MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

Department of Pathology and Clinical Laboratories

MiOncoSeq

OncoSeq V7 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 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

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	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	FOXK1	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
H3-3A	H3-3B	H3-5	H3C2	H3C3	H4C5
HAVCR2	HAX1	HDAC1	HDAC2	HDAC4	HDAC9
HEY1	HGF	HIF1A	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	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	SMARCAD1	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	TAF1L
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 188 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	**HNF1A**	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
SMAD3	**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				

ACMG SF3.3 genes for incidental reporting are shown above in **BOLD.**

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.
4/30/2026	4.0	Danrobi: Edited gene list and added "**ACMG SF3.3** genes for incidental reporting are shown above in **BOLD.**"