



Biomarker Testing Menu for Biopharma Services

Technical Specifications

Technical Information	IHC	CISH	FISH
Sample Requirements <i>(see requisition for full details)</i>	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 15 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	Microdissection performed on all cases resulting in ~25% increase in tumor nuclei and enhances detection of minor clonal variants	
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

Available Biomarkers

Immunohistochemistry (IHC)								
AE1/AE3	CD10	Chromogranin	Cyclin D1	H3K36me3	MelanA	PBRM1	RRM1	TOP01
AFP	CD20	CK 5/6	Cytokeratin AE1/AE3	HCG	Melanoma Specific	PD-1	RRM2	TrkA/B/C
ALK	CD20 (L26)	CK14	DOG-1	Her2/Neu	MGMT	PDGFR	S-100	TS
Androgen Receptor	CD25	CK17	EBV	HMB45	MITF	PD-L1 (22c3)	SMA	TTF
bcl-2	CD30	CK19	ECAD	HSP90	MLH1	PD-L1 (SP142)	SPARC	TTF-1
BCRP	CD31	CK20	EGFR	IGF1R	MRP1	PGP	SPARC Monoclonal	TUBB3
Bombesin	CD34	CK5	EGFR HScore	INHIBIN	MSH2	PMS2	SPARC Polyclonal	UCHL1
BRCP	CD52	CK5/6	EMA	Ki1	MSH6	PR	Survivin	VEGF
CA19-9	CD68	CK7	ER	Ki67	NSE	PSA	Synaptophysin	Vimentin
Calcitonin	CD99	CK8	ERCC1	L26	OC125	PSAP	Thyroglobulin	WT1
Calretinin	CDX2	c-kit	GCDFP	LCA	p53	PTEN	TLE3	
CAM5.2	CEA	cMET	GCDFP (BRST II)	Mammaglobin	p63	RCC	TOP2	
CAV-1	Chromogranin	COX-2	GCDFP-15	MART1	PAP	RCCA	TOP2A	
Chromogenic <i>in situ</i> Hybridization (CISH)								
cMET	EGFR	ERBB2 (HER2)	MDM2	TOP2A				
Fragment Analysis				Pyrosequencing				
MSI (Microsatellite Instability)				MGMT Methylation				

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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	SOC3	TLX3
BCL11B	CDKN2C	ETV4	HLF	KAT6A (MYST3)	MKL1	NUMA1	POU5F1	SOX2	TMPRSS2
BCL2	CEBPA	FAM46C	HMG2P46	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	GMP5	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	SFB31	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
ARHGFE12	CCNB1IP1	DDR2	FBXO11	HGF	MAF	NIN	PRRX1	SMAD2	TRIM33
ARID1A	CCND1	DDX10	FBXW7	HIP1	MALT1	NOTCH2	PSIP1	SMAD4	TRIP11
ARID2	CCND2	DDX5	FCRL4	HMG1	MAML2	NPM1	PTCH1	SMARCB1	TRRAP
ARNT	CCND3	DDX6	FGF10	HMG2	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	RII2	SYK	YWHAE
BCL7A	CLP1	ERC1	FLT4	KDMSA	MRE11	PDCD1 (PD1)	RNF43	TAF15	ZMYM2
BCL9	CLTC	ERCC2	FNBP1	KDR (VEGFR2)	MSH2	PDCD1LG2 (PDL2)	ROS1	TCF12	ZNF217
BCR	CLTCL1	ERCC3	FOXA1	KEAP1	MSH6	PDGFBR	RPL22	TCF3	ZNF331
BIRC3	CNBP	ERCC4	FOXO1	KIAA1549	MSI2	PDGFRA	RPL5	TCF7L2	ZNF384
BLM	CNTRL	ERCC5	FOXP1	KIF5B	MTOR	PDGFRB	RPN1	TET1	ZNF521
BMPR1A	CNTRL TFEB	ERG	FUBP1	KIT	MYB	PDK1	RPTOR	TET2	ZNF703
BRAF	COPB1								
Next-Generation Sequencing – Gene Fusions (RNA)								Variant Transcripts (RNA)	
AKT3	EGFR	ESR1	MAST1	NRG1	PDGFRB	RELA	TFEB		
ALK	EWSR1	ETV1	MAST2	NTRK1	PIK3CA	RET	THADA		
ARHGAP26	FGR	ETV4	MSMB	NTRK2	PKN1	ROS1	TMPRSS2		
AXL	FGFR1	ETV5	MUSK	NTRK3	PPARG	RSPO2			EGFR vIII
BRAF	FGFR2	ETV6	MYB	NUMBL	PRKCA	RSPO3			
BRD3	FGFR3	INSR	NOTCH1	NUTM1	PRKCB	TERT			
BRD4	ERG	MAML2	NOTCH2	PDGFRA	RAF1	TFE3			

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