

Table SI. Total genomic alterations detected in different genes.

Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
TP53	1,087	3	7	15	1,105	55.70
EGFR	1,012	160	3	1	1,041	52.47
KRAS	249	26	0	0	265	13.36
CDKN2A	133	68	17	28	244	12.30
LRP1B	201	5	3	15	220	11.09
TERT	56	151	3	0	210	10.58
PIK3CA	142	64	0	0	198	9.98
RBM10	192	0	1	5	198	9.98
ALK	31	0	135	2	165	8.32
RB1	95	11	3	9	117	5.90
MDM2	4	111	0	0	114	5.75
SPTA1	107	4	1	2	113	5.70
NKX2-1	13	98	1	1	112	5.65
SMARCA4	97	1	3	7	108	5.44
ERBB2	81	29	1	0	105	5.29
FAM135B	69	36	0	0	104	5.24
KMT2C	98	0	2	3	102	5.14
APC	92	3	4	4	100	5.04
FAT3	95	0	1	0	96	4.84
STK11	81	3	5	4	92	4.64
PTEN	83	2	3	5	91	4.59
FRS2	0	91	0	0	91	4.59
MYC	10	80	0	0	88	4.44
SMAD4	80	1	0	2	83	4.18
ARID1A	78	1	0	5	83	4.18
FAT1	71	4	2	5	82	4.13
GNAS	38	44	0	0	81	4.08
NF1	70	0	6	5	80	4.03
KEAP1	77	0	1	3	80	4.03
CDK4	5	73	1	0	79	3.98
KMT2D	76	0	3	1	78	3.93
ATM	73	0	2	2	77	3.88
SDHA	11	63	3	2	76	3.83
SOX2	4	72	0	0	75	3.78
CTNNB1	72	1	0	1	74	3.73
SETD2	69	0	2	5	74	3.73
RET	30	2	39	1	72	3.63
GRIN2A	67	1	1	2	71	3.58
BRAF	59	4	5	0	68	3.43
NOTCH1	62	4	1	2	68	3.43
FAT4	65	0	0	1	66	3.33
CDKN2B	1	59	2	3	65	3.28
PRKCI	6	60	0	0	65	3.28
CCND1	3	62	0	0	65	3.28
MCL1	8	56	0	0	63	3.18
EPHA3	55	5	0	2	62	3.13
NFE2L2	45	13	0	3	61	3.07
MET	29	30	6	2	61	3.07
KLHL6	6	56	0	0	61	3.07
ARID2	57	1	0	3	60	3.02
EPHA5	55	6	0	1	60	3.02
FGF19	4	54	0	0	58	2.92
ROS1	24	0	33	0	56	2.82
CCNE1	2	53	0	0	55	2.77
FGF3	6	48	0	0	54	2.72
LRP1	40	0	6	8	53	2.67
IL7R	19	33	0	0	52	2.62
BCL6	7	44	0	0	51	2.57
MAP3K13	7	42	0	1	50	2.52

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
FGF4	2	48	0	0	50	2.52
PREX2	43	6	0	0	49	2.47
CREBBP	40	8	1	1	48	2.42
MED12	47	0	0	1	48	2.42
FGFR1	8	39	2	0	48	2.42
LRP2	47	0	0	0	47	2.37
AKT2	5	42	0	0	47	2.37
ETV5	6	39	1	0	44	2.22
SRMS	9	34	0	0	43	2.17
ATRX	40	0	1	1	42	2.12
PTK6	1	40	1	0	42	2.12
EPHB1	38	1	0	2	41	2.07
RICTOR	10	30	1	0	41	2.07
POLE	34	0	4	2	40	2.02
GRM3	35	6	0	0	40	2.02
GLI3	34	6	0	0	40	2.02
PTK2	5	36	0	0	40	2.02
ZNF217	7	34	0	0	40	2.02
NTRK3	34	1	2	2	39	1.97
NOTCH2	27	9	1	1	38	1.92
CDK12	17	20	0	1	38	1.92
NOTCH3	32	5	0	1	38	1.92
ERBB4	37	1	0	0	38	1.92
ARFRP1	0	38	0	0	38	1.92
EP300	33	0	2	2	37	1.86
PIK3CG	33	4	0	0	37	1.86
EPHA7	36	1	0	0	37	1.86
KAT6A	4	33	0	0	37	1.86
PDGFRA	23	15	0	1	36	1.81
AMER1	34	0	0	2	36	1.81
FGF12	9	27	0	0	36	1.81
STK24	3	33	0	0	36	1.81
HDAC9	33	0	0	3	35	1.76
TGFBR2	34	0	0	1	35	1.76
KDR	24	13	0	0	35	1.76
RUNX1T1	34	0	0	1	35	1.76
POLB	1	34	0	0	35	1.76
HGF	32	1	0	0	33	1.66
PRKDC	22	7	0	4	33	1.66
TSC2	28	0	3	2	33	1.66
KDM6A	21	10	0	3	33	1.66
ATR	29	0	2	1	32	1.61
CARD11	25	7	0	0	32	1.61
GLI1	12	20	0	0	32	1.61
NOTCH4	27	3	0	2	31	1.56
TBX3	30	1	0	0	31	1.56
SLIT2	29	0	1	0	30	1.51
FLT4	23	7	0	0	30	1.51
TET2	29	0	1	0	30	1.51
STAG2	28	0	0	2	30	1.51
FBXW7	28	1	0	1	30	1.51
BCOR	28	1	0	1	30	1.51
GLI2	27	4	0	0	30	1.51
ADGRA2	5	25	0	0	30	1.51
MAGI2	28	0	0	1	29	1.46
CCND3	3	26	0	0	29	1.46
TET1	27	0	0	1	28	1.41

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
SPEN	26	0	1	1	28	1.41
KIT	12	16	0	0	28	1.41
KDM5C	23	4	1	0	28	1.41
VEGFA	6	22	0	0	28	1.41
PBRM1	25	0	0	2	27	1.36
FANCM	24	0	1	2	27	1.36
MAP2K4	25	2	0	0	27	1.36
NCOR1	26	0	0	1	27	1.36
RARA	8	15	3	1	27	1.36
NRG3	26	1	0	0	27	1.36
FOS	1	26	0	0	27	1.36
IRS2	16	10	0	0	26	1.31
FANCA	20	0	2	4	26	1.31
IKZF1	26	0	0	0	26	1.31
PIK3R1	23	0	1	2	26	1.31
NTRK1	17	7	2	0	26	1.31
DDR2	15	11	0	0	26	1.31
TNK2	6	20	0	0	25	1.26
FLT1	25	0	0	0	25	1.26
INPP4B	24	0	0	1	25	1.26
BRCA2	20	0	5	1	25	1.26
NSD1	12	13	0	1	25	1.26
BCORL1	18	6	1	0	25	1.26
BRCA1	20	0	4	1	25	1.26
INHBA	18	6	0	0	24	1.21
ARID1B	21	0	0	3	24	1.21
BCL2L2	1	23	0	0	24	1.21
DNMT3A	22	1	1	1	23	1.16
CFTR	14	6	2	2	23	1.16
TGFBR1	22	0	0	1	23	1.16
IGF1R	17	6	0	0	23	1.16
SETBP1	21	1	0	1	23	1.16
SF3B1	19	4	0	0	23	1.16
GATA4	14	8	0	1	23	1.16
FGFR4	15	7	0	0	22	1.11
AURKA	5	17	0	0	22	1.11
TIE1	13	9	0	0	22	1.11
JAK2	11	12	0	0	21	1.06
MAP3K1	16	2	2	1	21	1.06
MTOR	19	2	1	0	21	1.06
CHD4	18	3	0	1	21	1.06
KMT2A	18	1	1	2	21	1.06
RAC1	3	18	0	0	21	1.06
KDM5A	10	13	0	0	21	1.06
RANBP2	21	0	0	0	21	1.06
AXL	12	9	0	0	21	1.06
FGF10	4	17	0	0	21	1.06
PTCH1	20	0	0	0	20	1.01
ZNF703	1	19	0	0	20	1.01
WT1	14	5	0	0	19	0.96
CHD2	16	0	1	2	19	0.96
PAX5	11	8	0	0	19	0.96
FGF14	7	12	0	0	19	0.96
RPTOR	12	7	0	0	19	0.96
EZH2	6	13	0	0	19	0.96
TNFSF13B	2	17	0	0	19	0.96
KEL	19	0	0	0	19	0.96

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
CDK6	1	18	0	0	19	0.96
NPM1	0	19	0	0	19	0.96
SMAD2	15	2	1	0	18	0.91
ETV1	10	8	0	0	18	0.91
TSC1	13	1	3	1	18	0.91
PPP2R1A	15	2	0	1	18	0.91
COL1A1	14	2	1	1	18	0.91
CAMTA1	17	0	0	1	18	0.91
DICER1	15	0	1	2	18	0.91
FGFR2	14	3	1	0	18	0.91
PALB2	16	0	1	1	18	0.91
ERBB3	11	7	1	0	18	0.91
BRIP1	15	0	2	1	18	0.91
NFIB	5	13	0	0	18	0.91
CUL3	16	0	1	0	17	0.86
DAXX	14	0	1	2	17	0.86
NRG1	14	3	0	0	17	0.86
PMS2	14	0	2	2	17	0.86
NCOA2	17	0	0	0	17	0.86
RUNX1	16	0	0	1	17	0.86
U2AF1	17	0	0	0	17	0.86
TP63	11	6	0	0	17	0.86
PARP4	16	0	0	1	17	0.86
CBL	16	1	0	0	17	0.86
JAK3	10	6	1	0	17	0.86
TOP2A	3	14	0	0	17	0.86
RELA	7	10	0	0	16	0.81
IRF4	12	4	0	0	16	0.81
MSH6	15	0	1	0	16	0.81
GABRA6	16	0	0	0	16	0.81
PIK3CB	9	7	0	0	16	0.81
BAP1	13	2	0	1	16	0.81
AR	16	0	0	0	16	0.81
SMAD3	16	0	0	0	16	0.81
CIC	15	0	1	0	16	0.81
LZTR1	9	6	1	0	16	0.81
APEX1	2	14	0	0	16	0.81
PRSS1	15	0	0	0	15	0.76
IDH1	14	0	1	0	15	0.76
BRD4	7	7	1	0	15	0.76
ACVR2A	13	1	0	1	15	0.76
GATA3	13	2	0	0	15	0.76
PIK3C2B	7	8	0	0	15	0.76
TEK	10	5	0	1	15	0.76
FGF6	7	8	0	0	15	0.76
B2M	13	0	0	2	15	0.76
AKT1	9	6	0	0	15	0.76
STAT3	10	4	0	0	14	0.71
ASXL1	13	0	1	0	14	0.71
POLD1	11	0	1	2	14	0.71
MEN1	12	0	1	2	14	0.71
MSH2	12	1	0	1	14	0.71
MAP2K1	14	0	0	0	14	0.71
TIPARP	1	13	0	0	14	0.71
FH	11	2	0	1	14	0.71
TFE3	3	11	0	0	14	0.71
RAD52	2	11	1	0	14	0.71

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
EMSY	1	13	0	0	14	0.71
DPYD	12	1	0	0	13	0.66
PAK3	8	5	0	0	13	0.66
CHEK2	7	6	0	1	13	0.66
ETV6	9	0	3	1	13	0.66
FLI1	12	1	0	0	13	0.66
ESR1	12	0	0	1	13	0.66
ADAM29	13	0	0	0	13	0.66
GATA1	6	8	0	0	13	0.66
ERRFI1	12	0	0	1	13	0.66
SMARCD1	12	0	0	1	13	0.66
FGF23	5	8	0	0	13	0.66
CDC73	12	0	0	1	13	0.66
MPL	5	8	0	0	13	0.66
PLCG2	13	0	0	0	13	0.66
CTCF	7	3	2	1	13	0.66
CRKL	0	13	0	0	13	0.66
RNF43	12	0	0	0	12	0.60
FLT3	12	0	0	0	12	0.60
ACVR1B	9	2	0	1	12	0.60
TAF1	11	1	0	0	12	0.60
CDH1	10	0	2	0	12	0.60
CSF1R	11	1	0	0	12	0.60
ARAF	5	7	0	0	12	0.60
TSHR	11	1	0	0	12	0.60
PDGFRB	10	1	0	1	12	0.60
MLH1	11	0	1	0	12	0.60
XPO1	4	8	0	0	12	0.60
FANCD2	10	0	1	1	12	0.60
NF2	8	0	1	3	12	0.60
HCK	5	7	0	0	12	0.60
CD274	0	12	0	0	12	0.60
PDCD1LG2	0	12	0	0	12	0.60
MRE11	11	0	0	0	11	0.55
BLM	11	0	0	0	11	0.55
CYLD	8	1	0	2	11	0.55
NFKBIA	8	1	1	1	11	0.55
SMARCB1	11	0	0	0	11	0.55
HNF1A	11	0	0	0	11	0.55
BTK	9	2	0	0	11	0.55
CDK8	10	1	0	0	11	0.55
FLCN	10	0	1	0	11	0.55
CYP2D6	11	0	0	0	11	0.55
CASP8	11	0	0	0	11	0.55
IKBKE	7	4	0	0	11	0.55
RIT1	4	7	0	0	11	0.55
CRLF2	0	11	0	0	11	0.55
PIK3R2	6	4	0	0	10	0.50
BARD1	10	0	0	0	10	0.50
AXIN2	8	0	0	2	10	0.50
STAT4	4	6	0	0	10	0.50
TCF7L2	9	1	0	0	10	0.50
ITK	9	1	0	0	10	0.50
EPHA2	7	3	0	0	10	0.50
SSX1	5	5	0	0	10	0.50
PIK3CD	6	3	0	1	10	0.50
FUBP1	6	4	0	0	10	0.50

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
FUS	1	8	1	0	10	0.50
REL	2	8	0	0	10	0.50
EGF	8	1	0	0	9	0.45
ROCK1	9	0	0	0	9	0.45
SNCAIP	9	0	0	0	9	0.45
NTRK2	8	1	0	0	9	0.45
BCR	7	1	0	1	9	0.45
FGFR3	5	1	3	0	9	0.45
PRDM1	9	0	0	0	9	0.45
NBN	7	0	0	2	9	0.45
TET3	9	0	0	0	9	0.45
MDM4	2	7	0	0	9	0.45
ABL2	6	3	0	0	9	0.45
RAD54B	4	4	0	1	9	0.45
GATA6	7	1	1	0	9	0.45
YES1	4	5	0	0	9	0.45
CCND2	1	8	0	0	9	0.45
FOXP1	7	2	0	0	9	0.45
XIAP	3	6	0	0	9	0.45
FOXL2	7	0	1	1	8	0.40
MACC1	4	4	0	0	8	0.40
FANCF	7	0	0	1	8	0.40
SPOP	8	0	0	0	8	0.40
DOT1L	8	0	0	0	8	0.40
SMO	7	1	0	0	8	0.40
GSK3B	5	3	0	0	8	0.40
MYCN	5	3	0	0	8	0.40
MS4A1	8	0	0	0	8	0.40
RAD50	8	0	0	0	8	0.40
AXIN1	6	1	1	0	8	0.40
RAD51D	5	0	2	1	8	0.40
RAD51C	8	0	0	0	8	0.40
LIMK1	4	4	0	0	8	0.40
CHEK1	8	0	0	0	8	0.40
LYN	5	3	0	0	8	0.40
GNA13	2	6	0	0	8	0.40
PDK1	1	7	0	0	8	0.40
MYCL	0	8	0	0	8	0.40
BCL2L1	0	8	0	0	8	0.40
NEK11	7	0	0	0	7	0.35
TNFAIP3	4	0	1	2	7	0.35
CXCR4	7	0	0	0	7	0.35
RAF1	6	0	1	0	7	0.35
SRC	4	3	0	0	7	0.35
SND1	7	0	0	0	7	0.35
TMPRSS2	4	2	1	0	7	0.35
HSP90AA1	4	3	0	0	7	0.35
ERG	5	2	0	0	7	0.35
FAM46C	7	0	0	0	7	0.35
ROCK2	4	3	0	0	7	0.35
FAS	7	0	0	0	7	0.35
BTG1	7	0	0	0	7	0.35
USP6	7	0	0	0	7	0.35
PDGFB	2	3	2	0	7	0.35
JAK1	5	2	0	0	7	0.35
NUP93	4	3	0	0	7	0.35
PRKAR1A	4	0	0	2	6	0.30

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
RELB	6	0	0	0	6	0.30
FYN	6	0	0	0	6	0.30
LCK	5	1	0	0	6	0.30
CEBPA	4	0	1	1	6	0.30
MITF	5	1	0	0	6	0.30
SOX9	6	0	0	0	6	0.30
MST1R	6	0	0	0	6	0.30
SUFU	6	0	0	0	6	0.30
KDM5B	3	3	0	0	6	0.30
IDH2	4	2	0	0	6	0.30
BMX	1	5	0	0	6	0.30
BCL2L11	5	1	0	0	6	0.30
GATA2	5	1	0	0	6	0.30
IRF2	5	0	0	1	6	0.30
MAP4K5	1	4	0	1	6	0.30
PTPN11	5	1	0	0	6	0.30
CDKN1B	4	0	0	2	6	0.30
AKT3	1	5	0	0	6	0.30
PDCD1	6	0	0	0	6	0.30
MERTK	5	1	0	0	6	0.30
DDR1	3	2	0	0	5	0.25
TOP1	4	1	0	0	5	0.25
IGF2	5	0	0	0	5	0.25
GNA11	5	0	0	0	5	0.25
ZNF750	5	0	0	0	5	0.25
HRAS	5	0	0	0	5	0.25
WEE1	5	0	0	0	5	0.25
CDKN1A	5	0	0	0	5	0.25
TYK2	5	0	0	0	5	0.25
VHL	5	0	0	0	5	0.25
FOXO1	4	1	0	0	5	0.25
CDKN2C	5	0	0	0	5	0.25
NR4A3	5	0	0	0	5	0.25
PARP2	3	2	0	0	5	0.25
VGLL3	5	0	0	0	5	0.25
BLK	2	3	0	0	5	0.25
BIRC3	5	0	0	0	5	0.25
SOX10	2	3	0	0	5	0.25
APOBEC3B	0	5	0	0	5	0.25
EWSR1	4	0	0	0	4	0.20
MGMT	4	0	0	0	4	0.20
BMPR1A	4	0	0	0	4	0.20
RHOA	4	0	0	0	4	0.20
MYD88	3	1	0	0	4	0.20
PARK2	1	1	0	2	4	0.20
SDHB	3	0	0	1	4	0.20
PARP1	4	0	0	0	4	0.20
HSD3B1	4	0	0	0	4	0.20
FANCE	2	0	2	1	4	0.20
ERCC1	1	3	0	0	4	0.20
SYK	3	0	0	1	4	0.20
ABL1	4	0	0	0	4	0.20
FANCG	3	0	0	1	4	0.20
CD79A	3	1	0	0	4	0.20
FGF7	3	1	0	0	4	0.20
CREB3L1	3	0	0	1	4	0.20
SOCS1	4	0	0	0	4	0.20

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Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
TNFRSF14	4	0	0	0	4	0.20
CSNK1A1	3	1	0	0	4	0.20
NRAS	3	1	0	0	4	0.20
RECQL	4	0	0	0	4	0.20
MYB	3	0	1	0	4	0.20
PKD2	3	1	0	0	4	0.20
FGR	3	1	0	0	4	0.20
NSD2	2	2	0	0	4	0.20
ETV4	2	2	0	0	4	0.20
CREB3L2	2	1	0	0	3	0.15
XRCC3	3	0	0	0	3	0.15
MUTYH	3	0	0	0	3	0.15
SIK1	2	0	0	1	3	0.15
CSK	3	0	0	0	3	0.15
RAD51B	3	0	0	0	3	0.15
GNAQ	2	1	0	0	3	0.15
MAP2K2	3	0	0	0	3	0.15
HTATIP2	3	0	0	0	3	0.15
RAD54L	2	1	0	0	3	0.15
RHBDF2	3	0	0	0	3	0.15
PRSS8	3	0	1	0	3	0.15
PARP3	3	0	0	0	3	0.15
FANCC	2	0	1	0	3	0.15
CTNNA1	3	0	0	0	3	0.15
TPMT	2	0	0	1	3	0.15
MEF2B	0	3	0	0	3	0.15
SS18	0	0	2	1	3	0.15
CD79B	2	0	0	0	2	0.10
SPINK1	2	0	0	0	2	0.10
ZBTB2	2	0	0	0	2	0.10
SDHC	2	0	0	0	2	0.10
WEE2	2	0	0	0	2	0.10
KIF5B	2	0	0	0	2	0.10
TNFSF11	2	0	0	0	2	0.10
BCL2	2	0	0	0	2	0.10
CRBN	2	0	0	0	2	0.10
HLA-A	2	0	0	0	2	0.10
FANCL	1	0	1	0	2	0.10
QKI	2	0	0	0	2	0.10
UGT1A1	2	0	0	0	2	0.10
ATF1	2	0	0	0	2	0.10
WISP3	2	0	0	0	2	0.10
CBFB	2	0	0	0	2	0.10
RXRA	2	0	0	0	2	0.10
PRKACA	1	1	0	0	2	0.10
LMO1	2	0	0	0	2	0.10
H3F3A	1	1	0	0	2	0.10
NUP98	1	0	0	1	2	0.10
BIRC5	0	2	0	0	2	0.10
JUN	1	0	0	0	1	0.05
XRCC2	1	0	0	0	1	0.05
FEN1	1	0	0	0	1	0.05
PHF6	1	0	0	0	1	0.05
FEV	1	0	0	0	1	0.05
SDHD	1	0	0	0	1	0.05
CD36	1	0	0	0	1	0.05
SRSF2	1	0	0	0	1	0.05

Table SI. Contuned.

Gene	SNV/ShortIndel	CNV	Fusion	LongIndel	Total	Ratio (%)
CSF1	0	1	0	0	1	0.05
EPCAM	0	1	0	0	1	0.05
RAD51	0	0	1	0	1	0.05
DNAH5	0	0	1	0	1	0.05

SNV, single nucleotide variant; Indel, insertion-deletion polymorphism; CNV, copy number variation.