Next-Generation Sequencing Gene List

Next-Generation Sequencing – Genomic Stability Testing (DNA)									
Microsatellite Instability (MSI)					Tumor Mutational Burden (TMB)*				
Next-Generation Sequencing – Point Mutations and Indels (DNA)									
ABI1	BRD4	CRLF2	FOXO4	HOXC11	KLF4	MUC1	PAK3	RHOH	TAL2
ABL1	BTG1	DDB2	FSTL3	HOXC13	KLK2	MUTYH	PATZ1	RNF213	TBL1XR1
ACKR3	BTK	DDIT3	GATA1	HOXD11	LASP1	MYCL (MYCL1)	PAX8	RPL10	TCEA1
AKT1	C15orf65	DNM2	GATA2	HOXD13	LMO1	NBN	PDE4DIP	SEPT5	TCL1A
AMER1 (FAM123B)	CBLC	DNMT3A	GNA11	HRAS	LMO2	NDRG1	PHF6	SEPT6	TERT
AR	CD79B	EIF4A2	GPC3	IKBKE	MAFB	NKX2-1	PHOX2B	SFPQ	TFE3
ARAF	CDH1	ELF4	HEY1	INHBA	MAX	NONO	PIK3CG	SLC45A3	TFPT
ATP2B3	CDK12	ELN	HIST1H3B	IRS2	MECOM	NOTCH1	PLAG1	SMARCA4	THRAP3
ATRX	CDKN2B	ERCC1	HIST1H4I	JUN	MED12	NRAS	PMS1	SOCS1	TLX3
BCL11B	CDKN2C	ETV4	HLF	KAT6A (MYST3)	MKL1	NUMA1	POU5F1	SOX2	TMPRSS2
BCL2	CEBPA	FAM46C	HMGN2P46	KAT6B	MLLT11	NUTM2B	PPP2R1A	SPOP	UBR5
BCL2L2	CHCHD7	FANCF	HNF1A	KCNJ5	MN1	OLIG2	PRF1	SRC	VHL
BCOR	CNOT3	FEV	HOXA11	KDM5C	MPL	OMD	PRKDC	SSX1	WAS
BCORL1	COL1A1	FOXL2	HOXA13	KDM6A	MSN	P2RY8	RAD21	STAG2	ZBTB16
BRD3	COX6C	FOXO3	HOXA9	KDSR	MTCP1	PAFAH1B2	RECQL4	TAL1	ZRSR2
Next-Generation Sequencing – Point Mutations, Indels and Copy Number Alterations* (DNA)									
ABL2	BRCA1	CREB1	ESR1	FUS	KLHL6	MYC	PER1	RUNX1	TFEB
ACSL3	BRCA2	CREB3L1	ETV1	GAS7	KMT2A (MLL)	MYCN	PICALM	RUNX1T1	TFG
ACSL6	BRIP1	CREB3L2	ETV5	GATA3	KMT2C (MLL3)	MYD88	PIK3CA	SBDS	TFRC
ADGRA2	BUB1B	CREBBP	ETV6	GID4 (C17orf39)	KMT2D (MLL2)	MYH11	PIK3R1	SDC4	TGFBR2
AFDN	CACNA1D	CRKL	EWSR1	GMPS	KNL1	MYH9	PIK3R2	SDHAF2	TLX1
AFF1	CALR	CRTC1	EXT1	GNA13	KRAS	NACA	PIM1	SDHB	TNFAIP3
AFF3	CAMTA1	CRTC3	EXT2	GNAQ	KTN1	NCKIPSD	PML	SDHC	TNFRSF14
AFF4	CANT1	CSF1R	EZH2	GNAS	LCK	NCOA1	PMS2	SDHD	TNFRSF17
AKAP9	CARD11	CSF3R	EZR	GOLGA5	LCP1	NCOA2	POLE	SEPT9	TOP1
AKT2	CARS	CTCF	FANCA	GOPC	LGR5	NCOA4	POT1	SET	TP53
AKT3	CASP8	CTLA4	FANCC	GPHN	LHFPL6	NF1	POU2AF1	SETBP1	TPM3
ALDH2	CBFA2T3	CTNNA1	FANCD2	GRIN2A	LIFR	NF2	PPARG	SETD2	TPM4
ALK	CBFB	CTNNB1	FANCE	GSK3B	LPP	NFE2L2	PRCC	SF3B1	TPR
APC	CBL	CYLD	FANCG	H3F3A	LRIG3	NFIB	PRDM1	SH2B3	TRAF7
ARFRP1	CBLB	CYP2D6	FANCL	H3F3B	LRP1B	NFKB2	PRDM16	SH3GL1	TRIM26
ARHGAP26	CCDC6	DAXX	FAS	HERPUD1	LYL1	NFKBIA	PRKAR1A	SLC34A2	TRIM27
ARHGEF12	CCNB1IP1	DDR2	FBXO11	HGF	MAF	NIN	PRRX1	SMAD2	TRIM33
ARID1A	CCND1	DDX10	FBXW7	HIP1	MALT1	NOTCH2	PSIP1	SMAD4	TRIP11
ARID2	CCND2	DDX5	FCRL4	HMGA1	MAML2	NPM1	PTCH1	SMARCB1	TRRAP
ARNT	CCND3	DDX6	FGF10	HMGA2	MAP2K1 (MEK1)	NSD1	PTEN	SMARCE1	TSC1
ASPSCR1	CCNE1	DEK	FGF14	HNRNPA2B1	MAP2K2 (MEK2)	NSD2	PTPN11	SMO	TSC2
ASXL1	CD274 (PDL1)	DICER1	FGF19	HOOK3	MAP2K4	NSD3	PTPRC	SNX29	TSHR
ATF1	CD74	DOT1L	FGF23	HSP90AA1	MAP3K1	NT5C2	RABEP1	SOX10	TTL
ATIC	CD79A	EBF1	FGF3	HSP90AB1	MCL1	NTRK1	RAC1	SPECC1	U2AF1
ATM	CDC73	ECT2L	FGF4	IDH1	MDM2	NTRK2	RAD50	SPEN	USP6
ATP1A1	CDH11	EGFR	FGF6	IDH2	MDM4	NTRK3	RAD51	SRGAP3	VEGFA
ATR	CDK4	ELK4	FGFR1	IGF1R	MDS2	NUP214	RAD51B	SRSF2	VEGFB
AURKA	CDK6	ELL	FGFR1OP	IKZF1	MEF2B	NUP93	RAF1	SRSF3	VTI1A
AURKB	CDK8	EML4	FGFR2	IL2	MEN1	NUP98	RALGDS	SS18	WDCP
AXIN1	CDKN1B	EMSY	FGFR3	IL21R	MET	NUTM1	RANBP17	SS18L1	WIF1
AXL	CDKN2A	EP300	FGFR4	IL6ST	MITF	PALB2	RAP1GDS1	STAT3	WISP3
BAP1	CDX2	EPHA3	FH	IL7R	MLF1	PAX3	RARA	STAT4	WRN
BARD1	CHEK1	EPHA5	FHIT	IRF4	MLH1	PAX5	RB1	STAT5B	WT1
BCL10	CHEK2	EPHB1	FIP1L1	ITK	MLLT1	PAX7	RBM15	STIL	WWTR1
BCL11A	CHIC2	EPS15	FLCN	JAK1	MLLT10	PBRM1	REL	STK11	XPA
BCL2L11	CHN1	ERBB2 (HER2/NEU)	FLI1	JAK2	MLLT3	PBX1	RET	SUFU	XPC
BCL3	CIC	ERBB3 (HER3)	FLT1	JAK3	MLLT6	PCM1	RICTOR	SUZ12	XPO1
BCL6	CIITA	ERBB4 (HER4)	FLT3	JAZF1	MNX1	PCSK7	RMI2	SYK	YWHAE
BCL7A	CLP1	ERC1	FLT4	KDM5A	MRE11	PDCD1 (PD1)	RNF43	TAF15	ZMYM2
BCL9	CLTC	ERCC2	FNBP1	KDR (VEGFR2)	MSH2	PDCD1LG2 (PDL2)	ROS1	TCF12	ZNF217
BCR	CLTCL1	ERCC3	FOXA1	KEAP1	MSH6	PDGFB	RPL22	TCF3	ZNF331
BIRC3	CNBP	ERCC4	FOXO1	KIAA1549	MSI2	PDGFRA	RPL5	TCF7L2	ZNF384
BLM	CNTRL	ERCC5	FOXP1	KIF5B	MTOR	PDGFRB	RPN1	TET1	ZNF521
BMPR1A	COPB1	ERG	FUBP1	KIT	MYB	PDK1	RPTOR	TET2	ZNF703
BRAF									

Next-Generation Sequencing – Gene Fusions (RNA)								Variant Transcripts (RNA)
AKT3	EGFR	ESR1	MAST1	NRG1	PDGFRB	RELA	TFEB	EGFR vIII
ALK	EWSR1	ETV1	MAST2	NTRK1	PIK3CA	RET	THADA	
ARHGAP26	FGR	ETV4	MSMB	NTRK2	PKN1	ROS1	TMPRSS2	
AXL	FGFR1	ETV5	MUSK	NTRK3	PPARG	RSPO2		
BRAF	FGFR2	ETV6	MYB	NUMBL	PRKCA	RSPO3		MET Exon 14 Skipping
BRD3	FGFR3	INSR	NOTCH1	NUTM1	PRKCB	TERT		
BRD4	ERG	MAML2	NOTCH2	PDGFRA	RAF1	TFE3		

**May not be available in New York.*

To order or learn more, visit **www.CarisMolecularIntelligence.com.**
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DNA
Mutations, Indels & Copy Number Alterations

RNA
Fusions & Variant Transcripts

Protein
Immunohistochemistry

Technical Specifications

Sufficient tumor must be present to complete all analysis. If you have any questions, please contact Client Services at (888) 979-8669.

Technical Information	IHC	CISH	FISH
Sample Requirements *(see requisition for full details)*	1 unstained slide at 4µm thickness from FFPE block, with evaluable tumor present, per IHC test	1 unstained slide at 4µm thickness from FFPE block, with at least 20-100 evaluable tumor cells present, per CISH test	2 unstained slides at 4µm thickness from FFPE block, with at least 100 evaluable cells present and 10% tumor, per FISH test
Sensitivity/Specificity	>95%	>95%	>95%

Technical Information	Next-Generation Sequencing	
	Mutations and Copy Number Alterations (DNA)	Fusions (RNA)
Sample Requirements	FFPE block or 10 unstained slides with a minimum of 20% malignant origin. Needle biopsy is also acceptable (4-6 cores).	FFPE block or 2-5 unstained slides with a minimum of 20% malignant origin. Needle biopsy is also acceptable (4-6 cores).
Tumor Enrichment (when necessary)	Microdissection to increase and isolate a larger portion of cancer cells to improve the chances for successful testing from small tumor samples	
PPV	>99%	>98%
Sensitivity	> 99% for base substitutions at ≥ 5% mutant allele frequency; > 99% for indels at ≥ 5% mutant allele frequency; >90% for copy number alterations (amplifications ≥ 6 copies)	>91%
Average Depth of Coverage (DNA) Average Depth/Count (RNA)	>750X	>30,000 Unique RNA Fragments
Number of Genes	592 genes	52 genes

Caris Molecular Intelligence® Associations List

The list below details the biomarkers assessed, technology platforms utilized and associated therapies or clinical trials. **Biomarkers and therapy associations may vary by the tumor type submitted.** The current and definitive list menu can be found online at www.CarisMolecularIntelligence.com/profiling-menu. *Individual assay results are always included with the final report.*

Agent	Biomarker	Platform
afatinib (assoc. in NSCLC only)	**EGFR**	NGS Mutation
	ERBB2 (Her2)	NGS Mutation
afatinib + cetuximab (combination assoc. in NSCLC only)	**EGFR T790M**	NGS Mutation
alectinib, brigatinib, ceritinib	**ALK**	IHC; NGS Fusion Analysis (RNA)
aspirin (assoc. in CRC only)	**PIK3CA**	NGS Mutation
avelumab (assoc. in Merkel cell only)	**PD-L1**	IHC
cabozantinib	**MET**	NGS Fusion Analysis (RNA)
	RET	NGS Fusion Analysis (RNA)
capecitabine, fluorouracil, pemetrexed	**TS**	IHC
carboplatin, cisplatin, oxaliplatin	**ATM**	NGS Mutation
	BRCA1	NGS Mutation
	BRCA2	NGS Mutation
	ERCC1	IHC
ceritinib	**ROS1**	NGS Mutation (DNA) & Fusion Analysis (RNA)
cetuximab, panitumumab[1] (assoc. in CRC only)	**BRAF**	NGS Mutation
	KRAS	NGS Mutation
	NRAS	NGS Mutation
	PIK3CA	NGS Mutation
	PTEN	IHC
cetuximab	**EGFR**	NGS CNA
crizotinib	**ALK**	IHC; NGS Mutation (DNA) & Fusion Analysis (RNA)
	MET	NGS Mutation, CNA & Fusion Analysis (RNA)
	ROS1	NGS Fusion Analysis (RNA)
dabrafenib, cobimetinib, vemurafenib[1]	**BRAF**	NGS Mutation
dacarbazine, temozolomide	**MGMT**	IHC
	MGMT-Methylation	Pyrosequencing
	IDH1 (assoc. in High Grade Glioma only)	NGS Mutation
docetaxel, paclitaxel, nab-paclitaxel	**TUBB3**	IHC
doxorubicin, liposomal-doxorubicin, epirubicin	**TOP2A**	IHC
		CISH (Breast only)
enzalutamide, bicalutamide	**AR** (assoc. in TNBC only)	IHC
erlotinib, gefitinib (assoc. in NSCLC only)	**EGFR**	NGS Mutation
	KRAS	NGS Mutation
	PIK3CA	NGS Mutation
	cMET	NGS CNA (DNA)
	PTEN	IHC

Agent	Biomarker	Platform
everolimus, temsirolimus	**ER** (assoc. in Breast only)	IHC
	PIK3CA (excluding CRC)	NGS Mutation
exemestane + everolimus, fulvestrant, palbociclib combination therapy	**ER**	IHC
	ESR1	NGS Mutation
gemcitabine	**RRM1** (excluding Breast)	IHC
hormone therapies[2]	**AR**	IHC
	ER	IHC
	PR	IHC
imatinib	**KIT**	NGS Mutation
	PDGFRA	NGS Mutation
irinotecan, topotecan (excluding Breast, CRC, NSCLC)	**TOPO1**	IHC
lapatinib, neratinib, pertuzumab, T-DM1	**ERBB2 (Her2)**	NGS CNA (DNA)
mitomycin-c	**BRCA1**[1]	NGS Mutation
	BRCA2[1]	
atezolizumab, nivolumab, pembrolizumab (assoc. in Bladder, CUP, Gastric, Kidney, Melanoma, NSCLC only)	**PD-L1**	IHC
nivolumab, pembrolizumab	**MSI**	NGS Mutation
nivolumab (assoc. in CRC only), pembrolizumab	**MMRP Deficiency**	IHC
niraparib, olaparib, rucaparib	**ATM** (assoc. in Prostate only)	NGS Mutation
	BRCA1[1]	
	BRCA2[1]	
osimertinib (assoc. in NSCLC only)	**EGFR T90M, EGFR L858R and Exon 19del**	NGS Mutation
palbociclib, abemaciclib, ribociclib (assoc. in Breast only)	**ER**	IHC
	ERBB2 (Her2)	IHC
sunitinib (assoc. in GIST only)	**KIT**	NGS
trametinib[1] (assoc. in Melanoma and Lung)	**BRAF**	NGS
trastuzumab	**ERBB2 (HER2)**	CISH, IHC, NGS Mutation *(NSCLC only)*, CNA (DNA)
	PTEN (assoc. in Breast only)	IHC
	PIK3CA (assoc. in Breast only)	NGS Mutation
vandetanib	**RET**	NGS Mutation (DNA) & Fusion Analysis (RNA)

IHC: Immunohistochemistry **CISH:** Chromogenic *in situ* Hybridization
NGS: Next-Generation Sequencing **CNA:** Copy Number Alteration by NGS

Note: in certain instances, some biomarkers included in MI Profile or genes ordered individually will not associate with commercially available cancer therapies or clinical trials.

[1] *In CRC, cetuximab/panitumumab, vemurafenib/dabrafenib, and trametinib may be reported in combination.*
[2] *Hormone therapies may include: tamoxifen, toremifene, fulvestrant, letrozole, anastrozole, exemestane, megestrol acetate, leuprolide, goserelin, bicalutamide, flutamide, abiraterone, enzalutamide, triptorelin, abarelix, degarelix.*

Biomarker Analysis by Tumor Type

The information below details the biomarkers analyzed by technology for the tumor type submitted. Before ordering testing services, please refer to the profile menu online (www.CarisMolecularIntelligence.com/profiling-menu) to view the most up-to-date listing of biomarkers that will be performed. Tests may vary if insufficient tumor samples are submitted.

MI Profile™			
Tumor Type	Immunohistochemistry (IHC)	Next-Generation Sequencing (NGS) *(see reverse for gene list)*	Other
Bladder	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOP2A, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA); Fusion Analysis (RNA)	
Breast	AR, ER, ERCC1, Her2/Neu, MLH1, MSH2, MSH6, PD-L1, PMS2, PR, PTEN, TOPO1,TS	Mutation, CNA Analysis, MSI and TMB (DNA)	Her2, TOP2A *(Chromogenic in situ Hybridization)*
Cancer of Unknown Primary	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOPO1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Cervix	ER, ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, PR, RRM1, TOP2A, TOPO1, TS, TUBB3	Mutation, CNA Analysis (DNA), MSI and TMB	
Cholangiocarcinoma/ Hepatobiliary	ERCC1, Her2/Neu, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOPO1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA); Fusion Analysis (RNA)	Her2 *(Chromogenic in situ Hybridization)*
Colorectal and Small Intestinal	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, PTEN, TOPO1, TRKA/B/C, TS	Mutation, CNA Analysis, MSI and TMB (DNA)	
Endometrial	ER, ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, PR, PTEN, RRM1, TOP2A, TOPO1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Esophageal SCC	ERCC1, Her2/Neu, MLH1, MSH2, MSH6, PD-L1, PMS2, TOP2A, TOPO1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Gastric	ERCC1, Her2/Neu, MLH1, MSH2, MSH6, PD-L1, PMS2, TOP2A, TOPO1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	Her2 *(Chromogenic in situ Hybridization)*
GIST	MLH1, MSH2, MSH6, PD-L1, PMS2, PTEN	Mutation, CNA Analysis (DNA), MSI and TMB	
Glioma	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, TOPO1	Mutation, CNA Analysis, MSI and TMB (DNA); Fusion Analysis (RNA)	MGMT Methylation *(Pyrosequencing)*
Head & Neck	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Kidney	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOP2A, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Melanoma	ERCC1, MGMT, MLH1, MSH2, MSH6, PD-L1, PMS2, TRKA/B/C, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Merkel Cell	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, TOPO1, TOP2A	Mutation, CNA Analysis, MSI and TMB (DNA)	
Neuroendocrine/ Small Cell Lung	ERCC1, MGMT, MLH1, MSH2, MSH6, PD-L1, PMS2, TOP2A, TS	Mutation, CNA Analysis, MSI and TMB (DNA)	
Non-Small Cell Lung	ALK, MLH1, MSH2, MSH6, PD-L1, PMS2, PTEN, RRM1, TOPO1, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA); Fusion Analysis (RNA)	
Ovarian	ER, ERCC1, MLH1, MSH2, MSH6, PD-L1, PR, PMS2, RRM1, TOP2A, TOPO1, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Pancreatic	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOPO1, TRKA/B/C, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Prostate	AR, ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, TUBB3	Mutation, CNA Analysis (DNA), MSI and TMB	
Salivary Gland	AR, Her2/Neu, MLH1, MSH2, MSH6, PD-L1, PMS2	Mutation, CNA Analysis (DNA); Fusion Analysis (RNA), MSI and TMB	
Sarcoma	ERCC1, MGMT, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOP2A, TOPO1, TRKA/B/C, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	
Thyroid	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, TOP2A	Mutation, CNA Analysis, MSI and TMB (DNA); Fusion Analysis (RNA)	
Other Tumors	ERCC1, MLH1, MSH2, MSH6, PD-L1, PMS2, RRM1, TOP2A, TS, TUBB3	Mutation, CNA Analysis, MSI and TMB (DNA)	

For PD-L1 IHC testing, Dako antibody 22c3 is run for all NSCLC, Gastric and Gastroesophageal Junction (GEJ) cancers. Dako antibody 22c3 is available upon request for other tumor types. For TRK IHC positive results, reflex Fusion testing will be performed.