

S1 Table. List of 232 target genes

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
ABL1	chr9:133589243-133761095	SNV	InDel	CNV		12	4,949
ABL2	chr1:179076828-179198844	SNV	InDel	CNV		14	4,802
ACVR1	chr2:158594018-158732399	SNV	InDel	CNV		18	3,698
AKT1	chr14:105235898-105262113	SNV	InDel	CNV		17	4,674
AKT2	chr19:40739754-40791468	SNV	InDel	CNV		29	5,862
AKT3	chr1:243663020-244014406	SNV	InDel	CNV		17	2,607
ALK	chr2:29416065-30144502	SNV	InDel	CNV		31	7,620
APC	chr5:112043170-112198258	SNV	InDel	CNV		22	11,391
ARID1A	chr1:27022497-27107693	SNV	InDel	CNV		21	9,315
ARID1B	chr6:157099038-157529050	SNV	InDel	CNV		23	12,772
ARID2	chr12:46123423-46301848	SNV	InDel	CNV		24	13,259
ATM	chr11:108093186-108236786	SNV	InDel	CNV		63	21,810
ATRX	chrX:76763804-77041780	SNV	InDel	CNV		36	9,611
B9D2	chr19:41860580-41870103	SNV	InDel	CNV		5	1,093
BAX	chr19:49458047-49465080	SNV	InDel	CNV		4	2,584
BCAM	chr19:45312291-45324698	SNV	InDel	CNV		13	5,400
BCL2	chr18:60795833-60987386	SNV	InDel	CNV		2	2,315
BCOR	chrX:39909144-40036607	SNV	InDel	CNV		19	7,204
BIRC5	chr17:76210242-76219962	SNV	InDel	CNV		5	1,966
BLNK	chr10:97951704-98031369	SNV	InDel	CNV		19	2,596
BMX	chrX:15482344-15574295	SNV	InDel	CNV		21	3,532
BRAF	chr7:140426269-140624589	SNV	InDel	CNV	Fusion	21	3,490
BRCA1	chr17:41197670-41277525	SNV	InDel	CNV		26	7,454
BRCA2	chr13:32889586-32972932	SNV	InDel	CNV		29	12,219
BSND	chr1:55464581-55474326	SNV	InDel	CNV		4	1,417

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
C19ORF33	chr19:38794776-38795671	SNV	InDel	CNV		3	764
CABP5	chr19:48533789-48547336	SNV	InDel	CNV		6	954
CADM1	chr11:115047169-115375700	SNV	InDel	CNV		17	2,907
CARD11	chr7:2946247-3083604	SNV	InDel	CNV		26	5,230
CBL	chr11:119076727-119170516	SNV	InDel	CNV		16	3,897
CCND1	chr11:69455830-69466200	SNV	InDel	CNV		5	1,916
CCND2	chr12:4382877-4409200	SNV	InDel	CNV		7	2,184
CCND3	chr6:41903564-42018120	SNV	InDel	CNV		8	3,580
CCNE2	chr8:95893835-95908931	SNV	InDel	CNV		14	2,481
CD44	chr11:35160392-35251018	SNV	InDel	CNV		21	6,819
CD79B	chr17:62006561-62009739	SNV	InDel	CNV		6	1,086
CDH1	chr16:68771103-68867512	SNV	InDel	CNV		19	5,140
CDH8	chr16:61681656-62070964	SNV	InDel	CNV		16	4,644
CDK4	chr12:58142283-58149821	SNV	InDel	CNV		10	2,323
CDK6	chr7:92244429-92465966	SNV	InDel	CNV		9	1,993
CDKN1B	chr12:12867967-12874166	SNV	InDel	CNV		5	1,897
CDKN2A	chr9:21968183-21995325	SNV	InDel	CNV		8	2,849
CDKN2B	chr9:22005961-22009387	SNV	InDel	CNV		2	1,008
CDKN2C	chr1:51426392-51439967	SNV	InDel	CNV		3	3,149
CHEK1	chr11:125495006-125546175	SNV	InDel	CNV		14	7,266
CHEK2	chr22:29083860-29138435	SNV	InDel	CNV		21	3,955
CIC	chr19:42772664-42799368	SNV	InDel	CNV	Fusion	24	10,088
CSF1R	chr5:149433607-149492960	SNV	InDel	CNV		23	4,478
CSK	chr15:75074373-75094963	SNV	InDel	CNV		9	4,455
CTDNEP1	chr17:7147245-7155835	SNV	InDel	CNV		11	2,033
CTNNB1	chr3:41236303-41301612	SNV	InDel	CNV		22	6,615

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
CTU1	chr19:51601833-51611672	SNV	InDel	CNV		3	1,262
CXCR4	chr2:136872414-136875760	SNV	InDel	CNV		2	1,291
DDR1	chr6:30844173-30867884	SNV	InDel	CNV		25	9,584
DDR2	chr1:162601138-162750061	SNV	InDel	CNV		21	4,417
DDX3X	chrX:41192536-41223750	SNV	InDel	CNV		21	5,595
DICER1	chr14:95556810-95624372	SNV	InDel	CNV		33	8,322
EED	chr11:85955401-85989806	SNV	InDel	CNV		11	7,249
EGFR	chr7:55086689-55273335	SNV	InDel	CNV		34	7,229
EPHA3	chr3:89156649-89528677	SNV	InDel	CNV		17	4,053
ERBB2	chr17:37844142-37886704	SNV	InDel	CNV		31	11,869
ERBB3	chr12:56473616-56495864	SNV	InDel	CNV		25	8,147
ERBB4	chr2:212248315-213403590	SNV	InDel	CNV		30	5,872
ERCC2	chr19:45854862-45874201	SNV	InDel	CNV		23	4,167
ERVV-2	chr19:53547966-53554405	SNV	InDel	CNV		2	2,582
EWSR1	chr22:29663973-29696540	SNV	InDel	CNV	Fusion	15	11,078
EZH2	chr7:148504713-148581466	SNV	InDel	CNV		23	4,216
EZR	chr6:159187921-159240481	SNV	InDel	CNV		14	2,784
FAM167B	chr1:32712793-32714227	SNV	InDel	CNV		2	797
FGFR1	chr8:38271121-38326377	SNV	InDel	CNV	Fusion	26	6,022
FGFR2	chr10:123239070-123357997	SNV	InDel	CNV		28	6,105
FGFR3	chr4:1795009-1809040	SNV	InDel	CNV	Fusion	18	4,150
FGFR4	chr5:176513848-176524790	SNV	InDel	CNV		19	5,413
FGR	chr1:27939400-27961813	SNV	InDel	CNV		15	3,093
FIZ1	chr19:56103791-56113361	SNV	InDel	CNV		3	5,861
FLT1	chr13:28877279-29069290	SNV	InDel	CNV		35	6,621
FLT3	chr13:28578164-28674754	SNV	InDel	CNV		25	4,336

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
FLT4	chr5:180030167- 180076649	SNV	InDel	CNV		32	5,806
FUBP1	chr1:78413174- 78444914	SNV	InDel	CNV		23	3,430
GFI1	chr1:92941561- 92952458	SNV	InDel	CNV		9	2,247
GFI1B	chr9:135820907- 135866462	SNV	InDel	CNV		11	2,371
GLI2	chr2:121493174- 121748276	SNV	InDel	CNV		16	6,163
GLTSCR1	chr19:48111428- 48206558	SNV	InDel	CNV		16	7,947
GNA11	chr19:3094383- 3121477	SNV	InDel	CNV		7	4,042
GNAQ	chr9:80336214- 80646399	SNV	InDel	CNV		9	1,952
GPBP1L1	chr1:46093903- 46152327	SNV	InDel	CNV		13	3,436
GPR88	chr1:101003668- 101007608	SNV	InDel	CNV		2	3,600
GSK3B	chr3:119545610- 119813289	SNV	InDel	CNV		12	2,885
H3F3A	chr1:226249527- 226259205	SNV	InDel	CNV		5	1,504
H3F3B	chr17:73774647- 73781592	SNV	InDel	CNV		4	1,318
HDAC2	chr6:114262197- 114332497	SNV	InDel	CNV		19	3,779
HDAC9	chr7:18126547- 19036947	SNV	InDel	CNV		43	11,491
HGF	chr7:81331872- 81399779	SNV	InDel	CNV		21	3,829
HIST1H3B	chr6:26031853- 26032313	SNV	InDel	CNV		1	461
HIST1H3C	chr6:26045614- 26046074	SNV	InDel	CNV		1	461
HNF1A	chr12:121416321- 121439020	SNV	InDel	CNV		8	3,213
HPCAL4	chr1:40148183- 40157407	SNV	InDel	CNV		5	1,345
ID2	chr2:8818950- 8824186	SNV	InDel	CNV		5	1,932
IDH1	chr2:209101778- 209130823	SNV	InDel	CNV		12	3,169
IDH2	chr15:90627473- 90645811	SNV	InDel	CNV		12	2,243
INPP5D	chr2:233924652- 234115428	SNV	InDel	CNV		34	7,552
ITGB4	chr17:73717383- 73753811	SNV	InDel	CNV		43	8,634
JAK1	chr1:65300220- 65432212	SNV	InDel	CNV		25	4,964

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
KDM4D	chr11:94706820-94732707	SNV	InDel	CNV		3	3,128
KDM5A	chr12:394597-498646	SNV	InDel	CNV		31	7,357
KDM5B	chr1:202698139-202778623	SNV	InDel	CNV		30	7,847
KDM5C	chrX:53221901-53254629	SNV	InDel	CNV		29	6,907
KDM6A	chrX:44732396-44971882	SNV	InDel	CNV		30	8,653
KDM6B	chr17:7743197-7756864	SNV	InDel	CNV		24	7,183
KDR	chr4:55946083-55991787	SNV	InDel	CNV		30	5,873
KEL	chr7:142638314-142659793	SNV	InDel	CNV		20	3,708
KIT	chr4:55524060-55604748	SNV	InDel	CNV		21	4,455
KLF4	chr9:110248007-110252788	SNV	InDel	CNV		5	2,768
KLHL21	chr1:6653400-6674692	SNV	InDel	CNV		7	2,676
KMT2B	chr19:36208896-36229804	SNV	InDel	CNV		35	12,030
KMT2C	chr7:151833892-152133115	SNV	InDel	CNV		61	20,730
KMT2D	chr12:49415538-49453582	SNV	InDel	CNV		56	19,661
KRAS	chr12:25362704-25403895	SNV	InDel	CNV		7	1,255
LPHN2	chr1:81771820-82458145	SNV	InDel	CNV		37	9,576
LRIG2	chr1:113615767-113669847	SNV	InDel	CNV		19	8,385
LRP1B	chr2:140990730-142889295	SNV	InDel	CNV		92	19,486
LZTR1	chr22:21333726-21353346	SNV	InDel	CNV		20	8,482
MALT1	chr18:56338593-56415288	SNV	InDel	CNV		17	5,254
MAP2K1	chr15:66679130-66782978	SNV	InDel	CNV		12	2,662
MAX	chr14:65472897-65569438	SNV	InDel	CNV		9	1,791
MDM2	chr12:69201927-69238000	SNV	InDel	CNV		17	4,046
MDM4	chr1:204485482-204527834	SNV	InDel	CNV		14	7,708
MEG3	chr14:101297758-101327360	SNV	InDel	CNV		1	29,603
MET	chr7:116312223-116436203	SNV	InDel	CNV		25	6,362

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
MLH1	chr3:37034798-37107135	SNV	InDel	CNV		24	4,413
MRTO4	chr1:19578008-19585349	SNV	InDel	CNV		8	1,924
MSH2	chr2:47630083-47789475	SNV	InDel	CNV		19	4,423
MSH3	chr5:79950442-80171706	SNV	InDel	CNV		26	5,411
MSH5	chr6:31707700-31730478	SNV	InDel	CNV		24	6,926
MSH6	chr2:47922644-48034024	SNV	InDel	CNV		18	8,464
MTOR	chr1:11167517-11322633	SNV	InDel	CNV		58	11,647
MYB	chr6:135502428-135540334	SNV	InDel	CNV		22	5,685
MYBL1	chr8:67476907-67525554	SNV	InDel	CNV		16	3,515
MYC	chr8:128747655-128753229	SNV	InDel	CNV		3	2,675
MYCL	chr1:40363019-40367953	SNV	InDel	CNV		3	2,067
MYCN	chr2:16080535-16086244	SNV	InDel	CNV		3	2,278
MYD88	chr3:38179944-38184538	SNV	InDel	CNV		4	4,189
MZF1	chr19:59073414-59084967	SNV	InDel	CNV		7	3,350
NDRG2	chr14:21485013-21539056	SNV	InDel	CNV		22	5,713
NF1	chr17:29421920-29709159	SNV	InDel	CNV		62	24,596
NF2	chr22:29999520-30090816	SNV	InDel	CNV		17	3,117
NFKBIA	chr14:35871194-35873985	SNV	InDel	CNV		6	1,706
NOTCH1	chr9:139390498-139440339	SNV	InDel	CNV		34	9,444
NOTCH2	chr1:120457904-120612342	SNV	InDel	CNV		37	10,092
NOTCH3	chr19:15271448-15311817	SNV	InDel	CNV		33	8,797
NOTCH4	chr6:32163189-32191869	SNV	InDel	CNV		30	7,651
NRAS	chr1:115251131-115259540	SNV	InDel	CNV		5	1,074
NTRK1	chr1:156785407-156851667	SNV	InDel	CNV		20	5,356
NTRK2	chr9:87283348-87636377	SNV	InDel	CNV		24	4,900
NTRK3	chr15:88420141-88800003	SNV	InDel	CNV	Fusion	28	5,014

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
OTX2	chr14:57268428-57277222	SNV	InDel	CNV		5	1,692
PARP2	chr14:20811716-20825981	SNV	InDel	CNV		15	4,625
PDGFA	chr7:538176-559958	SNV	InDel	CNV		9	2,376
PDGFRA	chr4:55095239-55161464	SNV	InDel	CNV		30	6,913
PDGFRB	chr5:149495301-149535448	SNV	InDel	CNV		24	5,063
PIK3C2A	chr11:17111260-17229555	SNV	InDel	CNV		34	6,993
PIK3C2B	chr1:204393955-204463877	SNV	InDel	CNV		36	8,207
PIK3C2G	chr12:18400523-18800987	SNV	InDel	CNV		36	7,139
PIK3CA	chr3:178865877-178952177	SNV	InDel	CNV		23	4,832
PIK3CB	chr3:138374206-138553805	SNV	InDel	CNV		25	5,681
PIK3CD	chr1:9711765-9789002	SNV	InDel	CNV		29	6,899
PIK3CG	chr7:106505698-106545857	SNV	InDel	CNV		13	4,822
PIK3R1	chr5:67511523-67594458	SNV	InDel	CNV		18	8,562
PIK3R2	chr19:18263903-18281368	SNV	InDel	CNV		16	5,496
PMS1	chr2:190648786-190742380	SNV	InDel	CNV		17	5,206
PMS2	chr7:6013005-6048781	SNV	InDel	CNV		15	3,445
POLD1	chr19:50887436-50921300	SNV	InDel	CNV		27	6,208
POLE	chr12:133201258-133264135	SNV	InDel	CNV		47	12,784
POT1	chr7:124462557-124570062	SNV	InDel	CNV		22	4,277
PPM1D	chr17:58677519-58740938	SNV	InDel	CNV		8	2,638
PRDM2	chr1:14026668-14149704	SNV	InDel	CNV		15	8,226
PRKAR1A	chr17:66409739-66547290	SNV	InDel	CNV		16	4,344
PRKCA	chr17:64298729-64800180	SNV	InDel	CNV		20	3,796
PRKCD	chr3:53190000-53226307	SNV	InDel	CNV		23	4,095
PTCH1	chr9:98209169-98279364	SNV	InDel	CNV		27	7,372
PTCH2	chr1:45286336-45308760	SNV	InDel	CNV		24	5,022

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
PTEN	chr10:89622845-89725254	SNV	InDel	CNV		11	4,299
PTPN11	chr12:112856130-112942593	SNV	InDel	CNV		17	3,275
PTPRD	chr9:8317849-10612748	SNV	InDel	CNV		53	9,568
QKI	chr6:163835007-163992509	SNV	InDel	CNV	Fusion	15	4,864
RAF1	chr3:12625988-12705750	SNV	InDel	CNV		18	3,347
RB1	chr13:48877858-49054808	SNV	InDel	CNV		28	6,234
RELA	chr11:65421824-65430590	SNV	InDel	CNV		10	3,172
RET	chr10:43572450-43623742	SNV	InDel	CNV		20	4,829
ROS1	chr6:117609630-117747043	SNV	InDel	CNV		45	9,527
RPS6KB1	chr17:57970382-58027806	SNV	InDel	CNV		21	6,198
SAMD11	chr1:860235-879558	SNV	InDel	CNV		14	3,483
SAMD5	chr6:147829803-148058609	SNV	InDel	CNV	Fusion	3	1,041
SDHA	chr5:218313-256822	SNV	InDel	CNV		16	9,350
SDHAF2	chr11:61197489-61213568	SNV	InDel	CNV		6	1,206
SDHB	chr1:17345351-17380690	SNV	InDel	CNV		8	1,394
SDHC	chr1:161284022-161334560	SNV	InDel	CNV		8	3,965
SDHD	chr11:111957472-112064553	SNV	InDel	CNV		13	3,110
SETD2	chr3:47058558-47205492	SNV	InDel	CNV		24	9,142
SHH	chr7:155592709-155604992	SNV	InDel	CNV		7	2,446
SIGLEC11	chr19:50453202-50464454	SNV	InDel	CNV		11	2,738
SLC30A2	chr1:26365626-26372654	SNV	InDel	CNV		8	1,761
SMARCA4	chr19:11071573-11175902	SNV	InDel	CNV		43	12,904
SMARCB1	chr22:24129125-24176392	SNV	InDel	CNV		9	2,595
SMARCE1	chr17:38785012-38804785	SNV	InDel	CNV		15	3,187
SMO	chr7:128828688-128852317	SNV	InDel	CNV		12	3,704
SNCAIP	chr5:121647024-121799939	SNV	InDel	CNV		20	8,329

Gene	Region	SNV	InDel	CNV	Translocation (Fusion)	Number of regions	Size (bp)
SOX2	chr3:181429687- 181432249	SNV	InDel	CNV		1	2,563
SPTA1	chr1:158581029- 158656531	SNV	InDel	CNV		52	10,059
STAT1	chr2:191835404- 191885711	SNV	InDel	CNV		29	4,798
STAT3	chr17:40467738- 40540611	SNV	InDel	CNV		25	4,024
STAT5A	chr17:40439540- 40462712	SNV	InDel	CNV		20	5,311
STAT6	chr12:57490330- 57525947	SNV	InDel	CNV	Fusion	26	5,162
SUFU	chr10:104263694- 104389937	SNV	InDel	CNV		14	2,738
SUZ12	chr17:30264012- 30326420	SNV	InDel	CNV		17	6,871
T	chr6:166571778- 166582213	SNV	InDel	CNV		9	2,420
TCF12	chr15:57210796- 57579168	SNV	InDel	CNV		32	7,786
TEK	chr9:27109114- 27229255	SNV	InDel	CNV		23	4,975
TENM3	chr4:183065115- 183721529	SNV	InDel	CNV		32	10,932
TERT (Promoter)	chr5:1294900- 1296162	SNV	InDel	CNV		1	1,263
TMEM127	chr2:96919521- 96931776	SNV	InDel	CNV		5	1,344
TOP2A	chr17:38545746- 38574227	SNV	InDel	CNV		36	6,677
TP53	chr17:7565232- 7590893	SNV	InDel	CNV		14	2,804
TRAF7	chr16:2205674- 2226600	SNV	InDel	CNV		22	4,034
TSC1	chr9:135771597- 135820045	SNV	InDel	CNV		23	4,954
TSC2	chr16:2097441- 2138737	SNV	InDel	CNV		44	13,312
VHL	chr3:10182667- 10191854	SNV	InDel	CNV		4	2,338
WWTR1	chr3:149238567- 149421085	SNV	InDel	CNV		13	3,292
YAP1	chr11:101981167- 102101258	SNV	InDel	CNV		11	3,999
ZMYM3	chrX:70460741- 70475072	SNV	InDel	CNV		26	6,346
ZNF599	chr19:35249914- 35264159	SNV	InDel	CNV		5	2,460
ZNF865	chr19:56116746- 56129932	SNV	InDel	CNV		2	5,377

SNV, single nucleotide variant; InDel, insertion and deletion; CNV, copy number variant.