**Supplementary Table S1: Cancer associated genes panel of MSK-IMPACT assay.**

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| **Version 2 (n=230)** |  |
| ABL1 | CARD11 | CTNNB1 | ERG | GNAS | KDM5C | MLH1 | NTRK1 | PRKAR1A | SOX2 |  |  |  |  |  |  |
| ABL2 | CBL | CYLD | ESR1 | GOLPH3 | KDM6A | MLST8 | NTRK2 | PRKCI | SPOP |  |  |  |  |  |  |
| AKT1 | CBLB | DAXX | ETV1 | GRIN2A | KDR | MPL | NTRK3 | PTCH1 | SRC |  |  |  |  |  |  |
| AKT2 | CBLC  | DDR2 | ETV6 | GSK3B | KEAP1 | MSH2 | PAK7 | PTEN | STK11 |  |  |  |  |  |  |
| AKT3 | CCND1 | DICER1 | EZH2 | HDAC2 | KIT | MSH6 | PARK2 | PTPN11 | SUFU |  |  |  |  |  |  |
| ALK | CCNE1 | DIS3 | FAM123B | HIF1A | KLF6 | MTOR | PARP1 | PTPRD | TBK1 |  |  |  |  |  |  |
| ALOX12B | CD79B | DNMT1 | FAM46C | HMGA2 | KMT2A | MYB | PAX5 | PTPRS | TEK |  |  |  |  |  |  |
| APC | CDC42EP2 | DNMT3A | FAS | HNF1A | KMT2D | MYC | PBRM1 | RAF1 | TERT |  |  |  |  |  |  |
| AR | CDC73 | DNMT3B | FBXW7 | HRAS | KMT2C | MYCL1 | PDGFRA | RARA | TET1 |  |  |  |  |  |  |
| ARAF | CDH1 | EGFR | FGFR1 | HSP90AA1 | KRAS | MYCN | PDGFRB | RB1 | TET2 |  |  |  |  |  |  |
| ARHGAP26 | CDK4 | EIF4EBP1 | FGFR2 | IDH1 | LDHA | NCOA2 | PHOX2B | REL | TGFBR2 |  |  |  |  |  |  |
| ARID1A | CDK6 | EP300 | FGFR3 | IDH2 | LGR6 | NF1 | PIK3C2G | RET | TMPRSS2 |  |  |  |  |  |  |
| ASXL1 | CDK8 | EPHA3 | FGFR4 | IGF1R | MAGI2 | NF2 | PIK3CA | RICTOR | TNFAIP3 |  |  |  |  |  |  |
| ATM | CDKN2A | EPHA5 | FH | IGFBP7 | MAP2K1 | NFE2L2 | PIK3CB | RPTOR | TOP1 |  |  |  |  |  |  |
| ATRX | CDKN2B | EPHA6 | FLCN | IKBKE | MAP2K2 | NFKB1 | PIK3CD | RUNX1 | TP53 |  |  |  |  |  |  |
| AURKA | CDKN2C | EPHA7 | FLT1 | IKZF1 | MAP2K4 | NFKB2 | PIK3CG | SDHB | TP63 |  |  |  |  |  |  |
| BAP1 | CEBPA | EPHA8 | FLT3 | INSR | MAP3K8 | NKX2-1 | PIK3R1 | SETD2 | TSC1 |  |  |  |  |  |  |
| BCL2L1 | CHEK1 | EPHB1 | FOXL2 | IRS1 | MCL1 | NOTCH1 | PIK3R2 | SHQ1 | TSC2 |  |  |  |  |  |  |
| BCL6 | CHEK2 | EPHB4 | GATA1 | IRS2 | MDM2 | NOTCH2 | PIK3R3 | SMAD4 | TSHR |  |  |  |  |  |  |
| BIRC2 | CREBBP | EPHB6 | GATA2 | JAK1 | MDM4 | NOTCH3 | PKM2 | SMARCA4 | VHL |  |  |  |  |  |  |
| BRAF | CRKL | ERBB2 | GATA3 | JAK2 | MEN1 | NOTCH4 | PLK2 | SMARCB1 | WT1 |  |  |  |  |  |  |
| BRCA1 | CRLF2 | ERBB3 | GNA11 | JAK3 | MET | NPM1 | PNRC1 | SMO | YAP1 |  |  |  |  |  |  |
| BRCA2 | CSF1R | ERBB4 | GNAQ | JUN | MITF | NRAS | PREX2 | SOCS1 | YES1 |  |  |  |  |  |  |
| **46 Genes Added in Version 3 (n=275)** | **1 Gene removed in Version 3 (n=275)** |
| ARID2 | CDK12 | EPHA2 | FBXO11 | GRM3 | LMO1 | PPP2R1A | ROR2 | TNFRSF14 | ZRSR2 | CBLC |  |  |  |  |   |
| BCL2L11 | CDKN1A | EPHA4 | FLT4 | IL7R | MED12 | PRDM1 | ROS1 | U2AF1 |   |  |  |  |  |  |   |
| BCOR | CIC | EPHB2 | FUBP1 | INPP4A | MEF2B | PRKAA2 | SF3B1 | WAS |   |  |  |  |  |  |   |
| BUB1B | E2F3 | EPHB3 | GLI1 | INPP4B | MYD88 | PTPRT | SRSF2 | WNK1 |   |  |  |  |  |  |   |
| CDH11 | EPHA10 | FAT1 | GLI3 | KCNJ5 | PALB2 | RNF43 | STAG2 | XPO1 |   |   |   |   |   |   |   |
| **3 Genes Added in Version 4 (n=279)** | **1 Genes reintroduced in Version 4 (n=279)** |
| MAP3K1 | SMAD2 | SMAD3 |   |   |   |   |   |   |   | CBLC |   |   |   |   |   |
| **21 Genes Added in Version 5 (n=300)** |  |  |  |  |  |  |
| ARID1B | CCND3 | ERCC5 | HLA-A | MRE11A | POLE | RAD50 |  |  |   |  |  |  |  |  |  |
| ATR | CTCF | FAT4 | IRF4 | NBN | PPP6C | RPS6KB1 |  |  |   |  |  |  |  |  |  |
| CCND2 | ERCC2 | FKBP1A | MAPK1 | PMS2 | RAC1 | SYK |  |  |   |  |  |  |  |  |  |
| **100 Genes Added in Version 6 (n=341)** | **59 Genes removed in Version 6 (n=341)** |
| ARID5B | BLM | CTLA4 | FAM175A | HGF | KLF4 | NSD1 | RAD51C | RPS6KA4 | SOX9 | ABL2 | EIF4EBP1 | EPHB6 | HIF1A | MAP3K8 | PRKCI |
| ASXL2 | BMPR1A | CUL3 | FANCA | HIST1H1C | LATS1 | PAK1 | RAD51D | RPS6KB2 | SPEN | ARHGAP26 | EPHA10 | FAS | HLA-A | MLST8 | ROR2 |
| AURKB | BRD4 | DCUN1D1 | FANCC | HIST1H2BD | LATS2 | PDCD1 | RAD52 | RYBP | STK40 | BIRC2 | EPHA2 | FAT4 | HMGA2 | MYB | RPS6KB1 |
| AXIN1 | BRIP1 | DOT1L | FGF19 | HIST1H3B | MAP3K13 | PDPK1 | RAD54L | SDHA | SUZ12 | BUB1B | EPHA4 | FBXO11 | HSP90AA1 | NCOA2 | SRSF2 |
| AXIN2 | BTK | EED | FGF3 | ICOSLG | MAX | PIK3C3 | RASA1 | SDHAF2 | TBX3 | CBLB | EPHA6 | FKBP1A | IGFBP7 | NFKB1 | TBK1 |
| AXL | CASP8 | EGFL7 | FGF4 | IFNGR1 | MDC1 | PIM1 | RBM10 | SDHC | TGFBR1 | CBLC | EPHA7 | GLI1 | KCNJ5 | NFKB2 | TEK |
| B2M | CBFB | EIF1AX | FOXA1 | IGF1 | MUTYH | PMAIP1 | RECQL4 | SDHD | TMEM127 | CDC42EP2 | EPHA8 | GLI3 | KLF6 | PKM2 | WAS |
| BARD1 | CD274 | EPCAM | FOXP1 | IGF2 | MYOD1 | PMS1 | RFWD2 | SH2D1A | TRAF7 | CDH11 | EPHB2 | GOLPH3 | LDHA | PPP6C | WNK1 |
| BBC3 | CD276 | ERCC3 | GREM1 | IL10 | NCOR1 | RAD51 | RHOA | SMARCD1 | VTCN1 | CEBPA | EPHB3 | GRM3 | LGR6 | PREX2 | ZRSR2 |
| BCL2 | CDKN1B | ERCC4 | H3F3C | KDM5A | NKX3-1 | **RAD51B** | RIT1 | SOX17 | XIAP | CYLD | EPHB4 | HDAC2 | MAGI2 | PRKAA2 |   |
| **62 Genes Added in Version 7 (n=410)** | **7 Genes reintroduced in Version 7 (n=410)** |
| ACVR1 | CSF3R | FYN | HIST1H3E | HIST2H3D | MAP3K14 | NFKBIA | RAD21 | TCF3 |   | CEBPA |  |  |  |  |   |
| ANKRD11 | CXCR4 | GPS2 | HIST1H3F | HIST3H3 | MAPK3 | NUP93 | RHEB | TCF7L2 |   | EPHA7 |  |  |  |  |   |
| BCL10 | DNAJB1 | H3F3A | HIST1H3G | HOXB13 | MGA | PGR | SH2B3 | TRAF2 |   | GLI1 |  |  |  |  |   |
| BIRC3 | EIF4A2 | H3F3B | HIST1H3H | ID3 | MST1 | PLCG2 | STAT3 | VEGFA |   | HLA-A |  |  |  |  |   |
| CALR | EIF4E | HIST1H3A | HIST1H3I | INHA | MST1R | POLD1 | STAT5A | XRCC2 |   | PPP6C |  |  |  |  |   |
| CD79A | ERRFI1 | HIST1H3C | HIST1H3J | INHBA | NCOA3 | PPM1D | STAT5B | ZFHX3 |   | SRSF2 |  |  |  |  |   |
| CENPA | FOXO1 | HIST1H3D | HIST2H3C | MALT1 | NEGR1 | RAB35 | TCEB1 |   |   | ZRSR2 |   |   |   |   |   |
| **54 Genes Added in Version 8 (n=468)** | **4 Gene reintroduced in Version 8 (n=468)** |
| AGO2 | DROSHA | FAM58A | LYN | NUF2 | PTP4A1 | RTEL1 | SLX4 | TAP2 |   | CYLD |  |  |  |  |   |
| BABAM1 | DUSP4 | HLA-B | MAPKAP1 | PDCD1LG2 | RAC2 | RXRA | SMYD3 | TP53BP1 |   | PRKCI |  |  |  |  |   |
| CARM1 | ELF3 | INPPL1 | MSH3 | PPARG | RECQL | SESN1 | SOS1 | UPF1 |   | PREX2 |  |  |  |  |   |
| CDC42 | EPAS1 | KMT2B  | MSI1 | PPP4R2 | RRAGC | SESN2 | SPRED1 | WHSC1 |   | TEK |  |  |  |  |   |
| CSDE1 | ERF | KMT5A | MSI2 | PRDM14 | RRAS | SESN3 | STK19 | WHSC1L1 |   |  |  |  |  |  |   |
| CYSLTR2 | EZH1 | KNSTRN | NTHL1 | PRKD1 | RRAS2 | SHOC2 | TAP1 | WWTR1 |   |   |   |   |   |   |   |