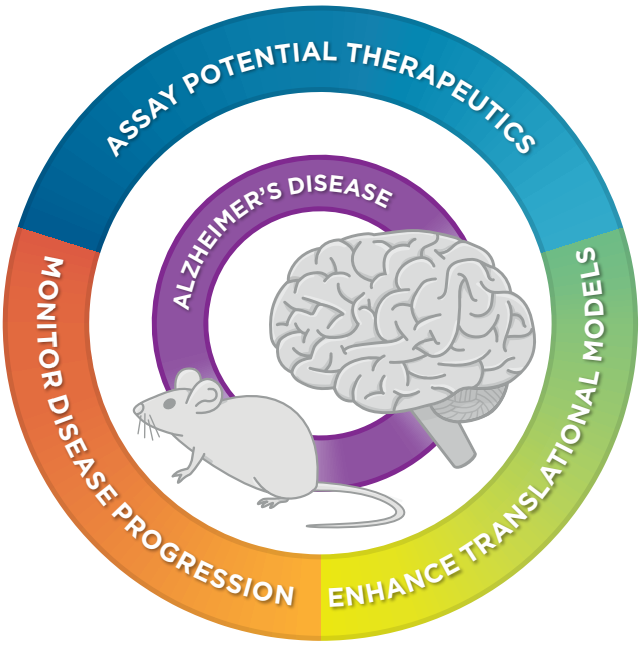
nCounter Alzheimer's Disease

Mouse AD and Human AD Expression Panel

Easily assess and monitor primary molecular characteristics of Alzheimer's disease (AD) with 770 standardized genes covering 30 clinically derived AD-associated modules discovered in the AMP-AD consortium study of human brain tissue[1-4]. Now studies in AD are more reproducible and translationally relevant with an efficient workflow that potentially reduces the time to clinic.



Product Highlights

- 770 genes specific for AD studies
  - Comprehensive assessment of 30 AD-associated gene co-expression modules including 23 neurodegeneration pathways and processes
  - Reproducible monitoring of AD progression with age
  - Functional screening of potential AD therapeutics
- AD characterization customizable with up to 30 additional user-defined genes with Panel Plus option
- nCounter workflow is streamlined, user-friendly, and efficient with just 15 minutes total hands-on time

Feature	Specifications
Number of Targets	770 including internal reference genes
Standard Input Material (No amplification required)	25 ng-300 ng
Sample Type(s)	FFPE-derived RNA, total RNA, fragmented RNA, PBMCs, whole blood/ plasma, iPS cells
Species	Mouse and Human
Customizable	Add up to 30 unique genes with Panel Plus
Time to Results	Approximately 24 hours
Data Analysis	nSolver™ Analysis Software, Advanced Analysis Modules

Brain Region Coverage

RNA-seq data from 7 brain regions generated by 3 separate post-mortem studies of AD was analyzed by weighted gene co-expression network analysis (WGCNA)[1-4], which finds clusters of co-expressed genes within the data that often correlate with known biological functions or cell types. Annotations included in this panel represent the resulting gene expression clusters, or modules, and are named by the brain region in which they were discovered and an assigned color[4]. The content within the modules suggests co-expression of genes related to neurons, microglia, and astrocytes.

Brain Region		Description	Associated Genes (Mm/Hs)
Dorsolateral prefrontal cortex (DLPFC)[1,4]		DLPFC is a cortical structure that supports higher cognitive functions, including working memory and verbal abilities. The PFC is vulnerable to neurodegeneration with healthy aging and AD.	655/657
Temporal cortex (TCX)[2,4]		TCX is a cortical brain region located in the temporal lobes. The temporal lobes play an important role in organizing sensory input, auditory perception, language and speech production, as well as memory association and formation. Damage to TCX can result in problems with memory, understanding language, and emotion and well documented neuropathological and neurochemical changes are apparent in AD.	655/659
Cerebellum (CBE)[2,4]		Located posteriorly in the brain, CBE plays an important role in voluntary movement, motor learning, and language. CBE is spared of classical AD-related neuropathology, but data indicates disease-related changes.	626/627
Inferior frontal gyrus (IFG)[3,4]		IFG makes up the lateral and inferior surface of the frontal lobe. IFG plays a role in inhibition and speech and language comprehension. IFG shows age-related atrophy and the presence of neuropathological changes in AD.	678/681
Superior temporal gyrus (STG)[3,4]		STG is one of three gyri in the temporal lobe. It consists of the primary auditory cortex and Wernicke's area, which is involved in language comprehension. This brain region shows neurodegenerative changes in AD corresponding to Braak stage 4.	630/632
Frontal pole (FP)[3,4]		FP of the PFC corresponds to the anterior most rounded point of the frontal lobe. This brain region is involved in a wide variety of functions, including higher order cognitive processing and is subject to atrophy in AD.	646/649
Parahippocampal gyrus (PHG)[3,4]		PHG is a cortical region in the medial temporal lobe that surrounds the hippocampus and plays an important role in both spatial memory and navigation. The cortical areas that form the PHG are vulnerable to pathological changes in AD, and its entorhinal and perirhinal subdivisions are heavily damaged in disease and are the focus for disease onset.	672/679

Mouse AD and Human AD Panel Functional Annotations

Content included in the nCounter Mouse AD and Human AD panels represent a transcriptomic fingerprint of AD-related changes[1-4] that can be directly compared to studies of mouse models of disease[5] and back to human tissue. Additionally, functional annotations for 23 fundamental pathways and processes were assigned across all genes in the Mouse AD and Human AD panels allowing for additional insight into important aspects of the onset, progression, and characterization of AD.

Module Annotations	Enriched Pathways and Processes Represented†	Mouse/Human Genes*
CBEblue	Transcription and Splicing	176
CBEbrown	Lipid Metabolism, Myelination	95
CBEturquoise	Cytokines	199
CBEyellow	Vesicle Trafficking, Transmitter Synthesis and Storage	156/157
DLPFCblue	Cytokines	182
DLPFCbrown	Lipid Metabolism, Myelination	139
DLPFCturquoise	Transcription and Splicing	143
DLPFCyellow	Transmitter Synthesis and Storage, Vesicle Trafficking, Transmitter Release, Neural Connectivity	191/193
FPblue	Lipid Metabolism, Myelination	277
FPbrown	‡	77
FPturquoise	Cytokines	107
FPyellow	Vesicle Trafficking, Transmitter Synthesis and Storage, Neural Connectivity, Transmitter Release	187/188
IFGblue	Transcription and Splicing, Lipid Metabolism, Myelination	236
IFGbrown	Transmitter Synthesis and Storage, Vesicle Trafficking, Transmitter Release, Neural Connectivity	232/235
IFGturquoise	Apoptosis, Cytokines	126
IFGyellow	‡	84
PHGblue	Transcription and Splicing	170
PHGbrown	Transmitter Synthesis and Storage, Vesicle Trafficking,	164/165
PHGgreen	Lipid Metabolism, Myelination	139
PHGturquoise	Cytokines	104
PHGyellow	‡	101
STGblue	Cytokines	143
STGbrown	Transmitter Synthesis and Storage, Vesicle Trafficking, Neural Connectivity, Transmitter Release, Transmitter Response and Reuptake	210/212
STGturquoise	Transcription and Splicing	118
STGyellow	Lipid Metabolism, Myelination	159
TCXblue	‡	118
TCXbrown	Transcription and Splicing	124
TCXgreen	Transmitter Synthesis and Storage, Vesicle Trafficking	185/187
TCXturquoise	‡	78
TCXyellow	Lipid Metabolism	152
Internal Reference Genes	‡	10

† Annotations for 23 fundamental pathways and processes were assigned across all genes in the Mouse AD and Human AD panels allowing for an additional view of important aspects of the onset and progression of neurodegenerative disease. Pathways and processes with >60% representative gene content per module are listed above. Additional annotations can be found in the complete gene list.

‡ <60% representative pathway and process gene content per module

* Genes selected based on human-mouse gene homology, maximal coverage of AMP-AD modules, top AGORA candidate gene status (agora.ampadportal.org), representation in AMP-AD module eigengenes, and expression in mouse brain[6].

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 Mouse AD and Human AD panel are organized and linked to various advanced analysis modules to allow for efficient analysis of the 30 AD-associated modules and 24 AD-related pathways and processes in addition to standard nSolver analysis.

To view the annotated gene list visit:
nanostring.com/AD

Examples of Advanced Analysis Modules include:

- Normalization
- Quality Control
- Pathway Analysis
- Pathway Based Module Analysis
- Differential Expression
- Gene Set Analysis
- Built-in compatibility for Panel Plus & Protein analysis

Ordering Information

Product	Product Description	Quantity	Catalog Number
nCounter® Mouse AD Panel	Includes 770 genes, including 10 internal reference genes for data normalization	12 reactions	XT-CSO-MAD1-12
nCounter® Human AD Panel	Includes 770 genes, including 10 internal reference genes for data normalization	12 reactions	XT-CSO-HAD1-12
nCounter Master Kit (Max or FLEX Systems) 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

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Selected Panel References

1. ROSMAP: Bennett DA, et al. Overview and Findings from the Religious Orders Study. Current Alzheimer Research. 2012; 9(6): 628-45.
2. Mayo: Allen M et al. Human whole genome genotype and transcriptome data for Alzheimer's and other neurodegenerative diseases. Scientific Data. 2016; 3.
3. MSBB: Wang M et al. The Mount Sinai cohort of large-scale genomic, transcriptomic and proteomic data in Alzheimer's disease. Scientific Data. 2018; 5.
4. Logsdon BA, Perumal T, et al. Heterogeneity across human AD coexpression modules identified by meta-analysis of the human brain transcriptome. bioRxiv. 2018; In Preparation.
5. AMP-AD Knowledge Portal (www.ampadportal.org)
6. Carter et al. Translational Genetic and Genomic Analyses of New Mouse Models of Alzheimer's Disease. Neuroscience 2018.

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