

NANOSTRING GeoMX® DIGITAL SPATIAL PROFILING (DSP) SERVICES

Biomarker Discovery & Validation with Morphological Context

Spatial Transcriptomics and GeoMx Digital Spatial Profiler (DSP)

Each organ/tissue of a complex organism consists of diverse cell types that often interact in highly structured manners under distinct microenvironments. Such highly structured spatial heterogeneity enables the organism to function correctly and efficiently. To fully understand gene functions in a given cell type, one must study gene expression in the context of the location of the cells in the tissue.

Spatial transcriptomics is a recently developed transformative technology that combines the strengths of the global transcriptional analysis of bulk RNAseq and In-situ hybridization, providing transcriptomics data in the context of spatial

locations of the cells in situ. GeoMX Digital Spatial Profiler, a novel platform developed by NanoString, is based on nCounter® barcoding technology and enables **spatially resolved, digital readout of up to 96 proteins or RNA targets** in a multiplexed assay. The assay relies upon antibody or RNA probes coupled to photocleavable oligonucleotide tags. After hybridization of probes to slide-mounted tissue sections, the oligonucleotide tags are released from discrete regions of the tissue via UV exposure. Released tags are quantitated using a standard NanoString nCounter assay system, and counts are mapped back to tissue locations, yielding a spatially-resolved digital profile of analyte abundance.



HETEROGENEITY,
RESOLVED

UNLOCK YOUR
SAMPLES WITH
CONFIDENCE

CONSISTENT
RESULTS,
RELIABLE
ANSWERS

DETECT MORE
WITHOUT
COMPROMISE

ANALYZE
TODAY, PUBLISH
TOMORROW

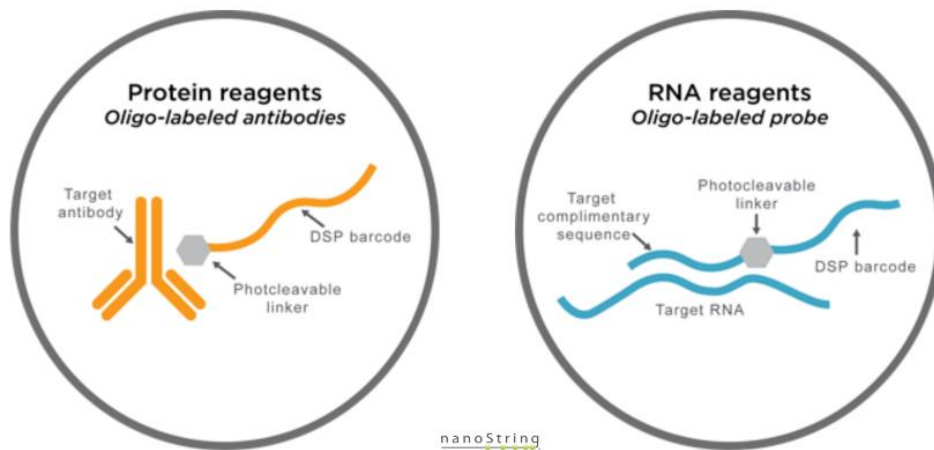
STRUCTURE
DICTATES
FUNCTION



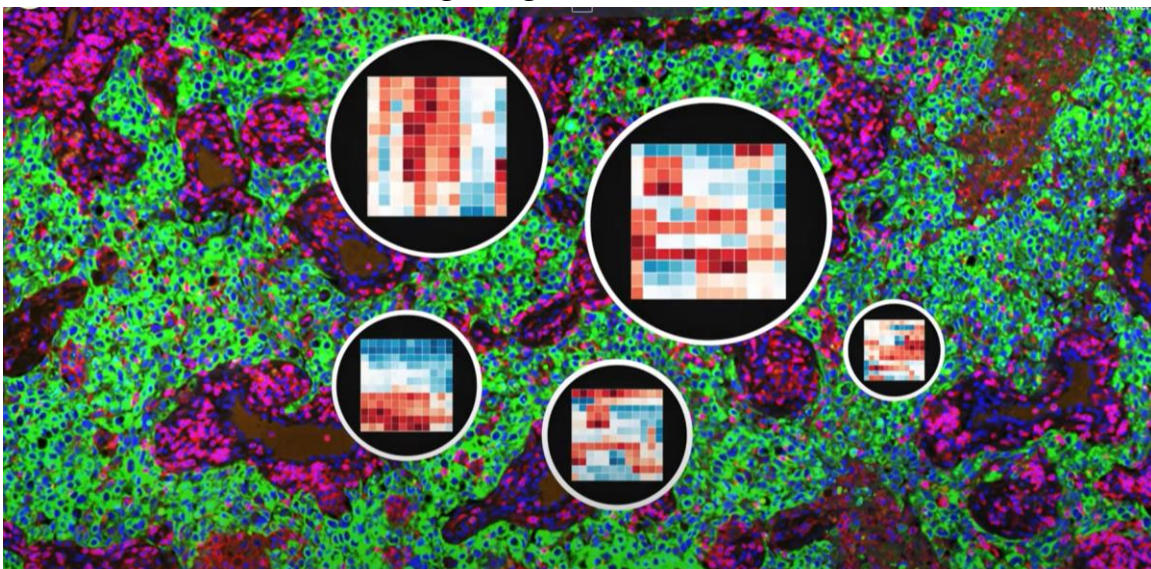
GeoMX DSP ASSAYS FOR SPATIAL MULTIOMICS

- ✓ GeoMx® Digital Spatial Profiler (DSP) combines standard immunofluorescence and IHC techniques with digital optical barcoding technology to perform highly multiplexed and spatially resolved profiling experiments.
- ✓ The ability to perform profiling experiments guided by tissue morphology increases the likelihood of capturing rare events often missed by bulk experiments.
- ✓ Barcoding chemistry provides high-plex profiling of RNA and protein targets, enabling deep characterization of the sample.
- ✓ GeoMx Assays are pre-validated and modular to provide flexibility and support a range of research needs.

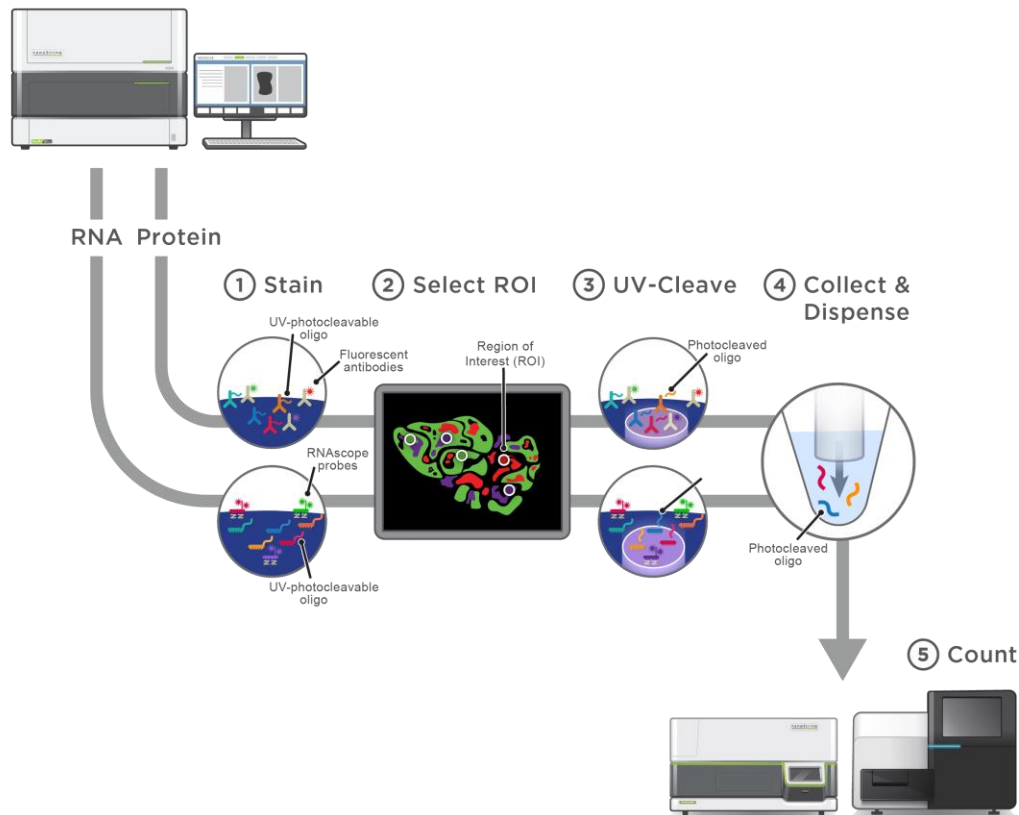
High-Plex Mixtures of Proprietary Reagents



Click the following image for a video: How DSP works



A SIMPLE WORKFLOW FOR COMPLEX ASSAYS



1. Slides are prepared and co-stained with fluorescent morphological markers and oligo-conjugated antibodies (protein assays) or oligo-conjugated *in situ* hybridization (ISH) probes (RNA assays).
2. Samples are then fluorescently imaged in the GeoMx DSP to visualize morphological markers allowing for region-of-interest (ROI) selection.
3. Each ROI is collected individually by discretely illuminating UV light over a specific region that releases photo-cleaved oligos, which are then aspirated and subsequently counted using a NanoString nCounter.
4. Digital counts are mapped back to tissue location, yielding a spatially-resolved gene/protein profile.

ASSAY BENEFITS

- ✓ GeoMx DSP provides morphological context in spatial transcriptomics and proteomics experiments from just one tissue slide.
- ✓ The workflow seamlessly integrates with current histology or genomics workflows to swiftly obtain robust



and reproducible spatial multi-omic data.

- ✓ Researchers can precisely select which tissue compartments or cell types to profile and subsequently count target protein and gene expression levels using the nCounter Analysis System.
- ✓ DSP Data Analysis suite provides streamlined interactive analysis that

moves raw count data to statistical analysis and visualization in minutes.

- ✓ Significant patterns of expression across tissue morphology and potential gene signatures or disease biomarkers can be identified using statistical and cluster analysis.

Imagine the Possibilities with GeoMx DSP



Heterogeneity. Resolved.

Spatially resolve tissues and cell populations with functional segmentation.



Detect more. Without compromise.

Detect more of the transcriptome and proteome with the highest plex and highest sensitivity.



Consistent results. Reliable answers.

Multi-sample analysis and cohort studies made easy with unmatched reproducibility and scalability.



Unlock your samples. With confidence.

Get proven, robust results from FFPE, FF tissues and TMAs using standard histology workflows.



Structure dictates function. Think outside the box.

Profile functionally distinct cells and structures to get a complete picture of the biology that matters.



Analyze today. Publish faster.

Don't wait. Get publication-ready results faster with higher throughput and an integrated data analysis software.

GeoMx DSP SPECIFICATIONS

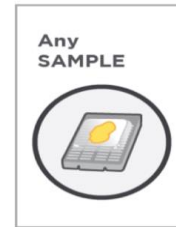
- ✓ Tissue sections: FFPE or fresh frozen
- ✓ Multi-analyte detection: RNA and protein
- ✓ Multiplexing capability: 96 targets
- ✓ Imaging Resolution: > 1 cell
- ✓ Quantitative: 6 logs dynamic range
- ✓ Modular assay panels to fit all needs.
- ✓ Flexible: custom morphological markers or probes can be designed



upon request tailored to each scientific question

- ✓ Validated content covers immunology, immune-oncology, neurodegeneration, neuroinflammation and more.

- ✓ Large inventory of expertly curated ready-to-use panels that can be mixed to create pathway- and disease-themed panels; custom probes designed to any sequence



FEATURES OF DSP SERVICE FROM PICOIMMUNE

- ✓ State-of-art platforms: GeoMx DSP, nCounter Prep Station and Analysis System
- ✓ Rapid turn-around time that accelerates discoveries
- ✓ Pathologist services available
- ✓ Transparent workflow and interactive discussion for ROI selection
- ✓ 30+ years of accumulated experience: expert data analysis and

interpretation, high quality scientific and technical support

- ✓ Flexible: we can quantify any gene/protein of interest. Targets of interest and assay layout are custom designed so we can deliver data from as few or as many samples/replicates as needed

READY-TO-USE AND CUSTOMIZABLE PANELS

GeoMx® RNA/Protein Panels for Immuno-Oncology

- ✓ Designed with modular panels for flexible and comprehensive coverage of the tumor, tumor microenvironment, and tumor immune status.
- ✓ Profile up to 96 curated RNA or protein targets with spatial resolution from a single tissue section using the DSP.
- ✓ Curated content designed for immuno-oncology research

- ✓ Includes tumor and tumor microenvironment coverage plus the Tumor Inflammation Signature (TIS)
- ✓ Pre-validated in multiplex format for use in human FFPE or fresh frozen tissue
- ✓ Customizable with up to 10 additional targets of interest





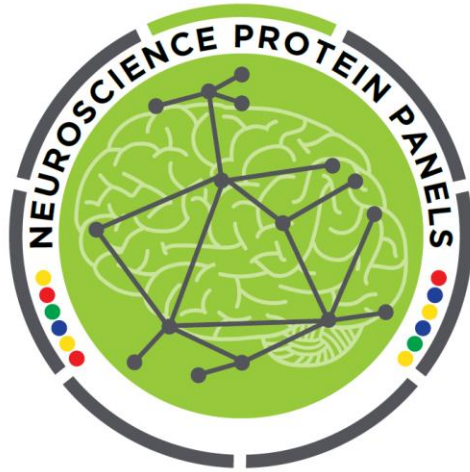
- Immune Cell Profiling Panel
- IO Drug Target Panel
- Immune Activation Status Panel
- Immune Cell Typing Panel
- Pan-Tumor Panel
- MAPK Signaling Panel
- PI3K/AKT Signaling Panel
- Cell Death Panel

Immune Cell Profiling Panel <i>Human Protein Core</i>						IO Drug Target Panel <i>Human Protein Module</i>	
Beta-2-microglobulin	CD3	CD56	CTLA4	GZMB	PD-1	4-1BB	LAG3
CD11c	CD4	CD68	Pan-cytokeratin	HLA-DR	PD-L1	ARG1	OX40L
CD20	CD45	CD8	Fibronectin	Ki-67	SMA	B7-H3	STING
Ms IgG2a			Histone H3			GITR	TIM-3
Ms IgG1			S6			IDO1	VISTA
Rb IgG			GAPDH				
Immune Activation Status Panel <i>Human Protein Module</i>		Cell Death Panel <i>Human Protein Module</i>		PI3K/AKT Signaling Panel <i>Human Protein Module</i>			
CD127	CD80	BAD	GZMA	Pan-AKT		Phospho-GSK3A (S21)/Phospho-GSK3B (S9)	
CD25	ICOS	BCL6	p53	MET		INPP4B	
CD27	PD-L2	BCLXL	PARP	Phospho-AKT1 (S473)		PLCG1	
CD40		BIM	Cleaved Caspase 9	Phospho-GSK3B (S9)		Phospho-PRAS40 (T246)	
CD44		CD95/Fas	Neurofibromin	Phospho-Tuberin (T1462)			
Immune Cell Typing Panel <i>Human Protein Module</i>		Pan-Tumor Panel <i>Human Protein Module</i>		MAPK Signaling Panel <i>Human Protein Module</i>			
CD14	FAPalpha	BCL-2	NY-ESO-1	EGFR		Phospho-MEK1 (S217/S221)	
CD163	FOXP3	EpCAM	PR	pan-RAS		Phospho-p38 MAPK (T180/Y182)	
CD34		ER alpha	PTEN	BRAF		Phospho-p44/42 MAPK ERK1/2 (T202/Y204)	
CD45RO		HER2/ERBB2	S100B	Phospho-c-RAF (S338)		p44/42 MAPK ERK1/2	
CD66b		MART1		Phospho-JNK (T183/Y185)		Phospho-p90 RSK (T359/S363)	



GeoMx Protein Assays for Neuroscience

- ✓ Designed to provide flexible and comprehensive coverage of key neural cell types and neurodegenerative disease pathology. With a modular design, profile up to 96 curated protein targets with spatial resolution from a single tissue section using the DSP.



- Neural Cell Profiling Panel**
- Alzheimer's Pathology Panel**
- Parkinson's Pathology Panel**
- Alzheimer's Pathology Extended Panel**
- Autophagy Panel**
- Glial Cell Subtyping Panel**

Neural Cell Profiling Panel <i>Human Protein Core</i>				AD Pathology Panel <i>Human Protein Module</i>		PD Pathology Panel <i>Human Protein Module</i>		AD Pathology Extended Panel <i>Human Protein Module</i>	
CD68	SYP	Olig2	P2ry12	Amyloid-Beta 1-40	Phospho-Tau (S404)	ApoA1	Park7	Phospho-Tau (T231)	PSEN1
HLA-DR	IBA1	CD40	TMEM119	Amyloid-Beta 1-42	Phospho-Tdp-43 (S409/S410)	Calbindin	Phospho-SNCA (S129)	Phospho-Tau (S396)	NRGN
CD11b	GFAP	CD45		APOE	Tau	FUS	PINK1	Phospho-Tau (S199)	Nepriylisin
MAP2	MBP	NEFL		APP	Tdp-43	LRRK2	SNCA	Phospho-Tau (S214)	IDE
KI-67	NeuN	CD31		P2RX7	UBB	Park5	TH	ADAM10	BACE1
CD163	S100B	CD39		Autophagy Panel <i>Human Protein Module</i>		Glial Cell Subtyping Panel <i>Human Protein Module</i>			
Ms IgG2a		Histone H3		ATG12	HSC70	LC3B	C4B	CTSD	EMP1
Ms IgG1		S6		ATG5	LAMP2A	P62	CD9	GPNMB	CD11c
Rb IgG		GAPDH		BAG3	TFEB		CLEC7A	MERTK	
				GBA	VPS35		CSF1R	Vimentin	

Neural Cell Profiling Panel <i>Mouse Protein Core</i>				AD Pathology Panel <i>Mouse Protein Module</i>		PD Pathology Panel <i>Mouse Protein Module</i>		AD Pathology Extended Panel <i>Mouse Protein Module</i>	
CD11b	CD45	MBP	SYP	Amyloid-Beta 1-42	Phospho-Tau (S404)	ApoA1	Phospho-SNCA (S129)	Nepriylisin	p-Tau (S199)
CD163	GFAP	NEFL	TMEM119	APOE	Tau	Calbindin	PINK1	BACE1	p-Tau (S396)
CD31	IBA1	NeuN	CD68	APP	Tdp-43	LRRK2	SNCA	IDE	p-Tau (T214)
CD39	KI-67	Olig2	MHC II	P2RX7	UBB	Park5	TH	Neurogranin	p-Tau (T231)
CD40	MAP2	S100B				Park7		PSEN1	
				Autophagy Panel <i>Mouse Protein Module</i>		Glial Cell Subtyping Panel <i>Mouse Protein Module</i>			
Rb IgG		Histone H3		ATG12	ULK1	LC3B	CD9	GPNMB	SPP1
Rt IgG2a		S6		ATG5	VPS35	P62	CSF1R	ITGAX	Aldh1l1
Rt IgG2b		GAPDH		Beclin-1	TFEB		Ctsd	Mertk	
				PLA2G6	BAG3		Vimentin	MSR1	



COMMON READY-TO-USE PANELS AND DETAILS

Panels for human RNA or proteins

Human, RNA/protein panels	Detailed description
GeoMx Immune Pathways Panel <i>Human RNA for nCounter</i>	RNA panel including 84 targets plus controls for human immune pathways and Tumor Inflammation Signature (TIS). Includes RNA probes.
GeoMx Immune Pathways Panel - Automated <i>Human RNA for nCounter</i>	RNA panel including 84 targets plus controls for human immune pathways and Tumor Inflammation Signature (TIS). Includes RNA probes formulated for use with the Leica Autostainer.
GeoMx Immune Cell Profiling Panel <i>Human Protein Core for nCounter</i>	Protein core including 18 targets for human immune cell profiling plus positive and negative controls. Includes AbMix and Probe R1 for 48 AOI per slide. Can be run as a stand alone panel.
GeoMx IO Drug Target Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human immuno-oncology drug targets. Includes AbMix and Probe R2 for 48 AOI per slide. Must be run with a protein core.
GeoMx Immune Activation Status Panel <i>Human Protein Module for nCounter</i>	Protein module including 8 targets for human immune activation status. Includes AbMix and Probe R3 for 48 AOI per slide. Must be run with a protein core.
GeoMx Immune Cell Typing Panel <i>Human Protein Module for nCounter</i>	Protein module including 7 targets for human immune cell typing. Includes AbMix and Probe R4 for 48 AOI per slide. Must be run with a protein core.
GeoMx Pan-Tumor Panel <i>Human Protein Module for nCounter</i>	Protein module including 9 targets for human pan-tumor analysis. Includes AbMix and Probe R5 for 48 AOI per slide. Must be run with a protein core.
GeoMx Cell Death Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human cell death. Includes AbMix and Probe R6 for 48 AOI per slide. Must be run with a protein core.
GeoMx PI3K/AKT Signaling Panel <i>Human Protein Module for nCounter</i>	Protein module including 9 targets for human PI3K/AKT signaling. Includes AbMix and Probe R7 for 48 AOI per slide. Must be run with a protein core.
GeoMx MAPK Signaling Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human MAPK signaling. Includes AbMix and Probe R4 for 48 AOI per slide. Must be run with a protein core.
GeoMx Neural Cell Profiling Panel <i>Human Protein Core for nCounter</i>	Protein core including 20 targets for human neural cell profiling plus positive and negative controls. Includes AbMix and Probe R1 for 48 AOI per slide. Can be run as a stand alone panel.
GeoMx Alzheimer's Pathology Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human AD pathology. Includes AbMix and Probe R2 for 48 AOI per slide. Must be run with a protein core.
GeoMx Alzheimer's Pathology Extended Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human AD pathology. Includes AbMix and Probe R4 for 48 AOI per slide. Must be run with a protein core.
GeoMx Parkinson's Pathology Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human PD pathology. Includes AbMix and Probe R3 for 48 AOI per slide. Must be run with a protein core.
GeoMx Autophagy Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human autophagy. Includes AbMix and Probe R5 for 48 AOI per slide. Must be run with a protein core.
GeoMx Glial Cell Subtyping Panel <i>Human Protein Module for nCounter</i>	Protein module including 10 targets for human glial cell subtyping. Includes AbMix and Probe R6 for 48 AOI per slide. Must be run with a protein core.



Panels for mouse RNA or proteins

Mouse, RNA/protein panels	Detailed description
GeoMx Immune Cell Profiling Panel <i>Mouse Protein Core for nCounter</i>	Protein core including 17 targets for mouse immune cell profiling plus positive and negative controls. Includes AbMix and Probe R1 for 48 AOI per slide. Can be run as a stand alone panel.
GeoMx IO Drug Target Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 6 targets for mouse immuno-oncology drug targets. Includes AbMix and Probe R2 for 48 AOI per slide. Must be run with a protein core.
GeoMx Immune Activation Status Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 7 targets for mouse immune activation status. Includes AbMix and Probe R3 for 48 AOI per slide. Must be run with a protein core.
GeoMx Immune Cell Typing Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 8 targets for mouse immune cell typing. Includes AbMix and Probe R4 for 48 AOI per slide. Must be run with a protein core.
GeoMx Pan-Tumor Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 9 targets for mouse pan-tumor analysis. Includes AbMix and Probe R5 for 48 AOI per slide. Must be run with a protein core.
GeoMx Cell Death Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 10 targets for human cell death. Includes AbMix and Probe R6 for 48 AOI per slide. Must be run with a protein core.
GeoMx PI3K/AKT Signaling Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 8 targets for human PI3K/AKT signaling. Includes AbMix and Probe R7 for 48 AOI per slide. Must be run with a protein core.
GeoMx MAPK Signaling Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 10 targets for human MAPK signaling. Includes AbMix and Probe R4 for 48 AOI per slide. Must be run with a protein core.
GeoMx Neural Cell Profiling Panel <i>Mouse Protein Core for nCounter</i>	Protein core including 19 targets for mouse neural cell profiling plus positive and negative controls. Includes AbMix and Probe R1 for 48 AOI per slide. Can be run as a stand alone panel.
GeoMx Alzheimer's Pathology Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 8 targets for mouse AD pathology. Includes AbMix and Probe R2 for 48 AOI per slide. Must be run with a protein core.
GeoMx Alzheimer's Pathology Extended Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 9 targets for mouse AD pathology. Includes AbMix and Probe R4 for 48 AOI per slide. Must be run with a protein core.
GeoMx Parkinson's Pathology Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 9 targets for mouse PD pathology. Includes AbMix and Probe R3 for 48 AOI per slide. Must be run with a protein core.
GeoMx Autophagy Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 10 targets for mouse autophagy. Includes AbMix and Probe R5 for 48 AOI per slide. Must be run with a protein core.
GeoMx Glial Cell Subtyping Panel <i>Mouse Protein Module for nCounter</i>	Protein module including 10 targets for mouse glial cell subtyping. Includes AbMix and Probe R6 for 48 AOI per slide. Must be run with a protein core.

