



## Department of Pathology and Clinical Laboratories

### MiOncoSeq

### OncoSeq Assay Test Definition

#### 1.0 Purpose and Scope

N/A

#### 2.0 Applies To

MiOncoSeq Lab

#### 3.0 Terms and Definitions

N/A

#### 4.0 Policy/Instructions

##### **OncoSeq v7 Assay Test Definition**

The OncoSeq v7 Assay covers all or parts of 936 genes that have been implicated in cancer. The assay design consists of approximately 2.7 Mb of target sequence including exons of targeted genes as well as regions added for technical reasons. A complete gene list is appended below.

The OncoSeq v7 Assay tests for somatic mutations in 924 protein coding genes and reports nonsynonymous somatic single nucleotide variants (SNVs), plus splicing variants (up to 3 bases into an intron) that are present at 5% or greater allelic fraction in the tumor sample. The assay covers somatic single nucleotide variants (SNVs), small insertions and deletions (indels), and indels up to exon length. The assay also reports variants as low as 1% allelic fraction if the variant exists with sufficient read support. Variants are annotated to RefSeq and reported with respect to the most commonly reported isoform, if there are multiple relevant annotations. An additional 12 noncoding or HLA loci genes are targeted for detection of LOH only and somatic variants are not reported in these genes.

The OncoSeq v7 Assay reports germline variants in 186 cancer predisposition genes. Variants at less than 0.5% population frequency are reported. The list of 186 cancer predisposition genes is appended at the end of this document.

OncoSeq validation against Sanger sequencing and externally generated data indicates that the assay has above 90% sensitivity for the detection of clonal mutations in samples with at least 20% tumor purity, and greater than 90% positive predictive value.

In cases where a matched normal sample is unavailable or of unacceptable quality, the OncoSeq v7 Assay filters by population frequencies instead of presence in the normal sample; this process recovers approximately 97% of the real somatic variants but also calls some private germline variants that cannot be distinguished from somatic mutations.

**OncoSeq v7 Assay Gene List (genes in *italics* do not have somatic variants reported)**

ABCB1	ABI1	ABL1	ABL2	ABRAXAS1	ACD
ACVR1	ACVR1B	ACVR2A	ADGRA2	ADGRB3	AFF2
AFF3	AHR	AIP	AJUBA	AKT1	AKT2
AKT3	ALK	AMER1	ANKRD11	ANKRD26	APC
APEX1	APOB	APOBEC3A	APOBEC3B	AR	ARAF
ARFRP1	ARHGAP26	ARHGAP35	ARID1A	ARID1B	ARID2
ARID5B	ARMC5	ARNT	ASXL1	ASXL2	ASXL3
ATAD2B	ATF1	ATM	ATP1A1	ATP2B3	ATP6AP1
ATP6AP2	ATP6V1B2	ATR	ATRX	AURKA	AURKB
AXIN1	AXIN2	AXL	B2M	BAP1	BARD1
BAX	BBC3	BCL10	BCL11A	BCL11B	BCL2
BCL2L1	BCL2L11	BCL2L2	BCL3	BCL6	BCL7A
BCL9	BCL9L	BCOR	BCORL1	BCR	BIRC2
BIRC3	BLM	BMPR1A	BRAF	BRCA1	BRCA2
BRCC3	BRD3	BRD4	BRD7	BRD9	BRINP3
BRIP1	BTG1	BTG2	BTK	BUB1	BUB1B
CALR	CAMTA1	CARD11	CASP8	CBFB	CBL
CBLB	CBLC	CCN6	CCNC	CCND1	CCND2
CCND3	CCNE1	CCNE2	CD19	CD22	CD27
CD274	CD28	CD38	CD40	CD40LG	CD44
CD52	CD58	CD70	CD79A	CD79B	CDC73
CDH1	CDK12	CDK4	CDK5	CDK6	CDK7
CDK8	CDKN1A	CDKN1B	CDKN1C	CDKN2A	CDKN2B
CDKN2C	CDKN3	CDX2	CEBPA	CEBPB	CEP57
CHD1	CHD2	CHD4	CHD7	CHEK1	CHEK2
CHIC1	CIC	CIITA	CILK1	CKS1B	CMPK1
CNOT3	CRBN	CREB1	CREB3L2	CREB3L4	CREBBP
CRKL	CRLF2	CRTC1	CSF1R	CSF3R	CSNK1A1
CTCF	CTLA4	CTNNA1	CTNNB1	CTNND2	CUL3
CUL4A	CUL4B	CUX1	CXCR4	CYLD	CYP2C19
CYP2C9	CYP2D6	CYP3A4	CYP3A5	CYSLTR2	DAXX
DDB2	DDIT3	DDR2	DDX3X	DDX41	DDX5
DDX6	DEK	DIAPH2	DIAPH3	DICER1	DIRAS3
DIS3	DIS3L2	DKC1	DNM2	DNMT1	DNMT3A
DNMT3B	DOT1L	DPYD	DROSHA	DSP	DTX1
DUSP12	DUSP22	DUX4	E2F3	EBF1	EED
EGFR	EGLN1	EHF	EIF1AX	ELANE	ELF3
ELOB	ELOC	EMSY	EP300	EPAS1	EPCAM
EPHA2	EPHA3	EPHA5	EPHA7	EPHB1	EPHB4
EPOR	ERBB2	ERBB3	ERBB4	ERCC1	ERCC2
ERCC3	ERCC4	ERCC5	ERCC6	ERCC6L2	ERF
ERG	ERRFI1	ESR1	ETNK1	ETS1	ETS2
ETV1	ETV4	ETV5	ETV6	EWSR1	EXT1
EXT2	EZH2	FADD	FAN1	FANCA	FANCB
FANCC	FANCD2	FANCE	FANCF	FANCG	FANCI

FANCL	FANCM	FAS	FASLG	FAT1	FAT2
FAT3	FAT4	FBXO11	FBXW7	FEN1	FES
FEV	FGF10	FGF14	FGF19	FGF23	FGF3
FGF4	FGF6	FGFR1	FGFR2	FGFR3	FGFR4
FH	FHIT	FLCN	FLI1	FLT1	FLT3
FLT4	FOXA1	FOXA2	FOKK1	FOXL2	FOXO1
FOXO3	FOXO4	FOXP1	FOXP2	FOXR1	FOXR2
FRK	FRS2	FUBP1	FUS	FYN	G6PC3
G6PD	GABRA6	GALNT12	GATA1	GATA2	GATA3
GATA4	GATA6	GDNF	GEN1	GFI1	GID4
GLCCI1	GLI1	GLI2	GNA11	GNA13	GNAQ
GNAS	GNB1	GPC3	GPC5	GPS2	GREM1
GRIN2A	GRM3	GSK3B	H1-2	H1-3	H1-4
H1-5	(H19)	H3-3A	H3-3B	H3-5	H3C2
H3C3	H4C5	HAVCR2	HAX1	HDAC1	HDAC2
HDAC4	HDAC9	HEY1	HGF	HIF1A	(HLA-A)
(HLA-B)	(HLA-C)	(HLA-DPA1)	(HLA-DPB1)	(HLA-DQA1)	(HLA-DQB1)
(HLA-DRA)	(HLA-DRB1)	HMGA1	HMGA2	HNF1A	HNF1B
HOXA11	HOXA13	HOXA9	HOXB13	HOXC11	HOXC13
HOXD11	HOXD13	HRAS	HSD3B1	HSP90AA1	ICOS
ID2	ID3	IDH1	IDH2	IGF1	IGF1R
IGF2	IKBKB	IKBKE	IKZF1	IKZF2	IKZF3
IL21R	IL2RG	IL6ST	IL7R	INHBA	INPP4B
INSR	INSRR	IRAK1	IRF1	IRF2	IRF4
IRF8	IRS2	IRS4	ITK	ITPKB	JAK1
JAK2	JAK3	JARID2	JUN	KAT6A	KAT6B
KDM1A	KDM3B	KDM5A	KDM5C	KDM5D	KDM6A
KDR	KEAP1	KIF1B	KIF5B	KIT	KLF2
KLF4	KLF6	KLHL6	KMT2A	KMT2B	KMT2C
KMT2D	KNSTRN	KRAS	LAG3	LATS1	LATS2
LCK	LEF1	LGR4	LIFR	LIG4	LMO1
LMO2	LRP1B	LRP5	LRRK2	LTBR	LTK
LYL1	LYN	LZTR1	MAD2L2	MAF	MAFB
MAGI2	MALT1	MAML1	MAML2	MAML3	MAMLD1
MAP2K1	MAP2K2	MAP2K4	MAP3K1	MAP3K13	MAP3K14
MAP3K3	MAP3K4	MAP3K7	MAP4K5	MAPK1	MAPK3
MAX	MBD1	MBD4	MC1R	MCL1	MCM7
MDC1	MDM2	MDM4	MECOM	MED12	MEF2B
MEF2C	MEG3	MEG8	MEN1	MET	MGA
MGMT	MIPOL1	MITF	MLH1	MLH3	MN1
MNX1	MPL	MRE11	MS4A1	MSH2	MSH3
MSH6	MSI2	MST1R	MTAP	MTOR	MUTYH
MYB	MYBL1	MYC	MYCL	MYCN	MYD88
MYOD1	NAIP	NBN	NCOA1	NCOA2	NCOA3
NCOA4	NCOR1	NCOR2	NEIL1	NEIL3	NF1
NF2	NFATC2	NFE2	NFE2L2	NFIB	NFKB1

NFKB2	NFKBIA	NFKBIE	NHEJ1	NHP2	NKX2-1
NKX3-1	NOP10	NOTCH1	NOTCH2	NOTCH3	NOTCH4
NPM1	NPPB	NQO1	NR3C1	NR4A3	NRAS
NRG1	NSD1	NSD2	NSD3	NT5C2	NTHL1
NTRK1	NTRK2	NTRK3	NUDT15	NUP214	NUP93
NUP98	NUTM1	OLIG2	P2RY8	PAK1	PAK3
PAK4	PAK5	PALB2	PARP1	PARP4	PAX3
PAX5	PAX7	PAX8	PBRM1	PBX1	PCBP1
PDCD1	PDCD11	PDCD1LG2	PDGFB	PDGFRA	PDGFRB
PDK1	PDPK1	PEG3	PGR	PHF1	PHF6
PHOX2B	PIGA	PIK3C2B	PIK3C2G	PIK3C3	PIK3CA
PIK3CB	PIK3CD	PIK3CG	PIK3R1	PIK3R2	PIK3R3
PIM1	PIM3	PLAG1	PLAGL1	PLAGL2	PLCG1
PLCG2	PLK1	PLK2	PLK3	PML	PMS1
PMS2	POLD1	POLE	POLH	POLQ	POT1
POU2AF1	POU5F1	PPARG	PPM1D	PPP2R1A	PPP2R2A
PPP6C	PRDM1	PRDM16	PRDM9	PREX2	PRF1
PRKACA	PRKAR1A	PRKCI	PRKD1	PRKDC	PRKN
PRPF40B	PRPF8	PRSS1	PRSS8	PSIP1	PTCH1
PTCH2	PTEN	PTK2	PTK6	PTPN11	PTPN13
PTPN6	PTPRB	PTPRD	PTPRG	PTPRJ	PTPRS
PTPRT	(PVT1)	QKI	RAC1	RAD21	RAD50
RAD51	RAD51B	RAD51C	RAD51D	RAD52	RAD54B
RAD54L	RAF1	RAP1GDS1	RARA	RASA1	RASA2
RB1	RBM10	RECQL	RECQL4	RECQL5	REL
RELA	REST	RET	RHEB	RHOA	RHOH
RICTOR	RINT1	RIPK1	RIT1	RNF213	RNF43
ROBO2	ROS1	RPA1	RPL10	RPL22	RPL5
RPS15	RPS20	RPTOR	RRAGC	RRM1	RSPO2
RSPO3	RTEL1	RUNX1	RUNX1T1	RXRA	S1PR2
SAMD9	SAMD9L	SAMHD1	SAV1	SBDS	SDHA
SDHAF2	SDHB	SDHC	SDHD	SET	SETBP1
SETD2	SETD5	SETDB1	SF1	SF3A1	SF3B1
SFRP4	SGK1	SH2B3	SH2D1A	SH3GL1	SHC2
SHH	SHOC2	SIX1	SKI	SKIL	SLAMF7
SLC47A1	SLC47A2	SLCO1B1	SLIT2	SLX4	SMAD2
SMAD3	SMAD4	SMAD6	SMAD7	SMARCA1	SMARCA2
SMARCA4	SMARCA5	SMARCA1	SMARCB1	SMARCD1	SMARCE1
SMC1A	SMC3	SMO	SNCAIP	SOCS1	SOS1
SOS2	SOX10	SOX17	SOX2	SOX9	SP100
SP110	SP140	SP140L	SP3	SPEN	SPOP
SPRED1	SRC	SRSF2	SRSF3	SRY	STAG1
STAG2	STAT2	STAT3	STAT4	STAT5A	STAT5B
STAT6	STK11	STK3	STK36	STK4	SUFU
SUZ12	SYK	TACSTD2	TAF1	TAF15	TAFIL
TAL1	TAL2	TBL1X	TBL1XR1	TBX3	TBXT

TCF12	TCF3	TCF4	TCF7L2	TCL1A	TEK
TENT5C	(TERC)	TERT	TET1	TET2	TET3
TFCP2	TFE3	TFEB	TFEC	TGFB1	TGFBR1
TGFBR2	THPO	TIE1	TIGIT	TINF2	TLR2
TLR4	TLX1	TLX3	TMEM127	TMEM30A	TMPRSS2
TNFAIP3	TNFRSF11A	TNFRSF13B	TNFRSF14	TNFRSF17	TNFRSF21
TNFRSF8	TOP1	TOP2A	TOP2B	TP53	TP53BP1
TP63	TPMT	TRAF2	TRAF3	TRAF5	TRAF6
TRAF7	TRIM27	TRIP13	TSC1	TSC2	TSHR
TTC6	TYK2	U2AF1	U2AF2	UBA1	UBR5
UGT1A1	USB1	USP1	USP14	USP22	USP28
USP6	USP7	USP8	USP9X	USP9Y	UTY
VAV1	VEGFA	VEGFB	VGLL1	VGLL2	VGLL3
VGLL4	VHL	VKORC1	VTCN1	WAS	WEE1
WIF1	WRN	WT1	WWTR1	XBP1	XIAP
XIRP2	XPA	XPC	XPO1	XRCC2	YAP1
YEATS4	YES1	YWHAE	ZBTB16	ZBTB2	ZBTB7A
ZBTB7B	ZEB2	ZFHX3	ZMYM3	ZNF217	ZNF384
ZNF521	ZNF703	ZNF704	ZNF750	ZNRF3	ZRSR2

## OncoSeq v7 Assay 186 Genes for Germline Variant Reporting

AIP	AKT1	ALK	ANKRD26	APC	ARMC5
ATM	ATR	AXIN2	BAP1	BARD1	BLM
BMPR1A	BRAF	BRCA1	BRCA2	BRIP1	BUB1B
CBL	CDC73	CDH1	CDK4	CDKN1B	CDKN1C
CDKN2A	CEBPA	CEP57	CHEK1	CHEK2	CTNNA1
CYLD	CYP21A2	DDB2	DDX41	DICER1	DIS3L2
DKC1	DLST	EGFR	EGLN1	ELANE	EPCAM
ERCC1	ERCC2	ERCC3	ERCC4	ERCC5	ERCC6L2
ETV6	EXT1	EXT2	FAN1	FANCA	FANCB
FANCC	FANCD2	FANCE	FANCF	FANCG	FANCI
FANCL	FANCM	FAS	FASLG	FH	FLCN
G6PC3	GALNT12	GATA2	GFI1	GPC3	GREM1
HAX1	HOXB13	HRAS	IGF1	IKZF1	JAK2
KIF1B	KIT	KRAS	LIG4	LZTR1	MAP2K1
MAP2K2	MAX	MBD4	MC1R	MEN1	MET
MITF	MLH1	MLH3	MPL	MRE11	MSH2
MSH3	MSH6	MUTYH	NBN	NEIL1	NF1
NF2	NHEJ1	NHP2	NOP10	NRAS	NSD1
NTHL1	PALB2	PAX5	PDGFRA	PDGFRB	PHOX2B
PIK3CA	PMS1	PMS2	POLD1	POLE	POT1
PPM1D	PRKAR1A	PRKN	PRSS1	PTCH1	PTEN
PTPN11	RAD50	RAD51	RAD51B	RAD51C	RAD51D
RAD54L	RAF1	RB1	RECQL	RECQL4	RECQL5
REST	RET	RNF43	RPS20	RTEL1	RUNX1
SAMD9	SAMD9L	SBDS	SDHA	SDHAF2	SDHB
SDHC	SDHD	SH2B3	SH2D1A	SHOC2	SMAD4
SMAD7	SMARCA4	SMARCB1	SMARCE1	SOS1	SPRED1
STK11	SUFU	TERC	TERT	TGFBR1	TGFBR2
THPO	TINF2	TLR2	TLR4	TMEM127	TP53
TRIP13	TSC1	TSC2	USB1	VHL	WAS
WRN	WT1	XPA	XPC	XRCC2	ZNRF3

## 5.0 Related Department Documents

N/A

## 6.0 References

N/A

## 7.0 Revision History

Date (mm/dd/yyyy)	Section	Revision Notes/Comments
10/2/2024	All	danrobi: Updated to OncoSeq v7 panel.
10/4/2024	All	pmingyu: Changed format.