

## Functional Groups

### Angiogenesis and Endothelial Activation

|     |        |         |        |        |        |       |        |          |       |        |       |
|-----|--------|---------|--------|--------|--------|-------|--------|----------|-------|--------|-------|
| AGT | ANGPT1 | ANGPTL1 | CAV1   | CXCL10 | FLT3   | FOXP1 | P2RX4  | PRMT5    | SMAD4 | TCF4   | TIMP2 |
| ANG | ANGPT2 | BMPER   | CAVIN2 | F2     | FLT3LG | HSH2D | PECAM1 | SERPINF1 | SOCS5 | TGFBR1 |       |

### Apoptosis

|        |        |       |        |        |        |         |        |         |        |           |        |
|--------|--------|-------|--------|--------|--------|---------|--------|---------|--------|-----------|--------|
| ACIN1  | BCL2L1 | CASP3 | DAB2IP | FAS    | HSH2D  | MAP3K14 | PDCD5  | PTGDS   | SAMD9L | TNFRSF10A | TXNDC9 |
| AKT1   | BCL6   | CASP8 | DAXX   | FASLG  | HTT    | MAPK3   | PIK3CA | PTK2    | SAMHD1 | TNFRSF10B | UBA52  |
| AKT2   | BCLAF1 | CD14  | DFFA   | FLT3   | IKBKB  | MCL1    | PIK3CD | RAPGEF1 | SGMS1  | TNFRSF1A  | WDR33  |
| AKT3   | BIRC2  | CFLAR | DDFB   | FLT3LG | IKBKG  | MXD3    | PIK3R2 | RBMS3   | SPTAN1 | TNFSF10   | XAF1   |
| APC    | BIRC3  | CHUK  | DIABLO | G0S2   | ITPR3  | MZB1    | PRF1   | RELA    | SQSTM1 | TP53      | XIAP   |
| ATM    | BIRC5  | CIDEA | DYNLL2 | GZMB   | JUN    | NAIP    | PRKCD  | RIPK1   | SRF    | TRADD     | ZBTB38 |
| BAD    | BIRC6  | CIDEB | EXOC2  | HMGB1  | KRAS   | NFKB1   | PRKCQ  | RNASEL  | STK26  | TRAF1     |        |
| BAX    | BIRC7  | CTSC  | EXOSC2 | HMGB2  | LY96   | NFKBIA  | PSMB10 | ROCK1   | TICAM1 | TRAF2     |        |
| BCL2   | CAPN1  | CTSO  | EXOSC8 | HPCA   | MAGED1 | NRAS    | PSMB8  | RRP1B   | TLR4   | TSC22D3   |        |
| BCL2A1 | CARD16 | CTSW  | FADD   | HRAS   | MAP2K1 | PARP1   | PSMB9  | SAMD9   | TNF    | TXNDC5    |        |

### Autoantigens

|         |         |           |           |          |          |       |             |        |         |    |
|---------|---------|-----------|-----------|----------|----------|-------|-------------|--------|---------|----|
| CEACAM1 | CEACAM8 | GRN       | HIST1H2AE | HIST1H3G | HIST1H4H | LCN1  | POLR1C      | POLR3D | SPAG4   | TG |
| CEACAM4 | EEF1A1  | H2AFY2    | HIST1H2BD | HIST1H3H | ICA1     | MBP   | POLR1D_Iso1 | POLR3H | SPAG5   |    |
| CEACAM6 | ENO1    | HIST1H2AC | HIST1H2BF | HIST1H4E | IMPDH2   | PARP1 | POLR2A      | SP100  | SPATS2L |    |

### B-Cell Receptor Signaling

|       |        |        |       |        |        |        |        |        |       |      |
|-------|--------|--------|-------|--------|--------|--------|--------|--------|-------|------|
| AKT1  | BTK    | CD81   | FCRL1 | HRAS   | KRAS   | NFATC1 | NRAS   | PLCG2  | PTPN6 | VAV1 |
| AKT2  | CARD11 | CHUK   | FCRL3 | IFITM1 | LYN    | NFATC2 | ORAI1  | PNP    | RAC1  |      |
| AKT3  | CBL    | CR2    | FCRL4 | IKKBK  | MALT1  | NFKB1  | PIK3CA | PSMB10 | RELA  |      |
| BCL10 | CD19   | CUL1   | FCRL5 | IKBKG  | MAP2K1 | NFKBIA | PIK3CD | PSMB8  | SKP1  |      |
| BLK   | CD22   | FBXW11 | GRB2  | ITPR3  | MAP3K7 | NFKBIB | PIK3R2 | PSMB9  | SYK   |      |
| BLNK  | CD79A  | FCGR2B | GSK3B | JUN    | MAPK3  | NFKBIE | PLCG1  | PTPN18 | UBA52 |      |

### Cell Cycle and Proliferation

|          |       |         |        |        |         |          |         |         |         |        |       |
|----------|-------|---------|--------|--------|---------|----------|---------|---------|---------|--------|-------|
| ABL1     | CAV1  | CCNH    | CDKN2A | DNAH12 | KAT2A   | MAPK13   | PBK     | PPP2R3B | PRKN    | SAMD9  | YWHAB |
| ANXA2    | CCNA1 | CDC14B_ | CDKN2B | DUSP1  | LAMTOR3 | MAPK4    | PDE4A   | PRKAA1  | PROSER2 | SAMD9L | YWHAE |
| ANXA3    | CCNA2 | CDC14C  | CDKN2C | E2F1   | MAD2L1  | MAPK6    | PDE4B   | PRKACA  | PTPN3   | SET    | YWHAZ |
| ANXA5    | CCNB1 | CDK11B_ | CDKN2D | ELK4   | MAP2K3  | MAPK8IP2 | PLK3    | PRKAG2  | RASA3   | SRF    |       |
| ANXA6    | CCNB2 | CDK11A  | CEBPA  | GAB2   | MAP2K5  | MAPK9    | POU2F1  | PRKAR1A | RBMS3   | TACC3  |       |
| APOBEC3B | CCND2 | CDK4    | CSNK1D | GRAP2  | MAP2K6  | MOS      | PPP2CA  | PRKAR1B | RRM2    | TFDP1  |       |
| BUB1     | CCND3 | CDKN1B  | CSNK2B | HBP1   | MAP4    | MXD3     | PPP2CB  | PRKAR2B | S100A7_ | TIMP3  |       |
| BUB1B    | CCNE1 | CDKN1C  | DDX41  | HSPA8  | MAPK10  | MXD4     | PPP2R3A | PRKD1   | S100A7A | WDR33  |       |

### Cell Type Markers

|         |      |       |       |       |       |        |           |          |          |
|---------|------|-------|-------|-------|-------|--------|-----------|----------|----------|
| ALOX5AP | CD1A | CD2   | CMPK2 | KRT10 | KRT82 | MS4A1  | PRXL2A    | PTPRC_RB | SERPINB2 |
| BCR     | CD1B | CD33  | CPA3  | KRT2  | KRT9  | NCR3   | PRXL2B    | PTPRC_RC | ST14     |
| CD151   | CD1C | CD38  | ID2   | KRT24 | LCN2  | NKX2-1 | PTPRC_Pan | PTPRC_RO |          |
| CD160   | CD1D | CD79B | KRT1  | KRT5  | MME   | PECAM1 | PTPRC_RA  | SERPINB1 |          |

### Chemokine Signaling

|       |       |        |        |       |         |        |        |        |       |        |           |
|-------|-------|--------|--------|-------|---------|--------|--------|--------|-------|--------|-----------|
| AKT1  | CCL19 | CCL8   | CXCL1  | CXCL9 | GRK2    | IKBKG  | MAPK3  | PIK3CA | PTK2  | ROCK2  | XCL1      |
| AKT2  | CCL2  | CCR1   | CXCL10 | CXCR1 | GRK6    | NFKB1  | PIK3CD | PIK3CD | PTK2B | SRC    | XCL2_XCL1 |
| AKT3  | CCL20 | CCR7   | CXCL12 | CXCR4 | GSK3B   | JAK2   | PIK3R2 | PIK3R2 | RAC1  | STAT1  |           |
| ARRB2 | CCL21 | CDC42  | CXCL13 | CXCR5 | HRAS    | JAK3   | NFKBIB | PLCB1  | RAP1A | STAT2  |           |
| BRAF  | CCL3  | CHUK   | CXCL2  | CXCR6 | ICOSLG_ | KRAS   | NRAS   | PLCB2  | RELA  | STAT3  |           |
| CCL13 | CCL4  | CMKLR1 | CXCL5  | FGR   | family  | LYN    | PARD3  | PPBP   | RHOA  | STAT5B |           |
| CCL18 | CCL5  | CX3CL1 | CXCL8  | GRB2  | IKBKB   | MAP2K1 | PF4V1  | PRKCD  | ROCK1 | VAV1   |           |

### Complement Cascade

|      |         |     |      |      |     |       |       |          |          |
|------|---------|-----|------|------|-----|-------|-------|----------|----------|
| C1QA | C4A_C4B | C7  | C9   | CD59 | CFH | CRP   | FCN1  | ITGB2    | SERPINF2 |
| C1QB | C5      | C8A | CD19 | CD81 | CFP | ELANE | GZMM  | PLAUR    | SERPINF1 |
| C2   | C5AR1   | C8B | CD46 | CFB  | CLU | F13A1 | ITGAM | PROS1    | THBD     |
| C3   | C6      | C8G | CD55 | CFD  | CR2 | F8    | ITGAX | SERPINA1 | VWF      |

# Annotated Gene List

## HTG EdgeSeq

### Immune Response Panel

#### Functional Groups Continued

#### Cytotoxic Receptors and Function

|        |        |        |      |      |      |      |          |          |
|--------|--------|--------|------|------|------|------|----------|----------|
| CLEC2D | CLEC4C | CLEC4D | GZMA | GZMB | GZMH | GZMM | KIR_panL | KIR_panS |
|--------|--------|--------|------|------|------|------|----------|----------|

#### DNA Damage Sensing and Repair

|       |       |        |       |       |       |        |              |        |         |        |
|-------|-------|--------|-------|-------|-------|--------|--------------|--------|---------|--------|
| ADAR  | CCL5  | CRCP   | DDX58 | IKBKB | IL6   | NFKBIA | POLR1C       | POLR3H | RIPK1   | ZBP1   |
| AIM2  | CDC20 | CSNK1D | ERCC3 | IKBKE | IRF3  | NFKBIB | POLR1D_Iso1  | PRKDC  | RIPK3   | ZBTB38 |
| ATR   | CDC6  | CSNK2B | FOXN3 | IKBKG | IRF7  | ORC2   | POLR1D_Iso2- | PYCARD | TBK1    |        |
| BARD1 | CGAS  | CXCL10 | GHDC  | IL18  | MCM2  | PCLAF  | 3            | RELA   | TMEM173 |        |
| CASP1 | CHD4  | DDIT3  | IFNA1 | IL1B  | MSH2  | PDRG1  | POLR2M       | RFC2   | TREX1   |        |
| CCL4  | CHUK  | DDX24  | IFNB1 | IL33  | NFKB1 | POLR1B | POLR3D       | RFC4   | XRCC6   |        |

#### Epigenetics and Transcriptional Regulation

|       |        |          |       |       |        |          |      |        |         |
|-------|--------|----------|-------|-------|--------|----------|------|--------|---------|
| AICDA | CREBBP | HIST1H3G | IKZF3 | PADI2 | POU2F2 | RB1      | SP3  | TAL1   | ZNF385A |
| AIRE  | DNMT1  | HIST1H3H | MLLT3 | PADI4 | PRDM1  | RNASEH2A | SPI1 | TCF7L2 |         |
| BRWD1 | DNMT3A | IKZF1    | NF1   | PAX5  | RAG2   | SMARCA4  | SPIB | YY1    |         |

#### Fc Receptors and Phagocytosis

|        |        |              |       |       |       |        |        |        |       |       |       |
|--------|--------|--------------|-------|-------|-------|--------|--------|--------|-------|-------|-------|
| BCL10  | CHUK   | FCGR2_family | FCRL1 | GRB2  | ITPR3 | MALT1  | NFATC2 | PIK3R2 | PSMB8 | SYK   | UBA52 |
| BTK    | CUL1   | FCGR2B       | FCRL2 | HRAS  | JUN   | MAP3K7 | NFKB1  | PLCG1  | PSMB9 | TAB1  | UBB   |
| CARD11 | FCAR   | FCGR3A_      | FCRL3 | IKBKB | KRAS  | MAPK3  | NFKBIA | PLCG2  | RAC1  | TAB2  | VAV1  |
| CD163  | FCGR1A | FCGR3B       | FCRL4 | IKBKG | LAT   | MS4A2  | NRAS   | PRKCQ  | RELA  | TAB3  |       |
| CD164  | FCGR1B | FCN1         | FCRL5 | ITK   | LYN   | NFATC1 | PIK3CA | PSMB10 | SKP1  | TRAF6 |       |

#### General Immune Response Genes

|        |        |        |        |             |        |        |         |          |          |           |        |
|--------|--------|--------|--------|-------------|--------|--------|---------|----------|----------|-----------|--------|
| ACKR2  | CCL24  | CLEC6A | ENTPD1 | IFI16       | IL17B  | IRF3   | LTB4R2  | NLRP3    | S1PR1    | TLR2      | TRAF2  |
| AHR    | CCL3   | CLEC7A | FADD   | IFI35       | IL17F  | ITGA2B | MAP3K14 | NOD1     | SELE     | TLR3      | TRAF4  |
| AIRE   | CCL4   | CSF1   | FAS    | IFIT2       | IL18   | ITGA5  | MAP3K7  | NOTCH1   | SELL     | TLR4      | TRAF5  |
| ARG1   | CCL5   | CSF1R  | FCER1A | IFITM1      | IL1A   | ITGA6  | MAP4K1  | NOTCH2   | SELPLG   | TLR5      | TRAF6  |
| B2M    | CCL8   | CSF2RB | FCER1G | IFNA_Family | IL1B   | ITGAE  | MAP4K2  | PAX5     | SERPING1 | TLR7      | VSIR   |
| BATF3  | CCR1   | CSF3R  | FCGRT  | IFNA2       | IL1RAP | ITGAX  | MAP4K4  | PDCD1    | SIGIRR   | TLR8      | XBP1   |
| BCL3   | CCR2   | CTNNB1 | FKBP5  | IFNB1       | IL1RN  | ITGB1  | MAPK11  | PDCD1LG2 | SMAD5    | TLR9      | ZAP70  |
| BCL6   | CCR7   | CX3CR1 | FOXP3  | IFNGR1      | IL21R  | ITGB2  | MAPK14  | PDCD2    | SOCS3    | TNFAIP6   | ZBTB16 |
| BID    | CD209  | CXCL10 | GBP1   | IFNL1       | IL2RB  | JAK1   | MAPK8   | PLAU     | SPP1     | TNFRSF10C | ZEB1   |
| BLNK   | CD247  | CXCL11 | GBP5   | IFNL3_IFNL2 | IL2RG  | JAK3   | MARCO   | PLAUR    | STAT6    | TNFRSF11A |        |
| BTK    | CD27   | CXCL13 | GFI1   | IKBKB       | IL31   | JUN    | MBP     | PPARG    | SYK      | TNFRSF13B |        |
| BTLA   | CD274  | CXCL9  | GZMA   | IKBKE       | IL32   | JUNB   | MIF     | PRF1     | TBK1     | TNFRSF13C |        |
| CASP1  | CD40LG | CXCR3  | GZMB   | IKBKG       | IL33   | KCNJ2  | MMP3    | PTGS2    | TGFB1    | TNFRSF17  |        |
| CASP10 | CD80   | CXCR4  | GZMK   | IL10RA      | IL4R   | LAG3   | MR1     | PTK2     | TGFB1    | TNFRSF1B  |        |
| CASP2  | CD83   | CXCR6  | GZMK   | IL11RA      | IL6    | LAMP3  | MX1     | PTPN6    | TGFBR1   | TNFRSF8   |        |
| CASP3  | CHUK   | DPP4   | ICAM2  | IL12RB1     | IL7    | LCK    | MYD88   | RAF1     | TGFBR2   | TNFSF10   |        |
| CCL18  | CISH   | DUSP4  | ICAM4  | IL13RA1     | IL9    | LCP2   | NFATC1  | RELB     | TICAM1   | TNFSF12   |        |
| CCL20  | CLEC4A | EBI3   | ICAM5  | IL15        | IRAK2  | LEF1   | NFATC2  | RIPK1    | TIGIT    | TNFSF13B  |        |
| CCL22  | CLEC4E | EGR1   | ICOS   | IL16        | IRAK3  | LGALS3 | NFATC3  | RORA     | TIRAP    | TOLLIP    |        |
| CCL23  | CLEC5A | EGR2   | IDO1   | IL17A       | IRAK4  | LTB4R  | NFKB2   | S100A9   | TLR1     | TRADD     |        |

#### Immunometabolism

|        |          |       |          |        |        |             |         |         |          |            |        |
|--------|----------|-------|----------|--------|--------|-------------|---------|---------|----------|------------|--------|
| ACE    | AQP9     | CTPS1 | GUCY1B1  | IMPDH2 | MTMR3  | PKM         | POLR2A  | PSMB9   | S1PR4    | SMN1_SMN2  | UBB    |
| ACP5   | ARHGEF1  | CTSA  | GUSB     | INS    | MTR    | PLCB1       | POLR3D  | PTEN    | S1PR5    | STK11      | VAMP2  |
| AGT    | ATP6V0A1 | CYC1  | HDC      | ITPR3  | NUDT1  | PLCB2       | POLR3H  | PTGS2   | SAR1B    | TATDN1     | ZDHHC2 |
| AHR    | ATP6V0C  | ENO1  | HPRT1    | KMT2A  | OAZ1   | PLCG1       | POMC    | RAP1A   | SDC1     | TCIRG1     |        |
| ALAS2  | ATP6V1C2 | G6PD  | HSD11B1  | LPIN1  | PGK1   | PLCG2       | PPARG   | RARRES3 | SDHA     | TPO        |        |
| ALOX15 | ATP6V1H  | GLCL  | HSP90AB1 | LTF    | PIK3CA | PLD3        | PPP2R5D | RORA    | SELENBP1 | TPS_family |        |
| ALOX5  | CD44     | GMPT  | IDO1     | MAN2B1 | PIK3CD | POLR1C      | PSMB10  | RPL4    | SLC3A2   | TXN        |        |
| AQP4   | CDK8     | GSTP1 | IMPDH1   | MTMR14 | PIK3R2 | POLR1D_Iso1 | PSMB8   | S1PR1   | SLC7A5   | UBA52      |        |

#### Inflammasomes

|      |        |       |       |          |       |       |       |         |            |       |
|------|--------|-------|-------|----------|-------|-------|-------|---------|------------|-------|
| AIM2 | BCL2   | CARD8 | CASP5 | HSP90AB1 | NFKB1 | NLRP1 | P2RX7 | PSTPIP1 | RELA       | TXN   |
| APP  | BCL2L1 | CASP1 | GSDMD | MEFV     | NFKB2 | NLRP3 | PANX1 | PYCARD  | TPS_family | TXNIP |

For Research Use Only. Not for use in diagnostic procedures.

## Functional Groups Continued

### Lymphocyte Trafficking

|       |        |         |         |          |         |        |        |          |          |         |          |
|-------|--------|---------|---------|----------|---------|--------|--------|----------|----------|---------|----------|
| CD177 | CD40LG | CD8A    | CXCL12  | HLA-DOA  | family  | ITGAL  | LILRB3 | NEO1     | PTPRC_RO | S1PR4   | TMEM176A |
| CD209 | CD52   | CD96    | CXCR4   | HLA-DOB  | HLA-E   | ITGAM  | MAPK11 | PDCD1    | PVR      | S1PR5   | TNS1     |
| CD22  | CD6    | CDC42   | CYBA    | HLA-DPA1 | HLA-F   | ITGAX  | MAPK12 | PDCD1LG2 | RAC1     | SDC1    | TREM1    |
| CD274 | CD68   | CDH2    | CYBB    | HLA-DPB1 | ICAM1   | ITGB2  | MAPK14 | PDPN     | RAP1A    | SELE    | VAV1     |
| CD276 | CD7    | CEACAM3 | FAM129C | HLA-DQA1 | ICOS    | ITGB7  | MMP9   | PLCG1    | RASSF5   | SELL    | VCAM1    |
| CD28  | CD80   | CLEC4E  | HLA-A   | HLA-DQA2 | ICOSLG_ | ITK    | MPZ    | PLCG2    | RHOA     | SIGLEC1 | VCL      |
| CD34  | CD83   | CTLA4   | HLA-C   | HLA-DRA  | family  | LILRA3 | MPZL1  | PTK2     | ROCK1    | SIGLEC5 |          |
| CD4   | CD84   | CTNNB1  | HLA-DMA | HLA-DRB1 | ITGA4   | LILRA5 | MSN    | PTK2B    | ROCK2    | SIPA1   |          |
| CD40  | CD86   | CTNND1  | HLA-DMB | HLA-DRB_ | ITGA5   | LILRB1 | NCAM1  | PTPN11   | S1PR1    | TIGIT   |          |

### MHC Class I Antigen Presentation

|      |       |        |       |        |        |        |        |       |       |        |        |
|------|-------|--------|-------|--------|--------|--------|--------|-------|-------|--------|--------|
| BTK  | CYBA  | FBXO7  | HERC6 | HLA-F  | LRR1   | PSMA3  | PSMB9  | SKP1  | TAP2  | TLR4   | UBE2L6 |
| CD14 | CYBB  | FBXW11 | HLA-A | IKBKB  | LRRC41 | PSMA6  | PSMC5  | SOCS1 | TAPBP | TRIM21 | UBE2S  |
| CHUK | DTX3L | FCGR1A | HLA-C | IKBKG  | LY96   | PSMB10 | RNF126 | SOCS3 | TIRAP | UBA52  |        |
| CUL1 | ERAP2 | HERC5  | HLA-E | KBTBD8 | MYD88  | PSMB8  | SAR1B  | TAP1  | TLR2  | UBE2L3 |        |

### MHC Class II Antigen Presentation

|        |       |       |      |         |          |          |          |       |       |  |  |
|--------|-------|-------|------|---------|----------|----------|----------|-------|-------|--|--|
| ACTR1B | AP1S1 | AP2M1 | CTSA | DYNLL2  | HLA-DOA  | HLA-DPB1 | HLA-DQB2 | IFI30 | LAG3  |  |  |
| AP1B1  | AP2A1 | ARF1  | CTSC | HLA-DMA | HLA-DOB  | HLA-DQA1 | HLA-DRA  | KIF22 | SAR1B |  |  |
| AP1M1  | AP2A2 | CD74  | CTSO | HLA-DMB | HLA-DPA1 | HLA-DQA2 | HLA-DRB1 | KLC1  |       |  |  |

### Miscellaneous Cytokines

|        |         |              |        |       |        |           |           |           |          |  |  |
|--------|---------|--------------|--------|-------|--------|-----------|-----------|-----------|----------|--|--|
| ACVR2A | ADAMTS5 | CCL27        | IL17D  | IL20  | IL41   | PLP2      | TGFBR3    | TNFRSF10D | TNFRSF25 |  |  |
| ADAM10 | CCL14   | CCL3L_family | IL17RA | IL26  | PDGFA  | SERPINA12 | TNFAIP2   | TNFRSF11B | TNFSF9   |  |  |
| ADAM12 | CCL15   | CCRL2        | IL18BP | IL36B | PDGFB  | SHBG      | TNFAIP8   | TNFRSF12A |          |  |  |
| ADAM33 | CCL26   | DOCK2        | IL19   | IL36G | PDGFRB | TGFA      | TNFAIP8L1 | TNFRSF21  |          |  |  |

### Miscellaneous Receptors and Ligands

|         |        |        |        |         |          |         |        |         |        |         |        |
|---------|--------|--------|--------|---------|----------|---------|--------|---------|--------|---------|--------|
| ADGRE5  | BDNF   | CGA    | ESR1   | HBEGF   | INSR     | LGALS8  | MAPK3  | PIK3C2B | PLSCR1 | ST3GAL5 | TRIP6  |
| ADORA1  | BRAF   | CSF1   | FER    | HDGFL3  | ITGA11   | LGALS9_ | NCK2   | PIK3CA  | RAC1   | STRAP   | TSHB   |
| ADORA2A | BRD8   | CTNNB1 | FES    | HGS     | ITGA2    | family  | NOS3   | PIK3CD  | RAP1A  | TCL1A   | TSHR   |
| ADORA2B | BTC    | CTNND1 | FLT1   | HRAS    | ITGAL    | LIFR    | NPTN   | PIK3R1  | RASSF5 | TEK     | USP18  |
| ADORA3  | CCRL2  | DLGAP5 | FLT3   | ID1     | ITGAM    | LRRC32  | NRAS   | PIK3R2  | REPS2  | TFFC    | VOPPP1 |
| AKT1    | CDC42  | EGF    | FLT3LG | IDE     | ITGB2    | MAP2K1  | NRG3   | PIM1    | RHOA   | THBS1   |        |
| AKT2    | CDH11  | EGR2   | FLT4   | IGF2BP3 | KIT      | MAP4K2  | OAS3   | PIP5K1B | SAP30  | THRB    |        |
| AKT3    | CDH5   | EIF4A2 | FPR1   | IGFALS  | KRAS     | MAPK11  | OCIAD2 | PLCB1   | SELP   | TOB1    |        |
| ANGPT1  | CDHR5  | ENPP1  | GCG    | IGFBP5  | LAT      | MAPK12  | PARD3  | PLCB2   | SIPA1  | TRIM22  |        |
| APELA   | CDKN1A | ERBB2  | GCCR   | INS     | LGALS3BP | MAPK14  | PI3    | PLCG1   | SRC    | TRIM63  |        |

### mTOR Signaling

|          |         |          |       |        |       |        |        |        |          |  |  |
|----------|---------|----------|-------|--------|-------|--------|--------|--------|----------|--|--|
| AKT1     | ATP6V1H | DVL2     | HRAS  | KRAS   | MTOR  | PIK3CA | RHOA   | STK11  | TNFRSF1A |  |  |
| AKT2     | BRAF    | EIF4EBP1 | IKBKB | LPIN1  | NPRL2 | PIK3CD | SGK1   | STRADB | TSC2     |  |  |
| AKT3     | CHUK    | GRB2     | INS   | MAP2K1 | NPRL3 | PIK3R2 | SLC3A2 | TELO2  | WNT10B   |  |  |
| ATP6V1C2 | DDIT4   | GSK3B    | INSR  | MAPK3  | NRAS  | PTEN   | SLC7A5 | TNF    |          |  |  |

### NF-κB Signaling

|        |        |        |        |       |         |        |       |         |           |        |  |
|--------|--------|--------|--------|-------|---------|--------|-------|---------|-----------|--------|--|
| ATM    | BTK    | CD40LG | FBXW11 | IRAK4 | MALT1   | NFKBIE | PSMB9 | TAB1    | TNFRSF11A | TRAF3  |  |
| BCL10  | CARD11 | CFLAR  | ICAM1  | LAT   | MAP3K14 | NFKBIZ | PTGS2 | TAB2    | TNFRSF13C | TRAF5  |  |
| BCL2   | CCL13  | CHUK   | IKBKB  | LBP   | MAP3K7  | PARP1  | RELA  | TAB3    | TNFRSF1A  | TRAF6  |  |
| BCL2A1 | CCL19  | CUL1   | IKBKE  | LTA   | MYD88   | PLCG1  | RELB  | TICAM1  | TNFSF11   | TRIM25 |  |
| BCL2L1 | CCL21  | CXCL12 | IKBKG  | LTB   | NFKB1   | PLCG2  | RIPK1 | TIRAP   | TNFSF13B  | UBA52  |  |
| BIRC2  | CCL4   | CXCL2  | IL1B   | LTF   | NFKB2   | PRKCQ  | SBN02 | TLR4    | TRADD     | VCAM1  |  |
| BIRC3  | CD14   | CXCL8  | IL1R1  | LY96  | NFKBIA  | PSMB10 | SKP1  | TNF     | TRAF1     | XIAP   |  |
| BLNK   | CD40   | DDX58  | IRAK1  | LYN   | NFKBIB  | PSMB8  | SYK   | TNFAIP3 | TRAF2     | ZAP70  |  |

### NOD-like Receptor Signaling

|        |       |       |          |       |        |        |       |         |       |         |       |
|--------|-------|-------|----------|-------|--------|--------|-------|---------|-------|---------|-------|
| AIM2   | CARD8 | CXCL2 | GSDMD    | IKBKG | IRF7   | MAPK14 | NLRP1 | PLCB1   | RIPK2 | TBK1    | TRAF5 |
| APP    | CASP1 | CXCL8 | HSP90AB1 | IL18  | IRF9   | MAPK3  | NLRP3 | PLCB2   | RIPK3 | TICAM1  | TRAF6 |
| ATG5   | CASP5 | CYBA  | IFNA1    | IL1B  | ITPR3  | MEFV   | NOD1  | PRKCD   | STAT1 | TLR4    | TXN   |
| BCL2   | CASP8 | CYBB  | IFNAR1   | IL6   | JAK1   | MYD88  | NOD2  | PSTPIP1 | STAT2 | TMEM173 | TXNIP |
| BCL2L1 | CCL2  | CYLD  | IFNAR2   | IRAK1 | JUN    | NFKB1  | OAS1  | PYCARD  | TAB1  | TNF     | TYK2  |
| BIRC2  | CCL5  | FADD  | IFNB1    | IRAK2 | MAP3K7 | NFKB2  | OAS2  | RELA    | TAB2  | TNFAIP3 | UBA52 |
| BIRC3  | CHUK  | GBP2  | IKBKB    | IRAK4 | MAPK11 | NFKBIA | P2RX7 | RHOA    | TAB3  | TRAF2   | XIAP  |
| CAMP   | CXCL1 | GBP5  | IKBKE    | IRF3  | MAPK12 | NFKBIB | PANX1 | RIPK1   | TANK  | TRAF3   |       |

For Research Use Only. Not for use in diagnostic procedures.

# Annotated Gene List

## HTG EdgeSeq

### Immune Response Panel

#### Functional Groups Continued

#### Other Interleukin Signaling

|        |         |        |         |       |        |       |       |       |        |        |
|--------|---------|--------|---------|-------|--------|-------|-------|-------|--------|--------|
| ARF1   | IL10RB  | IL13   | IL18R1  | IL21  | IL27   | IL33  | IL6ST | JAK3  | STAT1  | STAT5B |
| CDC42  | IL12A   | IL15   | IL18RAP | IL21R | IL27   | IL4   | IL7   | MSN   | STAT2  | STAT6  |
| EBI3   | IL12A   | IL17A  | IL1A    | IL22  | IL27RA | IL4R  | IL7R  | PLCB1 | STAT3  | TYK2   |
| IFNG   | IL12B   | IL17C  | IL1B    | IL23A | IL27RA | IL5   | JAK1  | PPIA  | STAT3  |        |
| IL10   | IL12B   | IL17F  | IL1R1   | IL23A | IL2RA  | IL6   | JAK1  | PTPN6 | STAT4  |        |
| IL10   | IL12RB1 | IL17RC | IL1RN   | IL23R | IL2RB  | IL6R  | JAK2  | SOD1  | STAT4  |        |
| IL10RA | IL12RB1 | IL18   | IL2     | IL23R | IL2RG  | IL6ST | JAK2  | STAT1 | STAT5A |        |

#### Oxidative Stress

|       |       |        |       |         |       |        |       |         |       |         |       |
|-------|-------|--------|-------|---------|-------|--------|-------|---------|-------|---------|-------|
| AGER  | CASP3 | CYBB   | FAS   | IL18RAP | JUN   | MPV17  | NR4A2 | PSIP1   | SDC1  | STK26   | TXN   |
| AKT1  | CCL19 | DIABLO | GCLC  | IL1B    | MAPK7 | MSRB2  | NUDT1 | PTGS2   | SIRT1 | TNF     | TXNIP |
| ANXA1 | CCL5  | EP300  | GSK3B | IL1R1   | MCL1  | MTR    | PARP1 | PTK2B   | SNCA  | TNFAIP3 | XBP1  |
| APP   | CCR7  | ERO1A  | GSTP1 | IL6     | MDM2  | NFE2L1 | PCGF2 | RELA    | SOD1  | TP53    |       |
| BAD   | CHUK  | ETS1   | HIF1A | INS     | MMP3  | NFE2L2 | PRDX2 | S100A7  | SRC   | TPO     |       |
| BCL2  | CYBA  | EZH2   | HSPB1 | JAK2    | MPO   | NFKB1  | PRKCD | S100A7A | STAT6 | TRAF2   |       |

#### T-Cell Checkpoint Modulation

|         |       |      |        |       |          |          |         |          |           |          |      |
|---------|-------|------|--------|-------|----------|----------|---------|----------|-----------|----------|------|
| ADORA2A | CCL21 | CD28 | CD40   | CD86  | HAVCR2   | HLA-DQB2 | family  | PDCD1    | PTPN6     | TNFRSF14 | VAV1 |
| AKT1    | CD24  | CD3D | CD40LG | CDC42 | HLA-DPA1 | HLA-DRA  | KLRK1   | PDCD1LG2 | RAC1      | TNFRSF4  |      |
| BTLA    | CD27  | CD3E | CD5    | CSK   | HLA-DPB1 | HLA-DRB1 | LAG3    | PIK3CA   | SRC       | TNFRSF9  |      |
| CARD11  | CD274 | CD3G | CD70   | CTLA4 | HLA-DQA1 | HLA-DQA2 | LYN     | PIK3R2   | TIGIT     | TNFSF13B |      |
| CCL19   | CD276 | CD4  | CD80   | GRB2  | HLA-DQA2 | ICOSLG   | MAP3K14 | PTPN11   | TNFRSF13C | TNFSF4   |      |

#### T-Cell Receptor Signaling

|        |        |        |          |          |      |         |        |        |          |       |       |
|--------|--------|--------|----------|----------|------|---------|--------|--------|----------|-------|-------|
| AHSA1  | CBL    | CDC42  | GRB2     | HLA-DRB1 | IL10 | LY6E    | MAPK14 | NRAS   | PSMB10   | RHOA  | VAV1  |
| AHSA2P | CD28   | CHUK   | GSK3B    | HLA-DRB_ | IL2  | LY9     | MAPK3  | PDCD1  | PSMB8    | RIPK2 | VTCN1 |
| AKT1   | CD3D   | CSF2   | HLA-DPA1 | family   | IL4  | MALT1   | NFATC1 | PIK3CA | PSMB9    | SKP1  | ZAP70 |
| AKT1S1 | CD3E   | CSF2RA | HLA-DPB1 | HRAS     | IL5  | MAP2K1  | NFATC2 | PIK3CD | PTEN     | TAB2  |       |
| AKT2   | CD3G   | CSK    | HLA-DQA1 | ICOS     | ITK  | MAP3K14 | NFKB1  | PIK3R2 | PTPN22   | TNF   |       |
| AKT3   | CD4    | CTLA4  | HLA-DQA2 | IFNG     | JUN  | MAP3K7  | NFKBIA | PLCG1  | PTPN6    | TRAF6 |       |
| BCL10  | CD40LG | CUL1   | HLA-DQB2 | IKKBK    | KRAS | MAPK11  | NFKBIB | PNP    | PTPRC_RO | TRAT1 |       |
| CARD11 | CD8A   | FBXW11 | HLA-DRA  | IKBKG    | LAT  | MAPK12  | NFKBIE | PRKCQ  | RELA     | UBA52 |       |

#### TGF-Beta Signaling

|       |        |       |       |       |       |       |       |        |        |       |
|-------|--------|-------|-------|-------|-------|-------|-------|--------|--------|-------|
| BMP8A | CDK9   | E2F4  | ID1   | MAPK3 | PARP1 | SKIL  | SMAD3 | TGFB1  | TGFBR2 | TNF   |
| CBL   | CREBBP | EP300 | IFNG  | MYC   | RHOA  | SKP1  | SMAD4 | TGFB3  | TGFBR3 | UBA52 |
| CDK8  | CUL1   | FURIN | LTBP1 | PARD3 | ROCK1 | SMAD2 | SMAD5 | TGFBR1 | THBS1  |       |

#### Th1 Polarization and Response

|      |        |       |         |      |       |        |       |       |      |  |
|------|--------|-------|---------|------|-------|--------|-------|-------|------|--|
| DLL1 | IFNG   | IL12A | IL12RB1 | JAK1 | MAML3 | NOTCH3 | RELA  | STAT4 | TYK2 |  |
| DLL4 | IFNGR1 | IL12B | IL2     | JAK2 | NFKB1 | RBRJ   | STAT1 | TBX21 |      |  |

#### Th2 Polarization and Response

|       |       |       |      |     |      |      |        |        |       |  |
|-------|-------|-------|------|-----|------|------|--------|--------|-------|--|
| GATA3 | IL2   | IL2RB | IL4  | IL5 | JAG1 | JAK3 | NOTCH1 | STAT5A | STAT6 |  |
| IL13  | IL2RA | IL2RG | IL4R | IL6 | JAG2 | MAF  | NOTCH2 | STAT5B |       |  |

#### Th17 Polarization and Response

|        |        |          |        |       |        |        |        |         |        |         |
|--------|--------|----------|--------|-------|--------|--------|--------|---------|--------|---------|
| AHR    | CXCL10 | HSP90AB1 | IL17A  | IL22  | IRF4   | MAPK12 | MTOR   | S100A7  | TAB2   | TNFAIP3 |
| CCL2   | CXCL2  | HSP90B1  | IL17F  | IL23A | JAK1   | MAPK14 | NFKB1  | S100A7A | TAB3   | TRAF2   |
| CCL20  | CXCL5  | IKKBK    | IL17RC | IL23R | JAK2   | MAPK15 | NFKBIA | S100A9  | TBK1   | TRAF3   |
| CHUK   | CXCL8  | IKBKE    | IL1B   | IL2RG | JAK3   | MAPK3  | PTGS2  | SMAD2   | TGFB1  | TRAF5   |
| CSF2   | ELAVL1 | IKBKG    | IL1R1  | IL6   | JUN    | MAPK7  | RELA   | SMAD3   | TGFBR1 | TRAF6   |
| CSF2RA | GSK3B  | IL12B    | IL21   | IL6R  | MAP3K7 | MMP3   | RORA   | SMAD4   | TGFBR2 | TYK2    |
| CXCL1  | HIF1A  | IL12RB1  | IL21R  | IL6ST | MAPK11 | MMP9   | RORC   | STAT3   | TNF    |         |

#### TNF Signaling

|        |        |         |        |        |         |        |         |         |           |         |       |
|--------|--------|---------|--------|--------|---------|--------|---------|---------|-----------|---------|-------|
| ADAM17 | CASP8  | CREB3L2 | CXCL2  | IKKBK  | LIF     | MAPK3  | PIK3CA  | SELE    | TNFAIP3   | TNFSF13 | VCAM1 |
| AKT1   | CCL2   | CREB3L4 | CXCL5  | IKBKG  | LTA     | MMP3   | PIK3CD  | SOCS3   | TNFRSF10A | TRADD   | XIAP  |
| AKT2   | CCL20  | CSF1    | CYLD   | IL15   | MAP2K1  | MMP9   | PIK3R2  | SPPL2B  | TNFRSF10B | TRAF1   |       |
| AKT3   | CCL5   | CSF2    | DAB2IP | IL18R1 | MAP3K14 | NFKB1  | PTGS2   | TAB1    | TNFRSF13B | TRAF2   |       |
| ATF2   | CSFLAR | CSF2RA  | FADD   | IL1B   | MAP3K7  | NFKBIA | RELA    | TAB2    | TNFRSF17  | TRAF3   |       |
| BIRC2  | CHUK   | CX3CL1  | FAS    | IL6    | MAPK11  | NOD2   | RIPK1   | TAB3    | TNFRSF1A  | TRAF5   |       |
| BIRC3  | CREB1  | CXCL1   | FASLG  | JAG1   | MAPK12  | OTUD7B | RIPK3   | TAX1BP1 | TNFRSF1B  | UBA52   |       |
| CASP3  | CREB3  | CXCL10  | ICAM1  | JUN    | MAPK14  | OTULIN | RPS6KA5 | TNF     | TNFSF10   | USP21   |       |

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## Functional Groups Continued

### Toll-like Receptor Signaling

|       |       |         |        |        |          |         |         |        |        |                     |
|-------|-------|---------|--------|--------|----------|---------|---------|--------|--------|---------------------|
| AGER  | CCL3  | CXCL10  | IFNAR2 | IRAK2  | MAP3K7   | NFKB2   | PLCG2   | S100A9 | TBK1   | TOLLIP              |
| AKT1  | CCL4  | CXCL8   | IFNB1  | IRAK4  | MAPK11   | NFKBIA  | PPP2R5D | S100B  | TICAM1 | TRAF3               |
| AKT2  | CCL5  | CXCL9   | IKKBK  | IRF3   | MAPK12   | NFKBIB  | PTPN11  | SIGIRR | TIRAP  | TRAF6               |
| AKT3  | CD14  | ELK1    | IKBKE  | IRF7   | MAPK14   | NKIRAS2 | RAC1    | SKP1   | TLR10  | UBA52               |
| APP   | CD40  | FADD    | IKBKG  | ITGAM  | MAPK3    | NOD1    | RELA    | SOCS1  | TLR2   | UBB                 |
| ATF2  | CD80  | FBXW11  | IL12A  | ITGB2  | MAPK7    | NOD2    | RIPK1   | STAT1  | TLR4   | UNC93B1             |
| BIRC2 | CD86  | HMGB1   | IL12B  | JUN    | MAPKAPK3 | OAS3    | RIPK2   | TAB1   | TLR5   | TICAM2_TMED7-TICAM2 |
| BIRC3 | CHUK  | HSP90B1 | IL1B   | LBP    | MEF2A    | PIK3CA  | RIPK3   | TAB2   | TLR7   |                     |
| BTK   | CREB1 | IFNA1   | IL6    | LY96   | MYD88    | PIK3CD  | RPS6KA5 | TAB3   | TLR9   |                     |
| CASP8 | CUL1  | IFNAR1  | IRAK1  | MAP2K1 | NFKB1    | PIK3R2  | S100A12 | TANK   | TNF    |                     |

### Treg Differentiation

|       |        |       |       |       |        |        |  |  |  |  |
|-------|--------|-------|-------|-------|--------|--------|--|--|--|--|
| FOXP3 | IL10RA | JAK1  | SMAD3 | STAT3 | TGFBR1 | TYK2   |  |  |  |  |
| IL10  | IL10RB | SMAD2 | SMAD4 | TGFB1 | TGFBR2 | ZNF683 |  |  |  |  |

### Type I Interferon Signaling

|       |       |        |         |        |      |       |      |        |       |       |
|-------|-------|--------|---------|--------|------|-------|------|--------|-------|-------|
| ADAR  | HLA-E | IFI44  | IFIT3   | IFNA1  | IRF1 | IRF7  | JAK1 | OASL   | RSAD2 | STAT2 |
| BST2  | HLA-F | IFI44L | IFITM1  | IFNAR1 | IRF2 | IRF9  | MX1  | PSMB8  | SOCS1 | TYK2  |
| GBP2  | IFI27 | IFIH1  | IFITM2_ | IFNAR2 | IRF3 | ISG15 | OAS1 | PTPN11 | SOCS3 |       |
| HLA-A | IFI35 | IFIT1  | IFITM3  | IFNB1  | IRF4 | ISG20 | OAS2 | PTPN6  | STAT1 |       |

### Type II Interferon Signaling

|        |          |          |          |         |      |       |       |        |        |  |
|--------|----------|----------|----------|---------|------|-------|-------|--------|--------|--|
| CAMK2D | GBP2     | HLA-DPB1 | HLA-DRB1 | IFITM2_ | IRF2 | JAK1  | OASL  | SP100  | TRIM26 |  |
| CAMK2G | GBP5     | HLA-DQA1 | HLA-E    | IFITM3  | IRF3 | JAK2  | PRKCD | STAT1  | TRIM35 |  |
| CD44   | HLA-A    | HLA-DQA2 | HLA-F    | IFNG    | IRF4 | NCAM1 | PTPN6 | TRIM14 | TRIM68 |  |
| CIITA  | HLA-C    | HLA-DQB2 | ICAM1    | IFNGR1  | IRF7 | OAS1  | SOCS1 | TRIM21 | TRIM8  |  |
| FCGR1A | HLA-DPA1 | HLA-DRA  | IFI30    | IRF1    | IRF9 | OAS2  | SOCS3 | TRIM25 | VCAM1  |  |

### Vesicle and Endocytosis

|        |        |             |          |         |        |        |           |         |          |          |      |
|--------|--------|-------------|----------|---------|--------|--------|-----------|---------|----------|----------|------|
| ACPP   | BAD    | CST3        | ELP1     | HSPA8   | LOXL2  | MTOR   | PIK3R2    | RAB4A   | SERPINB1 | STXB2    | VILL |
| ANK3   | BCL2   | CTSD        | ENTR1    | IDH1    | LRP1   | NRAS   | PLEKHB2   | RAB5A   | SERPINB2 | SYNJ2    |      |
| ARF5   | BCL2L1 | CTSG        | FGD2     | IDH2    | MAP2K1 | NRBF2  | PRKCD     | RALB    | SNAP23   | TP53INP2 |      |
| ATG101 | CFLAR  | CTSL        | HIF1A    | INS     | MAP3K7 | NSF    | PRKCQ     | RALBP1  | SNAP25   | TRAF6    |      |
| ATG4B  | CLTC   | DDIT4       | HMGB1    | KRAS    | MAPK3  | PAK1   | PTEN      | REPS2   | STK11    | TSC2     |      |
| ATG5   | COPS2  | DEFA_family | HRAS     | LAMTOR3 | MTMR14 | PIK3CA | RAB11FIP1 | RRAS2   | STX4     | TSG101   |      |
| ATG9A  | COPS5  | DEFA4       | HSP90AA1 | LOXL1   | MTMR3  | PIK3CD | RAB31     | SEC14L1 | STXB1    | VAPA     |      |

### Other

|        |            |          |            |            |         |        |             |          |           |          |                  |
|--------|------------|----------|------------|------------|---------|--------|-------------|----------|-----------|----------|------------------|
| ABCA1  | ALPL       | CELF1    | EIF3J      | GSTM4      | IRS2    | MMP11  | NCOR2       | PPIA     | RPSAP58   | SNRPE    | TF               |
| ABCB1  | ANKRD22    | CELF2    | EIF3K      | GSTO1      | JMJD7-  | MMP12  | NEAT1       | PPIG     | RUNX1T1   | SNRPF    | THAP7            |
| ABCC2  | AQP1       | CIR1     | ELF3       | GTF2F1     | PLA2G4B | MMP13  | NELL2       | PRDM2    | SALL2     | SOX4     | TRA2A            |
| ABCC3  | AQP2       | CRLS1    | EPSTI1     | GTF2F2     | KDM1A   | MMP16  | NMT1        | PRICKLE1 | SCGB2A1   | SOX5     | TUBB             |
| ABCC5  | ARL3       | CRYGD    | FAM30A     | GTF2H4     | KPNA2   | MMP19  | NOMO_family | PRLR     | SCNN1A    | SPEN     | UBB              |
| ABCC8  | ATF3_      | CSTF3    | FAM81A     | GUSB       | LIX1    | MMP2   | NPM1        | PRND     | SDC2      | SPINK1   | UFD1             |
| ABCF1  | activating | CTDP1    | FBP1       | HCG11      | LPIN2   | MMP28  | NR1D2       | PRR15L   | SDHA      | SREBF1   | UTP14A           |
| ACE2   | ATF3_      | CYC1     | FGL2       | HDAC3      | LSM1    | MMP7   | NR1I3       | PRSS2    | SERPINA3  | STAU1    | UTP14C           |
| ACLY   | repressing | CYP4A11L | FOXC2      | HES1       | LSM4    | MMP8   | NRDE2       | PRTN3    | SERPINA7  | STK11IP  | VNN2             |
| ACOT1_ | ATF6       | CYP4A22  | FOXG1      | HIRIP3     | LSM5    | MPDU1  | NRF1        | PYGL     | SERPINE1  | STUB1    | WARS             |
| ACOT2  | ATP2A2     | CYP5A1   | FUBP1      | HIST1H2BK_ | LSM6    | MPP6   | OAZ1        | RAMP3    | SF3B3     | SUCNR1   | WNK1             |
| ACOT13 | ATP2B4     | DACT1    | G3BP1      | H2BFS      | LSM7    | MRPL40 | ODF1        | RBBP4    | SH3BP2    | SULT1A_  | YTHDC1           |
| ACTG2  | ATP5F1B    | DHX38    | G6PC       | HIST3H3    | MAFF    | MRPS7  | ODF2        | RBM14    | SHMT1     | family   | ZDHHC20          |
| ACTL6A | BABAM1     | DHX9     | G6PD       | HNF1B      | MBD3    | MS4A4A | PARP10      | RERE     | SLC11A2   | SURF1    | ZEB2             |
| ADI1   | BASP1      | DIS3     | GBP_family | HNRNPF     | ME1     | MTA1   | PCSK5       | RGS12    | SLC22A4   | SYN1     | ZNF532           |
| ADRB3  | BAZ2B      | DNM3     | GCOM1      | HOXA9      | MED12   | MTREX  | PCSK7       | RIMBP3_  | SLC2A3    | SYN2     | ZNF91-ZNF_family |
| AES    | BIN1       | EED      | GLDC       | HPGD       | METTL7A | MX2    | PET100      | family   | SLC33A1   | TAF1A    |                  |
| AGO1   | BRF1       | EEF1G    | GPD1       | HPRT1      | MIB2    | MYZAP  | PGK1        | RPL19    | SMN1_SMN2 | TAF5L    |                  |
| AGO2   | C19orf33   | EIF3B    | GPI        | HS3ST6     | MIP     | NAMPT  | PNOC        | RPL4     | SNCG      | TBC1D10B |                  |
| AIG1   | CAMK1G     | EIF3D    | GPR84      | IMMT       | MMP1    | NARS   | POLR2A      | RPL5     | SNRNP70   | TBP      |                  |
| ALAS1  | CCDC60     | EIF3H    | GRHPR      | IRS1       | MMP10   | NCBP1  | PPA1        | RPSA_    | SNRPD2    | TCEA1    |                  |

# Annotated Gene List

## HTG EdgeSeq

### Immune Response Panel

#### Diseases

##### Ankylosing Spondylitis

|        |       |       |         |       |        |        |        |         |          |        |
|--------|-------|-------|---------|-------|--------|--------|--------|---------|----------|--------|
| ANTXR2 | EOMES | GPR25 | HSPA6   | IL1R1 | IL6R   | LTBR   | OR5B21 | RUNX3   | TBKBP1   | TYK2   |
| BACH2  | ERAP1 | GPR35 | ICOSLG_ | IL1R2 | IL7R   | NKX2-3 | OSMR   | SH2B3   | TBX21    | UBE2E3 |
| CARD9  | ERAP2 | GPR65 | family  | IL23R | KEAP1  | NOS2   | PTGER4 | SULT1A_ | TNFRSF1A | UBE2L3 |
| CDC37  | ETS2  | HHAT  | IL12B   | IL27  | KIF21B | NPEPPS | RAVER1 | family  | TNP2     | ZMIZ1  |

##### Crohn's Disease

|          |         |         |         |         |          |          |         |         |          |          |         |
|----------|---------|---------|---------|---------|----------|----------|---------|---------|----------|----------|---------|
| ACSL6    | CD40    | DDX6    | GALC    | IKZF1   | IL6ST    | LST1     | NUPR1   | RASSF5  | SLC11A1  | TEC      | TUBD1   |
| ADA      | CD5     | DENND1B | GART    | IKZF3   | INAVA    | LTA      | ORMDL3  | RAVER1  | SLC22A5  | THADA    | TXK     |
| ADAM30   | CD58    | DNMT3A  | GPR18   | IL10    | INPP5D   | LTB      | OSM     | REL     | SLC2A4RG | THEMIS   | TYK2    |
| ADCY3    | CD6     | EMSY    | GPR183  | IL10RB  | INPP5E   | MAP3K8   | OSMR    | RELA    | SMAD3    | TMBIM1   | UBE2D1  |
| ADCY7    | CDKAL1  | EPO     | GPR35   | IL12B   | IP6K1    | MAPK1    | PDLIM4  | REV3L   | SMURF1   | TMEM50B  | UBE2L3  |
| APOBEC3G | CEBPG   | ERAP1   | GPR65   | IL12RB2 | IP6K2    | MAPKAPK2 | PFKFB4  | RIMBP3_ | SNAPC4   | TNF      | UBQLN4  |
| ARPC2    | CIITA   | ERAP2   | GPX1    | IL13    | IPMK     | MICB     | PHACTR2 | family  | SNX32    | TNFRSF18 | UCN     |
| ATF4     | CISD1   | ESRRA   | GPX4    | IL15RA  | IRF1     | MLH3     | PIGR    | RIPK2   | SOC3     | TNFRSF4  | UCN2    |
| ATG16L1  | CPEB4   | FADS1   | GSDMA   | IL18R1  | IRF8     | MLX      | PLCL1   | RIT1    | SP140    | TNFRSF6B | USP4    |
| BABAM2   | CREM    | FADS2   | GSDMB   | IL18RAP | JAK2     | MMP9     | PLTP    | RMI2    | SPHK2    | TNFRSF9  | VAMP3   |
| BACH2    | CRTC3   | FASLG   | HCK     | IL1R1   | JAZF1    | MST1     | PMPCA   | RNASET2 | SPRED2   | TNFSF11  | YDJC    |
| BSN      | CSF2    | FCGR2B  | HNF4A   | IL1R2   | KEAP1    | MST1R    | PNKD    | RORC    | SPRY4    | TNFSF15  | ZFP36L1 |
| C1orf53  | CTDSP1  | FCMR    | ICAM1   | IL1RL1  | KIAA1841 | MSTO1    | PRDM1   | RPS6KA2 | STAT1    | TNFSF18  | ZGPAT   |
| CCDC116  | CTSW    | FIGLN1  | ICAM3   | IL2     | KIF21B   | MTMR3    | PRDX5   | RPS6KA4 | STAT3    | TNFSF4   | ZMIZ1   |
| CCDC88B  | CTSZ    | FLRT1   | ICOSLG_ | IL23R   | LAT      | MUC1     | PTGDR2  | RPS6KB1 | STAT4    | TNFSF8   | ZNF831  |
| CCL11    | CXCR1   | FOS     | family  | IL24    | LGALS9_  | MYRF     | PTGER4  | RTEL1   | STAT5A   | TNIP1    |         |
| CCL13    | CXCR2   | FOSL1   | IFNAR1  | IL27    | family   | NDFIP1   | PTPN2   | SBNO2   | STAT5B   | TNP2     |         |
| CCL2     | CXCR5   | FOSL2   | IFNAR2  | IL2RA   | LIF      | NFKBIL1  | PTPN22  | SCAMP3  | SULT1A_  | TRAF3IP2 |         |
| CCL7     | DAP     | FOXO3   | IFNGR2  | IL3     | LIME1    | NKX2-3   | RABEP2  | SH2B1   | family   | TRIB1    |         |
| CCR6     | DBP     | FUT2    | IGFBP1  | IL4     | LITAF    | NOD2     | RASGRP1 | SLAMF8  | TAB1     | TRPT1    |         |
| CD19     | DCLRE1B | FYN     | IGFBP3  | IL5     | LNPEP    | NOS2     | RASIP1  | SLC10A4 | TAGAP    | TSPAN14  |         |

##### General Immune Response Genes

|        |        |        |        |             |        |        |         |          |          |           |        |
|--------|--------|--------|--------|-------------|--------|--------|---------|----------|----------|-----------|--------|
| ACKR2  | CCL24  | CLEC6A | ENTPD1 | IFI16       | IL17B  | IRF3   | LTB4R2  | NLRP3    | S1PR1    | TLR2      | TRAF2  |
| AHR    | CCL3   | CLEC7A | FADD   | IFI35       | IL17F  | ITGA2B | MAP3K14 | NOD1     | SELE     | TLR3      | TRAF4  |
| AIRE   | CCL4   | CSF1   | FAS    | IFIT2       | IL18   | ITGA5  | MAP3K7  | NOTCH1   | SELL     | TLR4      | TRAF5  |
| ARG1   | CCL5   | CSF1R  | FCER1A | IFITM1      | IL1A   | ITGA6  | MAP4K1  | NOTCH2   | SELPLG   | TLR5      | TRAF6  |
| B2M    | CCL8   | CSF2RB | FCER1G | IFNA_Family | IL1B   | ITGAE  | MAP4K2  | PAX5     | SERPING1 | TLR7      | VSIR   |
| BATF3  | CCR1   | CSF3R  | FCGR1  | IFNA2       | IL1RAP | ITGAX  | MAP4K4  | PDCD1    | SIGIRR   | TLR8      | XBP1   |
| BCL3   | CCR2   | CTNBN1 | FKBP5  | IFNB1       | IL1RN  | ITGB1  | MAPK11  | PDCD1LG2 | SMAD5    | TLR9      | ZAP70  |
| BCL6   | CCR7   | CX3CR1 | FOXP3  | IFNGR1      | IL21R  | ITGB2  | MAPK14  | PDCD2    | SOC3     | TNFAIP6   | ZBTB16 |
| BID    | CD209  | CXCL10 | GBP1   | IFNL1       | IL2RB  | JAK1   | MAPK8   | PLAU     | SPP1     | TNFRSF10C | ZEB1   |
| BLNK   | CD247  | CXCL11 | GBP5   | IFNL3_IFNL2 | IL2RG  | JAK3   | MARCO   | PLAUR    | STAT6    | TNFRSF11A |        |
| BTK    | CD27   | CXCL13 | GF11   | IKKBK       | IL31   | JUN    | MBP     | PPARG    | SYK      | TNFRSF13B |        |
| BTLA   | CD274  | CXCL9  | GNLY   | IKBKE       | IL32   | JUNB   | MIF     | PRF1     | TBK1     | TNFRSF13C |        |
| CASP1  | CD40LG | CXCR3  | GZMA   | IKBKG       | IL33   | KCNJ2  | MMP3    | PTGS2    | TGFB1    | TNFRSF17  |        |
| CASP10 | CD80   | CXCR4  | GZMB   | IL10RA      | IL4R   | LAG3   | MR1     | PTK2     | TGFB1    | TNFRSF1B  |        |
| CASP2  | CD83   | CXCR6  | GZMK   | IL11RA      | IL6    | LAMP3  | MX1     | PTPN6    | TGFBR1   | TNFRSF8   |        |
| CASP3  | CHUK   | DPP4   | ICAM2  | IL12RB1     | IL7    | LCK    | MYD88   | RAF1     | TGFBR2   | TNFSF10   |        |
| CCL18  | CISH   | DUSP4  | ICAM4  | IL13RA1     | IL9    | LCP2   | NFATC1  | RELB     | TICAM1   | TNFSF12   |        |
| CCL20  | CLEC4A | EBI3   | ICAM5  | IL15        | IRAK2  | LEF1   | NFATC2  | RIPK1    | TIGIT    | TNFSF13B  |        |
| CCL22  | CLEC4E | EGR1   | ICOS   | IL16        | IRAK3  | LGALS3 | NFATC3  | RORA     | TIRAP    | TOLLIP    |        |
| CCL23  | CLEC5A | EGR2   | IDO1   | IL17A       | IRAK4  | LTB4R  | NFKB2   | S100A9   | TLR1     | TRADD     |        |

For Research Use Only. Not for use in diagnostic procedures.

## Diseases Continued

### Irritable Bowel Syndrome

|          |        |        |        |         |        |          |         |         |          |          |         |
|----------|--------|--------|--------|---------|--------|----------|---------|---------|----------|----------|---------|
| ACSL6    | CCL2   | CXCL1  | FCMR   | ICAM1   | IL2    | ITGAL    | MSTO1   | PLCL1   | RPS6KA4  | STAT5B   | TRPT1   |
| ADA      | CCR6   | CXCL2  | FLRT1  | ICOSLG_ | IL21   | ITGB8    | MTMR3   | PLTP    | RPS6KB1  | SULT1A_  | TSPAN14 |
| ADAM30   | CD226  | CXCL3  | FOS    | family  | IL22   | JAK2     | MYRF    | PMPCA   | SLAMF1   | family   | TSPAN33 |
| ADCY3    | CD244  | CXCL5  | FOSL1  | IFIH1   | IL23R  | KIAA1841 | NDFIP1  | PNKD    | SLAMF7   | TAB1     | TTYH3   |
| ADCY7    | CD40   | CXCL8  | FOSL2  | IFNAR1  | IL24   | KIF21B   | NFIL3   | PRKCB   | SLAMF8   | TMBIM1   | TUBD1   |
| APOBEC3G | CD48   | CXCR1  | FUT2   | IFNAR2  | IL27   | KIR2DL1  | NFKBIL1 | PROCR   | SLC11A1  | TMEM50B  | TYK2    |
| ARHGAP30 | CD5    | CXCR2  | FYN    | IFNG    | IL2RA  | LIF      | NKX2-3  | PTGDR2  | SLC22A5  | TNC      | UBE2L3  |
| ARPC2    | CD58   | CXCR5  | GALC   | IFNGR2  | IL3    | LILRB4   | NLRP2   | PTGER4  | SLC2A4RG | TNFAIP3  | UBQLN4  |
| ATF4     | CD6    | DAP    | GART   | IKZF1   | IL4    | LIME1    | NOD2    | RABEP2  | SMAD3    | TNFRSF14 | UCN     |
| ATG16L1  | CEBPB  | DBP    | GNA12  | IKZF3   | IL5    | LITAF    | NUPR1   | RASSF5  | SMAD7    | TNFRSF18 | UCN2    |
| BABAM2   | CEBPG  | DDX6   | GPR18  | IL10    | IL6ST  | LNPEP    | NXPE4   | RELA    | SMURF1   | TNFRSF4  | UQC1    |
| BORCS5   | CEP250 | DLD    | GPR183 | IL10RB  | INPP5D | LPXN     | NXPE4   | RELA    | SNX32    | TNFRSF6B | USF1    |
| BSN      | CIITA  | DOK3   | GPR35  | IL12B   | INPP5E | LSP1     | ORMDL3  | REV3L   | SOCS1    | TNFRSF9  | USP4    |
| C1orf53  | CISD1  | EPO    | GPR65  | IL12RB2 | IP6K1  | MAP3K8   | OSM     | RIMBP3_ | SP140    | TNFSF15  | VDR     |
| CALM3    | CPEB4  | ERAP1  | GPX1   | IL13    | IP6K2  | MAPKAPK2 | PDLIM4  | family  | SPHK2    | TNFSF18  | YDJC    |
| CARD11   | CREM   | ERAP2  | GPX4   | IL15RA  | IPMK   | MICB     | PF4     | RIPK2   | SPRED2   | TNFSF8   | ZFP36L1 |
| CARD9    | CRTC3  | F11R   | GSDMA  | IL18R1  | IQGAP1 | MLH3     | PFKB4   | RIT1    | SPRY4    | TNIP1    | ZFP90   |
| CCDC116  | CSF2   | FADS1  | GSDMB  | IL18RAP | IRF1   | MMEL1    | PHACTR2 | RMI2    | STAT1    | TNNI2    | ZGPAT   |
| CCDC88B  | CTDSP1 | FADS2  | HCK    | IL1R1   | IRF5   | MMP9     | PIGR    | RNASET2 | STAT3    | TNPO3    | ZNF831  |
| CCL11    | CTSW   | FASLG  | HNF4A  | IL1R2   | IRF8   | MST1     | PLCG2   | RORC    | STAT4    | TRAF3IP2 |         |
| CCL13    | CTSZ   | FCGR2B | HSPA6  | IL1RL1  | ITGA4  | MST1R    | PLCH2   | RPS6KA2 | STAT5A   | TRIB1    |         |

### Multiple Sclerosis

|         |       |         |       |        |        |         |         |          |         |          |         |
|---------|-------|---------|-------|--------|--------|---------|---------|----------|---------|----------|---------|
| AGAP2   | CCR4  | CENPO   | EVI5  | IKZF3  | JAZF1  | METTL1  | PHGDH   | RGS14    | SOX8    | TNFAIP3  | ZBTB46  |
| AHI1    | CD226 | CLEC16A | EXTL2 | IL12A  | LTBR   | MMEL1   | PITPNM2 | RMI2     | SP140   | TNFRSF1A | ZC2HC1A |
| ANKRD55 | CD40  | CTSH    | FCRL1 | IL12B  | MAF    | MPV17L2 | PLEK    | RPS6KB1  | STAT3   | TNFSF14  | ZFP36L1 |
| BACH2   | CD5   | CXCR5   | FOXP1 | IL2RA  | MALT1  | MYC     | PLEKHG5 | SLAMF7   | STAT4   | TRAF3    | ZMIZ1   |
| BATF    | CD58  | DDAH1   | GALC  | IL7R   | MAMSTR | NCOA5   | PRDX5   | SLC15A2  | TAGAP   | TSFM     | ZNF767P |
| BCL10   | CD6   | DDX6    | GPR65 | INAVA  | MANBA  | NDFIP1  | PTGER4  | SLC2A4RG | TCF7    | TYK2     |         |
| CARD11  | CD69  | ELMO1   | HHEX  | IQCB1  | MAPK1  | NFKBIZ  | PTPRK   | SLC30A7  | TET2    | VCAM1    |         |
| CARM1   | CD80  | EOMES   | IFI30 | IQGAP1 | MAPK3  | NPEPPS  | PVT1    | SLC44A2  | THADA   | VMP1     |         |
| CBLB    | CD86  | EPS15L1 | IKZF1 | IRF8   | MERTK  | ODF3B   | RGS1    | SLC9A8   | TIMMDC1 | WWOX     |         |

### Psoriasis

|        |       |        |       |       |             |      |        |         |         |          |        |
|--------|-------|--------|-------|-------|-------------|------|--------|---------|---------|----------|--------|
| ATM    | DDX58 | EVI5   | IL12B | IL4   | KLF4        | NOS2 | PRSS53 | RUNX3   | STAT3   | TNFRSF9  | TYK2   |
| CARD11 | ELMO1 | FBXL19 | IL13  | ILF3  | LCE3_family | OSMR | RAVER1 | SLC45A1 | STAT5A  | TNIP1    | UBE2L3 |
| CARD14 | ERAP1 | IFIH1  | IL23A | IRF4  | MBD2        | POLI | REL    | SOCS1   | STAT5B  | TNP2     | ZMIZ1  |
| CAVIN1 | ETS1  | IFNLR1 | IL23R | KEAP1 | NFKBIA      | PRM3 | RNF114 | STAT2   | TNFAIP3 | TRAF3IP2 |        |

### Rheumatoid Arthritis

|         |         |       |          |       |        |        |        |        |          |          |         |
|---------|---------|-------|----------|-------|--------|--------|--------|--------|----------|----------|---------|
| ABHD6   | BACH2   | CCR6  | CFLAR    | EOMES | IKZF3  | INPP5B | MMEL1  | PRKCH  | RASGRP1  | SMIM20   | TPD52   |
| ACOXL   | BLK     | CD226 | COG6     | ERBB3 | IL2    | IRAK1  | MTF1   | PRKCQ  | RBPJ     | SPRED2   | TRAF1   |
| AFF3    | C1QBP   | CD28  | CSF3     | ETS1  | IL20RB | IRF4   | NFKBIE | PTPN11 | RCAN1    | STAT4    | TXNDC11 |
| ANKRD55 | C5orf30 | CD40  | CTLA4    | ETV7  | IL21   | IRF5   | P2RY10 | PTPN2  | REL      | SYNGR1   | TYK2    |
| ARID5B  | CARM1   | CD5   | CXCR5    | FADS1 | IL2RA  | IRF8   | PADI4  | PTPN22 | RTKN2    | TAGAP    | UBASH3A |
| ATG5    | CASP8   | CDK2  | DDX6     | FADS2 | IL6R   | JAZF1  | PLCL2  | PVT1   | RUNX1    | TLE3     | UBE2L3  |
| ATM     | CCL19   | CDK6  | DNASE1L3 | FADS3 | IL6ST  | LBH    | POU3F1 | PXK    | SERPINH1 | TNFAIP3  | WDFY4   |
| B3GNT2  | CCL21   | CEP57 | ELMO1    | GATA3 | ILF3   | MED1   | PPIL4  | RAD51B | SH2B3    | TNFRSF14 | YDJC    |

### Systemic Lupus Erythematosus

|        |         |        |       |       |       |         |        |         |         |          |
|--------|---------|--------|-------|-------|-------|---------|--------|---------|---------|----------|
| ABHD6  | CD44    | DHCR7  | HSPA6 | IL10  | IRF8  | NADSYN1 | PTPN22 | SH2B3   | STAT4   | TNPO3    |
| ARID5B | CD80    | EDEM3  | IFIH1 | IL12A | ITGAM | NCF2    | PXK    | SKP1    | TCF7    | TYK2     |
| ATG5   | CIITA   | ETS1   | IKZF1 | IRAK1 | JAZF1 | PHRF1   | RAD51B | SLC15A4 | TNFAIP3 | UBE2L3   |
| BANK1  | CSK     | FAM98B | IKZF2 | IRF5  | LYST  | PLD2    | RNF114 | SMG7    | TNFSF4  | UBER1BP1 |
| BLK    | CXorf21 | FLI1   | IKZF3 | IRF7  | MECP2 | PRDM1   | RO60   | SOCS1   | TNIP1   | WDFY4    |

# Annotated Gene List

## HTG EdgeSeq

### Immune Response Panel



#### Diseases Continued

##### Type I Diabetes

|         |         |       |        |       |       |        |         |        |           |         |         |
|---------|---------|-------|--------|-------|-------|--------|---------|--------|-----------|---------|---------|
| AFF3    | CD226   | DEXI  | FUT2   | GRB14 | IKZF1 | IL2RA  | NAA25   | PHTF1  | RASGRP1   | SH2B3   | TRIB3   |
| BACH2   | CD69    | DGKA  | GCK    | GSDMB | IKZF4 | IL7R   | NEUROD1 | PRKCQ  | RBM17     | SHC1    | TYK2    |
| BAD     | CLEC16A | DLK1  | GLIS3  | ICA1  | IL10  | INPPL1 | NRP1    | PTPN2  | RETN      | SLC2A4  | UBASH3A |
| C1QTNF6 | CTLA4   | EFR3B | GLP1R  | IDE   | IL2   | ITGB7  | ORMDL3  | PTPN22 | RNLS      | TAGAP   |         |
| CCR5    | CTSH    | ERBB3 | GPR183 | IFIH1 | IL27  | MIDN   | PDX1    | RAC2   | SERPINA12 | TNFAIP3 |         |

##### Ulcerative Colitis

|          |         |        |         |         |          |          |        |         |          |          |        |
|----------|---------|--------|---------|---------|----------|----------|--------|---------|----------|----------|--------|
| AAMP     | CCDC88B | CXCL2  | GALC    | IKZF3   | IP6K1    | LPXN     | NXPE1  | PROCR   | SLC11A1  | TNFRSF14 | UBE2L3 |
| ACSL6    | CCNY    | CXCL3  | GMPPB   | IL10    | IP6K2    | LSP1     | NXPE4  | PTGDR2  | SLC22A5  | TNFRSF18 | UCN2   |
| ADCY3    | CD226   | CXCL5  | GNA12   | IL12B   | IQGAP1   | MAML2    | ORMDL3 | PTGER4  | SLC2A4RG | TNFRSF4  | UQCCL1 |
| AMIGO3   | CD244   | CXCL8  | GPR18   | IL12RB2 | IRF1     | MANBA    | OSM    | RASSF5  | SMAD7    | TNFRSF6B | USF1   |
| APEH     | CD48    | CXCR1  | GPR183  | IL13    | IRF5     | MAPK1    | OSMR   | RAVER1  | SMURF1   | TNFRSF9  | USP4   |
| APOBEC3G | CD5     | CXCR2  | GPR35   | IL1R2   | ITGAL    | MAPKAPK2 | PARK7  | REL     | SNAPC4   | TNFSF15  | VDR    |
| ARHGAP30 | CD58    | DAP    | GPR65   | IL2     | ITIH4    | MMEL1    | PDLIM4 | REV3L   | SPRY4    | TNFSF8   | YDJC   |
| ARPC2    | CD6     | DDX6   | GPX1    | IL21    | ITPKA    | MST1     | PF4    | RIMBP3_ | STAT1    | TNIP1    | ZBTB46 |
| ATF4     | CEBPB   | DLD    | GSDMA   | IL22    | JAK2     | MST1R    | PFKFB4 | family  | STAT3    | TNNI2    | ZFP90  |
| BORCS5   | CEBPG   | DOK3   | GSDMB   | IL23R   | JRKL     | MTMR3    | PIGR   | RNF186  | STAT4    | TNP2     | ZGPAT  |
| BSN      | CEP250  | ERRFI1 | HNF4A   | IL24    | KEAP1    | NDFIP1   | PLCH2  | RORC    | STAT5A   | TNPO3    | ZNF831 |
| BTNL2    | CREM    | EVI5   | HSPA6   | IL3     | KIAA1841 | NDUFAF1  | PMPCA  | RPS6KA4 | STAT5B   | TRAF3IP2 |        |
| C1orf53  | CRTC3   | F11R   | ICAM1   | IL4     | KIF21B   | NFIL3    | PNKD   | RTEL1   | STMN3    | TRPT1    |        |
| CALM3    | CSF2    | FCGR2B | ICOSLG_ | IL5     | KIR2DL1  | NFKB1    | PNMT   | SEC16A  | TAB1     | TSpan33  |        |
| CARD11   | CTDSP1  | FCMR   | family  | IL7R    | LIF      | NKX2-3   | PRDM1  | SERINC3 | TMBIM1   | TTYH3    |        |
| CARD9    | CTSZ    | FLRT1  | IFIH1   | INAVA   | LILRB4   | NLRP2    | PRKCB  | SLAMF1  | TNC      | TYK2     |        |
| CCDC116  | CXCL1   | FYN    | IFNG    | INPP5E  | LIME1    | NUSAP1   | PRKCD  | SLAMF7  | TNFAIP3  | UBA7     |        |