

S3 Table. GSEA result of DEG sets for BL and OP group

Test DEG	Pathway	p-value	DEG SetSize	Gene SetSize	Genes
BL upregulation	B-Cell Functions	0.036793	11	25	CD1D,TNFRSF14,CXCR5,PTPRC,CR2,TNFSF18,BLK,CD5,SOCS1,MS4A1,CD3E
BL upregulation	Senescence	0.176425	5	12	PRKCD,ABL1,HRAS,SERPINB2,IRF5
BL upregulation	TNF Superfamily	0.02743	13	30	TNFRSF14,LTB,TNFRSF11A,TNFSF12,TNFRSF13B,TNFRSF10C,TNFRSF4,TNFSF14,TNFSF18,TNFRSF10B,TNFRSF1B,TNFSF11,TNFSF8
BL upregulation	Notch	0.142774	9	24	KAT2B,MFNG,HDAC1,JAG1,DLL1,NOTCH2,LFNG,EP300,NOTCH1
BL upregulation	Chromatin Modification	0.186659	8	22	HDAC6,HELLS,HDAC1,MAP3K12,ARID1A,NPM2,HDAC10,RPS6KA5
BL upregulation	DNA Damage - Repair	0.003551	22	50	POLD4,UBB,BRCA2,RAD51,FANCA,H2AFX,MGMT,POLD1,FANCL,NTHL1,XPA,NBN,POLR2D,GTF2H3,POLR2H,DDB2,POLB,RFC4,MAD2L2,XRCC4,FANCG,MDC1
BL upregulation	MAPK	0.095566	48	157	AKT2,PRKCG,MAPT,CACNA1D,RASGRF1,PRKX,NGF,AKT1,GADD45G,MAPK9,DUSP10,RAF1,CACNB3,MAP3K12,MAPK12,ZAK,FGF7,DDIT3,SOS1,FGF20,PPP3CC,CACNA1H,HSPA2,CACNA1C,FGF4,CACNG1,MAP3K14,RASGRP2,STMN1,RASGRP1,MAP3K13,PRKACB,NF1,FGF18,PRKCB,RPS6KA5,PPP3CB,IKBKG,NFKB1,MAPK8,MAP3K1,NFATC1,TP53,HRAS,IKBKB,RELA,TGFB2,MAPK3

BL upregulation	Cell Cycle - Apoptosis	0.001403	51	137	AKT2,CDK4,PRKX,HDAC1,SMC1A,CDK2,ATR,NGF,AKT1,E2F1,GADD45G,GSK3B,WEE1,CDC14A,CHEK2,MCM7,CDKN1B,TNFRSF10A,CCNE2,BAD,PPP3CC,CDK6,MAP3K14,PKMYT1,CDKN2C,PRKACB,MCM5,MAD2L2,MCM4,CASP7,CAPN2,STAG2,SMC1B,CCNB3,PPP3CB,EP300,IKBKG,PIK3CD,CASP8,NFKB1,TNFRSF10C,IRAK2,IL3RA,ABL1,BCL2,TNFRSF10B,TP53,IKBKB,RELA,BCL2L1,TGFB2
OP upregulation	Interleukins	6.35E-05	21	38	IL1A,IL5,IL17F,IL1B,IFNA2,IL21,IL7,IL11,IL15,IFNA8,IL18,IL13,IFNG,IL24,IFNA7,IL26,IL25,IFNA1,IL27,IFNA17,IL12B
OP upregulation	Complement	0.00442	9	15	C7,CCL25,C1QA,C1S,C8B,C1QB,C6,C8A,C9
OP upregulation	Cytokines	0.013393	22	56	IL1A,IL5,IL1B,PTGS2,CCR4,IL21,NOD2,IL2,IL9,IL11,IL22,CD70,IL23R,IL13,IFNG,IL24,IL26,IL5RA,CXCL10,IL12B,CCR2,CCL3L1
OP upregulation	Pathogen Defense	0.014998	7	12	CTSG,PRF1,IL1B,IFNAR1,CCL22,CD8A,CXCL10
OP upregulation	TGF-beta	0.018455	20	51	BAMBI,BMP6,BMP7,TFDP1,TGFB3,BMP8A,LEFTY2,SP1,ACVR1C,PPP2CB,FAST,GDF6,PITX2,NODAL,BMP5,LEFTY1,BMPR1B,SMAD9,NOG,IFNG
OP upregulation	Hedgehog	0.031118	12	28	SMO,WNT5B,WNT6,WNT10B,GLI1,WNT3,WNT16,PRKACG,WNT2B,WNT2,GAS1,ZIC2
OP upregulation	JAK-STAT	0.074565	28	86	EPO,PRL,TSLP,LEP,SOCS3,SOCS2,PTPN11,CNTRF,TPO,MPL,GHR,IL13RA2,IFNA2,IL7,IL11,IL15,IL2RA,IL22RA1,IL23R,IL13,IFNG,IL24,IFNA7,IL3,IL5RA,CSF3,IFNA17,IL12B
OP upregulation	Cell Functions	0.10527	23	71	GZMB,CXCR4,F13A1,CD209,GZMK,TPSAB1,NEFL,MPPED1,ICOS,PMCH,LTK,CD70,PTGDR2,TNFRSF17,FUT5,FEZ1,TARP,MME,CD1A,CSF3,GATA3,GZMA,LAIR2

OP upregulation	Chemokines	0.145496	30	99	CCL25,IL13RA2,CXCR4,CCL26,CCL15,CCL16,IL1B,CCR4,CCR3,IRF2,CMKL R1,XCL2,CCL11,CCL20,IL22RA1,CCL3,CCRL2,TNFSF4,CCL22,CEACAM8,C XCL6,XCR1,IFNL2,CXCL10,CCL13,CCL1,CXCL2,CXCR6,A2M,CCL4
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BL, baseline; DEG, differentially expressed genes; GSEA, gene set enrichment analysis; OP, operation.