Order ID :	123456
Clinical ID :	ABC123
Indication :	Non-Small Cell Lung Cancer (NSCLC) - NOS
Physician :	Dr. Smith
Patient Age :	65
Patient Gender :	Male
Patient Status :	Refractory
Sample Type :	Not Available
Genomic Input :	NGS Report

The Cellworks proprietary workflow solution used to generate this test report from patient's medical records (Test Report), has not been approved by any regulatory or medical authority. Cellworks generated information is adjunctive information to physicians and molecular tumor boards. CELLWORKS DOES NOT ASSURE OR GUARANTEE THE SUCCESS OF ANY THERAPEUTIC OPTION IDENTIFIED IN THIS TEST REPORT. Cellworks reports have not been validated or specifically developed for pregnant women or nursing mothers. The user of this Test Report remains responsible for the conduct of patient care and for evaluating the clinical relevance of information provided by the prediction software. Cellworks is not an entity licensed to practice medicine or clinical activity and the Test Report generated by Cellworks does not amount to, or substitute, qualified professional medical advice.

Non-Small Cell Lung Cancer (NSCLC) - NOS

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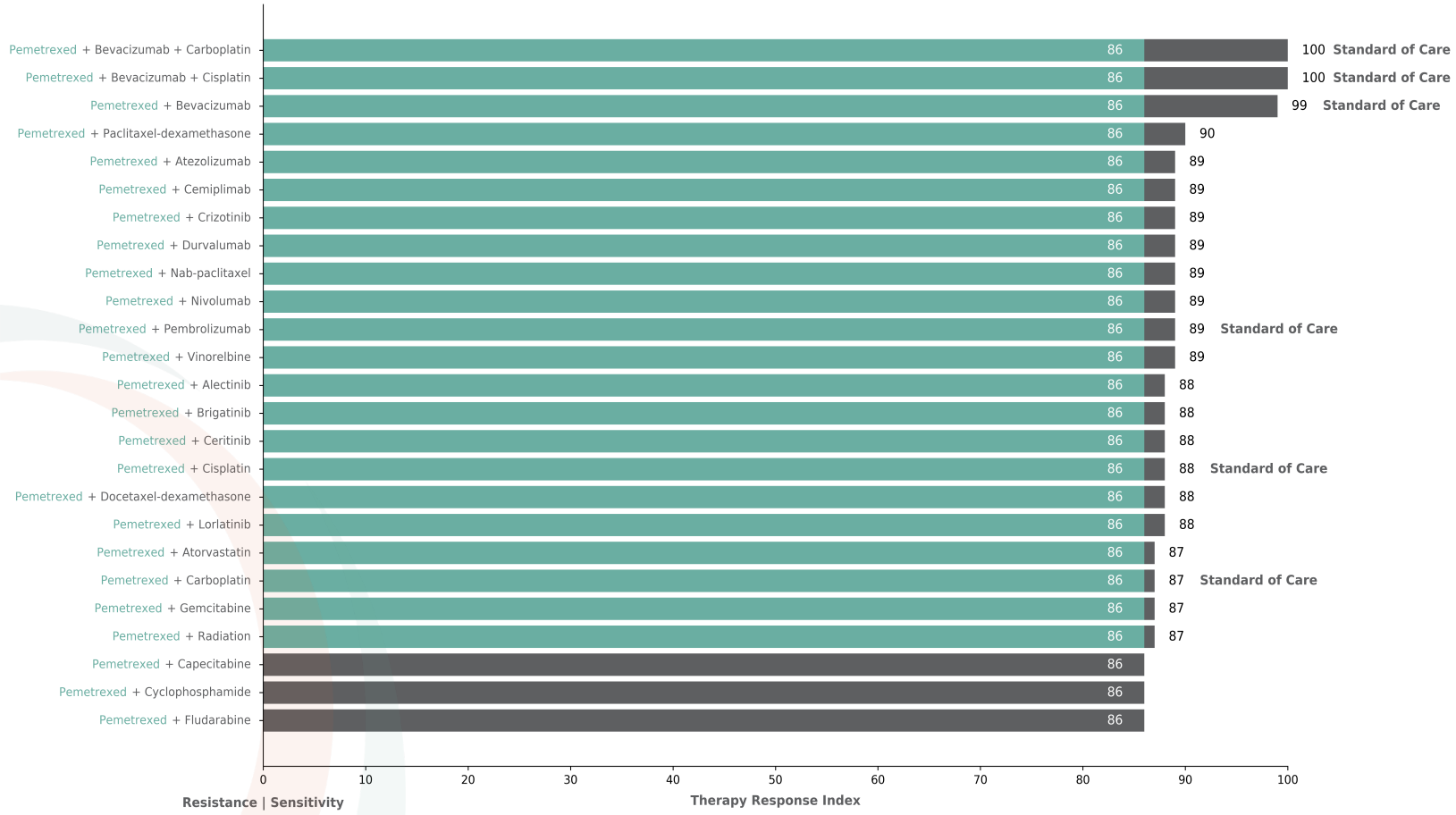
1. Top Biosimulation Treatments

The histogram includes efficacy scores for the top 25 therapies and combinations based on the patients genomics. The overall score in grey represents the complete therapy or combination. The highlighted green section of the bar represents the largest single agent contributor for comparison. Therapy pharmacodynamics is not considered as part of this analysis.



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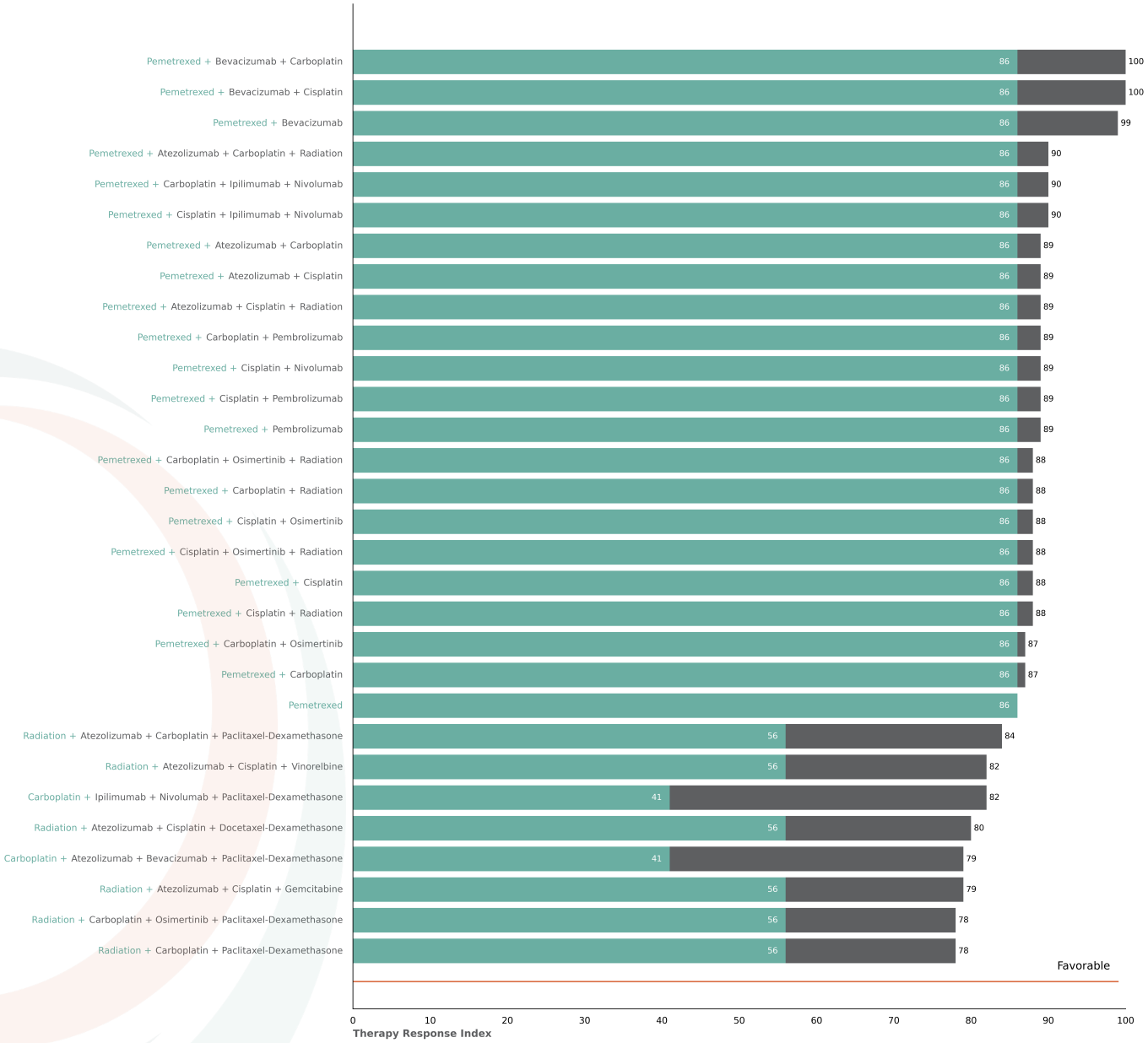
1.1 Indication Specific Therapies Reponse



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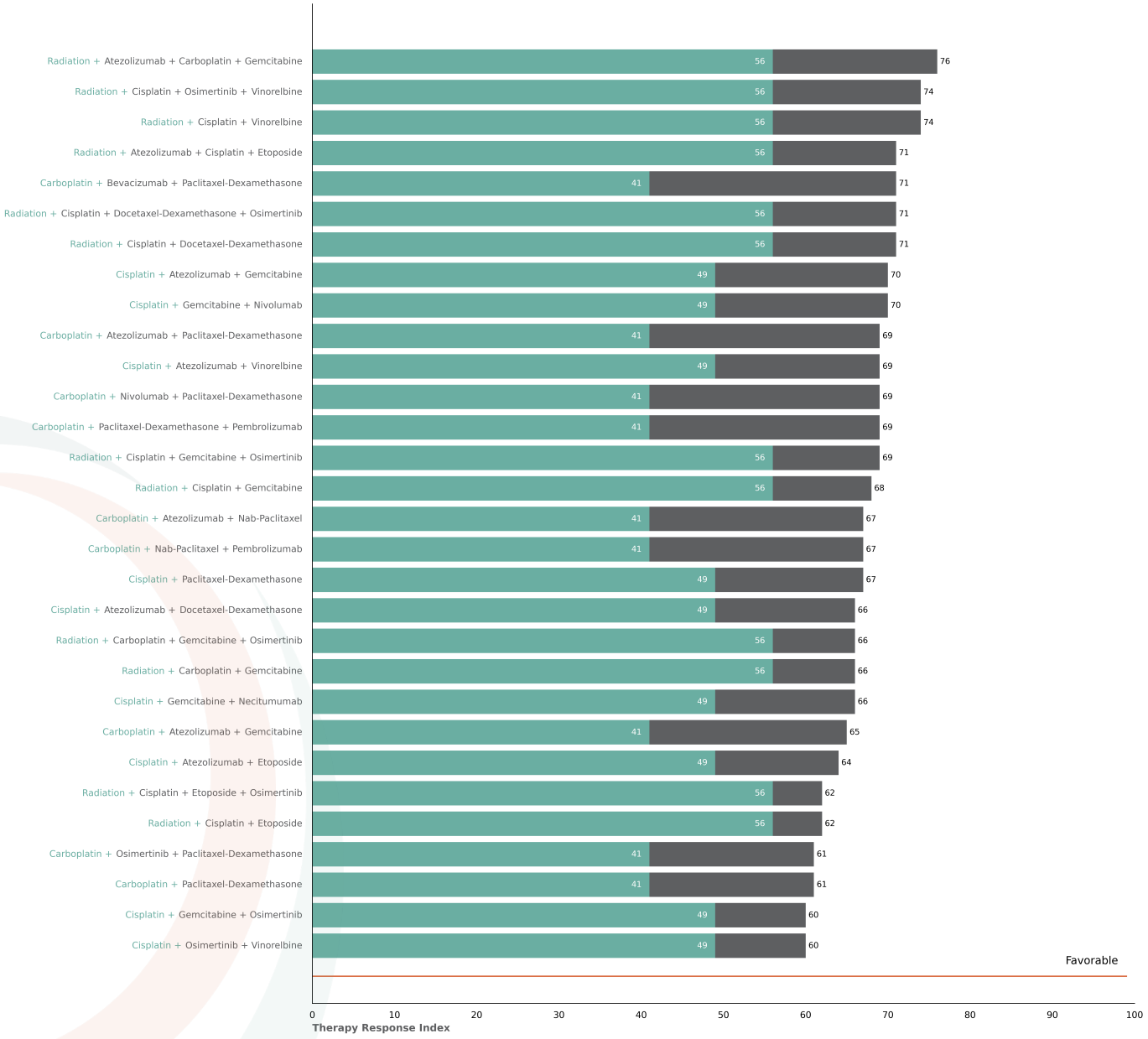

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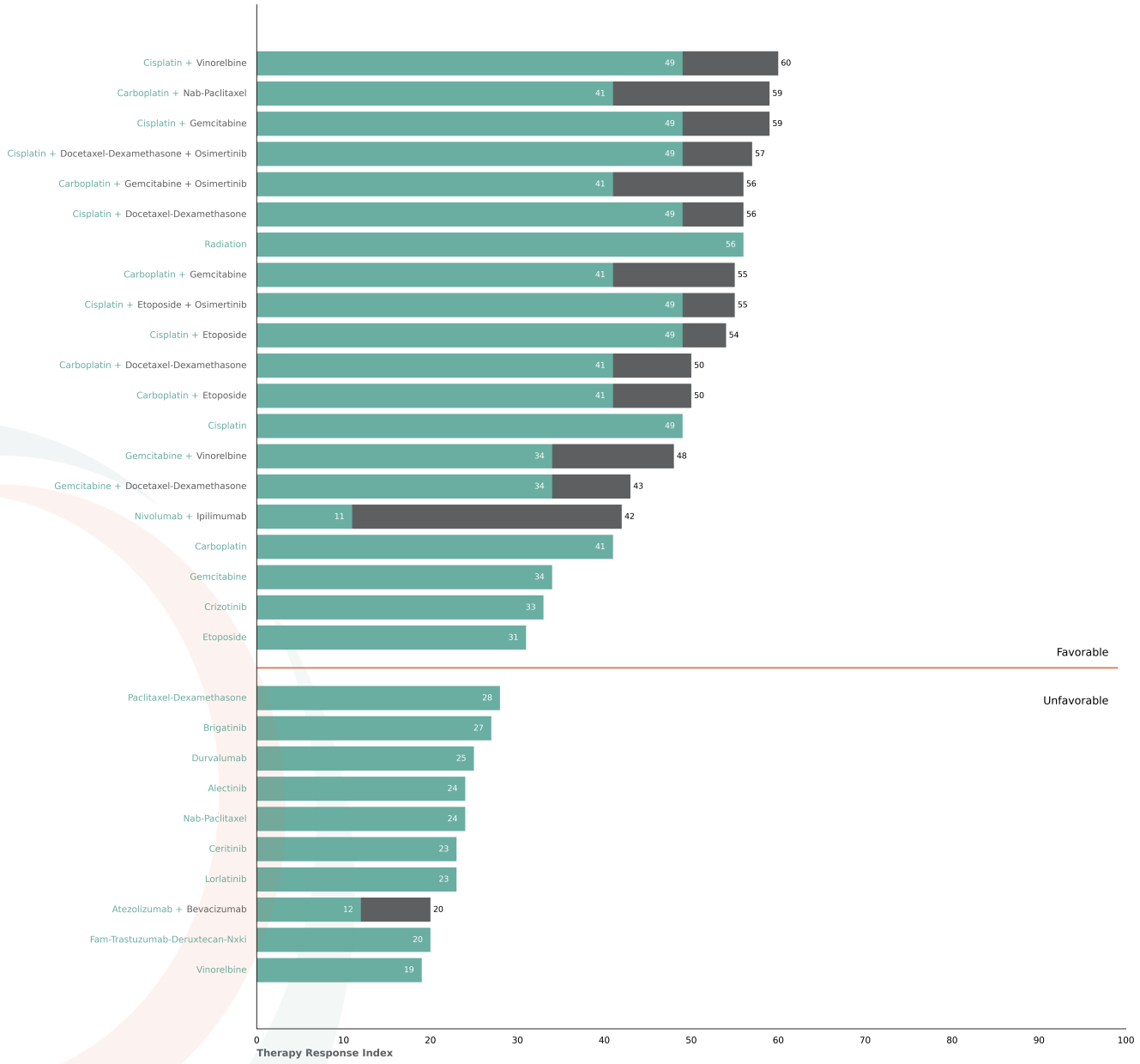
Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**



Non-Small Cell Lung Cancer (NSCLC) - NOS

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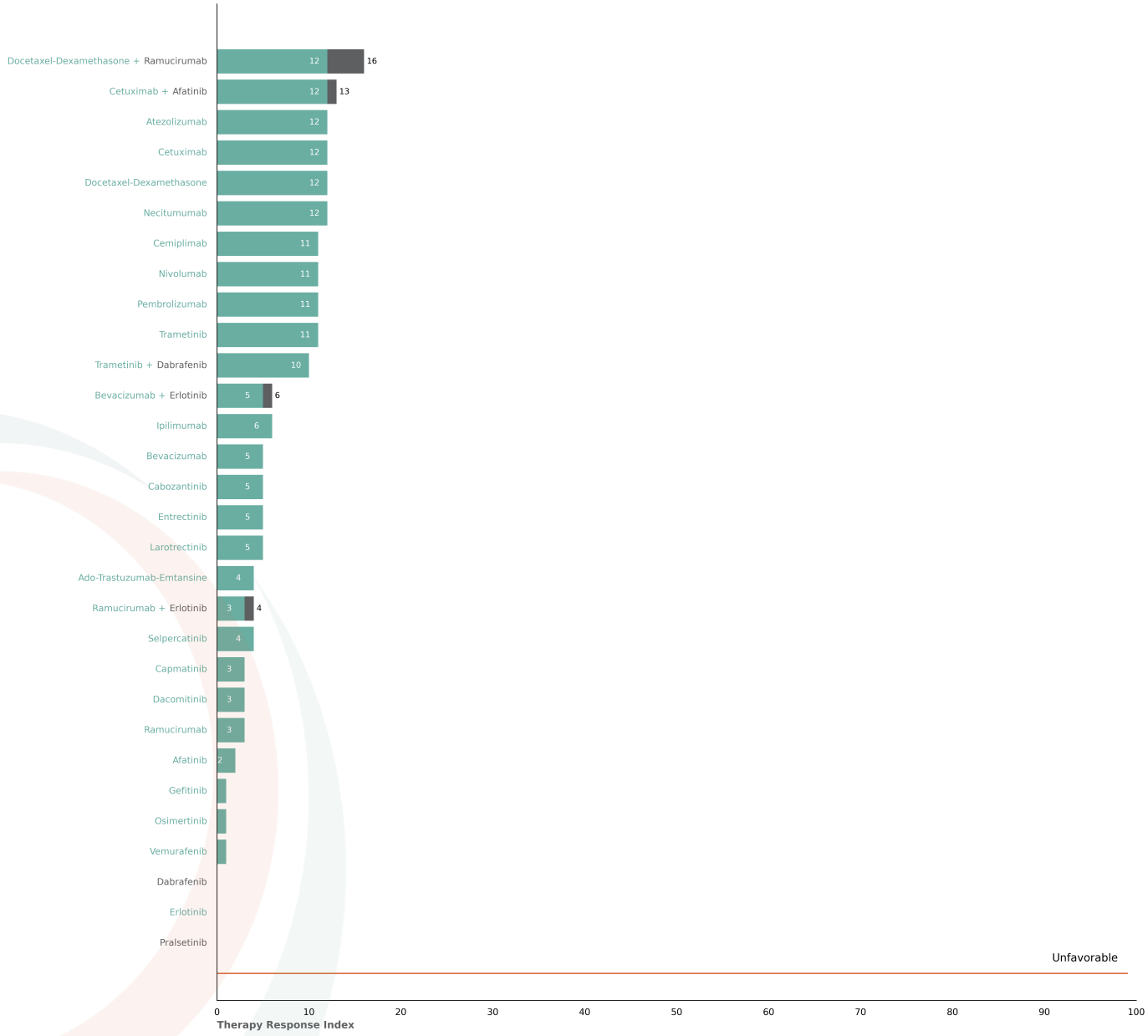

Non-Small Cell Lung Cancer (NSCLC) - NOS

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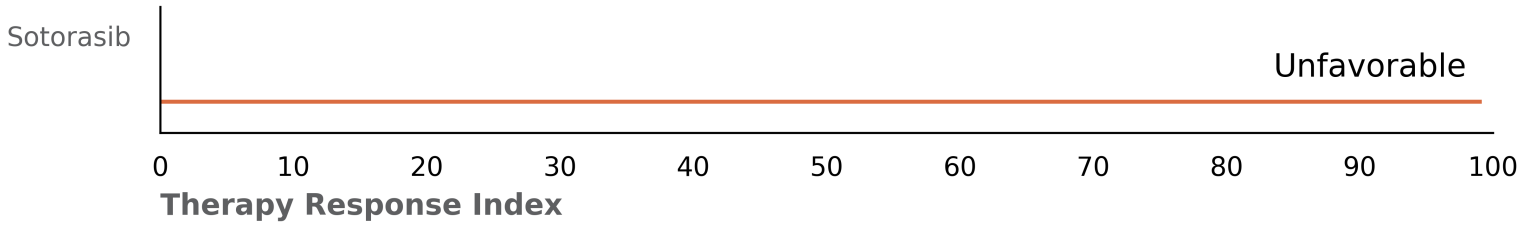

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2. Master Regulators

The master regulators are uniquely selected for each patient. The Biosimulation process uses the master regulators to identify the targetable pathways for maximum phenotype impact. Up to 10 master regulators are shown her. See Section 6 for detailed illustrations of Specific Master Regulators and their impact on the patient's disease profile.

2.1 Master Regulator Impact Weight

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2.2 Treatment Impact on Master Regulators

The marks indicate whether each treatment has a meaningful impact on each of the master regulators. It is not required for each responder treatment to impact every master regulator since phenotype response can be driven by more than one pathway. Typically however, treatments that successful impact several master regulators tend to have the best outcomes.

Therapies of Interest	Master Regulators									
	AURKA	E2F1	FOXM1	GLI1	HK2	ILK	JUN	MTOR	PAK1	PRKCE
Bevacizumab + Carboplatin + Pemetrexed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bevacizumab + Cisplatin + Pemetrexed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bevacizumab + Pemetrexed	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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3. Phenotype Fold Change

The phenotype impact value represents the deviation of the patient's disease from a normal healthy cell model. Cellworks uses index values corresponding to the Hallmarks of Cancer for evaluation. The impact for each drug on the phenotype is used as part of the efficacy score generation.

Phenotype Index	Fold Change
Proliferation	4.5
Evading Growth Suppressors	2.2
Apoptotic Blockade	0.3
Replicative Immortality	1.8
Angiogenesis	1.9
Invasion and Metastasis	2.6
Immune Evasion	2.3

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4. Patient Profile

4.1 Summary of Patient Genomic Profile

The table below includes all of the patient genomic and lab results used as input when generating this report.

Input Data Type	Mutations and CNV
Genetic Mutation(s)	2
Copy Number Variation(s)	1447
MGMT Methylation Status	Not Available
Karyotype Value	Not Available
IHC Value	Not Available

4.2 Detailed Information of Genomic Aberration(s) Modeled

The table below lists all of the gene mutations and copy number variations in chromosomal order.

4.2.1 Gene Mutation(s) with Loss of Function

KDR D1171N

4.2.2 Gene Mutations(s) with Switch of Function

EML4_ALK FUS

4.2.3 Gene(s) with Increase in Copy Number Variation [CNV]

ABCC1	ABCC11	ABCC6	ACAT1	ACVR1	ACVR2A	AIP	AKIP1
AKTIP	ALDOA	ALG1	ALG8	ALG9	ALKBH3	AMBRA1	AMFR
AMPD3	APOA1	APOC3	ARHGAP17	ARHGAP32	ARHGEF12	ARNTL	ARRB1
ASXL2	ATG13	ATM	B3GAT3	BAD	BCL7C	BDNF	BIRC2
BIRC3	BRD7	CAD	CADM1	CAPN1	CASP1	CASP12	CASP4
CASP5	CAT	CBL	CCL17	CCL22	CCND1	CCS	CD19
CD274	CD3D	CD3E	CD3G	CD44	CD5	CD59	CD81
CDKN1C	CENPA	CES1	CHEK1	CHKA	CPT1A	CRY2	CTNND1
CTSD	CTTN	CUL5	CX3CL1	CXCR5	CYLD	DAGLA	DCHS1

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DDB1	DDB2	DGKZ	DHCR7	DIXDC1	DKK3	DNMT3A	DRD2
EED	EEF2K	EIF2B4	EIF3C	EIF3F	EIF3M	ESRRA	ETS1
EXT2	F2	FADD	FANCF	FBXO3	FEN1	FGF19	FGF4
FLI1	FOLR1	FOSL1	FOSL2	FTH1	FUS	FZD4	GAB2
GANAB	GAS2	GLIS2	GNAO1	GPD2	GPT2	GSTP1	HBG1
HRAS	HSPA8	IGF2	IL18	IL18BP	IL21R	IL27	IL4R
ILK	INPPL1	INS	IRF7	ITGAD	ITGAL	ITGAM	KAT5
KAT8	KCTD13	KIFC3	KMT2A	KYNU	LAMTOR1	LAT	LDHA
LGR4	LMO1	LMO2	LRP5	LRRC32	MALAT1	MAP3K11	MAP4K2
MAPK3	MAPK8IP1	MDK	ME3	MEN1	MIR125B1	MIR130A	MIR210
MIR365A	MMP1	MMP10	MMP12	MMP13	MMP2	MMP3	MMP7
MMP8	MPG	MS4A1	MT2A	MTA2	MUC2	MUC5AC	MUS81
MVP	MYOD1	NCOA1	NCR3LG1	NLRC5	NOX4	NPRL3	NR1H3
NR4A2	NUP160	NUP93	NUP98	NUPR1	ORC6	P4HA3	PAAF1
PACSIN3	PAGR1	PAK1	PALB2	PANX1	PAX6	PC	PDE2A
PDE3B	PDGFD	PDIA2	PGA3	PGR	PHF21A	PICALM	PLCB3
PLK1	PMM2	POLD3	POLD4	POU2AF1	PPP1CA	PPP1CB	PPP2R1B
PPP4C	PRDX5	PRKCB	PRPF19	PSMA1	PSMC3	PTDSS2	PTGDR2
PTPRJ	PTS	PYCARD	RAB10	RAB1B	RAB6A	RAD9A	RAG1
RAG2	RASGRP2	RBBP6	RBL2	RCE1	RELA	RHOG	RIF1
RIN1	RND3	ROBO3	ROBO4	RPRM	RPS3	RPS6KA4	RPS6KB2
RRAS2	RRM1	RSF1	SAA1	SAA2	SALL1	SART1	SDHD
SERPINH1	SESN3	SETD1A	SF1	SH2B1	SIAH1	SIK2	SIRT3
SLC22A6	SLC22A8	SLC29A2	SLC3A2	SLC6A2	SLC6A5	SLCO2B1	SMG1
SMPD1	SOCS1	SPA17	SPDYA	SPI1	ST3GAL4	STT3A	SULT1A1
SULT1A3	SYVN1	TALDO1	TCIRG1	TEAD1	TFAP4	TGFB1I1	TH
THRSP	TIRAP	TNFAIP6	TOLLIP	TP53AIP1	TP53I3	TPH1	TRAF6
UBE2L6	UPP2	USP28	USP7	UVRAG	VASN	VEGFB	VIPR1

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VWA5A	WEE1	WT1	XYLT1	YAP1	ZBTB16	ZEB2	ZNF143
ZNF668							

4.2.4 Gene(s) with Decrease in Copy Number Variation [CNV]

ABCA1	ABCC2	ABCC4	ABCC5	ABHD17B	ABHD6	ABL1	ABL2
ACAA2	ACACB	ACAT2	ACO2	ACTL6A	ACVR1B	ADAM10	ADAM17
ADCYAP1	ADK	ADORA1	ADORA2A	ADORA2B	ADORA3	AGPAT2	AGT
AK1	AKT1	AKT3	ALDH18A1	ALDH1A1	ALDH1A2	ALDH1L1	ALDH2
ALDH3A1	ALDH9A1	ALDOB	ALG12	ALG14	ALG2	ALG3	ALK
ALKBH2	ALOX12	ALOX12B	ALOX15	AMPD1	AMPD2	ANAPC2	ANAPC5
ANGPT2	ANKRD11	ANKRD54	ANO6	ANP32B	ANXA1	ANXA11	ANXA2
AOX1	AP2M1	APCDD1	APH1A	APPL1	APRT	APTX	ARG1
ARG2	ARHGAP8	ARHGEF11	ARHGEF15	ARHGEF3	ARHGEF7	ARID1B	ARID2
ARNT	ARRB2	ASAH1	ASB2	ASB6	ASH2L	ASS1	ATF1
ATF2	ATF3	ATF6	ATG2B	ATG5	ATP10A	ATP2A2	ATP2A3
ATRIP	AURKB	B2M	B4GALT6	BACH2	BAG1	BAG2	BAG4
BAP1	BCAN	BCAS2	BCL11B	BCL2	BCL2L10	BCL6	BCL7A
BCL9	BCR	BDH1	BGLAP	BID	BIK	BLK	BLNK
BMPR1A	BRAP	BRD3	BTG2	BTRC	BUB1B	C4BPA	C5
CA9	CABLES1	CAMK2G	CAMKK1	CAMKK2	CAPN2	CARD9	CASP10
CASP8	CBFA2T3	CCL19	CCL21	CCNB2	CCNC	CCNDBP1	CCNK
CCNT1	CD160	CD1A	CD1B	CD1C	CD1D	CD1E	CD2
CD247	CD34	CD46	CD48	CD55	CD58	CD72	CD80
CD86	CDC14A	CDC14B	CDC16	CDC25A	CDC25B	CDC26	CDC42BPA
CDC45	CDC7	CDC73	CDCA7	CDH2	CDK20	CDK9	CDKN2A
CDKN2B	CDT1	CEP192	CEP70	CERK	CERS2	CERS5	CFH
CFHR1	CFLAR	CGN	CHD3	CHDH	CHEK2	CHFR	CHKB
CHMP1A	CHST3	CHUK	CISH	CITED2	CKB	CKS1B	CLDN1

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CLDN5	CLIP1	CLK1	CLTA	CLU	CNBP	CNDP2	CNOT7
COL15A1	COL2A1	COL3A1	COL4A1	COL4A2	COL5A1	COPS2	COPS3
COPS4	COX4I1	CR1	CR2	CRABP2	CREB3	CRK	CRKL
CRP	CRTC2	CSF1	CSF2RB	CSGALNACT1	CSNK2A1	CTDP1	CTSB
CTSK	CTSL	CTSS	CUL4A	CXCL16	CYBA	CYP26A1	CYP2C8
CYP2C9	DAB2IP	DAPK1	DAPK2	DCC	DCUN1D1	DDIT4	DDR2
DDX20	DDX23	DEDD	DEGS1	DEGS2	DEPDC5	DERL2	DGKG
DHH	DIABLO	DICER1	DKK4	DLC1	DLG1	DLL1	DLL4
DNAJA1	DNAJC3	DNM1	DNTT	DOCK3	DOLK	DPEP1	DPY30
DPYD	DTL	DTX1	DUOX1	DUOX2	DUOXA1	DUOXA2	DUSP23
DUT	DVL2	DVL3	DYNLT1	E2F6	EAF2	ECT2	EDF1
EEF1A1	EFNA1	EFNA3	EFNA4	EFNB2	EFNB3	EGLN1	EGR3
EHMT1	EIF2AK2	EIF2AK4	EIF2S1	EIF3D	EIF3J	EIF3L	EIF4EBP1
EIF4G1	ELF3	ELK4	ELL3	ELP3	ENDOG	ENPP1	ENTPD1
EP300	EPHA7	EPHB3	EPHX2	ERC2	ERCC5	ERP44	ESR1
ETV5	EVI5	EWSR1	EXO1	EXTL2	EZR	F3	F7
FABP7	FAM20B	FANCA	FANCC	FANCG	FAS	FASLG	FBP1
FBP2	FBXO15	FBXO31	FBXO40	FBXO5	FBXW5	FBXW8	FCER1G
FCGR1A	FCGR2B	FCGR3A	FDFT1	FDPS	FEZF2	FGF5	FGF7
FGF8	FGFR1	FH	FHIT	FKBP1A	FLCN	FLNB	FNTB
FOS	FOXA2	FOXC2	FOXF1	FOXL1	FOXL2	FOXO3	FOXP1
FPGS	FRAT1	FRK	FSIP1	FUT8	FYN	FZD10	GABPB1
GALNT12	GALNT14	GAS6	GATA2	GATA4	GATA6	GCHFR	GCLC
GCNT1	GDA	GFI1	GFI1B	GFRA2	GFRA4	GFRAL	GGPS1
GJA1	GLDC	GLS	GLUD1	GLUL	GMPPB	GNAI3	GNAQ
GNE	GNL3	GOT1	GPD1	GPS2	GPSM1	GPX1	GRIN1
GRIN3A	GRK1	GSK3B	GSKIP	GSR	GSTA1	GSTA2	GSTA4
GSTA5	GSTM1	GTSE1	GUCY2D	GUK1	GZF1	HCAR3	HCLS1

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HDAC10	HDAC2	HDAC7	HES1	HHAT	HHEX	HIC1	HIF1AN
HMOX1	HNF1A	HNRNPK	HOXD13	HPSE	HR	HRK	HSP90AA1
HSPA5	HSPD1	HSPE1	HTR1B	HTR1E	HTR7	HYAL1	HYAL2
IBTK	ID2	IDH3B	IDO1	IDO2	IFI16	IFIT1	IFNGR1
IGF2R	IGHD	IGHE	IGHM	IGSF11	IKBKB	IKBKE	IL10
IL11RA	IL17A	IL17F	IL17RA	IL17RB	IL1RAP	IL20	IL20RA
IL20RB	IL22RA2	IL2RB	IL6R	IMPDH2	INPP5E	IRAK4	IRF2BP2
IRF8	IRS2	ITGA4	ITGA6	ITGAE	ITGAV	ITGB5	JAG2
JAK2	KALRN	KAT6A	KAT6B	KDM2B	KDM4C	KDM5B	KDM6B
KDSR	KIDINS220	KIF12	KIF14	KISS1	KLF13	KLF15	KLF4
KLF9	KLHL18	KLHL20	KLHL22	KLHL6	KLLN	KMO	KMT2D
KNTC1	KPNA1	L3MBTL2	LAMA1	LAMA3	LAMA4	LAMB3	LAMC1
LAMC2	LAMTOR2	LATS1	LBX1	LCN2	LDB1	LGALS1	LIF
LIG4	LIN9	LMAN1	LOXL2	LPA	LPAR1	LPIN1	LPL
LRRK2	LTBP1	LTK	LZTR1	MAF	MAGI1	MALT1	MAN1B1
MAP1LC3B	MAP2K1	MAP2K3	MAP2K4	MAP3K13	MAP3K4	MAP3K5	MAP3K7
MAP4	MAPK1	MAPK11	MAPK12	MAPK4	MAPK6	MAPK7	MAPKAP1
MAPKAPK2	MAPKAPK5	MARK3	MAT1A	MAVS	MAX	MBD1	MBD2
MBD4	MBTPS1	MCL1	MCM2	MCM3	MCM5	MDM4	ME1
ME2	MECOM	MED13L	MEF2D	MELK	MEX3A	MGA	MGLL
MIB1	MIF	MINK1	MIR130B	MIR132	MIR134	MIR181B1	MIR199A2
MIR199B	MIR23B	MIR29C	MIR320A	MIR33A	MIR33B	MIR370	MIR410
MIR488	MIR648	MIR92B	MIRLET7A1	MIS12	MITF	MLH3	MLLT11
MLLT3	MLXIP	MLYCD	MN1	MNT	MOAP1	MSI1	MSMP
MST1	MST1R	MTA1	MTAP	MTHFD1L	MTR	MTUS1	MUC1
MUC4	MVD	MVK	MYB	MYBBP1A	MYCN	MYLK	MYO1C
MYO5A	MYOG	NCF2	NCF4	NCK1	NCKAP1	NCKIPSD	NCOR1
NCOR2	NCSTN	NDC80	NDN	NEDD4	NEDD4L	NEIL2	NEK2

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NEK6	NELFB	NEUROD1	NF2	NFATC1	NFE2L2	NFKB2	NGF
NID1	NLRP1	NLRP3	NOP10	NOTCH1	NOTCH2	NOX3	NOXA1
NPC1	NPR1	NPR2	NPRL2	NR1I2	NR2E1	NR4A3	NR5A2
NRARP	NRAS	NRG1	NRG3	NRON	NSFL1C	NSL1	NT5C2
NT5E	NTN1	NTPCR	NTRK1	NTRK2	NUDT18	NUF2	NUP214
NUP50	NUS1	ONECUT1	ONECUT2	OSM	P2RX1	P2RX7	P4HA1
PAK2	PARP1	PARP3	PARP9	PATZ1	PAX2	PAX5	PBK
PBRM1	PBX1	PCYT1A	PDCD1LG2	PDCD2	PDIA3	PDIA6	PDK1
PDLIM2	PDZK1	PEA15	PEBP1	PEMT	PER1	PFAS	PFKM
PGAM1	PGF	PGM3	PHGDH	PHLPP1	PIAS2	PIAS3	PIK3AP1
PIK3C2B	PIK3C3	PIK3CA	PIK3CB	PIK3IP1	PIM3	PISD	PITPNA
PKLR	PKN3	PLA2G4A	PLAT	PLAU	PLCE1	PLCG2	PLD1
PLD2	PLG	PLXNB1	PLXNB2	PLXND1	PMAIP1	PMS1	PMVK
POLB	POLE	POLL	POLQ	POLR2A	POLR3A	POU2F1	POU3F2
PPARA	PPP1CC	PPP1R2	PPP2R2A	PPP2R5A	PPP2R5C	PPP6C	PRDM1
PRDX6	PRF1	PRICKLE1	PRKAB1	PRKAR2A	PRKCD	PRKCI	PRKG2
PRKRA	PRNP	PRODH	PRPF8	PRPSAP2	PRR5	PRRX1	PSAT1
PSEN2	PSMA5	PSMB1	PSMB4	PSMB6	PSMB7	PSMD2	PSMD4
PSMD5	PSMD6	PSMD9	PSMG2	PTCH1	PTEN	PTGDS	PTGES
PTGS1	PTGS2	PTK2B	PTPN11	PTPN14	PTPN2	PTPN3	PTPRA
PTPRC	PTPRD	PTPRG	PTPRK	PXN	PYCR2	PYGO1	RAB14
RAB31	RAB35	RAB4A	RAB7A	RAB8B	RAC2	RAD23B	RAD51
RAD51B	RALBP1	RALGAPA2	RALGDS	RAN	RANBP1	RANGAP1	RAP1A
RAPGEF1	RAPGEF3	RAPGEF4	RASA3	RASAL1	RASD1	RASGRP1	RASGRP3
RASSF1	RASSF5	RBBP5	RBBP8	RBCK1	RBFOX2	RBM15	RBP4
RCOR1	RDH11	RDH12	REN	REV3L	RFC4	RFC5	RFT1
RFX5	RGS2	RGS4	RGS5	RHOA	RHOB	RIOK3	RIT1
RMRP	RNF111	RNF146	RNF168	RNF187	RNF2	RNF20	ROCK1

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ROR2	RORC	ROS1	RPA1	RPL26	RPL5	RPS6	RPS6KA2
RPS6KC1	RRAGA	RRAGD	RRM2	RSPO3	RXRA	RYR2	S100A10
S100A4	S100A6	S100A7	S1PR1	S1PR3	SALL3	SARDH	SCAP
SCD	SCO2	SDC1	SDHC	SEC31A	SEC61A1	SEC61B	SEH1L
SEMA3B	SEMA4A	SEMA4D	SENP1	SENP2	SENP3	SENP6	SERPINA1
SERPINB2	SERPINF1	SERPINF2	SESN1	SET	SETBP1	SETD1B	SETD2
SETDB1	SF3B1	SFRP1	SFTPC	SGK1	SH2B3	SHC1	SHMT1
SHPRH	SIRPA	SIRT4	SIVA1	SLAMF6	SLAMF7	SLC14A2	SLC15A1
SLC16A1	SLC16A10	SLC22A1	SLC22A16	SLC22A2	SLC25A11	SLC25A20	SLC27A2
SLC27A4	SLC28A2	SLC28A3	SLC29A3	SLC2A2	SLC2A4	SLC31A1	SLC38A1
SLC38A2	SLC43A2	SLC44A1	SLC7A5	SMAD2	SMAD3	SMAD4	SMAD6
SMAD7	SMARCA2	SMARCB1	SMARCC1	SMARCD1	SMC1B	SMPD2	SMYD2
SMYD3	SNCG	SOCS6	SOD2	SOX10	SOX2	SP3	SPTLC1
SREBF1	SREBF2	SRSF9	SRXN1	SS18	ST6GALNAC4	STARD9	STAT1
STAT4	STK24	STOM	STRN	SUFU	SYK	TAB2	TAF5L
TAL2	TAOK3	TBC1D13	TBL1XR1	TBX3	TBX5	TCF12	TCL1A
TEK	TERC	TERF2IP	TFDP1	TFRC	TGFB2	TGFB3	TGFBR1
TGFBR3	THBS1	THBS2	THPO	TIMP3	TJP1	TJP2	TKT
TLE1	TLE4	TLN1	TLR4	TLR9	TLX1	TMEM30A	TNC
TNFAIP3	TNFRSF10A	TNFRSF10B	TNFRSF10C	TNFRSF10D	TNFRSF11A	TNFRSF13B	TNFRSF13C
TNFSF10	TNFSF12	TNFSF13	TNFSF13B	TNFSF15	TNFSF18	TNFSF4	TNFSF8
TNIK	TNK2	TNKS	TNKS2	TP53	TP53BP1	TP63	TPR
TRAF1	TRAF2	TRAF3	TRAF3IP2	TRAF3IP3	TRAF5	TREX1	TRIB2
TRIB3	TRIM33	TSC1	TTF1	TTK	TTR	TUBA1A	TUBB3
TUBB4B	TXN	TXN2	TXNIP	TXNRD2	TYMP	TYMS	TYRO3
UAP1	UBA3	UBA7	UBC	UBE2G1	UBE2L3	UBE2R2	UBE2T
UBE3A	UBQLN1	UBXN7	UCK1	UCK2	UGCG	UGGT2	UHMK1
ULBP1	ULBP2	ULBP3	ULK1	ULK2	UMPS	UNG	UPB1

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

USF1	USP10	USP13	USP18	USP21	USP6	USP8	UTRN
VAMP2	VAV2	VAV3	VCAM1	VCL	VCP	VDR	VIP
VRK1	VSNL1	WASF1	WDR5	WDR77	WNT1	WNT3A	WNT5A
WNT7B	WRAP53	WRN	WSB2	WWOX	XAF1	XBP1	XDH
XPA	XRCC3	XRCC6	YES1	YWHAE	YWHAQ	YY1	YY1AP1
ZBTB2	ZBTB7C	ZDHHC14	ZDHHC16	ZDHHC19	ZDHHC2	ZDHHC21	ZDHHC7
ZDHHC8	ZFPM1	ZNF140	ZNF24	ZNF521	ZNF692		

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

5. Therapy Rationales

Rationales provided in this section highlight the pathways connected to drug sensitivity and resistance and include references to supporting published literature.

Species in red denote drug impact points. Species highlighted in blue are the Master Regulators.

Bevacizumab				
Mechanism of Action: **BEVACIZUMAB** ⊣ **para_VEGFA**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
DNMT3A	CNV Amplification	Resistant	DNMT3A → CPGMET ⊣ VEGFA → para_VEGFA → KDR → ANGIOGENESIS → CANCER PROGRESSION	15961063 17145519 28252641 26850336 27619687
TP53	CNV Deletion	Sensitive	TP53 ⊣ HIF1A → VEGFA → para_VEGFA → KDR → ANGIOGENESIS → CANCER PROGRESSION	15961063 17145519 31564192 23449391 27619687

Bevacizumab				
Mechanism of Action: **BEVACIZUMAB** ⊣ **para_VEGFA** → **KDR** → **SRC** ⊣ **HRAS**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
HRAS	CNV Amplification	Resistant	HRAS → RAF1 → MAP2K1/2 → MAPK1/3 → MYC → E2F1 → CANCER PROGRESSION	22302382 25157176 22461507 15944709 12509223 33139506

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Carboplatin				
Mechanism of Action: **CARBOPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
CCND1	CNV Amplification	Resistant	CCND1 → CDK4_CCND1 → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	20395447 12570712 3512077 16696564
FEN1	CNV Amplification	Resistant	FEN1 → DNA REPAIR (BER) ⊣ DNA DAMAGE	26718738 24880630 12570712 3512077 16696564
GSTP1	CNV Amplification	Resistant	GSTP1 ⊣ CARBOPLATIN	3512077 16696564 25010864
HRAS	CNV Amplification	Resistant	HRAS → RAF1 → MAP2K1/2 → MAPK1/3 → MYC → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 18356021 12077341 22461507 21668996 23388117
KAT5	CNV Amplification	Resistant	KAT5 → MRE11A-NBN-RAD50 → DNA REPAIR (HR) ⊣ DNA DAMAGE	28634400 26915295 18458078 12570712 3512077 16696564
PAK1	CNV Amplification	Resistant	PAK1 → AURKA → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	27713506 28535002 10531298 12570712 3512077 16696564
PLK1	CNV Amplification	Resistant	PLK1 → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	27748936 29663364 30876762 30488440 12570712 3512077 16696564
SIRT3	CNV Amplification	Resistant	SIRT3 ⊣ SOD2 → ROS → DNA DAMAGE	3512077 27420645 33655712
CDKN2A	CNV Deletion	Resistant	CDKN2A ⊣ CDK4_CCND1 ⊣ RB1 ⊣ E2F1 → BRCA1/2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 16696564 18438954 12947386 10660629

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Carboplatin				
Mechanism of Action: **CARBOPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
CDKN2B	CNV Deletion	Resistant	CDKN2B ⊣ CDK4_CCND1 ⊣ RB1 ⊣ E2F1 → BRCA1/2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 16696564 18438954 12947386 10660629
LIG4	CNV Deletion	Resistant	LIG4 → DNA REPAIR (NHEJ) ⊣ DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 20538911 20598602 28930678
PPP2R2A	CNV Deletion	Resistant	PPP2R2A ⊣ ATM → BRCA1 → DNA REPAIR (HR) → DNA DAMAGE	23087057 26800397 31221814 12570712 3512077 16696564
PTEN	CNV Deletion	Resistant	PTEN ⊣ AKT → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	2649354 18657898 23663432 29156644
RASSF1	CNV Deletion	Resistant	RASSF1 ⊣ CCND1 → CDK4_CCND1 → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	23147544 29368096 25368379 12570712 3512077 16696564
SLC31A1	CNV Deletion	Resistant	SLC31A1 → CARBOPLATIN	22725681 3512077 23010323 16847145
SMAD4	CNV Deletion	Resistant	SMAD4 ⊣ BRCA1 → DNA REPAIR (HR) → DNA DAMAGE	19686080 20807115 24773018 30506138 12570712 3512077 16696564
SUFU	CNV Deletion	Resistant	SUFU ⊣ GLI1 → FOXM1 → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE SUFU ⊣ GLI1 → FOXM1 → BRCA2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	23162656 28405019 25373737 22977194 12183437
TP53	CNV Deletion	Resistant	TP53 ⊣ BRCA2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 11595686 25263447 12591928

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Carboplatin				
Mechanism of Action: **CARBOPLATIN → ICL → DSB → DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
TP53BP1	CNV Deletion	Resistant	TP53BP1 → DNA REPAIR (NHEJ) ⊣ DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 20538911 20598602 24326623
XRCC6	CNV Deletion	Resistant	XRCC6 → DNA REPAIR (NHEJ) ⊣ DNA REPAIR (HR) ⊣ DNA DAMAGE	20598602 20538911 3512077
PRKCB	CNV Amplification	Sensitive	PRKCB → AKT ⊣ AKT1S1 ⊣ MTOR ⊣ ULK1 → AUTOPHAGY ⊣ SQSTM1 ⊣ RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	28246354 12570712 3512077 16696564
CHEK2	CNV Deletion	Sensitive	CHEK2 → BRCA1/2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 16696564 14701743 26957554 10843985
ERCC5	CNV Deletion	Sensitive	ERCC5 → DNA REPAIR (NER) ⊣ DNA DAMAGE	3512077 12208738
FANCA	CNV Deletion	Sensitive	FANCA → FA COMPLEX → DNA REPAIR (ICL) ⊣ DNA DAMAGE	3512077 25891850 26385482 20509860 26238431 30882047
FANCC	CNV Deletion	Sensitive	FANCC → FA COMPLEX → DNA REPAIR (ICL) ⊣ DNA DAMAGE	26238431 20509860 3512077
FANCG	CNV Deletion	Sensitive	FANCG → FA COMPLEX → DNA REPAIR (ICL) ⊣ DNA DAMAGE	26385482 25891850 26238431 20509860 3512077 12861027
HSP90AA1	CNV Deletion	Sensitive	HSP90AA1 → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 30153855 23069143 10843985 24971740
MAP1LC3B	CNV Deletion	Sensitive	MAP1LC3B → AUTOPHAGY ⊣ SQSTM1 ⊣ RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 20807115 26553068

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Carboplatin				
Mechanism of Action: **CARBOPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
MBD1	CNV Deletion	Sensitive	MBD1 → MRE11A-NBN-RAD50 → DNA REPAIR(HR) ⊣ DNA DAMAGE	3512077 23588667
RAD51	CNV Deletion	Sensitive	RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	10843985 3512077 18544565 24971740
RAD51B	CNV Deletion	Sensitive	RAD51B → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 25368520
RBBP8	CNV Deletion	Sensitive	RBBP8 → DNA REPAIR (HR) ⊣ DNA DAMAGE	16696564 3512077 17965729
REV3L	CNV Deletion	Sensitive	REV3L → DNA REPAIR (TLS) ⊣ DNA DAMAGE	21068376 3512077
WRN	CNV Deletion	Sensitive	WRN → RAD52 → ERCC1-ERCC4 → DNA REPAIR (NER) ⊣ DNA DAMAGE	25801465 3512077
XPA	CNV Deletion	Sensitive	XPA → DNA REPAIR (NER) ⊣ DNA DAMAGE	12208738 8512813
XRCC3	CNV Deletion	Sensitive	XRCC3 → DNA REPAIR (HR) ⊣ DNA DAMAGE	15843498 3512077 16696564

Carboplatin				
Mechanism of Action: **CARBOPLATIN** → **AP** → **MMR** → **FUTILE REPAIR** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
EP300	CNV Deletion	Resistant	EP300 → CREBBP_EP300 → MSH2 → MMR	26004186 23229133 9721864 3512077
EXO1	CNV Deletion	Resistant	EXO1 → MMR	2649354 24829455 25956862 32167078

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Carboplatin				
Mechanism of Action: **CARBOPLATIN** → **AP** → **MMR** → **FUTILE REPAIR** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
KMT2D	CNV Deletion	Resistant	KMT2D → H3K4 METHYLATION → MLH1 → MMR	19038057 8895738 19286655 28669924 25043185

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Cisplatin				
Mechanism of Action: **CISPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
CCND1	CNV Amplification	Resistant	CCND1 → CDK4_CCND1 → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	20395447 12570712 25058905
FEN1	CNV Amplification	Resistant	FEN1 → DNA REPAIR (BER) ⊣ DNA DAMAGE	26718738 24880630 12570712 25058905
GSTP1	CNV Amplification	Resistant	GSTP1 ⊣ CISPLATIN	25058905 27688757 20807115 18701490 18852128 31221747 25010864 30431119
HRAS	CNV Amplification	Resistant	HRAS → RAF1 → MAP2K1/2 → MAPK1/3 → MYC → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	25058905 18356021 12077341 22461507 21668996 23388117
KAT5	CNV Amplification	Resistant	KAT5 → MRE11A-NBN-RAD50 → DNA REPAIR (HR) ⊣ DNA DAMAGE	28634400 26915295 18458078 12570712 25058905
PAK1	CNV Amplification	Resistant	PAK1 → AURKA → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	27713506 28535002 10531298 12570712 25058905
PLK1	CNV Amplification	Resistant	PLK1 → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	27748936 29663364 30876762 30488440 12570712 25058905
SIRT3	CNV Amplification	Resistant	SIRT3 ⊣ SOD2 → ROS → DNA DAMAGE	25058905 19403702 27420645 33655712
CDKN2A	CNV Deletion	Resistant	CDKN2A ⊣ CDK4_CCND1 ⊣ RB1 ⊣ E2F1 → BRCA1/2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	29394020 18438954 12947386 10660629

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Cisplatin				
Mechanism of Action: **CISPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
CDKN2B	CNV Deletion	Resistant	CDKN2B ⊣ CDK4_CCND1 ⊣ RB1 ⊣ E2F1 → BRCA1/2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	29394020 18438954 12947386 10660629
LIG4	CNV Deletion	Resistant	LIG4 → DNA REPAIR (NHEJ) ⊣ DNA REPAIR (HR) ⊣ DNA DAMAGE	20538911 20598602 28930678 25058905
PPP2R2A	CNV Deletion	Resistant	PPP2R2A ⊣ ATM → BRCA1 → DNA REPAIR (HR) → DNA DAMAGE	23087057 26800397 31221814 12570712 25058905
PTEN	CNV Deletion	Resistant	PTEN ⊣ AKT → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	18657898 23663432 3512077 29156644
RASSF1	CNV Deletion	Resistant	RASSF1 ⊣ CCND1 → CDK4_CCND1 → BRCA1 → DNA REPAIR (HR) ⊣ DNA DAMAGE	23147544 29368096 25368379 12570712 25058905
SLC31A1	CNV Deletion	Resistant	SLC31A1 → CISPLATIN	22725681 23010323 16847145 25058905
SMAD4	CNV Deletion	Resistant	SMAD4 ⊣ BRCA1 → DNA REPAIR (HR) → DNA DAMAGE	19686080 20807115 24773018 30506138 12570712 25058905
SUFU	CNV Deletion	Resistant	SUFU ⊣ GLI1 → FOXM1 → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	23162656 28405019 25373737 22977194 12183437
TP53	CNV Deletion	Resistant	TP53 ⊣ BRCA2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	12591928 25058905 11595686 25263447
TP53BP1	CNV Deletion	Resistant	TP53BP1 → DNA REPAIR (NHEJ) ⊣ DNA REPAIR (HR) ⊣ DNA DAMAGE	20598602 20538911 24326623 25058905

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Cisplatin				
Mechanism of Action: **CISPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
XRCC6	CNV Deletion	Resistant	XRCC6 → DNA REPAIR (NHEJ) ⊣ DNA REPAIR (HR) ⊣ DNA DAMAGE	20598602 20538911 25058905
PRKCB	CNV Amplification	Sensitive	PRKCB → AKT ⊣ AKT1S1 ⊣ MTOR ⊣ ULK1 → AUTOPHAGY ⊣ SQSTM1 ⊣ RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	28246354 12570712 25058905
CHEK2	CNV Deletion	Sensitive	CHEK2 → BRCA1/2 → DNA REPAIR (HR) ⊣ DNA DAMAGE	26957554 10843985 23229133 25847936 14701743 18797466
ERCC5	CNV Deletion	Sensitive	ERCC5 → DNA REPAIR (NER) ⊣ DNA DAMAGE	25058905 27688757 20807115 33469680 21452186 7799936 21385444
FANCA	CNV Deletion	Sensitive	FANCA → FA COMPLEX → DNA REPAIR (ICL) ⊣ DNA DAMAGE	25058905 27688757 20807115 28864460 12692539
FANCC	CNV Deletion	Sensitive	FANCC → FA COMPLEX → DNA REPAIR (ICL) ⊣ DNA DAMAGE	25058905 27688757 20807115 20034732 32165095 12692539
FANCG	CNV Deletion	Sensitive	FANCG → FA COMPLEX → DNA REPAIR (ICL) ⊣ DNA DAMAGE	25058905 27688757 20807115 12692539 12861027
HSP90AA1	CNV Deletion	Sensitive	HSP90AA1 → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	3512077 30153855 23069143 10843985 24971740
MAP1LC3B	CNV Deletion	Sensitive	MAP1LC3B → AUTOPHAGY ⊣ SQSTM1 ⊣ RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	25058905 27688757 20807115 26553068

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Cisplatin				
Mechanism of Action: **CISPLATIN** → **ICL** → **DSB** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
MBD1	CNV Deletion	Sensitive	MBD1 → MRE11A-NBN-RAD50 → DNA REPAIR(HR) ⊣ DNA DAMAGE	23588667 25058905
RAD51	CNV Deletion	Sensitive	RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	25058905 10843985 24971740 18544565
RAD51B	CNV Deletion	Sensitive	RAD51B → RAD51 → DNA REPAIR (HR) ⊣ DNA DAMAGE	25058905 25368520
RBBP8	CNV Deletion	Sensitive	RBBP8 → DNA REPAIR (HR) ⊣ DNA DAMAGE	27688757 17965729 30956230 21087997
REV3L	CNV Deletion	Sensitive	REV3L → DNA REPAIR (TLS) ⊣ DNA DAMAGE	25058905 26165320 19289490 21068376
WRN	CNV Deletion	Sensitive	WRN → RAD52 → ERCC1-ERCC4 → DNA REPAIR (NER) ⊣ DNA DAMAGE	25801465 25058905
XPA	CNV Deletion	Sensitive	XPA → DNA REPAIR (NER) ⊣ DNA DAMAGE	12208738 8512813
XRCC3	CNV Deletion	Sensitive	XRCC3 → DNA REPAIR (HR) ⊣ DNA DAMAGE	10725659 25058905 15843498

Cisplatin				
Mechanism of Action: **CISPLATIN** → **AP** → **MMR** → **FUTILE REPAIR** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
EP300	CNV Deletion	Resistant	EP300 → CREBBP_EP300 → MSH2 → MMR	26004186 23229133 9721864 25058905
EXO1	CNV Deletion	Resistant	EXO1 → MMR	24829455 27688757 25956862

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Cisplatin				
Mechanism of Action: **CISPLATIN** → **AP** → **MMR** → **FUTILE REPAIR** → **DNA DAMAGE**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
KMT2D	CNV Deletion	Resistant	KMT2D → H3K4 METHYLATION → MLH1 → MMR	12570712 8895738 19286655 28669924 25043185

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Pemetrexed				
Mechanism of Action: **PEMETREXED** ⊣ **TYMS** → **dTTP** ⊣ **REPLICATION STRESS**				
Gene	Status	Drug Effect	Gene Status Drug Action Pathways	Supporting PMIDs
ATRIP	CNV Deletion	Sensitive	ATRIP → ATR-ATRIP → CHEK1 ⊣ REPLICATION STRESS → APOPTOSIS	15117425 24040222 22203733 24113549 15743907
TYMS	CNV Deletion	Sensitive	TYMS → dTTP ⊣ REPLICATION STRESS → APOPTOSIS (Low/negative TYMS expression is significantly associated with higher response rate of PEMETREXED)	15117425 24040222 30127925 26502926
UNG	CNV Deletion	Sensitive	UNG ⊣ REPLICATION STRESS → APOPTOSIS	24040222 15117425 24503537 23873851
WRN	CNV Deletion	Sensitive	WRN ⊣ REPLICATION STRESS → APOPTOSIS	15117425 24040222 20802463

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

6. Genomic Aberration to Master Regulator Pathway(s)

This section provides a snapshot of paths connecting the most significant gene aberrations with patient master regulators and references to published research supporting these pathways.

RED: Gain of Function/Switch of Function Mutation(s) or Amplified Gene(s) BLUE: Loss of Function Mutation(s) or Deleted Gene(s)

TRANSCRIPTION FACTORS:

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
JUN	PPP2R2A ⊣ MAPK8 → HNRNPK → JUN	
	PSMB6 → PSMB5 ⊣ MAPK8 → HNRNPK → JUN	
	TP53 → DUSP1 ⊣ MAPK8 → HNRNPK → JUN	
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCA → JUN	10430888 20518497
	ARHGEF12 → RHOA → PTK2 → PLCG1 → PRKCA → JUN	10430888 18854312 19805522
	ATRIP → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCA → JUN	10430888 20518497
JUN	PRKCB → CARD11 → BCL10 → MALT1 → MAPK8 → HNRNPK → JUN	12228228 15125833 16356855 19815501 20516126 23690623
FOXM1	PPP2R2A ⊣ PKN1 → CDC25B → CCNA2_CDK2 → FOXM1	
	RCE1 → RALB → TBK1 → PLK1 → FOXM1	17018283 19737929 23404835
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 → CCNA2_CDK2 → FOXM1	11585904
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 → CCNA2_CDK2 → FOXM1	10094049 10887201 11784851 15024054 15208311 9275204
	RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 → CCNA2_CDK2 → FOXM1	21489991 25946971 26898830

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
FOXM1	CD81 → CD19 → PIK3CB → PDPK1 → RPS6KA3 → PIN1 → CCNA2_CDK2 → FOXM1	9445476
	DDIT4 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA → PLK1 → FOXM1	12869586 19737929 21258367 23404835
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ UCHL1 → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	10837489 15077116 15574336 15637055 15694340 15721256 15901672 16697956 22001920 22361683 22899714 23543736
	FBP1 ⊣ NPM1 → AURKA → PLK1 → FOXM1	19737929 23404835
	EIF3C → EIF3E → EIF4E → CCNA2 → CCNA2_CDK2 → FOXM1	
FOXM1	RELA → NPM1 → FOXM1	
	TP53 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	17101782 18585004 19011621 20673369 23431171
	YAP1 → SLC7A5 → ITGA4_ITGB1 → SRC → AURKA → PLK1 → FOXM1	19737929 23404835 25501815
	CHEK2 → BRCA1 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	10373534 14701743 17101782
	TP63 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
FOXM1	ULK1 → FBP1 ⊣ NPM1 → AURKA → PLK1 → FOXM1	19737929 23404835
	IL4R → JAK3 → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA → PLK1 → FOXM1	16129412 16684964 18281483 19737929 20378826 20671117 23404835 25501815 8266076 8962143
	FLI1 → EZH2 ⊣ CDKN1B ⊣ CCNA2_CDK2 → FOXM1	
	CD19 → PIK3CB → PDPK1 → RPS6KA3 → PIN1 → CCNA2_CDK2 → FOXM1	9445476
	MAP4K2 → MAP3K1 → MAP2K3 → MAPK12 → PLK1 → FOXM1	11062067 11784851 19737929 23404835
FOXM1	MMP7 → SPP1 → ITGA4_ITGB1 → SRC → AURKA → PLK1 → FOXM1	11375993 19737929 23404835 25501815
	FAS → DAXX → RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 → CCNA2_CDK2 → FOXM1	11003656 11483955 21199877 21489991 25946971 26898830
	TSC1 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA → PLK1 → FOXM1	12869586 19737929 21258367 23404835
	PMS1 → CHEK1 ⊣ CDC25A → CCNA2_CDK2 → FOXM1	
	DNMT3A ⊣ CDKN1A ⊣ CCNA2_CDK2 → FOXM1	

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
FOXM1	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → PLK1 → FOXM1	11927607 19737929 20378826 20518497 23404835 25501815
	KLF4 → CDKN1B ⊣ CCNA2_CDK2 → FOXM1	
	SETD2 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	18585004
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ UCHL1 → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	11062067 12169272 12566458 12818176 15574336 15694340 15901672 16478725 20679476 22001920 22899714 23543736
	ETS1 → HPSE → FGFR3 → RPS6KA3 → PIN1 → CCNA2_CDK2 → FOXM1	
FOXM1	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ UCHL1 → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	15353804 15574336 15694340 15901672 18469004 22001920 22899714 23543736
	XRCC6 → XRCC5_XRCC6 → CHEK2 → BRCA1 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	10373534 14701743 15668230 17101782
	PLK1 → FOXM1	19737929 23404835
	ARHGEF12 → RHOA → ROCK1 → PKN1 → CDC25B → CCNA2_CDK2 → FOXM1	
	MMP2 → MMP3 → SPP1 → ITGA4_ITGB1 → SRC → AURKA → PLK1 → FOXM1	11120741 11375993 19737929 22275356 23404835 25501815 8663255 9665471

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
FOXM1	CCNK → CDK12 → BRCA1 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	
	IL21R → IL21_IL21R → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA → PLK1 → FOXM1	11438544 18281483 19230867 19737929 20378826 23404835 25501815 9178903
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 ⊣ CDKN1B ⊣ CCNA2_CDK2 → FOXM1	
	ATRIP → CHEK1 ⊣ CDC25A → CCNA2_CDK2 → FOXM1	
	FOXO3 → CDKN1B ⊣ CCNA2_CDK2 → FOXM1	11994454 14976264 15100294 18393360
FOXM1	STAT1 → CDKN1B ⊣ CCNA2_CDK2 → FOXM1	
	MMP10 → MMP7 → SPP1 → ITGA4_ITGB1 → SRC → AURKA → PLK1 → FOXM1	11375993 19737929 23404835 25501815 9578462
	MS4A1 → FYN → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	12372285 22899714 7545683
	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → FYN → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	12372285 22899714
	PRKCB → MS4A1 → FYN → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	12372285 22899714 7545683
FOXM1	BIK → BAK1 → HTRA2 ⊣ UCHL1 → CDK5 → CDC25A → CCNA2_CDK2 → FOXM1	15574336 22001920 22899714 23543736
	TP53BP1 → BRCA1 → CDKN1A ⊣ CCNA2_CDK2 → FOXM1	10373534 12364621
	EED ⊣ CDKN1B ⊣ CCNA2_CDK2 → FOXM1	
	PAK1 → AURKA → PLK1 → FOXM1	19737929 23404835

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
GLI1	PPP2R2A ⊣ RPS6KA3 → NEK2 → GLI1	11923207
	RCE1 → RALB → TBK1 → PLK1 → NEK2 → GLI1	17018283
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → PLK1 → NEK2 → GLI1	11585904 22513362
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → PLK1 → NEK2 → GLI1	10094049 10887201 11784851 15024054 15208311 22513362 9275204
	CD81 → CD19 → PIK3CB → PDPK1 → RPS6KA3 → NEK2 → GLI1	11923207 9445476
GLI1	DDIT4 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA → PLK1 → NEK2 → GLI1	12869586 21258367
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ UCHL1 → CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	10837489 15077116 15574336 15637055 15694340 15721256 15901672 16697956 22001920 22361683
	FBP1 ⊣ NPM1 → AURKA → PLK1 → NEK2 → GLI1	
	TP53 ⊣ PTK2 → SRC → AURKA → PLK1 → NEK2 → GLI1	15157737 17725966 20378826 25501815
	YAP1 → SLC7A5 → ITGA1_ITGB1 → FYN → RPS6KA3 → NEK2 → GLI1	11923207
GLI1	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CB → PDPK1 → RPS6KA3 → NEK2 → GLI1	11923207 9445476
	CHEK2 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	14701743 24067368
	TP63 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	
	ULK1 → FBP1 ⊣ NPM1 → AURKA → PLK1 → NEK2 → GLI1	
	ITGAM → ITGAM_ITGB2 → ILK → PDGFRA → FYN → RPS6KA3 → NEK2 → GLI1	11923207 9736715

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
GLI1	ITGAL → ITGAL_ITGB2 → ILK → PDGFRA → FYN → RPS6KA3 → NEK2 → GLI1	11923207 9736715
	IL4R → JAK3 → PIK3CB → PDPK1 → RPS6KA3 → NEK2 → GLI1	11035047 11923207 15010462 16129412 16873377 8266076 9445476
	ILK → PDGFRA → FYN → RPS6KA3 → NEK2 → GLI1	11923207
	GSTP1 → GAPDH → AKT ⊣ GSK3B ⊣ AURKA → PLK1 → NEK2 → GLI1	11035810 12172554 15678105 22513362 27563096
	CD19 → PIK3CB → PDPK1 → RPS6KA3 → NEK2 → GLI1	11923207 9445476
GLI1	MAP4K2 → MAP3K1 → MAP2K3 → MAPK12 → PLK1 → NEK2 → GLI1	11062067 11784851
	MMP7 → SPP1 → ITGAV_ITGB3 → FGFR3 → RPS6KA3 → NEK2 → GLI1	10835423 11375993 11923207 7592829
	TSC1 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA → PLK1 → NEK2 → GLI1	12869586 21258367
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	8428596
	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
GLI1	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → PLK1 → NEK2 → GLI1	11927607 20378826 20518497 25501815
	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	18585004
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ UCHL1 → CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	11062067 11923207 12169272 12566458 12818176 15574336 15694340 15901672 16478725 20679476 22001920 9430630
	ETS1 → HPSE → FGFR3 → RPS6KA3 → NEK2 → GLI1	11923207
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ UCHL1 → CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	15353804 15574336 15694340 15901672 18469004 22001920
GLI1	PLK1 → NEK2 → GLI1	
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CB → PDPK1 → RPS6KA3 → NEK2 → GLI1	11923207 9445476
	ARHGEF12 → RHOA → ROCK1 → PKN1 → MAPK12 → PLK1 → NEK2 → GLI1	12761180
	RPS6KB2 → XIAP → AKT ⊣ GSK3B ⊣ AURKA → PLK1 → NEK2 → GLI1	11035810 12172554 15678105 22513362 23640046
	MMP2 → MMP9 → IGFBP2 → ITGA5_ITGB1 → FYN → RPS6KA3 → NEK2 → GLI1	11923207 12879005 16569642 20514406

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
GLI1	CCNK → CDK12 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	24067368
	IL21R → IL21_IL21R → PIK3CB → PDPK1 → RPS6KA3 → NEK2 → GLI1	11923207 9178903 9445476
	GSK3B ⊣ AURKA → PLK1 → NEK2 → GLI1	22513362
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 → CPGMET ⊣ CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	16357870
	ATRIP → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	8428596
GLI1	FOXO3 → GADD45A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	12124778 14976264
	STAT1 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	
	MMP10 → MMP7 → SPP1 → ITGAV_ITGB3 → FGFR3 → RPS6KA3 → NEK2 → GLI1	10835423 11375993 11923207 7592829 9578462
	MS4A1 → FYN → RPS6KA3 → NEK2 → GLI1	11923207 7545683
	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → FYN → RPS6KA3 → NEK2 → GLI1	11923207
GLI1	PRKCB → MS4A1 → FYN → RPS6KA3 → NEK2 → GLI1	11923207 7545683
	BIK → BAK1 → HTRA2 ⊣ UCHL1 → CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	15574336 22001920
	TP53BP1 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	12364621 24067368
	EED → CPGMET ⊣ CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → NEK2 → GLI1	16357870
	PAK1 → AURKA → PLK1 → NEK2 → GLI1	

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	PPP2R2A ⊣ SRC → AURKA → E2F1	20300951 25501815
	RCE1 → RAC1 → PAK1 → AURKA → E2F1	20300951
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → E2F1	11585904 20300951 22513362
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → E2F1	10094049 10887201 11784851 15024054 15208311 20300951 22513362 9275204
	RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → E2F1	20300951 21489991 22513362 25946971 26898830
E2F1	CD81 → CD19 → PIK3CB → PRKCZ ⊣ GSK3B ⊣ AURKA → E2F1	11481324 16510873 17606986 20300951 22513362
	DDIT4 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA → E2F1	12869586 20300951 21258367
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	10837489 11035810 11583623 11602612 11606597 11803371 12172554 15077116 15574336 15637055 15678105 15694340
	FBP1 ⊣ NPM1 → AURKA → E2F1	20300951
	EIF3C → EIF3E → EIF4E → XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 12172554 15678105 20300951 22513362 23518498 23640046

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	TP53 ⊣ PTK2 → SRC → AURKA → E2F1	14627987 15157737 17725966 19610065 20300951 20378826 25501815
	YAP1 → SLC7A5 → ITGA4_ITGB1 → SRC → AURKA → E2F1	20300951 25501815
	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA → E2F1	20300951 20378826 25501815
	CHEK2 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 14701743 20300951 20378826 20518497 25501815
	TP63 → STK11 → PRKAA1 → ULK1 → FBP1 ⊣ NPM1 → AURKA → E2F1	14985505 15231735 20300951 21159649
E2F1	ULK1 → FBP1 ⊣ NPM1 → AURKA → E2F1	20300951
	ITGAM → ITGAM_ITGB2 → ILK ⊣ GSK3B ⊣ AURKA → E2F1	20300951 22513362 9736715
	ITGAL → ITGAL_ITGB2 → ILK ⊣ GSK3B ⊣ AURKA → E2F1	20300951 22513362 9736715
	IL4R → JAK3 → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA → E2F1	16129412 16684964 18281483 20300951 20378826 20671117 25501815 8266076 8962143
	ILK ⊣ GSK3B ⊣ AURKA → E2F1	20300951 22513362 9736715

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	GSTP1 → GAPDH → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 12172554 15678105 20300951 22513362 23518498 27563096
	CD19 → PIK3CB → PRKCZ ⊣ GSK3B ⊣ AURKA → E2F1	11481324 16510873 17606986 20300951 22513362
	MAP4K2 → MAP3K1 → MAP2K3 → MAPK12 → PLK1 → TPX2 → AURKA → E2F1	11062067 11784851 14580337 15173575 20300951
	MMP7 → SPP1 → ITGA4_ITGB1 → SRC → AURKA → E2F1	11375993 20300951 25501815
	NDN ⊣ E2F1	9422723
E2F1	FAS → DAXX → RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → E2F1	11003656 11483955 20300951 21199877 21489991 22513362 25946971 26898830
	TSC1 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA → E2F1	12869586 20300951 21258367
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → TPX2 → AURKA → E2F1	14580337 15173575 20300951 8428596
	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → TPX2 → AURKA → E2F1	14580337 15173575 20300951
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 20300951 20378826 20518497 25501815

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → TPX2 → AURKA → E2F1	14580337 15173575 18585004 20300951
	MITF → HIF1A ⊣ DNM2 → RAC1 → PAK1 → AURKA → E2F1	12086670 15983061 20300951
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 11062067 11583623 11602612 11606597 11803371 12169272 12172554 12566458 12818176 15574336 15678105
	ETS1 → KIF14 → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 12172554 15678105 20300951 22513362 23518498
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 11583623 11602612 11606597 11803371 12172554 15353804 15574336 15678105 15694340 15901672 18469004

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	FANCG → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 15138265 20300951 20378826 20518497 25501815
	PLK1 → TPX2 → AURKA → E2F1	14580337 15173575 20300951
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA → E2F1	20300951 20378826 25501815
	ARHGEF12 → RHOA → PTK2 → SRC → AURKA → E2F1	18854312 20300951 20378826 25501815
	RPS6KB2 → XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 12172554 15678105 20300951 22513362 23518498 23640046
E2F1	MMP2 → MMP3 → SPP1 → ITGA4_ITGB1 → SRC → AURKA → E2F1	11120741 11375993 20300951 25501815 8663255 9665471
	CCNK → CDK12 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 20300951 20378826 20518497 25501815
	IL21R → IL21_IL21R → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA → E2F1	11438544 18281483 19230867 20300951 20378826 25501815 9178903
	GSK3B ⊣ AURKA → E2F1	20300951 22513362
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 → CPGMET ⊣ BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 16357870 19079346 20300951 20378826 20518497 22211105 25501815

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	ATRIP → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 20300951 20378826 20518497 25501815
	FOXO3 → BBC3 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	10837489 11035810 11583623 11602612 11606597 11803371 12172554 14976264 15077116 15574336 15637055 15678105
	STAT1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 20300951 20378826 20518497 22271894 25501815
	MMP10 → MMP7 → SPP1 → ITGA4_ITGB1 → SRC → AURKA → E2F1	11375993 20300951 25501815 9578462
	MS4A1 → FYN → GRB2 → PAK1 → AURKA → E2F1	12522133 20300951 7545683 8943564

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
E2F1	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → PTK2 → SRC → AURKA → E2F1	19889638 20300951 20378826 25501815
	PRKCB → MS4A1 → FYN → GRB2 → PAK1 → AURKA → E2F1	12522133 20300951 7545683 8943564
	BIK → BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA → E2F1	11035810 11583623 11602612 11606597 11803371 12172554 15574336 15678105 18469004 20300951 22513362 23518498
	TP53BP1 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 12364621 20300951 20378826 20518497 25501815
	EED → CPGMET ⊣ BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA → E2F1	11927607 16357870 20300951 20378826 20518497 25501815
E2F1	PAK1 → AURKA → E2F1	20300951

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

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Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PRKCE	RCE1 → RHOA → PTK2 → PLCG1 → PRKCE	10430888 18854312 19805522
	FBP1 ⊣ NPM1 → AURKA → PTK2 → PLCG1 → PRKCE	10430888 25501815
	TP53 ⊣ PTK2 → PLCG1 → PRKCE	10430888 15157737 17725966
	YAP1 → SLC7A5 → ITGA5_ITGB1 → PTK2 → PLCG1 → PRKCE	10430888 19889638
	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → PLCG1 → PRKCE	10087335 10430888
PRKCE	CHEK2 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 14701743 20518497
	ULK1 → FBP1 ⊣ NPM1 → AURKA → PTK2 → PLCG1 → PRKCE	10430888 25501815
	ITGAM → ITGAM_ITGB2 → ILK → PTK2 → PLCG1 → PRKCE	10430888 19118217 8649427 9736715
	ITGAL → ITGAL_ITGB2 → ILK → PTK2 → PLCG1 → PRKCE	10430888 19118217 8649427 9736715
	IL4R → JAK3 → PIK3CA → SLC9A1 → PTK2 → PLCG1 → PRKCE	10430888 16129412 18281483 8266076 8962143

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PRKCE	ILK → PTK2 → PLCG1 → PRKCE	10430888 19118217
	MMP7 → SPP1 → ITGAV_ITGB3 → PTK2B → PTK2 → PLCG1 → PRKCE	10430888 10835423 11375993 11683411 11927607 16760434 19889638 7592829 8649427
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 20518497
	FANCG → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 15138265 20518497
	PLK1 → VIM → ITGA5_ITGB1 → PTK2 → PLCG1 → PRKCE	10430888 19889638
PRKCE	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → PLCG1 → PRKCE	10087335 10430888
	ARHGEF12 → RHOA → PTK2 → PLCG1 → PRKCE	10430888 18854312 19805522
	MMP2 → MMP9 → IGFBP2 → ITGA5_ITGB1 → PTK2 → PLCG1 → PRKCE	10430888 12879005 16569642 19889638 20514406
	CCNK → CDK12 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 20518497
	IL21R → IL21_IL21R → PIK3CA → SLC9A1 → PTK2 → PLCG1 → PRKCE	10430888 11438544 18281483 19230867 8598449 9178903

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PRKCE	GSK3B ⊣ AURKA → PTK2 → PLCG1 → PRKCE	10430888 22513362 25501815
	ATRIP → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 20518497
	STAT1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 20518497
	MMP10 → MMP7 → SPP1 → ITGAV_ITGB3 → PTK2B → PTK2 → PLCG1 → PRKCE	10430888 10835423 11375993 11683411 11927607 16760434 19889638 7592829 8649427 9578462
	MS4A1 → LCK → ITK → PLCG1 → PRKCE	10586033 23219468 9178760 9312162
PRKCE	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → PTK2 → PLCG1 → PRKCE	10430888 19889638
	PRKCB → CARD11 → BCL10 → MALT1 → PRKCE	15125833 16356855 19815501 20516126 23690623
	TP53BP1 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → PLCG1 → PRKCE	10430888 12364621 20518497
	PAK1 → ILK → PTK2 → PLCG1 → PRKCE	10430888 19118217

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
ILK	PPP2R2A ⊣ VIM → ITGA5_ITGB1 → ILK	8538749 9736715
	RCE1 → RAC1 → PAK1 → ILK	
	RASSF1 → SAV1 → STK4 → LATS2 ⊣ WWTR1 → SLC7A5 → ITGA4_ITGB1 → ILK	21489991 26898830 8538749 9736715
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1 → ILK	10806474 10837489 11356828 11583623 11602612 11606597 11803371 12522133 15077116 15574336 15637055 15694340
	TP53 ⊣ PTK2 → GRB2 → PAK1 → ILK	12522133 15157737 16298995 17725966
ILK	YAP1 → SLC7A5 → ITGA4_ITGB1 → ILK	8538749 9736715
	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1 → ILK	10806474 12522133 16298995
	CHEK2 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1 → ILK	11044453 12522133 12660812 14701743 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124
	TP63 ⊣ ID2 → ITGB4 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1 → ILK	11044453 12522133 12660812 7556090 7650032 8112292 8262059 9126968 9171350 9852124 9927207
	ITGAM → ITGAM_ITGB2 → ILK	9736715

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
ILK	ITGAL → ITGAL_ITGB2 → ILK	9736715
	IL4R → JAK3 → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1 → ILK	10806474 12522133 12660812 12923167 15143164 16129412 16298995 18281483 23318428 8266076 8962143 9824671
	GSTP1 → GAPDH → AKT ⊣ GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1 → ILK	10806474 11035810 11604394 11809746 12172554 12522133 15143164 15678105 16298995 17012749 17483337 18854312
	MAP4K2 → MAP3K1 → MAP2K3 → MAPK12 → PLK1 → VIM → ITGA5_ITGB1 → ILK	11062067 11784851 8538749 9736715
	MMP7 → SPP1 → ITGA4_ITGB1 → ILK	11375993 8538749 9736715
ILK	FAS → DAXX → RASSF1 → SAV1 → STK4 → LATS2 ⊣ WWTR1 → SLC7A5 → ITGA4_ITGB1 → ILK	11003656 11483955 21199877 21489991 26898830 8538749 9736715
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → CDK1 → DNM2 → RAC1 → PAK1 → ILK	8428596
	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → CDK1 → DNM2 → RAC1 → PAK1 → ILK	
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1 → ILK	12522133 16298995 20518497 8649427
	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → CDK1 → DNM2 → RAC1 → PAK1 → ILK	18585004

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
ILK	MITF → HIF1A ⊣ DNM2 → RAC1 → PAK1 → ILK	12086670 15983061
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1 → ILK	10806474 11062067 11356828 11583623 11602612 11606597 11803371 12169272 12522133 12566458 12660812 12818176
	ETS1 → ITGA3 → ITGA3_ITGB1 → ILK	8538749 9736715
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1 → ILK	10806474 11356828 11583623 11602612 11606597 11803371 12522133 15353804 15574336 15694340 15901672 16298995
	XRCC6 → XRCC5_XRCC6 → CHEK2 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1 → ILK	11044453 12522133 12660812 14701743 15668230 19882246 7556090 7650032 8112292 8262059 9126968 9171350

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
ILK	FANCG → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1 → ILK	12522133 15138265 16298995 20518497 8649427
	PLK1 → VIM → ITGA5_ITGB1 → ILK	8538749 9736715
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1 → ILK	10806474 12522133 16298995
	ARHGEF12 → RHOA → PTK2 → GRB2 → PAK1 → ILK	10806474 12522133 16298995 18854312 19118217
	RPS6KB2 → XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1 → ILK	10806474 11356828 12522133 16298995 18854312 19118217

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
ILK	MMP2 → MMP3 → SPP1 → ITGA4_ITGB1 → ILK	11120741 11375993 8538749 8663255 9665471 9736715
	CCNK → CDK12 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1 → ILK	11044453 12522133 12660812 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124 9927207
	IL21R → IL21_IL21R → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1 → ILK	10806474 11438544 12522133 16298995 18281483 19230867 9178903
	GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1 → ILK	10806474 12522133 16298995 22513362 25501815 9736715
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 ⊣ CIITA ⊣ MMP9 → IGFBP2 → ITGA5_ITGB1 → ILK	16569642 20514406 20634887 8538749 9736715
ILK	ATRIP → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1 → ILK	12522133 16298995 20518497 8649427
	STAT1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1 → ILK	11882364 12522133 16298995 20518497 8649427
	MMP10 → MMP7 → SPP1 → ITGA4_ITGB1 → ILK	11375993 8538749 9578462 9736715
	MS4A1 → FYN → GRB2 → PAK1 → ILK	12522133 7545683 8943564
	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → ILK	8538749 9736715

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
ILK	PRKCB → ITGAD_ITGB2 → ILK	11700305 9736715
	BIK → BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1 → ILK	10806474 11356828 11583623 11602612 11606597 11803371 12522133 15574336 16298995 18469004 18854312 19118217
	TP53BP1 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1 → ILK	11044453 12364621 12522133 12660812 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124
	EED ⊣ CIITA ⊣ MMP9 → IGFBP2 → ITGA5_ITGB1 → ILK	16569642 20514406 8538749 9736715
	PAK1 → ILK	

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	PPP2R2A ⊣ SRC → DNM2 → RAC1 → PAK1	12782622 17686471
	RCE1 → RAC1 → PAK1	
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1	10806474 11585904 11809746 12522133 16298995 22513362 25501815
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1	10094049 10806474 10887201 11784851 11809746 12522133 15024054 15208311 16298995 22513362 25501815 9275204
	CD81 → CD19 → PIK3CB → PRKCZ ⊣ GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1	10806474 11481324 11809746 12522133 16298995 16510873 17606986 22513362 25501815

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1	10806474 10837489 11356828 11583623 11602612 11606597 11803371 12522133 15077116 15574336 15637055 15694340
	EIF3C → EIF3E → EIF4E → VEGFA → FLT1 → GRB2 → PAK1	12522133 14741347 17560152 18079407 18515749 9099677 9751730
	TP53 ⊣ PTK2 → GRB2 → PAK1	12522133 15157737 16298995 17725966
	YAP1 → SLC7A5 → ITGA1_ITGB1 → FYN → GRB2 → PAK1	12522133 8943564
	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1	10806474 12522133 16298995

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	CHEK2 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 14701743 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124
	TP63 ⊣ ID2 → ITGB4 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 7556090 7650032 8112292 8262059 9126968 9171350 9852124 9927207
	ITGAM → ITGAM_ITGB2 → ILK → PTK2 → GRB2 → PAK1	12522133 16298995 19118217 8649427 9736715
	ITGAL → ITGAL_ITGB2 → ILK → PTK2 → GRB2 → PAK1	12522133 16298995 19118217 8649427 9736715
	IL4R → JAK3 → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1	10806474 12522133 12660812 12923167 15143164 16129412 16298995 18281483 23318428 8266076 8962143 9824671

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	ILK → PTK2 → GRB2 → PAK1	12522133 16298995 19118217 8649427
	GSTP1 → GAPDH → AKT ⊣ GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1	10806474 11035810 11604394 11809746 12172554 12522133 15143164 15678105 16298995 17012749 18854312 19345670
	CD19 → PIK3CB → PRKCZ ⊣ GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1	10806474 11481324 11809746 12522133 16298995 16510873 17606986 22513362 25501815
	MMP7 → SPP1 → ITGAV_ITGB3 → PTK2B → SHC1 → GRB2 → PAK1	10835423 11375993 11683411 11882364 12522133 12660812 7592829 7650032 8112292 8262059 9126968 9852124
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → CDK1 → DNM2 → RAC1 → PAK1	8428596

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → CDK1 → DNM2 → RAC1 → PAK1	
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1	12522133 16298995 20518497 8649427
	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → CDK1 → DNM2 → RAC1 → PAK1	18585004
	MITF → HIF1A ⊣ DNM2 → RAC1 → PAK1	12086670 15983061
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1	10806474 11062067 11356828 11583623 11602612 11606597 11803371 12169272 12522133 12566458 12660812 12818176

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	ETS1 → ITGB4 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 7556090 7650032 8112292 8262059 9126968 9171350 9852124 9927207
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1	10806474 11356828 11583623 11602612 11606597 11803371 12522133 15353804 15574336 15694340 15901672 16298995
	XRCC6 → XRCC5_XRCC6 → CHEK2 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 14701743 15668230 19882246 7556090 7650032 8112292 8262059 9126968 9171350
	FANCG → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1	12522133 15138265 16298995 20518497 8649427
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1	10806474 12522133 16298995

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	ARHGEF12 → RHOA → PTK2 → GRB2 → PAK1	10806474 12522133 16298995 18854312
	RPS6KB2 → XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1	10806474 11356828 12522133 16298995 18854312
	MMP2 → MMP9 → IGFBP2 → ITGA5_ITGB1 → FYN → GRB2 → PAK1	12522133 12879005 16569642 20514406 8943564
	CCNK → CDK12 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124 9927207
	IL21R → IL21_IL21R → PIK3CA → SLC9A1 → PTK2 → GRB2 → PAK1	10806474 11438544 12522133 16298995 18281483 19230867 9178903

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	GSK3B ⊣ AURKA → PTK2 → GRB2 → PAK1	10806474 12522133 16298995 22513362 25501815
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 → CPGMET ⊣ BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 16357870 19079346 19882246 22211105 7556090 7650032 8112292 8262059 9126968
	ATRIP → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1	12522133 16298995 20518497 8649427
	STAT1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → GRB2 → PAK1	11882364 12522133 16298995 20518497 8649427
	MMP10 → MMP7 → SPP1 → ITGAV_ITGB3 → PTK2B → SHC1 → GRB2 → PAK1	10835423 11375993 11683411 11882364 12522133 12660812 7592829 7650032 8112292 8262059 9126968 9578462

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
PAK1	MS4A1 → FYN → GRB2 → PAK1	12522133 7545683 8943564
	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → FYN → GRB2 → PAK1	12522133 8943564
	PRKCB → MS4A1 → FYN → GRB2 → PAK1	12522133 7545683 8943564
	BIK → BAK1 → HTRA2 ⊣ XIAP → TGFBR1_TGFBR2 → RHOA → PTK2 → GRB2 → PAK1	10806474 11356828 11583623 11602612 11606597 11803371 12522133 15574336 16298995 18469004 18854312
	TP53BP1 → BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12364621 12522133 12660812 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124
PAK1	EED → CPGMET ⊣ BRCA1 ⊣ CDH3 → ITGA6_ITGB4 → SHC1 → GRB2 → PAK1	11044453 12522133 12660812 16357870 19882246 7556090 7650032 8112292 8262059 9126968 9171350 9852124

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	PPP2R2A ⊣ AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985
	RCE1 → RAC1 → MTOR	
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 → AKT ⊣ AKT1S1 ⊣ MTOR	11585904 12138205 17510057 17517883 19276681 20138985
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 → AKT ⊣ AKT1S1 ⊣ MTOR	10094049 10887201 11784851 12138205 15024054 15208311 17510057 17517883 19276681 20138985 9275204
	RASSF1 → SAV1 → STK4 → LATS2 ⊣ WWTR1 → SLC7A5 → MTOR	21489991 22424946 26898830
MTOR	CD81 → CD19 → PIK3CB → PDPK1 → AKT ⊣ AKT1S1 ⊣ MTOR	10698680 17510057 17517883 19276681 20138985
	DDIT4 → TSC1_TSC2 ⊣ RHEB → MTOR	12869586
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	10837489 11583623 11602612 11606597 11803371 15077116 15574336 15637055 15694340 15721256 15901672 16697956
	TP53 → ULK1 ⊣ MTOR	21475306 23651856
	YAP1 → SLC7A5 → MTOR	22424946

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CB → PDPK1 → AKT ⊣ AKT1S1 ⊣ MTOR	10698680 17510057 17517883 19276681 20138985
	CHEK2 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	10542266 14701743 17510057 17517883 19276681 20138985 23640046 27927753
	TP63 → STK11 → PRKAA1 → ULK1 ⊣ MTOR	14985505 15231735 21159649 21460630
	ULK1 ⊣ MTOR	
	ITGAM → ITGAM_ITGB2 → ILK → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 9736715
MTOR	ITGAL → ITGAL_ITGB2 → ILK → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 9736715
	IL4R → JAK3 → PIK3CB → PDPK1 → AKT ⊣ AKT1S1 ⊣ MTOR	10698680 11035047 15010462 16129412 16873377 17510057 17517883 19276681 20138985 8266076
	ILK → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 9736715
	GSTP1 → GAPDH → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985
	CD19 → PIK3CB → PDPK1 → AKT ⊣ AKT1S1 ⊣ MTOR	10698680 17510057 17517883 19276681 20138985

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	MAP4K2 → MAP3K1 → MAP2K3 → MAPK14 → MAPKAPK2 → AKT ⊣ AKT1S1 ⊣ MTOR	11784851 15273249 17510053 17510057 17517883 19276681 20138985 20978232 9430721
	MMP7 → SPP1 → ITGA4_ITGB1 → ILK → AKT ⊣ AKT1S1 ⊣ MTOR	11375993 17510057 17517883 19276681 20138985 8538749 9736715
	FAS → DAXX → RASSF1 → SAV1 → STK4 → LATS2 ⊣ WWTR1 → SLC7A5 → MTOR	11003656 11483955 21199877 21489991 22424946 26898830
	TSC1 → TSC1_TSC2 ⊣ RHEB → MTOR	12869586
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 23640046 27927753 8428596

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 23640046 27927753
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → NEDD4 → AKT ⊣ AKT1S1 ⊣ MTOR	11927607 17510057 17517883 19276681 20138985 20378826 20518497 23195959 25292214
	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 18585004 19276681 20138985 23640046 27927753
	MITF → HIF1A ⊣ DNM2 → RAC1 → PAK1 → AKT ⊣ AKT1S1 ⊣ MTOR	12086670 15983061 17502379 17510057 17517883 19276681 20138985
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	11062067 11583623 11602612 11606597 11803371 12169272 12566458 12818176 15574336 15694340 15901672 16478725

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	ETS1 → KIFI4 → AKT ⊣ AKT1S1 ⊣ MTOR	15718470 17510057 17517883 19276681 20138985
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	11583623 11602612 11606597 11803371 15353804 15574336 15694340 15901672 17510057 17517883 18469004 19276681
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CB → PDPK1 → AKT ⊣ AKT1S1 ⊣ MTOR	10698680 17510057 17517883 19276681 20138985
	ARHGEF12 → RHOA → PTK2 → SRC → NEDD4 → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 18854312 19276681 20138985 20378826 23195959 25292214
	RPS6KB2 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 23640046

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	MMP2 → MMP3 → SPP1 → ITGA4_ITGB1 → ILK → AKT ⊣ AKT1S1 ⊣ MTOR	11120741 11375993 17510057 17517883 19276681 20138985 8538749 8663255 9665471 9736715
	CCNK → CDK12 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 23640046 27927753
	IL21R → IL21_IL21R → PIK3CB → PDPK1 → AKT ⊣ AKT1S1 ⊣ MTOR	10698680 17510057 17517883 19276681 20138985 9178903
	GSK3B ⊣ WWTR1 → SLC7A5 → MTOR	22424946
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 → CPGMET ⊣ CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	16357870 17510057 17517883 19276681 20138985 23640046 27927753

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	ATRIP → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 23640046 27927753 8428596
	FOXO3 → BBC3 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	10837489 11583623 11602612 11606597 11803371 14976264 15077116 15574336 15637055 15694340 15721256 15901672
	STAT1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 22271894 23640046 27927753
	MMP10 → MMP7 → SPP1 → ITGA4_ITGB1 → ILK → AKT ⊣ AKT1S1 ⊣ MTOR	11375993 17510057 17517883 19276681 20138985 8538749 9578462 9736715
	MS4A1 → FYN → NTRK2 → TNK2 → AKT ⊣ AKT1S1 ⊣ MTOR	14506255 17510057 17517883 19276681 20138985 23598414 7545683 9648856

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
MTOR	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → ILK → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985 8538749 9736715
	PRKCB → CARD11 → BCL10 → MALT1 → MTOR	16356855 19815501 20516126 23690623
	BIK → BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	11583623 11602612 11606597 11803371 15574336 17510057 17517883 18469004 19276681 20138985 23640046
	TP53BP1 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	10542266 12364621 17510057 17517883 19276681 20138985 23640046 27927753
	EED → CPGMET ⊣ CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT ⊣ AKT1S1 ⊣ MTOR	16357870 17510057 17517883 19276681 20138985 23640046 27927753
MTOR	PAK1 → AKT ⊣ AKT1S1 ⊣ MTOR	17510057 17517883 19276681 20138985

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
HK2	PPP2R2A ⊣ AKT → HK2	
	RCE1 → RAC1 → PAK1 → AKT → HK2	
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 → AKT → HK2	11585904 12138205
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 → AKT → HK2	10094049 10887201 11784851 12138205 15024054 15208311 9275204
	RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 → AKT → HK2	12138205 21489991 25946971 26898830
HK2	CD81 → CD19 → PIK3CB → PDPK1 → AKT → HK2	10698680
	DDIT4 → TSC1_TSC2 ⊣ RHEB → GRB10 → AKT → HK2	12869586 15718470 16221682 16226444 19995915 21659605
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT → HK2	10837489 11583623 11602612 11606597 11803371 15077116 15574336 15637055 15694340 15721256 15901672 16697956
	EIF3C → EIF3E → EIF4E → XIAP → AKT → HK2	23640046
	YAP1 → SLC7A5 → ITGA4_ITGB1 → ILK → AKT → HK2	8538749 9736715

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
HK2	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CB → PDPK1 → AKT → HK2	10698680
	CHEK2 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	10542266 14701743 23640046 27927753
	TP63 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	23640046 27927753
	ULK1 ⊣ GRB10 → AKT → HK2	15718470 16221682 16226444 19995915 21659605
	ITGAM → ITGAM_ITGB2 → ILK → AKT → HK2	9736715
HK2	ITGAL → ITGAL_ITGB2 → ILK → AKT → HK2	9736715
	IL4R → JAK3 → PIK3CB → PDPK1 → AKT → HK2	10698680 11035047 15010462 16129412 16873377 8266076
	ILK → AKT → HK2	9736715
	GSTP1 → GAPDH → AKT → HK2	
	CD19 → PIK3CB → PDPK1 → AKT → HK2	10698680

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
HK2	MAP4K2 → MAP3K1 → MAP2K3 → MAPK14 → MAPKAPK2 → AKT → HK2	11784851 15273249 17510053 20978232 9430721
	MMP7 → SPP1 → ITGA4_ITGB1 → ILK → AKT → HK2	11375993 8538749 9736715
	FAS → DAXX → RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 → AKT → HK2	11003656 11483955 12138205 19223555 21199877 21489991 25946971 26898830
	TSC1 → TSC1_TSC2 ⊣ RHEB → GRB10 → AKT → HK2	12869586 15718470 16221682 16226444 19995915 21659605
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	23640046 27927753 8428596
HK2	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	23640046 27927753
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → NEDD4 → AKT → HK2	11927607 20378826 20518497 23195959 25292214
	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	18585004 23640046 27927753
	MITF → HIF1A ⊣ DNM2 → RAC1 → PAK1 → AKT → HK2	12086670 15983061
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT → HK2	11062067 11583623 11602612 11606597 11803371 12169272 12566458 12818176 15574336 15694340 15901672 16478725

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
HK2	ETS1 → KIF14 → AKT → HK2	
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT → HK2	11583623 11602612 11606597 11803371 15353804 15574336 15694340 15901672 18469004 23640046
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CB → PDPK1 → AKT → HK2	10698680
	ARHGEF12 → RHOA → PTK2 → SRC → NEDD4 → AKT → HK2	18854312 20378826 23195959 25292214
	RPS6KB2 → XIAP → AKT → HK2	23640046
HK2	MMP2 → MMP3 → SPP1 → ITGA4_ITGB1 → ILK → AKT → HK2	11120741 11375993 8538749 8663255 9665471 9736715
	CCNK → CDK12 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	23640046 27927753
	IL21R → IL21_IL21R → PIK3CB → PDPK1 → AKT → HK2	10698680 9178903
	GSK3B ⊣ AURKA → SRC → NEDD4 → AKT → HK2	21785464 22513362 23195959 25292214
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 → CPGMET ⊣ CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	16357870 23640046 27927753

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
HK2	ATRIP → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	23640046 27927753 8428596
	FOXO3 → BBC3 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT → HK2	10837489 11583623 11602612 11606597 11803371 14976264 15077116 15574336 15637055 15694340 15721256 15901672
	STAT1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	22271894 23640046 27927753
	MMP10 → MMP7 → SPP1 → ITGA4_ITGB1 → ILK → AKT → HK2	11375993 8538749 9578462 9736715
	MS4A1 → FYN → NTRK2 → TNK2 → AKT → HK2	14506255 23598414 7545683 9648856
HK2	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → ILK → AKT → HK2	8538749 9736715
	PRKCB → GSTP1 → GAPDH → AKT → HK2	
	BIK → BAK1 → HTRA2 ⊣ XIAP → AKT → HK2	11583623 11602612 11606597 11803371 15574336 18469004 23640046
	TP53BP1 → BRCA1 → CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	10542266 12364621 23640046 27927753
	EED → CPGMET ⊣ CDKN1A ⊣ CCNB1_CDK1 → XIAP → AKT → HK2	16357870 23640046 27927753
HK2	PAK1 → AKT → HK2	

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
AURKA	PPP2R2A ⊣ SRC → AURKA	25501815
	RCE1 → RAC1 → PAK1 → AURKA	
	PEBP1 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA	11585904 22513362
	TNFAIP3 ⊣ MAP3K14 → IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA	10094049 10887201 11784851 15024054 15208311 22513362 9275204
	RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA	21489991 22513362 25946971 26898830
AURKA	CD81 → CD19 → PIK3CB → PRKCZ ⊣ GSK3B ⊣ AURKA	11481324 16510873 17606986 22513362
	DDIT4 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA	12869586 21258367
	PMAIP1 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA	10837489 11035810 11583623 11602612 11606597 11803371 12172554 15077116 15574336 15637055 15678105 15694340
	FBP1 ⊣ NPM1 → AURKA	
	EIF3C → EIF3E → EIF4E → XIAP → AKT ⊣ GSK3B ⊣ AURKA	11035810 12172554 15678105 22513362 23640046

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
AURKA	TP53 ⊣ PTK2 → SRC → AURKA	15157737 17725966 20378826 25501815
	YAP1 → SLC7A5 → ITGA4_ITGB1 → SRC → AURKA	25501815
	LMO1 → LDB1_LMO1 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA	20378826 25501815
	CHEK2 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 14701743 20378826 20518497 25501815
	TP63 → STK11 → PRKAA1 → ULK1 → FBP1 ⊣ NPM1 → AURKA	14985505 15231735 21159649
AURKA	ULK1 → FBP1 ⊣ NPM1 → AURKA	
	ITGAM → ITGAM_ITGB2 → ILK ⊣ GSK3B ⊣ AURKA	22513362 9736715
	ITGAL → ITGAL_ITGB2 → ILK ⊣ GSK3B ⊣ AURKA	22513362 9736715
	IL4R → JAK3 → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA	16129412 16684964 18281483 20378826 20671117 25501815 8266076 8962143
	ILK ⊣ GSK3B ⊣ AURKA	22513362 9736715

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
AURKA	GSTP1 → GAPDH → AKT ⊣ GSK3B ⊣ AURKA	11035810 12172554 15678105 22513362 27563096
	CD19 → PIK3CB → PRKCZ ⊣ GSK3B ⊣ AURKA	11481324 16510873 17606986 22513362
	MAP4K2 → MAP3K1 → MAP2K3 → MAPK12 → PLK1 → TPX2 → AURKA	11062067 11784851 14580337 15173575
	MMP7 → SPP1 → ITGA4_ITGB1 → SRC → AURKA	11375993 25501815
	FAS → DAXX → RASSF1 → SAV1 → STK4 → LATS2 ⊣ IKBKB → MAP3K8 → PIN1 ⊣ GSK3B ⊣ AURKA	11003656 11483955 21199877 21489991 22513362 25946971 26898830
AURKA	TSC1 → TSC1_TSC2 ⊣ RHEB ⊣ ULK1 → FBP1 ⊣ NPM1 → AURKA	12869586 21258367
	PMS1 → CHEK1 → WEE1 ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → TPX2 → AURKA	14580337 15173575 8428596
	DNMT3A ⊣ CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → TPX2 → AURKA	14580337 15173575
	FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 20378826 20518497 25501815
	SETD2 → CDKN1A ⊣ CCNB1_CDK1 → MAPK12 → PLK1 → TPX2 → AURKA	14580337 15173575 18585004

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
AURKA	MITF → HIF1A ⊣ DNM2 → RAC1 → PAK1 → AURKA	12086670 15983061
	MAP3K5 → MAP2K7 → MAPK9 → BCL2L11 ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA	11035810 11062067 11583623 11602612 11606597 11803371 12169272 12172554 12566458 12818176 15574336 15678105
	ETS1 → KIF14 → AKT ⊣ GSK3B ⊣ AURKA	11035810 12172554 15678105 22513362
	BID ⊣ BCL2L1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA	11035810 11583623 11602612 11606597 11803371 12172554 15353804 15574336 15678105 15694340 15901672 18469004
	FANCG → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 15138265 20378826 20518497 25501815
AURKA	PLK1 → TPX2 → AURKA	14580337 15173575
	LMO2 → LDB1_LMO2 → LYL1_TAL1 → EPOR → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA	20378826 25501815
	ARHGEF12 → RHOA → PTK2 → SRC → AURKA	18854312 20378826 25501815
	RPS6KB2 → XIAP → AKT ⊣ GSK3B ⊣ AURKA	11035810 12172554 15678105 22513362 23640046
	MMP2 → MMP3 → SPP1 → ITGA4_ITGB1 → SRC → AURKA	11120741 11375993 25501815 8663255 9665471

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
AURKA	CCNK → CDK12 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 20378826 20518497 25501815
	IL21R → IL21_IL21R → PIK3CA → SLC9A1 → PTK2 → SRC → AURKA	11438544 18281483 19230867 20378826 25501815 9178903
	GSK3B ⊣ AURKA	22513362
	BAP1 → BAP1_L3MBTL2 ⊣ EZH2 → CPGMET ⊣ BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 16357870 19079346 20378826 20518497 22211105 25501815
	ATRIP → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 20378826 20518497 25501815
AURKA	FOXO3 → BBC3 ⊣ MCL1 ⊣ BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA	10837489 11035810 11583623 11602612 11606597 11803371 12172554 14976264 15077116 15574336 15637055 15678105
	STAT1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 20378826 20518497 22271894 25501815
	MMP10 → MMP7 → SPP1 → ITGA4_ITGB1 → SRC → AURKA	11375993 25501815 9578462
	MS4A1 → FYN → GRB2 → PAK1 → AURKA	12522133 7545683 8943564
	ZEB2 → CTBP1_ZEB2 → VIM → ITGA5_ITGB1 → PTK2 → SRC → AURKA	19889638 20378826 25501815

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Master Regulators	Molecular Pathway Rationale for Master Regulators	Reference PMIDs
AURKA	PRKCB → MS4A1 → FYN → GRB2 → PAK1 → AURKA	12522133 7545683 8943564
	BIK → BAK1 → HTRA2 ⊣ XIAP → AKT ⊣ GSK3B ⊣ AURKA	11035810 11583623 11602612 11606597 11803371 12172554 15574336 15678105 18469004 22513362 23640046
	TP53BP1 → BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 12364621 20378826 20518497 25501815
	EED → CPGMET ⊣ BRCA1 → FANCA ⊣ CAPN1_CAPNS1 → PTK2 → SRC → AURKA	11927607 16357870 20378826 20518497 25501815
	PAK1 → AURKA	

** Assayable key kinase biomarkers identified for this patient.

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

7. Ventura™ Assessment sections: How to Read the Report

Cellworks Precision Medicine Reports equip oncologists with the knowledge of how an individual patient will respond to all standard care drugs (Singula™) and novel combination therapies (Ventura™) prior to treatment. The biosimulation analyzes mutational interactions of 4,000+ networked genes to predict and rank phenotype responses to millions of drug combinations.

The Ventura™ report predicts and ranks the patient's response to combinations of FDA-approved drugs, including off-label and non-oncology drugs.

Please Note:

The current assessment assumes that the drugs are faithfully delivered to the site of action. Cellworks considers all molecular interactions once the therapy is delivered to the site of action (Pharmacodynamics of the drug compound). Cellworks does not account for absorption, distribution, metabolism & excretion (ADME) properties of the drug that determine how the drug is delivered to the site of action. Any toxicity in the delivery process, or pharmacokinetics, is not considered.

Cellworks does not provide recommendations on drug dosage. However, it is highly recommended to follow the dosage instructions in the drug FDA labels and standard guidelines.

1 Top Biosimulation Treatments

Therapy Response Index: This index represents the patient specific biosimulation score for each treatment or combination Cellworks evaluates. The score is determined by the impact on master regulators and phenotype responses in the patient disease model.

The top overall list represents the highest scoring TRI prediction treatments. The histogram ranks Standard Care drug treatments and monotherapies, and combinations including off-label and non-oncology drugs on the Y-axis in decreasing order of efficacy. The number on the X-axis is the Therapy Response Index which reflects the predicted effectiveness of the drug treatments.

The histogram also indicates the efficacy of individual treatments in a combination. The total score of the treatment is listed as a dark grey bar. For combination therapies, the light green section represents the strongest monotherapy component of the combination. The Standard Care treatments are labelled.

1.1 Standard Care Predicted Responders

This table lists all the Standard Care treatments to which the patient is predicted to respond.

The "Therapy Response Index" column shows the TRI score for each of these treatments. Top scoring Standard Care treatments will be found in the top 25 treatments shown in the histogram, Section 4.

1.2 Standard Care Predicted Non-Responders

This table lists all the Standard Care treatments to which the patient is predicted to not respond.

2 Master Regulators

Non-Small Cell Lung Cancer (NSCLC) - NOS

Clinical ID: **ABC123** Cellworks ID: **123456** Physician: **Dr. Smith**

Cellworks multi-omics biosimulation determines master regulators in the patient's disease network. They are points of convergence of the pathways impacted by the aberrations in the patient's genomic profile. These master regulators are tumor promoter/suppressor genes that a drug needs to impact for the patient to respond to treatment.

Detailed illustrations showing molecular biochemical pathways from genomic aberrations in the patient profile to the master regulators are provided in the Genomic Aberration to Master Regulator Pathway Section (Section 6).

2.1 Treatment Impact on Master Regulators

Cellworks multi-omics biosimulation classifies a patient as a responder or a non-responder to a drug based on the impact the drug has on the phenotype of the patient's cancer as well as the impact on the master regulators identified in the patient's disease network.

If the drug successfully impacts a master regulator to a significant extent, it is represented by a check symbol ('✓'). Absence of a check symbol implies that the drug does not sufficiently impact the master regulator.

3. Phenotype Index Values

The drug efficacy score is an aggregation of the impact of a drug on the phenotypes of a disease model. To create a patient disease model, Cellworks evaluates the downstream impact on phenotypic endpoints. These endpoints are evaluated as index values showing the deviation from healthy cell values. The endpoints are correlated to the 10 Hallmarks of Cancer. As part of the biosimulation process, each drug model is evaluated on these same endpoints to determine to what extent the disease model deviation returns to a healthy cell value range.

4. Active Clinical Trials

All clinical trial details are provided by https://clinicaltrials.gov/. The inclusion criteria is matched to the patients genomic profile and exclusion details are evaluated when possible. The list is not meant to be exhaustive and is solely provided for information. Physicians and patients are encouraged to use this list as a starting point for evaluating potential clinical trials.

5.1 Summary of Patient Genomic Profile

This section provides a summary of the patient genomics used for therapy assessment. It shows the type of input received from the next generation sequencing data (NGS) with the number of genetic mutations, copy number variations (CNVs) and any epigenetic data that is reported. Some indications also require additional lab tests as input to the biosimulation process.

5.2 Aberrations by Chromosome Location

The plot contains the CNVs from the patient profile as determined by NGS, showing gain and loss values. The values are plotted in chromosomal order for ease of understanding. The genomic mutations are plotted at the bottom of the chart colored to illustrate gain of function (blue dot), loss of function (red dot), or switch of function (purple dot).

5.3 Detailed Information of Genomic Aberration(s) Modeled

Aberrations of oncogenic significance found in the patient's genomic profile are used to create the disease model of the patient and are listed in

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this section. Based on the type of mutation and original functionality of a gene, aberrations are categorized into 5 major groups -

I. Gene Mutation(s) with Gain of Function
II. Gene Mutation(s) with Loss of Function
III. Gene Mutation(s) with Switch of Function
IV. Gene(s) with Increase in Copy Number Variation [CNV]
V. Gene(s) with Decrease in Copy Number Variation [CNV]

This information forms the patient-specific input on which a Cellworks assessment is based.

6. Therapy Rationales

Each therapy recommendation made in a Cellworks report is accompanied by a clear rationale explaining the reason behind the recommendation.

A therapy rationale illustrates the role of key aberrations in causing sensitivity or resistance to drugs. A drug will have a therapy rationale for every aberration that contributes significantly to its sensitivity or resistance.

The first illustration in the rationale defines the mechanism of action of the drug.

The second illustration articulates the signaling or metabolic pathway by which the aberration of interest contributes to drug sensitivity or resistance including the point of intersection with the drug's mechanism of action.

The pathway can be read as a dependent relationship (represented by an arrow) where an increase in one gene increases the next, or a block or inverse relationship (represented by a line with a bar) where an increase in one gene decreases the next. The description is accompanied by relevant PMID references that support the drug mechanism of action and rationale for drug sensitivity or resistance.

7. Genomic Aberration to Key Biomarker Pathways

This section illustrates molecular biochemical pathways from a genomic aberration in the patient profile to critical master regulators identified by Cellworks' multi-omics biosimulation. These illustrations explain why the master regulators listed in Section 2 are important to the patient's disease network. The illustration is accompanied by relevant PMID references that were used to determine the interaction.

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