Table S17: GO process analysis of ranked signals from YRI population using the $T_1$ test statistic.

| Description | $p$-value | Enrichment | Genes |
|---|---|---|---|
| Interferon-gamma-mediated signaling pathway | $2.0 \times 10^{-15}$ | 110.4 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Cellular response to interferon-gamma | $1.9 \times 10^{-14}$ | 89.2 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Response to interferon-gamma | $3.0 \times 10^{-14}$ | 105.1 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Antigen processing and presentation of exogenous peptide antigen | $5.6 \times 10^{-13}$ | 63.6 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Antigen processing and presentation of exogenous antigen | $6.7 \times 10^{-13}$ | 62.8 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Antigen processing and presentation of peptide antigen | $1.1 \times 10^{-12}$ | 59.4 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Antigen processing and presentation | $3.2 \times 10^{-12}$ | 52.0 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Cytokine-mediated signaling pathway | $8.8 \times 10^{-11}$ | 35.0 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Biological adhesion | $4.4 \times 10^{-10}$ | 1.8 | *ADAM12*, *AJAP1*, *AMBN*, *AMTN*, *BMPR1B*, *CADM2*, *CD84*, *CDH10*, *CDH13*, *CDH18*, *CDH23*, *CDH4*, *CDH7*, *CDH9*, *CDHR2*, *CDON*, *CDSN*, *CELSR1*, *CELSR2*, *CFDP1*, *CHL1*, *CLCA2*, *CLDN10*, *CLDN14*, *CLDN23*, *CLSTN2*, *CNTN1*, *CNTN3*, *CNTN4*, *CNTN5*, *CNTN6*, *CNTNAP2*, *CNTNAP4*, *CNTNAP5*, *COL11A1*, *COL13A1*, *COL2A1*, *COL4A3*, *COL5A1*, *CTNNA2*, *CTNNA3*, *CTNND2*, *CXADR*, *CXCL12*, *DAB1*, *DPT*, *DSC1*, *DSC3*, *DSCAM*, *DSG1*, *DSG3*, *EMR1*, *EMR2*, *EPHA3*, *EPHA4*, *EPHB1*, *F5*, *FAT2*, *FAT3*, *FREM1*, *HABP2*, *HPSE*, *HSPB11*, *IGFBP7*, *IGSF5*, *ITGA1*, *ITGA10*, *ITGA11*, *ITGA8*, *ITGA9*, *ITGB3*, *ITGB3BP*, *ITGB5*, *ITGBL1*, *LAMA2*, *LAMA4*, *LAMC1*, *LAMC2*, *LOXL2*, *LPP*, *MAEA*, *MAGI1*, *MTSS1*, *MUC16*, *NCAM2*, *NELL2*, *NFASC*, *NID2*, *NLGN1*, *NRCAM*, *NRXN1*, *NRXN3*, *NTM*, *ODZ3*, *OPCML*, *PARVA*, *PCDH15*, *PECAM1*, *PKD1L1*, *PKHD1*, *PKP2*, *PLEK*, *PLXNC1*, *PPFIBP1*, *PRKCA*, *PRKCE*, *PTPRD*, *PTPRF*, *PTPRM*, *PTPRT*, *RELN*, *ROBO2*, *ROR2*, *RPSA*, *SCARB1*, *SDK1*, *SELL*, *SEMA5A*, *SIRPA*, *SORBS1*, *SPOCK1*, *SYK*, *TEK*, *THBS2*, *TNN*, *TNR*, *VNN1*, *VWF* |
| Cell adhesion | $4.4 \times 10^{-10}$ | 1.8 | *ADAM12*, *AJAP1*, *AMBN*, *AMTN*, *BMPR1B*, *CADM2*, *CD84*, *CDH10*, *CDH13*, *CDH18*, *CDH23*, *CDH4*, *CDH7*, *CDH9*, *CDHR2*, *CDON*, *CDSN*, *CELSR1*, *CELSR2*, *CFDP1*, *CHL1*, *CLCA2*, *CLDN10*, *CLDN14*, *CLDN23*, *CLSTN2*, *CNTN1*, *CNTN3*, *CNTN4*, *CNTN5*, *CNTN6*, *CNTNAP2*, *CNTNAP4*, *CNTNAP5*, *COL11A1*, *COL13A1*, *COL2A1*, *COL4A3*, *COL5A1*, *CTNNA2*, *CTNNA3*, *CTNND2*, *CXADR*, *CXCL12*, *DAB1*, *DPT*, *DSC1*, *DSC3*, *DSCAM*, *DSG1*, *DSG3*, *EMR1*, *EMR2*, *EPHA3*, *EPHA4*, *EPHB1*, *F5*, *FAT2*, *FAT3*, *FREM1*, *HABP2*, *HPSE*, *HSPB11*, *IGFBP7*, *IGSF5*, *ITGA1*, *ITGA10*, *ITGA11*, *ITGA8*, *ITGA9*, *ITGB3*, *ITGB3BP*, *ITGB5*, *ITGBL1*, *LAMA2*, *LAMA4*, *LAMC1*, *LAMC2*, *LOXL2*, *LPP*, *MAEA*, *MAGI1*, *MTSS1*, *MUC16*, *NCAM2*, *NELL2*, *NFASC*, *NID2*, *NLGN1*, *NRCAM*, *NRXN1*, *NRXN3*, *NTM*, *ODZ3*, *OPCML*, *PARVA*, *PCDH15*, *PECAM1*, *PKD1L1*, *PKHD1*, *PKP2*, *PLEK*, *PLXNC1*, *PPFIBP1*, *PRKCA*, *PRKCE*, *PTPRD*, *PTPRF*, *PTPRM*, *PTPRT*, *RELN*, *ROBO2*, *ROR2*, *RPSA*, *SCARB1*, *SDK1*, *SELL*, *SEMA5A*, *SIRPA*, *SORBS1*, *SPOCK1*, *SYK*, *TEK*, *THBS2*, *TNN*, *TNR*, *VNN1*, *VWF* |
| Regulation of immune response | $4.6 \times 10^{-10}$ | 14.9 | *DMBT1*, *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Cellular response to cytokine stimulus | $6.6 \times 10^{-10}$ | 27.6 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Immune response-activating signal transduction | $1.4 \times 10^{-9}$ | 28.9 | *DMBT1*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| T cell costimulation | $1.8 \times 10^{-9}$ | 76.0 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Lymphocyte costimulation | $2.0 \times 10^{-9}$ | 74.8 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Immune response-regulating signaling pathway | $2.3 \times 10^{-9}$ | 27.0 | *DMBT1*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Response to cytokine stimulus | $3.8 \times 10^{-9}$ | 22.2 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| T cell receptor signaling pathway | $7.2 \times 10^{-9}$ | 61.0 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Activation of immune response | $8.0 \times 10^{-9}$ | 23.0 | *DMBT1*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Detection of bacterium | $1.1 \times 10^{-8}$ | 237.8 | *HLA-A*, *HLA-B*, *HLA-DRB1*, *HLA-DRB5* |
| Antigen processing and presentation of exogenous peptide antigen via MHC class II | $1.4 \times 10^{-8}$ | 55.2 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Antigen processing and presentation of exogenous peptide antigen via MHC class I TAP-independent | $1.5 \times 10^{-8}$ | 901.5 | *HLA-A*, *HLA-B*, *HLA-C* |

GO categories in which false discovery rate is less than 0.01.

Table S17 continued.

| Description | $p$-value | Enrichment | Genes |
|---|---|---|---|
| Antigen processing and presentation of peptide or polysaccharide antigen via MHC class II | $1.6 \times 10^{-8}$ | 53.9 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Antigen processing and presentation of peptide antigen via MHC class II | $1.6 \times 10^{-8}$ | 53.9 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Antigen receptor-mediated signaling pathway | $3.7 \times 10^{-8}$ | 47.3 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Immune response-activating cell surface receptor signaling pathway | $5.3 \times 10^{-8}$ | 44.6 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Positive regulation of immune response | $7.2 \times 10^{-8}$ | 17.6 | *DMBT1*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Immune response-regulating cell surface receptor signaling pathway | $9.4 \times 10^{-8}$ | 40.7 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of immune system process | $1.1 \times 10^{-7}$ | 9.0 | *DMBT1*, *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Immunoglobulin production involved in immunoglobulin mediated immune response | $1.5 \times 10^{-7}$ | 386.4 | *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Humoral immune response mediated by circulating immunoglobulin | $1.5 \times 10^{-7}$ | 386.4 | *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Detection of biotic stimulus | $1.6 \times 10^{-7}$ | 134.4 | *HLA-A*, *HLA-B*, *HLA-DRB1*, *HLA-DRB5* |
| Positive regulation of T cell activation | $1.8 \times 10^{-7}$ | 30.1 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Immune response | $2.5 \times 10^{-7}$ | 9.9 | *DMBT1*, *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Immunoglobulin production | $5.1 \times 10^{-7}$ | 289.8 | *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Positive regulation of lymphocyte activation | $7.7 \times 10^{-7}$ | 24.0 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of T cell activation | $1.1 \times 10^{-6}$ | 22.5 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Positive regulation of leukocyte activation | $1.3 \times 10^{-6}$ | 22.0 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of action potential | $1.4 \times 10^{-6}$ | 5.5 | *ADRA1A*, *ANK2*, *ANK3*, *CNR2*, *DPP6*, *GRIK2*, *GRIN2A*, *KCNC2*, *KCNIP1*, *KCNMB2*, *KCNMB3*, *PKP2*, *RYR2*, *SCN9A* |
| Regulation of ion transmembrane transporter activity | $1.6 \times 10^{-6}$ | 4.0 | *ANK2*, *ANK3*, *CACNG8*, *CAMK2D*, *CASQ2*, *CNIH3*, *DAPK1*, *JPH3*, *MYO5A*, *NEDD4*, *NEDD4L*, *NLGN1*, *NRXN1*, *PLCG2*, *RELN*, *RYR2*, *TESC*, *TRPC6*, *WWP2* |
| Positive regulation of cell activation | $1.6 \times 10^{-6}$ | 21.2 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of transporter activity | $2.4 \times 10^{-6}$ | 3.3 | *ACTN4*, *ANK2*, *ANK3*, *CACNG8*, *CAMK2D*, *CASQ2*, *CNIH3*, *DAPK1*, *JPH3*, *MYO5A*, *NDFIP2*, *NEDD4*, *NEDD4L*, *NLGN1*, *NRXN1*, *PLCG2*, *PON1*, *RELN*, *RYR2*, *SNCA*, *TESC*, *TRPC6*, *WWP2* |
| Positive regulation of immune system process | $3.0 \times 10^{-6}$ | 11.0 | *DMBT1*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Production of molecular mediator of immune response | $3.2 \times 10^{-6}$ | 178.3 | *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Axon guidance | $3.6 \times 10^{-6}$ | 1.9 | *ABLIM1*, *ABLIM3*, *ANK1*, *ANK2*, *ANK3*, *BMPR1B*, *CACNA1C*, *CAP1*, *CDH4*, *CHL1*, *CNTN1*, *CNTN4*, *CNTN6*, *COL2A1*, *COL4A1*, *COL4A2*, *COL4A3*, *COL4A4*, *COL5A1*, *COL9A1*, *CXCL12*, *DCC*, *DOCK1*, *DPYSL3*, *EFNA5*, *EPHA4*, *EPHA7*, *EPHB1*, *ETV1*, *EXT1*, *GLI2*, *ITGA1*, *ITGA9*, *ITGB3*, *KLF7*, *LAMA2*, *LAMC1*, *MYO10*, *NFASC*, *NRCAM*, *NRXN1*, *NRXN3*, *NTN4*, *PAK1*, *PLXNA4*, *PLXNC1*, *PTPRM*, *RAC2*, *RELN*, *ROBO2*, *RPS6KA2*, *SEMA3A*, *SEMA3E*, *SEMA5A*, *SH3GL2*, *SLIT3*, *SPTB*, *ST8SIA2*, *TNR*, *TRPC6*, *UNC5D*, *VAV2* |
| Positive regulation of ion transmembrane transporter activity | $3.7 \times 10^{-6}$ | 18.9 | *ANK2*, *ANK3*, *PLCG2*, *RELN*, *RYR2*, *TRPC6* |
| Regulation of lymphocyte activation | $5.2 \times 10^{-6}$ | 17.4 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of transmembrane transporter activity | $5.5 \times 10^{-6}$ | 3.7 | *ANK2*, *ANK3*, *CACNG8*, *CAMK2D*, *CASQ2*, *CNIH3*, *DAPK1*, *JPH3*, *MYO5A*, *NEDD4*, *NEDD4L*, *NLGN1*, *NRXN1*, *PLCG2*, *RELN*, *RYR2*, *TESC*, *TRPC6*, *WWP2* |
| Response to bacterium | $5.9 \times 10^{-6}$ | 25.8 | *DMBT1*, *HLA-A*, *HLA-B*, *HLA-DRB1*, *HLA-DRB5* |
| Cellular response to organic substance | $6.0 \times 10^{-6}$ | 8.9 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Immunoglobulin mediated immune response | $7.8 \times 10^{-6}$ | 144.9 | *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Protein localization to membrane | $8.4 \times 10^{-6}$ | 8.7 | *ANK2*, *ANK3*, *CPE*, *DLG2*, *MAGI2*, *NLGN1*, *RAMP3*, *RELN*, *SCP2* |
| Immune system process | $1.1 \times 10^{-5}$ | 5.8 | *DMBT1*, *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5*, *MAP2K3* |
| Cellular response to type I interferon | $1.3 \times 10^{-5}$ | 126.8 | *HLA-A*, *HLA-B*, *HLA-C* |
| Type I interferon-mediated signaling pathway | $1.3 \times 10^{-5}$ | 126.8 | *HLA-A*, *HLA-B*, *HLA-C* |
| Regulation of leukocyte activation | $1.3 \times 10^{-5}$ | 15.2 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Response to type I interferon | $1.4 \times 10^{-5}$ | 124.8 | *HLA-A*, *HLA-B*, *HLA-C* |
| Regulation of Rho protein signal transduction | $1.6 \times 10^{-5}$ | 3.1 | *ABCA1*, *ADRA1A*, *ARAP3*, *ARHGEF18*, *ARHGEF37*, *ARHGEF4*, *DLC1*, *ECT2L*, *FARP1*, *FLOT1*, *KALRN*, *KANK1*, *MCF2L2*, *PLEKHG1*, *RASGRF2*, *SPATA13*, *TIAM1*, *TIAM2*, *TNFAIP1*, *VAV2*, *VAV3* |
| B cell mediated immunity | $1.6 \times 10^{-5}$ | 115.9 | *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |

GO categories in which false discovery rate is less than 0.01.

Table S17 continued.

| Description | $p$-value | Enrichment | Genes |
|---|---|---|---|
| Antigen processing and presentation of exogenous peptide antigen via MHC class I TAP-dependent | $2.0 \times 10^{-5}$ | 112.7 | *HLA-A*, *HLA-B*, *HLA-C* |
| Regulation of cell activation | $2.1 \times 10^{-5}$ | 14.1 | *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of membrane potential | $2.2 \times 10^{-5}$ | 2.7 | *ABCB5*, *ADRA1A*, *ANK2*, *ANK3*, *CACNA1A*, *CASQ2*, *CNR2*, *DPP6*, *GRID2*, *GRIK2*, *GRIN2A*, *KCNC2*, *KCNIP1*, *KCNMA1*, *KCNMB2*, *KCNMB3*, *NEDD4*, *NEDD4L*, *NLGN1*, *NRXN1*, *PKP2*, *RELN*, *RYR2*, *SCN9A*, *WWP2* |
| Cell projection organization | $2.3 \times 10^{-5}$ | 1.7 | *ALS2*, *ANK3*, *ARHGAP26*, *ARHGAP42*, *ARHGEF4*, *ASAP1*, *CACNA1A*, *CDH13*, *CDH23*, *CELSR2*, *CHAT*, *CLIC5*, *CLMN*, *CNTN4*, *CNTNAP2*, *CSF1R*, *CTNNA2*, *DAB1*, *DCC*, *DFNB31*, *DNAH9*, *DNM3*, *DSCAM*, *DYNC2H1*, *EPHA4*, *EPHB1*, *FAS*, *FGD5*, *FLOT1*, *FOPNL*, *GAS7*, *GLI2*, *IFT122*, *IFT43*, *IQCB1*, *ITGA8*, *KALRN*, *KLF7*, *KLHL1*, *LPAR3*, *LRRC16A*, *MAP2*, *MTSS1*, *MUTED*, *MYLK*, *MYO16*, *MYO7A*, *NEDD4*, *NRCAM*, *PAK1*, *PARVA*, *PCM1*, *PKHD1*, *PLEK*, *PLXNA4*, *PRKCA*, *PRKG1*, *PTK2B*, *PTPRM*, *RAC2*, *RELN*, *RSPH9*, *SDC2*, *SEMA3A*, *SPAG16*, *SPATA13*, *TEKT4*, *TMEM17*, *TMEM237*, *TNN*, *VAV2*, *VAV3*, *WWTR1* |
| Antigen processing and presentation of exogenous peptide antigen via MHC class I | $2.4 \times 10^{-5}$ | 106.8 | *HLA-A*, *HLA-B*, *HLA-C* |
| Cellular response to chemical stimulus | $2.6 \times 10^{-5}$ | 7.4 | *HLA-A*, *HLA-B*, *HLA-C*, *HLA-DPA1*, *HLA-DPB1*, *HLA-DQA1*, *HLA-DQB1*, *HLA-DRB5* |
| Regulation of ion transmembrane transport | $2.7 \times 10^{-5}$ | 3.0 | *ACTN4*, *ANK2*, *ANK3*, *ANO6*, *CACNG8*, *CAMK2D*, *CASQ2*, *CNIH3*, *DAPK1*, *JPH3*, *KCNE1*, *MYO5A*, *NEDD4*, *NEDD4L*, *NLGN1*, *NRXN1*, *PLCG2*, *RELN*, *RYR2*, *TESC*, *TRPC6*, *WWP2* |
| Positive regulation of transporter activity | $2.9 \times 10^{-5}$ | 14.0 | *ANK2*, *ANK3*, *PLCG2*, *RELN*, *RYR2*, *TRPC6* |
| Regulation of potassium ion transmembrane transporter activity | $3.6 \times 10^{-5}$ | 13.5 | *ANK2*, *CASQ2*, *NEDD4*, *NEDD4L*, *WWP2* |
| Humoral immune response | $4.1 \times 10^{-5}$ | 37.7 | *DMBT1*, *HLA-DQB1*, *HLA-DRB1*, *HLA-DRB5* |
| Antigen processing and presentation of peptide antigen via MHC class I | $4.4 \times 10^{-5}$ | 88.2 | *HLA-A*, *HLA-B*, *HLA-C* |
| Detection of external stimulus | $5.2 \times 10^{-5}$ | 35.5 | *HLA-A*, *HLA-B*, *HLA-DRB1*, *HLA-DRB5* |
| Regulation of potassium ion transport | $5.7 \times 10^{-5}$ | 4.3 | *ANK2*, *ANK3*, *CASQ2*, *DPP6*, *KCNE1*, *KCNE3*, *NEDD4*, *NEDD4L*, *PTK2B*, *STK39*, *WWP2* |
| Regulation of interleukin-10 secretion | $6.0 \times 10^{-5}$ | 309.1 | *HLA-DRB1*, *HLA-DRB5* |
| Regulation of small GTPase mediated signal transduction | $6.0 \times 10^{-5}$ | 1.9 | *ABCA1*, *ADRA1A*, *ALS2*, *ARAP1*, *ARAP3*, *ARHGAP15*, *ARHGAP22*, *ARHGAP24*, *ARHGAP25*, *ARHGAP26*, *ARHGAP44*, *ARHGAP8*, *ARHGEF18*, *ARHGEF37*, *ARHGEF4*, *BCR*, *BNIP2*, *CDC42BPA*, *CDON*, *CHN2*, *DGKI*, *DLC1*, *ECT2L*, *FARP1*, *FLOT1*, *IQSEC1*, *KALRN*, *KANK1*, *MCF2L2*, *NOTCH2*, *NRG1*, *PLEKHG1*, *PSD3*, *RAC2*, *RASGEF1C*, *RASGRF2*, *RELN*, *RGL1*, *SPATA13*, *STARD13*, *TIAM1*, *TIAM2*, *TNFAIP1*, *VAV2*, *VAV3* |

GO categories in which false discovery rate is less than 0.01.