**Supplementary Table 1|**Ion AmpliSeq comprehensive cancer panel genes list (409) used on this study

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ABL1 | BLM | CRTC1 | EXT1 | HIF1A | LAMP1 | MSH6 | PAX5 | RAD50 | STK36 | WHSC1 |
| ABL2 | BLNK | CSF1R | EXT2 | HLF | LCK | MTOR | PAX7 | RAF1 | SUFU | WRN |
| ACVR2A | BMPR1A | CSMD3 | EZH2 | HNF1A | LIFR | MTR | PAX8 | RALGDS | SYK | WT1 |
| ADAMTS20 | BRAF | CTNNA1 | FAM123B | HOOK3 | LPHN3 | MTRR | PBRM1 | RARA | SYNE1 | XPA |
| AFF1 | BRD3 | CTNNB1 | FANCA | HRAS | POT1 | MUC1 | PBX1 | RB1 | TAF1 | XPC |
| AFF3 | BRIP1 | CYLD | FANCC | HSP90AA1 | LPP | MUTYH | PDE4DIP | RECQL4 | TAF1L | XPO1 |
| AKAP9 | BTK | CYP2C19 | FANCD2 | HSP90AB1 | LRP1B | MYB | PDGFB | REL | TAL1 | XRCC2 |
| AKT1 | BUB1B | CYP2D6 | FANCF | ICK | LTF | MYC | PDGFRA | RET | TBX22 | ZNF384 |
| AKT2 | CARD11 | DAXX | FANCG | IDH1 | LTK | MYCL1 | PDGFRB | RHOH | TCF12 | ZNF521 |
| AKT3 | CASC5 | DCC | FAS | IDH2 | MAF | MYCN | PER1 | RNASEL | TCF3 |  |
| ALK | CBL | DDB2 | FBXW7 | IGF1R | MAFB | MYD88 | PGAP3 | RNF2 | TCF7L1 |  |
| APC | CCND1 | DDIT3 | FGFR1 | IGF2 | MAGEA1 | MYH11 | PHOX2B | RNF213 | TCF7L2 |  |
| AR | CCND2 | DDR2 | FGFR2 | IGF2R | MAGI1 | MYH9 | PIK3C2B | ROS1 | TCL1A |  |
| ARID1A | CCNE1 | DEK | FGFR3 | IKBKB | MALT1 | NBN | PIK3CA | RPS6KA2 | TET1 |  |
| ARID2 | CD79A | DICER1 | FGFR4 | IKBKE | MAML2 | NCOA1 | PIK3CB | RRM1 | TET2 |  |
| ARNT | CD79B | DNMT3A | FH | IKZF1 | MAP2K1 | NCOA2 | PIK3CD | RUNX1 | TFE3 |  |
| ASXL1 | CDC73 | DPYD | FLCN | IL2 | MAP2K2 | NCOA4 | PIK3CG | RUNX1T1 | TGFBR2 |  |
| ATF1 | CDH1 | DST | FLI1 | IL21R | MAP2K4 | NF1 | PIK3R1 | SAMD9 | TGM7 |  |
| ATM | CDH11 | EGFR | FLT1 | IL6ST | MAP3K7 | NF2 | PIK3R2 | SBDS | THBS1 |  |
| ATR | CDH2 | EML4 | FLT3 | IL7R | MAPK1 | NFE2L2 | PIM1 | SDHA | TIMP3 |  |
| ATRX | CDH20 | EP300 | FLT4 | ING4 | MAPK8 | NFKB1 | PKHD1 | SDHB | TLR4 |  |
| AURKA | CDH5 | EP400 | FN1 | IRF4 | MARK1 | NFKB2 | PLAG1 | SDHC | TLX1 |  |
| AURKB | CDK12 | EPHA3 | FOXL2 | IRS2 | MARK4 | NIN | PLCG1 | SDHD | TNFAIP3 |  |
| AURKC | CDK4 | EPHA7 | FOXO1 | ITGA10 | MBD1 | NKX2-1 | PLEKHG5 | SEPT9 | TNFRSF14 |
| AXL | CDK6 | EPHB1 | FOXO3 | ITGA9 | MCL1 | NLRP1 | PML | SETD2 | TNK2 |  |
| BAI3 | CDK8 | EPHB4 | FOXP1 | ITGB2 | MDM2 | NOTCH1 | PMS1 | SF3B1 | TOP1 |  |
| BAP1 | CDKN2A | EPHB6 | FOXP4 | ITGB3 | MDM4 | NOTCH2 | PMS2 | SGK1 | TP53 |  |
| BCL10 | CDKN2B | ERBB2 | FZR1 | JAK1 | MEN1 | NOTCH4 | POU5F1 | SH2D1A | TPR |  |
| BCL11A | CDKN2C | ERBB3 | G6PD | JAK2 | MET | NPM1 | PPARG | SMAD2 | TRIM24 |  |
| BCL11B | CEBPA | ERBB4 | GATA1 | JAK3 | MITF | NRAS | PPP2R1A | SMAD4 | TRIM33 |  |
| BCL2 | CHEK1 | ERCC1 | GATA2 | JUN | MLH1 | NSD1 | PRDM1 | SMARCA4 | TRIP11 |  |
| BCL2L1 | CHEK2 | ERCC2 | GATA3 | KAT6A | MLL | NTRK1 | PRKAR1A | SMARCB1 | TRRAP |  |
| BCL2L2 | CIC | ERCC3 | GDNF | KAT6B | MLL2 | NTRK3 | PRKDC | SMO | TSC1 |  |
| BCL3 | CKS1B | ERCC4 | GNA11 | KDM5C | MLL3 | NUMA1 | PSIP1 | SMUG1 | TSC2 |  |
| BCL6 | CMPK1 | ERCC5 | GNAQ | KDM6A | MLLT10 | NUP214 | PTCH1 | SOCS1 | TSHR |  |
| BCL9 | COL1A1 | ERG | GNAS | KDR | MMP2 | NUP98 | PTEN | SOX11 | UBR5 |  |
| BCR | CRBN | ESR1 | GPR124 | KEAP1 | MN1 | PAK3 | PTGS2 | SOX2 | UGT1A1 |  |
| BIRC2 | CREB1 | ETS1 | GRM8 | KIT | MPL | PALB2 | PTPN11 | SRC | USP9X |  |
| BIRC3 | CREBBP | ETV1 | GUCY1A2 | KLF6 | MRE11A | PARP1 | PTPRD | SSX1 | VHL |  |
| BIRC5 | CRKL | ETV4 | HCAR1 | KRAS | MSH2 | PAX3 | PTPRT | STK11 | WAS |  |