

5 Supplementary materials from No.1 to No.5

104 cancer- related genes

CSNK1G1, BCAR3, HIF1A, CREB5, CREB3L4, CD40, FAS, TNFRSF4, TNFRSF11A, TNFRSF10B, PIAS1, REL, SH2D3A, NGFR, MDM2, TNFRSF10D, TP73, BLM, SMC1B, NOS1AP, CREB3L1, CSK, LTBR, RELB, CSNK1G2, RAD9A, SMC1A, BCAS4, EDA2R, BCAS1, GADD45GIP1, GRAP, TNFRSF1A, BCAS3, SH2B3, PML, MYD88, GRAP2, NCK2, CDC25A, FANCA, CD27, CREB3, LDLRAP1, FANCE, CREB3L2, TNFRSF10C, FANCF, TNFRSF10A, TNFRSF21, GRB2, SH2B2, PIK3AP1, AP3B2, CSNK1E, GADD45B, TNFRSF11B, TNFRSF19, TNFRSF17, MDM4, TLK1, CSNK1A1, VCP, CSNK1G3, ATF2, MAPK8, TNFRSF18, SHC1, GADD45G, SH2B1, GAB2, HIPK2, CSNK1D, NFKB2, TNFRSF12A, ATF4, TNFRSF25, FANCC, TNFRSF9, CDK2, MDC1, TNFRSF1B, FANCG, SHB, CDC25C, ABL1, NFKB1, DIRAS3, PIK3CA, FAM83B, EGFR, RINT1, MYC, NBN, GATA3, PTEN, ATM, MRE11A, FANCD2, ERBB2, H2AFX, CDH1, STK11, TP53

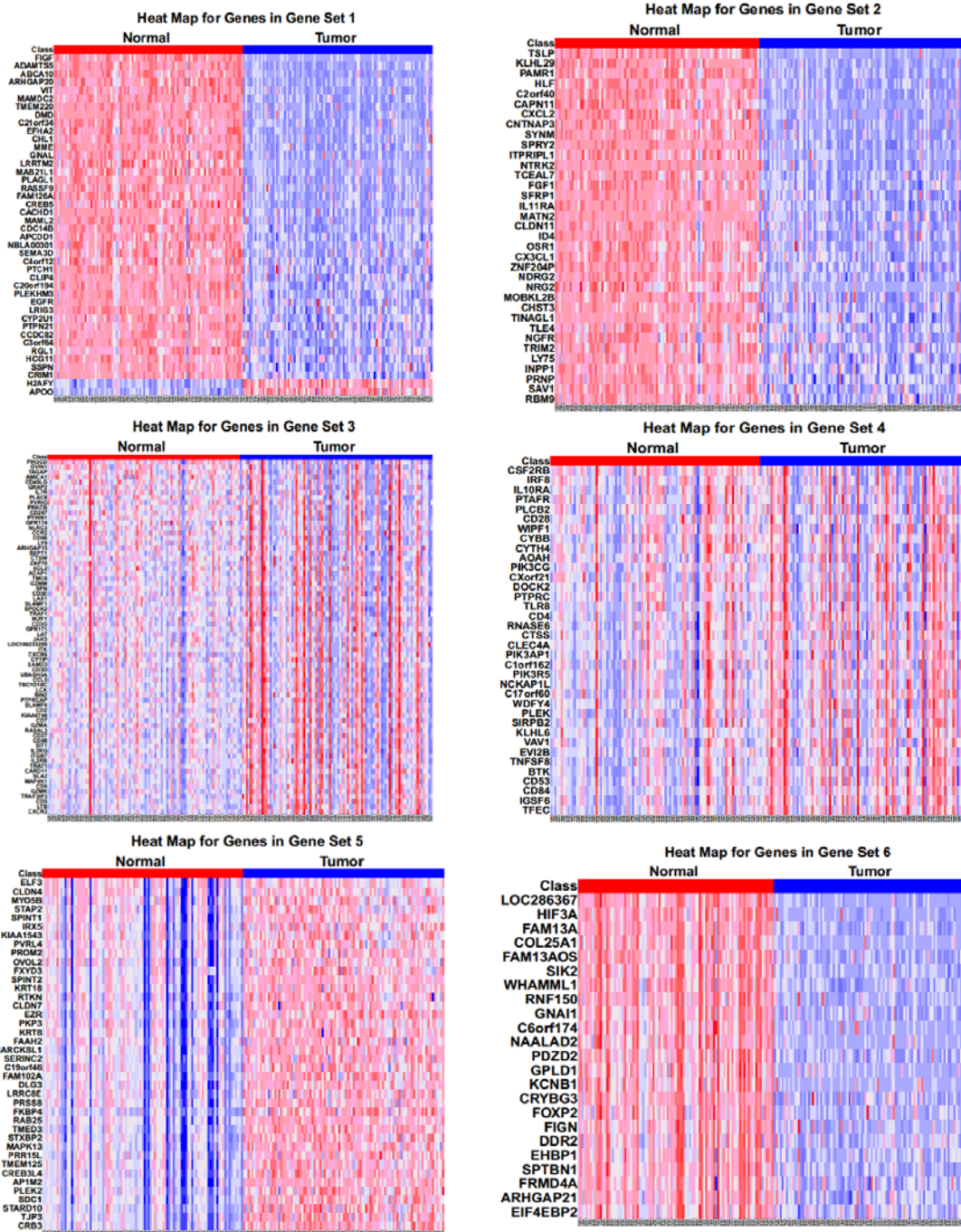
Supplementary material No.2

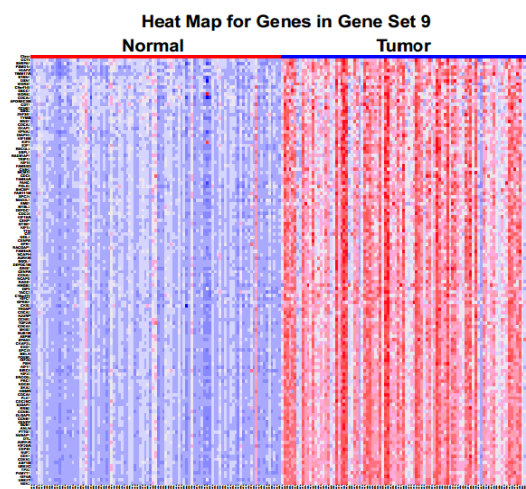
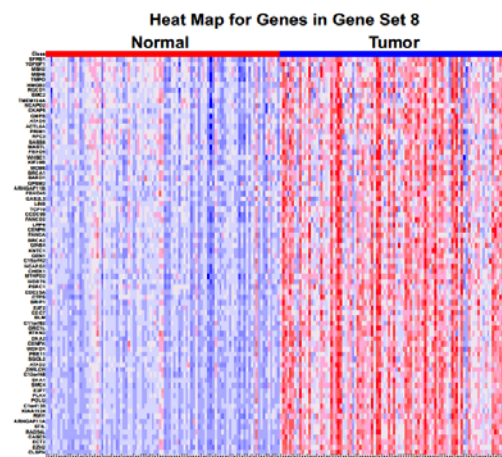
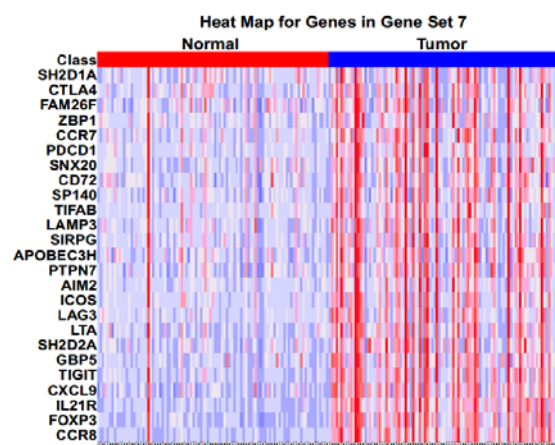
473 screened genes allocated in 9 subsets

Subset & Size	Gene Name
No. 1 42	ABCA10, ADAMTS5, APCDD1, APOO, ARHGAP20, C20orf194, C21orf34, C4orf12, CDC14B, CHL1, CREB5, CRIM1, CYP2U1, EFHA2, FIGF, GNAL, LRRTM2, MAB21L1, MAMDC2, MME, NBLA00301, PLAGL1, PTPN21, SEMA3D, SSPN, RGL1, CACHD1, RASSF9, TMEM220, H2AFY, PLEKHM3, VIT, CLIP4, DMD, CCDC82, C3orf64, FAM126A, LRIG3, EGFR, HCG11, MAML2, PTCH1
No. 2 35	CHST3, ITPRIPL1, PRNP, SAV1, TLE4, TRIM2, CNTNAP3, LY75, MOBKL2B, RBM9, CX3CL1, C2orf40, CAPN11, CLDN11, CXCL2, FGF1, HLF, ID4, IL11RA, INPP1, KLHL29, MATN2, NDRG2, NGFR, NRG2, NTRK2, OSR1, PAMR1, SFRP1, SPRY2, SYNM, TCEAL7, TINAGL1, TSLP, ZNF204P
No. 3 70	AMICA1, PIK3CD, ARHGAP15, BIN2, CCR2, GRAP2, IKZF1, KIAA0748, LAX1, LOC100233209, PRKCB, SPN, TAGAP, CD3G, CD40LG, CYTIP, GPR171, GPR174, GVIN1, IL7R, ITK, NLRC3, PLAC8, PYHIN1, SLAMF1, SLAMF6, TRAT1, CD96, LY9, SAMD3, CCL5, CD247, CD27, CD2, CD3D, CD3E, CD48, CD5, CD6, CTSW, CXCR3, CXCR6, GZMA, GZMK, IL2RB, IL2RG, JAK3, LCK, SIT1, SLA2, SPOCK2, TRAF3IP3, UBASH3A, XCL2, ZAP70, ACAP1, CARD11, CD7, GZMM, ITGB7, LAT, LTB, MAP4K1, PTPRCAP, PVRIG, RASAL3, SEPT1, TBC1D10C, TMC8, TRAF1
No. 4 36	AOAH, CSF2RB, KLHL6, PTPRC, BTK, C17orf60, C1orf162, CD28, CD4, CD53, CD84, CLEC4A, CTSS, CXorf21, CYBB, CYTH4, DOCK2, EVI2B, IGSF6, IL10RA, IRF8, NCKAP1L, PIK3AP1, PIK3CG, PIK3R5, PLCB2, PLEK, PTAFR, RNASE6, SIRPB2, TFEC, TLR8, TNFSF8, VAV1, WDFY4, WIPF1
No. 5 40	STARD10, DLG3, FAAH2, FAM102A, IRX5, LRRC8E, PRR15L, AP1M2, C19orf46, CLDN7, CRB3, CREB3L4, EZR, KIAA1543, KRT18, KRT8, MAPK13, PLEK2, STXBP2, TJP3, TMEM125, FKBP4, CLDN4, ELF3, FXYD3, MARCKSL1, MYO5B, OVOL2, PKP3, PROM2, PRSS8, PVRL4, RAB25, RTKN, SDC1, SERINC2, SPINT1, SPINT2, STAP2, TMED3
No. 6 23	ARHGAP21, C6orf174, COL25A1, CRYBG3, DDR2, EHBP1, EIF4EBP2, FAM13A, FAM13AOS, FIGN, FOXP2, FRMD4A, GNAI1, GPLD1, HIF3A, KCNB1, LOC286367, NAALAD2, PDZD2, RNF150, SIK2, SPTBN1, WHAMML1
No. 7 25	SH2D1A, AIM2, CTLA4, GBP5, ICOS, LAG3, LAMP3, ZBP1, APOBEC3H, CCR7, CCR8, CD72, CXCL9, FAM26F, FOXP3, IL21R, LTA, PDCD1, PTPN7, SH2D2A, SIRPG, SNX20, SP140, TIFAB, TIGIT
No. 8 77	PSRC1, LRP8, CTPS, GPSM2, HMGB2, ORC1L, SKA1, E2F2, RAD54L, C15orf42, CDC25A , C1orf135, NCAPD2, FANCA , STIL, GINS4, CHEK1 , EZH2 , WHSC1, CDC7, C11orf82, KIAA1524 , PLK4, SMC4, CENPN, ARHGAP11B, CENPK, BLM, C12orf48, CKAP5, CLSPN, POLQ, PRR11, MCM6, TCF19, ARHGAP11A, E2F7, GAS2L3, CASC5, BRIP1 , SGOL2, ATAD5, FBXO5, KIF20B, KNTC1, LIN9, MASTL, MSH2 , MSH6 , PRIM1, RFC3, SASS6, SMC2, TMEM194A, TMPO, TOPBP1 , CCDC99, GMPs, GEN1, DNA2, WDHD1, RTKN2, ATAD2 , SFRS1 , BARD1 , FANCD2 , ACTL6A, RQCD1, RMI1, WDR76, BRCA1 , BRCA2 , ECT2, FBXO45, NCAPG2, ZWILCH, MTHFD2
No. 9 125	PSMD14, CDCA4, KIF18B, AURKB, C9orf140, CCNE1, CDC20, CDCA3, CDCA5, CDCA8, CDT1, CENPA, CNIH2, E2F1, EPR1, FAM64A, FAM83D, GPRIN1, KIF2C, RECQL4, SNRPA1, SPC24, STMN1, TACC3, TROAP, TYMS, WDR62, GSG2, ESPL1, BIRC5, CDKN3, EME1, FOXM1, GTSE1, HMGB3, KIF20A, KIFC1, MYBL2, NDC80, PKMYT1, PLK1, PTTG1, UBE2C, ASF1B, AURKA, C16orf75, CCNB1, CCNB2, CDC25C, CDCA2, CEP55, CKS2, DLGAP5, H2AFZ, IQGAP3, KIF4A, KPNA2, NUF2, RAD51 , TPX2, TTK, UBE2T, TIMM17A, ANLN, APOBEC3B, ASPM, CDK1, CENPF, FAM54A, GINS1, HJURP, HMMR, MELK, NEK2, NUSAP1, OIP5, PBK, PRC1, RRM2, SKA3, SPAG5, TRIP13, MKI67, BUB1B, CIT, DTL, FAM111B, KIF11, KIF18A, KIF23, SPC25, TOP2A, RAD51AP1, CDC6, CKAP2, FANCI, KIF15, MCM10, MND1, CCT5, DSCC1, DEPDC1, CENPE, CENPI, DIAPH3, E2F8, KIF14, MAD2L1, NEIL3, ZNF367, BUB1, CCNA2, CCNE2, CKAP2L, DEPDC1B, ERCC6L, EXO1, NCAPG, NCAPH, RACGAP1, SGOL1, SHCBP1, WDR67, POLE2, DSN1

Supplementary material No.3

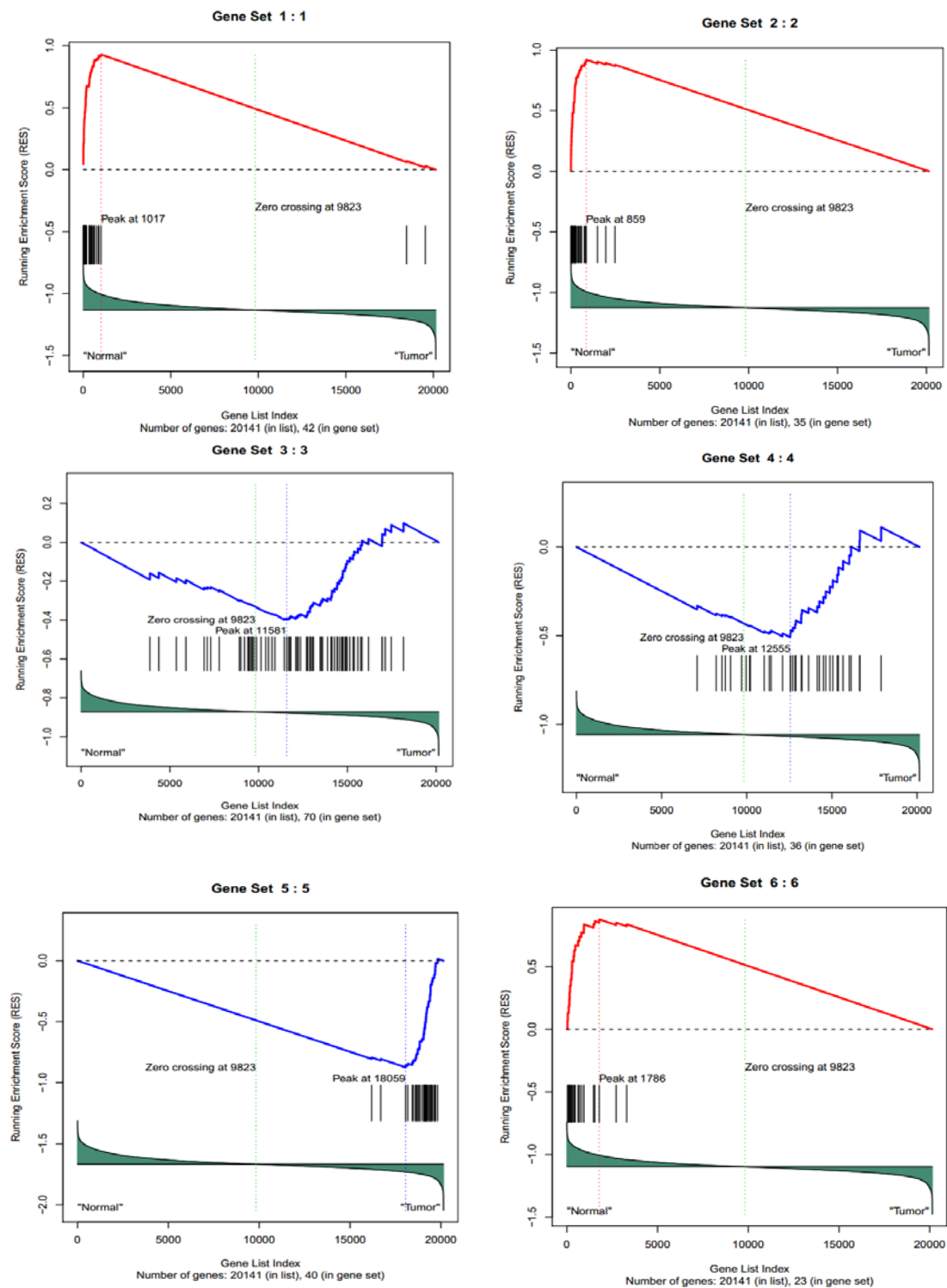
Heatmaps of 9 gene subsets

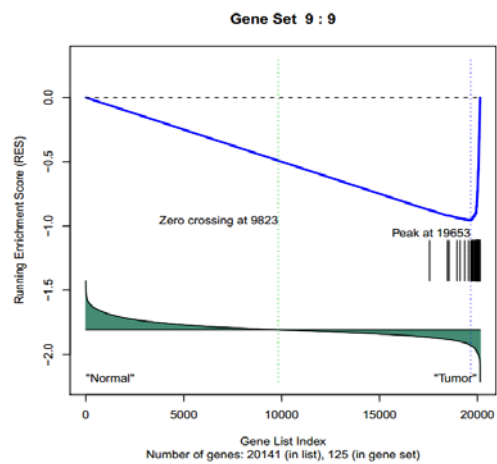
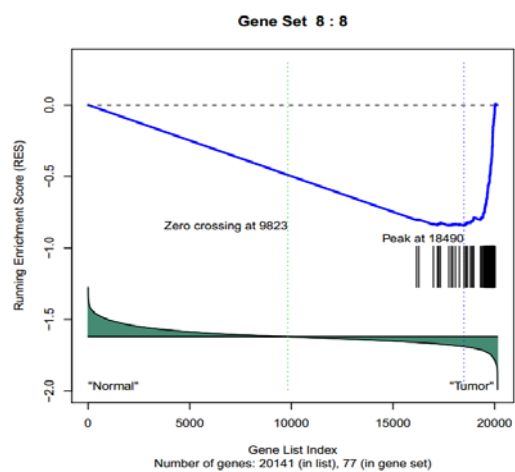
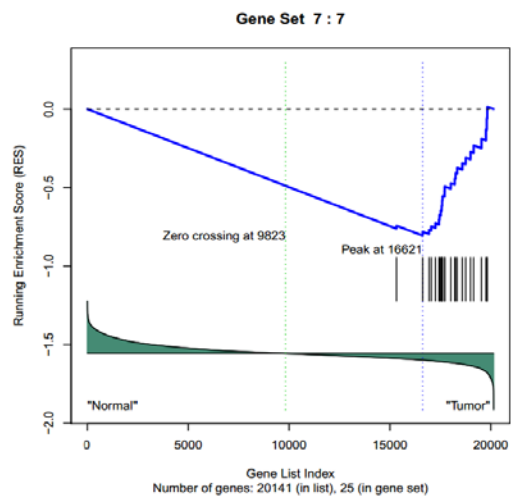




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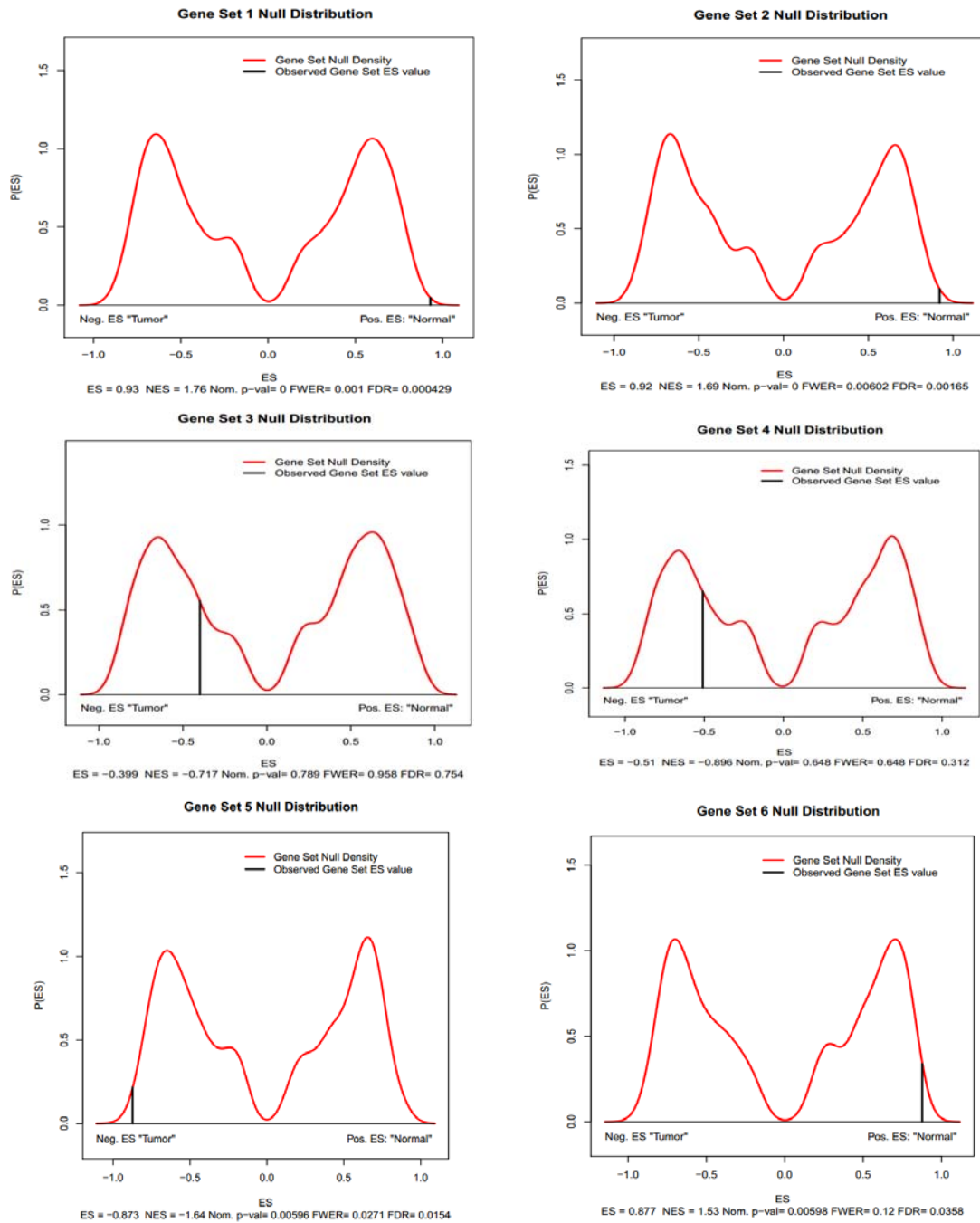
Enrichment score of 9 gene subsets



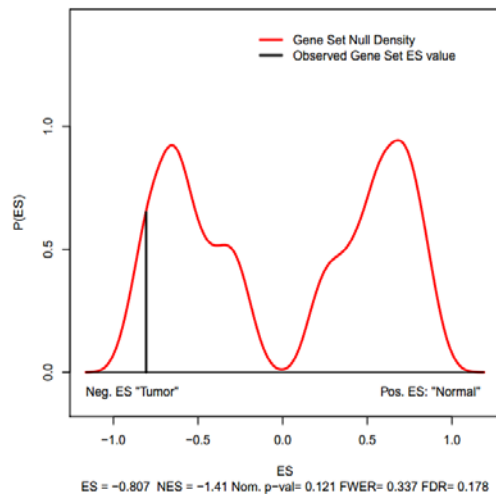


Supplementary material No.5

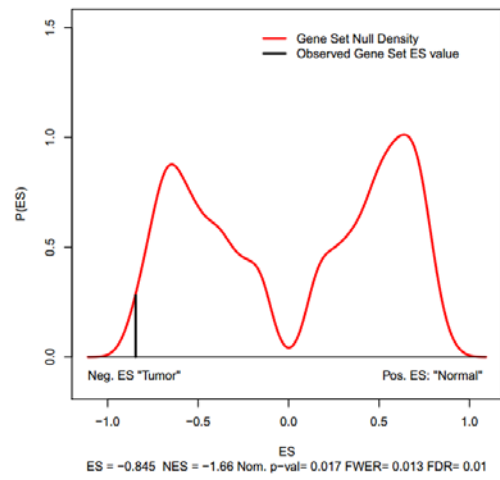
Null distribution of 9 gene subsets with class label vector permuted randomly for 1000 times



Gene Set 7 Null Distribution



Gene Set 8 Null Distribution



Gene Set 9 Null Distribution

