Supplementary material: detailed description of material and methods

Study design and participants

Full methodological details of the study design are published elsewhere [1]. Briefly, this phase II clinical study used a Simon Two-Stage design protocol to determine the response rate of allergic rhinitis (AR) sufferers to a multi-species probiotic supplement. Participants consumed a probiotic supplement twice daily for eight weeks and attended the allergy clinic at the beginning and end of intervention for assessment. The Simon Two-Stage design protocol was defined as $p_1/p_0 = 0.18$ where $p_0$ (non-effective treatment) was nominated as a response in ≤15% of participants and $p_1$ (effective treatment) was as a response in least 33% of participants [2]. Response rates were calculated based on the proportion of participants reporting a clinically beneficial change in the validated mini Rhinoconjunctivitis Quality of Life Questionnaire (mRQLQ) [3] scores using a threshold of 0.7 as described in the work of Juniper et al. 2000.

Immune gene expression in blood and nasal lavage / brushing was assessed in a subset of participants; seven AR suffersers who were considered responders to the probiotic supplement and five AR sufferers who were considered non-responders based on the findings of the previously published trial [4].

Assessment of symptom severity

Symptom severity at baseline was assessed with an overall symptom survey, individual symptom questionnaire, and the mRQLQ, all of which were completed during the clinic visit. The overall symptom questionnaire assessed overall symptoms experienced in the previous 24 hours using an 11-point Likert scale (0 ‘No distress’ to 10 ‘Unbearable distress’). The maximum overall symptom score was 10. The individual symptom questionnaire assessed specific symptoms (nasal itch, eye itch, sneezing, runny nose, post nasal drip, unrefreshed sleep and sinus pain) on the same 11-point likert scale. The scores for each symptom were summed to give a ‘sum of individual symptoms’ score with a possible maximum score of 70. The mRQLQ is a validated survey designed to measure the degree to which AR symptoms impact on the quality of life of an individual [3]. The survey consists of 15 questions separated into five sections; Activities, Practical problems, Nose Symptoms, Eye Symptoms, Other Symptoms. Each question is rated on a 7-point likert scale with the highest score indicating extremely troubled by symptoms and poorer quality of life.

Laboratory measures of immune parameters

Venous blood samples were collected from all participants at baseline. Analysis of white cell differential and specific IgE to Bermuda grass were completed by a local pathology provider (QML Pathology, Murarrie, Queensland, Australia). Erythrocyte sedimentation rate (ESR) over one hour was measured using fresh blood samples collected in sodium citrate tubes and using commercially available Vacuette ESR pipettes (Greiner Bio-One, Kremsmünster, Austria) as per the Westergren method [5]. Total serum IgE and IgG were measured in serum samples using commercially available enzyme-linked immunosorbent assay (ELISA) kits (eBioscience, San Diego, CA, USA).

Whole blood and nasal mucosa sampling

Venous blood samples were also collected into PAXgene RNA tubes (Pre-AnalytiX, Feldbachstrasse, Switzerland) and handled and stored according to the manufacturer’s instructions. RNA was extracted from thawed PAXgene tubes with the Maxwell® RSC automated RNA extraction instrument using commercially available Maxwell® RSC miRNA Tissue Kit in accordance with the manufacturer’s instructions. The quality and quantity of the extracted RNA was assessed spectrophotometrically with the NanoDrop 1000 UV-Vis spectrophotometer (ThermoScientific, Massachusetts, United States). RNA extracts were stored at -80 °C until analysis.
Nasal lavage samples were collected from participants with a modified nasal lavage procedure. Traditionally nasal lavage samples are collected by tilting the participants head backwards and instilling 5 ml of saline solution into each nasal cavity with fluid recovery after a predetermined dwell time. The method used in the current study was designed to sample a greater surface area of the nasal mucosa and sinuses. Using a nasal irrigation bottle (FLO Sinus Care, ENT technologies, Melbourne, Australia), participants administered 100 ml of PBS into each nostril and collected the fluid that was expelled from the free nostril into a sterile container. A volume of 20 ml of RPMI was then added to the lavage fluid to support the live cells until processing.

Nasal brushing was performed directly after the nasal lavage. Participants were advised to insert a brush (Piksters size 5, Erkstine oral care, Macksville, Australia) between the nasal septum and inferior turbinate and gently rotate the brush in circular and linear movements for 30 secs. The brush was then removed from the nasal cavity and suspended in a sterile container containing 3.5 ml RPMI. The procedure was then repeated in the other nostril with a fresh brush and placed into the same container following brushing. The nasal lavage and nasal brushing solutions were stored on ice until arrival at the laboratory.

Processing of nasal lavage and nasal brushing samples

The nasal lavage fluid was transferred into nuclease-free centrifuge tubes and centrifuged at 300 xg for 20 mins at 4 °C to concentrate cellular material. If substantial mucous was present, the lavage fluid was passed through a 100 µM filter (Corning, New York, United States) prior to centrifugation. Once centrifuged, the supernatant was removed and the resulting cell pellets resuspended in the residual volume and transferred into 1.5 ml nuclease-free microfuge tubes. In parallel, the nasal brushes were gently shaken in the RPMI solution to dislodge the nasal cells from the brush and discarded. The resulting cell brushing material was transferred into 1.5 ml nuclease free microfuge tubes. The microfuge tubes were spun at 14,000 xg for 5 mins. The supernatant was removed and the cell pellets resuspended in residual volume. The resuspended cell pellets from the lavage and brushing samples were then pooled into a single 1.5 ml nuclease-free tube and centrifuged again at 14,000 xg for 5 mins. The entire supernatant was removed and the resulting cell pellet was resuspended in commercially available lysis buffer (RLT, Qiagen, Hilden, Germany). The lysate was stored at -80 °C for downstream processing.

NanoString gene expression analysis

Immune gene expression analysis was undertaken using the NanoString nCounter analysis system (NanoString Technologies, Seattle, WA) using the commercially available nCounter PanCancer Immune Profiling panel kit together with the nCounter panel plus probe set of 30 immune genes (listed in Supplementary Table 5). The PanCancer Immune profiling panel contains n = 730 genes of key inflammatory pathways and n = 40 reference/housekeeping genes. The nCounter system directly detects and counts single-stranded nucleic acid via reporter probes affixed with fluorophore barcodes and biotinylated capture-probes attached to microscopic beads. These are then affixed to lanes in cartridge and read in a digital scanner. Following the manufacturers protocol, 100 ng of total RNA extracted from whole blood or 5 µl of nasal cell lysate was hybridised with probes at 65 °C for 23 hours before being inserted into NanoString Prep Station were the target-probe complex was immobilised onto the analysis cartridge. Cartridges were read by the nCounter Digital Analyser for digital counting of molecular barcodes corresponding to each target at 280 fields of view.

Data approach

Statistical analysis for the baseline data (clinical chemistry, symptom severity, demographic data and white cell differential) was undertaken using GraphPad Prism V6.0 for Windows (GraphPad Software, La Jolla California USA). Data was log transformed for analysis and a Student’s t-test used to compare responders and non-responders.

Gene expression data was analysed using the Advanced Analysis Module in the nSolver™ Analysis Software version 4.0 from NanoString Technologies (NanoString Technologies, WA, USA)
and TIGR Multi-Experiment Viewer (http://mev.tm4.org). The Advanced Analysis Module enables quality control (QC), normalisation, differential gene expression (DGE), Pathview Plots and immune cell profiling. Raw data was normalised by subtracting the mean plus one standard deviation of eight negative controls while technical variation was normalised through internal positive controls. Data was corrected for input volume via internal housekeeping genes using the geNorm algorithm. Genes that were expressed below 20 counts in more than 60% of samples were excluded from analysis. Differential gene expression was determined in blood and nasal lysate samples and significance between responders and non-responders determined using a t-test. Immune cell scores were determined using cell specific gene expression from The Cancer Genome Atlas (TCGA). Significance was accepted at $p < 0.05$ given the exploratory nature of the design. Clusters of functional protein-protein interactions were visualized using the STRING 10.5 software (https://string-db.org/), with a minimum confidence score of 0.90.

**References**

1. Watts, A.M., et al., *Probiotics and Allergic Rhinitis: A Simon Two-Stage Design to Determine Effectiveness*. The Journal of Alternative and Complementary Medicine, 2016. 22(12): p. 1007-1012.
2. Watts, A.M., et al., *Probiotics and Allergic Rhinitis: A Simon Two-Stage Design to Determine Effectiveness*. J Altern Complement Med, 2016. 22(12): p. 1007-1012.
3. Juniper, E.F., et al., Development and validation of the mini Rhinoconjunctivitis Quality of Life Questionnaire. Clin Exp Allergy, 2000. 30(1): p. 132-40.
4. Watts, A.M., et al., A Specifically Designed Multispecies Probiotic Supplement Relieves Seasonal Allergic Rhinitis Symptoms. The Journal of Alternative and Complementary Medicine, 2018. in-press.
5. Von Boroviczeny, K.G., et al., Recommendation for Measurement of Erythrocyte Sedimentation Rate of Human Blood: International Committee For Standardization in Haematology. American Journal of Clinical Pathology, 1977. 68(4): p. 505-507.
Table S1: DEG in blood at baseline between responders and non-responders. There were 414 genes at baseline in blood expressed above background threshold. The table is order by fold change.

| Gene       | Log2 fold change | Lower confidence limit (log2) | Upper confidence limit (log2) | Linear fold change | Lower confidence limit (linear) | Upper confidence limit (linear) | p-value |
|------------|------------------|------------------------------|------------------------------|-------------------|-------------------------------|-------------------------------|---------|
| HLA-DQA1   | 3.7              | -0.436                       | 7.84                         | 13                | 0.739                         | 229                           | 0.11    |
| HLA-DQB1   | 1.76             | -0.331                       | 3.85                         | 3.38              | 0.795                         | 14.4                          | 0.13    |
| BCL2       | 0.837            | 0.196                        | 1.48                         | 1.79              | 1.15                          | 2.78                          | 0.0284  |
| IDO1       | 0.751            | -0.108                       | 1.61                         | 1.68              | 0.928                         | 3.05                          | 0.118   |
| LRRN3      | 0.626            | -3.29                        | 4.55                         | 1.54              | 0.102                         | 23.4                          | 0.761   |
| HLA-C      | 0.609            | 0.241                        | 0.976                        | 1.52              | 1.18                          | 1.97                          | 0.00876 |
| ETS1       | 0.594            | 0.316                        | 0.872                        | 1.51              | 1.24                          | 1.83                          | 0.00186 |
| NFATC1     | 0.571            | 0.222                        | 0.92                         | 1.49              | 1.17                          | 1.89                          | 0.0107  |
| IL6ST      | 0.541            | -0.0506                      | 1.13                         | 1.46              | 0.966                         | 2.19                          | 0.103   |
| CCR7       | 0.525            | -0.0335                      | 1.08                         | 1.44              | 0.977                         | 2.12                          | 0.0952  |
| ITK        | 0.513            | 0.293                        | 0.734                        | 1.43              | 1.22                          | 1.66                          | 0.00105 |
| LAIR2      | 0.504            | 0.0817                       | 0.926                        | 1.42              | 1.06                          | 1.9                           | 0.0414  |
| C3AR1      | 0.497            | -0.0765                      | 1.07                         | 1.41              | 0.948                         | 2.1                           | 0.12    |
| MX1        | 0.499            | -0.147                       | 1.15                         | 1.41              | 0.903                         | 2.21                          | 0.161   |
| YTHDF2     | 0.45             | -0.0817                      | 0.982                        | 1.37              | 0.945                         | 1.97                          | 0.128   |
| NLRC5      | 0.451            | 0.184                        | 0.718                        | 1.37              | 1.14                          | 1.65                          | 0.00788 |
| HRH4       | 0.454            | -0.293                       | 1.2                          | 1.37              | 0.816                         | 2.3                           | 0.261   |
| TXK        | 0.442            | -3.68                        | 4.56                         | 1.36              | 0.0781                        | 23.6                          | 0.838   |
| TCF7       | 0.431            | -0.0607                      | 0.801                        | 1.35              | 1.04                          | 1.74                          | 0.0457  |
| SELL       | 0.423            | -0.0472                      | 0.893                        | 1.34              | 0.968                         | 1.86                          | 0.108   |
| CD6        | 0.396            | 0.129                        | 0.663                        | 1.32              | 1.09                          | 1.58                          | 0.0156  |
| IGF1R      | 0.401            | -0.0558                      | 0.858                        | 1.32              | 0.962                         | 1.81                          | 0.116   |
| BTLA       | 0.406            | 0.00465                      | 0.807                        | 1.32              | 1                            | 1.75                          | 0.0755  |
| IFNAR1     | 0.386            | -4.86                        | 5.63                         | 1.31              | 0.0345                        | 49.4                          | 0.888   |
| IFIT2      | 0.380            | -0.413                       | 1.19                         | 1.31              | 0.751                         | 2.28                          | 0.365   |
| IFIH1      | 0.394            | -0.044                       | 0.831                        | 1.31              | 0.97                          | 1.78                          | 0.108   |
| IFIT1      | 0.375            | -0.523                       | 1.27                         | 1.3               | 0.696                         | 2.42                          | 0.432   |
| CMKL1R1    | 0.376            | -11.9                        | 12.7                         | 1.3               | 0.000256                      | 6590                          | 0.954   |
| DDX58      | 0.378            | -0.112                       | 0.868                        | 1.3               | 0.925                         | 1.82                          | 0.161   |
| IFIH1      | 0.364            | -0.0159                      | 0.784                        | 1.3               | 0.989                         | 1.72                          | 0.0892  |
| Gene   | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 |
|--------|--------|--------|--------|--------|--------|--------|
| THBS1  | 0.384  | -2.72  | 3.48   | 1.3    | 0.152  | 11.2   |
| CD3E   | 0.362  | 0.0791 | 0.646  | 1.29   | 1.06   | 1.56   |
| CD5    | 0.366  | -0.0563| 0.788  | 1.29   | 0.962  | 1.73   |
| MME    | 0.369  | -0.203 | 0.941  | 1.29   | 0.869  | 1.92   |
| CD81   | 0.371  | 0.114  | 0.628  | 1.29   | 1.08   | 1.55   |
| TLR10  | 0.354  | -0.17  | 0.878  | 1.28   | 0.889  | 1.84   |
| CD8A   | 0.356  | -0.224 | 0.936  | 1.28   | 0.856  | 1.91   |
| CD79A  | 0.358  | -0.174 | 0.89   | 1.28   | 0.887  | 1.85   |
| ITGA6  | 0.359  | -0.218 | 0.935  | 1.28   | 0.86   | 1.91   |
| OAS3   | 0.341  | -0.164 | 0.845  | 1.27   | 0.893  | 1.8    |
| EP300  | 0.343  | 0.0253 | 0.66   | 1.27   | 1.02   | 1.58   |
| CREB5  | 0.343  | -0.252 | 0.938  | 1.27   | 0.84   | 1.92   |
| LAMP1  | 0.344  | 0.0449 | 0.643  | 1.27   | 1.03   | 1.56   |
| CYBB   | 0.35   | -0.138 | 0.837  | 1.27   | 0.909  | 1.79   |
| CARD1I | 0.33   | -0.0326| 0.694  | 1.26   | 0.978  | 1.62   |
| CREB1  | 0.338  | 0.0801 | 0.596  | 1.26   | 1.06   | 1.51   |
| IGF2R  | 0.319  | -0.212 | 0.85   | 1.25   | 0.863  | 1.8    |
| TAPBP  | 0.32   | 0.0238 | 0.616  | 1.25   | 1.02   | 1.53   |
| CASP3  | 0.327  | -0.0722| 0.727  | 1.25   | 0.951  | 1.66   |
| DOCK9  | 0.305  | -0.0105| 0.621  | 1.24   | 0.993  | 1.54   |
| FLT3LG | 0.308  | 0.0449 | 0.572  | 1.24   | 1.03   | 1.49   |
| JAK3   | 0.312  | -0.117 | 0.74   | 1.24   | 0.922  | 1.67   |
| F13A1  | 0.315  | -0.441 | 1.07   | 1.24   | 0.737  | 2.1    |
| IL17RA | 0.294  | -0.0165| 0.605  | 1.23   | 0.989  | 1.52   |
| CD28   | 0.302  | -0.0848| 0.688  | 1.23   | 0.943  | 1.61   |
| CD9    | 0.304  | -0.372 | 0.98   | 1.23   | 0.773  | 1.97   |
| TNFRSF13C | 0.283 | -5.4   | 5.97   | 1.22   | 0.0236 | 62.7   |
| ST6GAL1| 0.271  | 0.0158 | 0.526  | 1.21   | 1.01   | 1.44   |
| PTGES2 | 0.271  | -0.0338| 0.575  | 1.21   | 0.977  | 1.49   |
| IRF5   | 0.272  | -0.0521| 0.596  | 1.21   | 0.965  | 1.51   |
| NFATC2 | 0.273  | -0.00532| 0.551  | 1.21   | 0.996  | 1.47   |
| IL18R1 | 0.276  | -0.0819| 0.633  | 1.21   | 0.945  | 1.35   |
| NCR1   | 0.281  | -0.338 | 0.899  | 1.21   | 0.791  | 1.86   |
| TAB1   | 0.281  | -15.1  | 15.6   | 1.21   | 2.90E-05| 50900  |
| CYLD   | 0.257  | 0.00766| 0.507  | 1.2    | 1.01   | 1.42   |
| CD7    | 0.258  | -0.114 | 0.63   | 1.2    | 0.924  | 1.55   |
| Gene   | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 | Value7 | Value8 | Value9 | Value10 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| CD2    | 0.259  | -5.8   | 6.32   | 1.2    | 0.018  | 79.7   | 0.935  |
| LCK    | 0.261  | 0.0617 | 0.46   | 1.2    | 1.04   | 1.38   | 0.028  |
| GZMM   | 0.264  | -5.99  | 6.51   | 1.2    | 0.0158 | 91.3   | 0.936  |
| CD4    | 0.266  | -0.269 | 0.802  | 1.2    | 0.83   | 1.74   | 0.353  |
| IL7R   | 0.269  | -0.269 | 0.564  | 1.2    | 0.982  | 1.48   | 0.105  |
| MAP3K1 | 0.25   | -0.118 | 0.619  | 1.19   | 0.921  | 1.54   | 0.213  |
| ILF3   | 0.252  | 0.0309 | 0.473  | 1.19   | 1.02   | 1.39   | 0.0495 |
| GTF3C1 | 0.255  | -0.0713| 0.581  | 1.19   | 0.952  | 1.5    | 0.157  |
| CD24   | 0.234  | -0.4   | 0.869  | 1.18   | 0.758  | 1.83   | 0.486  |
| APP    | 0.236  | -0.446 | 0.918  | 1.18   | 0.734  | 1.89   | 0.513  |
| ITGA4  | 0.237  | -0.0944| 0.567  | 1.18   | 0.937  | 1.48   | 0.192  |
| BMI1   | 0.237  | -0.107 | 0.582  | 1.18   | 0.929  | 1.5    | 0.206  |
| ENTPD1 | 0.238  | -0.278 | 0.755  | 1.18   | 0.825  | 1.69   | 0.387  |
| JAK1   | 0.244  | -0.00502| 0.493  | 1.18   | 0.997  | 1.41   | 0.0837 |
| REL    | 0.22   | -0.00725| 0.448  | 1.17   | 0.995  | 1.36   | 0.087  |
| CCR1   | 0.23   | -0.435 | 0.896  | 1.17   | 0.74   | 1.86   | 0.513  |
| IRF8   | 0.231  | -0.229 | 0.692  | 1.17   | 0.853  | 1.62   | 0.349  |
| STAT2  | 0.232  | -0.0177| 0.481  | 1.17   | 0.988  | 1.4    | 0.0987 |
| ATF2   | 0.208  | 0.0471 | 0.37   | 1.16   | 1.03   | 1.29   | 0.0297 |
| IL32   | 0.215  | -0.078 | 0.507  | 1.16   | 0.947  | 1.42   | 0.181  |
| PAFAH2 | 0.215  | -6.66  | 7.09   | 1.16   | 0.00991| 136    | 0.953  |
| BCL6   | 0.218  | -0.427 | 0.862  | 1.16   | 0.744  | 1.82   | 0.523  |
| CXCR5  | 0.218  | -5.08  | 5.51   | 1.16   | 0.0297 | 45.6   | 0.938  |
| TAP2   | 0.196  | -0.204 | 0.595  | 1.15   | 0.868  | 1.51   | 0.36   |
| IKBK2  | 0.199  | -0.218 | 0.616  | 1.15   | 0.859  | 1.53   | 0.372  |
| ITGB1  | 0.201  | -0.149 | 0.551  | 1.15   | 0.902  | 1.47   | 0.286  |
| IL6R   | 0.201  | -0.217 | 0.618  | 1.15   | 0.861  | 1.54   | 0.368  |
| TRAF3  | 0.203  | -0.169 | 0.576  | 1.15   | 0.889  | 1.49   | 0.309  |
| CD36   | 0.205  | -0.21  | 0.619  | 1.15   | 0.865  | 1.54   | 0.356  |
| LCP1   | 0.184  | -0.0669| 0.435  | 1.14   | 0.955  | 1.35   | 0.181  |
| CYFIP2 | 0.185  | -0.0305| 0.401  | 1.14   | 0.979  | 1.32   | 0.123  |
| IL2RG  | 0.185  | 0.00956| 0.466  | 1.14   | 0.936  | 1.38   | 0.225  |
| ADA    | 0.185  | -0.215 | 0.586  | 1.14   | 0.861  | 1.5    | 0.386  |
| MEF2C  | 0.187  | -0.166 | 0.54   | 1.14   | 0.891  | 1.45   | 0.324  |
| IFNAR2 | 0.189  | -0.0244| 0.402  | 1.14   | 0.983  | 1.32   | 0.113  |
| CD96   | 0.191  | -0.0524| 0.434  | 1.14   | 0.964  | 1.35   | 0.155  |
| Gene   | Log2 Fold Change | P-Value | Adjusted P-Value | Odds Ratio | 95% CI Lower | 95% CI Upper |
|--------|-----------------|---------|-----------------|------------|--------------|--------------|
| CD74   | 0.172           | -0.0328 | 0.376           | 1.13       | 0.978        | 1.3          |
| TNFAIP3| 0.172           | -0.111  | 0.456           | 1.13       | 0.926        | 1.37         |
| PTGDR2 | 0.174           | -4.62   | 0.971           | 1.13       | 0.0407       | 31.2         |
| ATG16L1| 0.175           | -0.127  | 0.478           | 1.13       | 0.915        | 1.39         |
| LAMP2  | 0.175           | -0.213  | 0.563           | 1.13       | 0.863        | 1.48         |
| CXCL5  | 0.176           | -1      | 1.36            | 1.13       | 0.499        | 2.56         |
| IL2RB  | 0.179           | -0.34   | 0.698           | 1.13       | 0.79         | 1.62         |
| CD180  | 0.18            | -0.39   | 0.751           | 1.13       | 0.763        | 1.68         |
| IL4R   | 0.182           | -0.252  | 0.615           | 1.13       | 0.84         | 1.53         |
| PLA2G6 | 0.157           | -5.87   | 6.18            | 1.12       | 0.0171       | 72.6         |
| ZAP70  | 0.159           | -0.0622 | 0.38            | 1.12       | 0.958        | 1.3          |
| IKBKB  | 0.161           | -0.199  | 0.521           | 1.12       | 0.871        | 1.43         |
| CCR2   | 0.161           | -0.297  | 0.619           | 1.12       | 0.814        | 1.54         |
| HLA-DRB3| 0.164           | -0.243  | 0.571           | 1.12       | 0.845        | 1.49         |
| CD46   | 0.165           | -0.118  | 0.448           | 1.12       | 0.921        | 1.36         |
| ANXA1  | 0.167           | -0.167  | 0.502           | 1.12       | 0.89         | 1.42         |
| ITGB2  | 0.168           | -0.1    | 0.437           | 1.12       | 0.933        | 1.35         |
| CD44   | 0.144           | -0.103  | 0.392           | 1.11       | 0.931        | 1.31         |
| GNLY   | 0.145           | -0.907  | 1.2             | 1.11       | 0.533        | 2.29         |
| EWSR1  | 0.146           | -0.0885 | 0.38            | 1.11       | 0.941        | 1.3          |
| NFATC3 | 0.149           | -0.0833 | 0.382           | 1.11       | 0.944        | 1.3          |
| SMAD3  | 0.149           | -0.13   | 0.427           | 1.11       | 0.914        | 1.34         |
| STAT1  | 0.15            | -0.127  | 0.427           | 1.11       | 0.916        | 1.34         |
| TNFRSF10B| 0.152           | -7.11   | 7.42            | 1.11       | 0.00722      | 171          |
| ISG20  | 0.154           | -0.249  | 0.557           | 1.11       | 0.841        | 1.47         |
| IRF4   | 0.132           | -6.39   | 6.65            | 1.1        | 0.0119       | 101          |
| PRF1   | 0.137           | -0.37   | 0.645           | 1.1        | 0.774        | 1.56         |
| MS4A1  | 0.137           | -0.394  | 0.669           | 1.1        | 0.761        | 1.59         |
| CD247  | 0.138           | -0.16   | 0.436           | 1.1        | 0.895        | 1.35         |
| F2RL1  | 0.138           | -3.93   | 4.21            | 1.1        | 0.0657       | 18.5         |
| STAT3  | 0.141           | -0.18   | 0.462           | 1.1        | 0.883        | 1.38         |
| CD97   | 0.142           | -0.149  | 0.433           | 1.1        | 0.902        | 1.35         |
| IL1R1  | 0.142           | -6.9    | 7.19            | 1.1        | 0.00835      | 146          |
| ATG7   | 0.12            | -0.168  | 0.407           | 1.09       | 0.89         | 1.33         |
| BTK    | 0.12            | -0.22   | 0.46            | 1.09       | 0.858        | 1.38         |
| CD37   | 0.12            | -0.228  | 0.467           | 1.09       | 0.854        | 1.38         |
| Gene    | RELB  | NR3C1 | ITCH  | CD59  | CTLA4 | AKT3  | PIK3CD | ITCH  | CD59  |
|---------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
|         | 0.122 | 0.123 | 0.123 | 0.124 | 0.125 | 0.126 | 0.128  | 0.128 | 0.128 |
|         | -13.9 | -0.0665 | -0.134 | -0.304 | -0.187 | -0.114 | -0.233 | -0.733 | -0.304 |
|         | 14.1  | 0.313 | 0.381 | 0.553 | 0.437 | 0.367 | 0.489 | 0.988 | 0.553 |
|         | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  |
|         | 6.69E-05 | 0.955 | 0.911 | 0.81  | 0.879 | 0.924 | 0.851 | 0.602 | 0.95  |
|         | 17700 | 1.24  | 1.3   | 1.47  | 1.35  | 1.29  | 1.4   | 1.98  | 1.26  |
|         | 0.987 | 0.232 | 0.37  | 0.582 | 0.451 | 0.327 | 0.502 | 0.777 | 0.241 |
| NR3C1   | 0.123 | 0.123 | 0.123 | 0.124 | 0.125 | 0.126 | 0.128  | 0.128 | 0.128 |
|         | 0.0665 | 0.313 | 0.381 | 0.553 | 0.437 | 0.367 | 0.489 | 0.988 | 0.553 |
|         | 14.1  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  | 1.09  |
|         | 6.69E-05 | 0.955 | 0.911 | 0.81  | 0.879 | 0.924 | 0.851 | 0.602 | 0.95  |
|         | 17700 | 1.24  | 1.3   | 1.47  | 1.35  | 1.29  | 1.4   | 1.98  | 1.26  |
|         | 0.987 | 0.232 | 0.37  | 0.582 | 0.451 | 0.327 | 0.502 | 0.777 | 0.241 |

...
| Gene        | Fold Change | Expression Level | p-value |
|-------------|-------------|-----------------|---------|
| IRF7        | 0.0842      | -0.349          | 1.06    | 0.785 | 1.43 | 0.711 |
| LY9         | 0.0847      | -0.167          | 1.06    | 0.891 | 1.26 | 0.525 |
| FYN         | 0.0864      | -0.136          | 1.06    | 0.91  | 1.24 | 0.464 |
| KLRF1       | 0.0883      | -0.699          | 1.06    | 0.616 | 1.83 | 0.83  |
| PRKCD       | 0.0887      | -0.241          | 1.06    | 0.846 | 1.34 | 0.609 |
| TNFRSF1B    | 0.0888      | -0.315          | 1.06    | 0.804 | 1.41 | 0.675 |
| ALOX5       | 0.0896      | -0.239          | 1.06    | 0.847 | 1.34 | 0.605 |
| CX3CR1      | 0.0648      | -0.359          | 1.05    | 0.78  | 1.4  | 0.77  |
| HRH2        | 0.066       | -0.34           | 1.05    | 0.79  | 1.39 | 0.756 |
| NLRP3       | 0.0664      | -6.15           | 1.05    | 0.0141| 77.9 | 0.984 |
| CIQBp       | 0.0683      | -0.181          | 1.05    | 0.882 | 1.25 | 0.602 |
| MAP3K5      | 0.0723      | -0.188          | 1.05    | 0.878 | 1.26 | 0.598 |
| PECAM1      | 0.0727      | -0.316          | 1.05    | 0.804 | 1.38 | 0.721 |
| IRF2        | 0.0501      | -0.218          | 1.04    | 0.86  | 1.25 | 0.722 |
| CD3G        | 0.0535      | -0.222          | 1.04    | 0.857 | 1.26 | 0.711 |
| TOLLIP      | 0.0551      | -0.155          | 1.04    | 0.898 | 1.2  | 0.618 |
| MAV5        | 0.0568      | -0.316          | 1.04    | 0.803 | 1.35 | 0.771 |
| HLA-DOB     | 0.0577      | -0.508          | 1.04    | 0.703 | 1.54 | 0.845 |
| MR1         | 0.059       | -13.2           | 1.04    | 0.00011 | 9900 | 0.993 |
| MICB        | 0.0593      | -0.199          | 1.04    | 0.871 | 1.25 | 0.662 |
| NFKB2       | 0.0616      | -0.36           | 1.04    | 0.779 | 1.4  | 0.78  |
| SNO2        | 0.0627      | -0.312          | 1.04    | 0.806 | 1.35 | 0.749 |
| HLA-DPB1    | 0.0632      | -0.219          | 1.04    | 0.859 | 1.27 | 0.67  |
| PTPRC       | 0.0368      | -0.271          | 1.03    | 0.829 | 1.27 | 0.82  |
| CD68        | 0.0369      | -0.439          | 1.03    | 0.738 | 1.43 | 0.882 |
| INPP5D      | 0.0373      | -0.157          | 1.03    | 0.897 | 1.17 | 0.715 |
| SYK         | 0.038       | -0.252          | 1.03    | 0.84  | 1.26 | 0.803 |
| CD1C        | 0.0422      | -0.326          | 1.03    | 0.798 | 1.33 | 0.827 |
| SIGIRR      | 0.0437      | -0.199          | 1.03    | 0.871 | 1.22 | 0.732 |
| CXCR3       | 0.044       | -10             | 1.03    | 0.000959 | 1110 | 0.993 |
| TXNIP       | 0.0455      | -0.0704         | 1.03    | 0.952 | 1.12 | 0.459 |
| TP53        | 0.0455      | -0.301          | 1.03    | 0.812 | 1.31 | 0.802 |
| ATG10       | 0.0476      | -0.308          | 1.03    | 0.807 | 1.32 | 0.799 |
| CTSW        | 0.0478      | -0.439          | 1.03    | 0.738 | 1.45 | 0.851 |
| CD22        | 0.0479      | -0.399          | 1.03    | 0.758 | 1.41 | 0.838 |
| TYK2        | 0.0482      | -0.253          | 1.03    | 0.839 | 1.27 | 0.761 |
| Gene     | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 |
|----------|--------|--------|--------|--------|--------|--------|
| ICOS    | 0.0494 | -0.271 | 0.37   | 1.03   | 0.829  | 1.29   | 0.769 |
| IL1R2   | 0.0494 | -0.485 | 0.584  | 1.03   | 0.715  | 1.5    | 0.86  |
| TLR6    | 0.0229 | -0.445 | 0.491  | 1.02   | 0.734  | 1.41   | 0.926 |
| TLR2    | 0.0234 | -0.531 | 0.578  | 1.02   | 0.692  | 1.49   | 0.936 |
| ISG15   | 0.0241 | -0.464 | 0.512  | 1.02   | 0.725  | 1.43   | 0.925 |
| CEACAM1 | 0.0253 | -6.26  | 6.31   | 1.02   | 0.013  | 79.5   | 0.994 |
| CD79B   | 0.0293 | -0.474 | 0.532  | 1.02   | 0.72   | 1.45   | 0.911 |
| IL18RAP | 0.035  | -0.657 | 0.727  | 1.02   | 0.634  | 1.65   | 0.923 |
| PTGS2   | 0.00721| -0.467 | 0.482  | 1.01   | 0.723  | 1.4    | 0.977 |
| POU2F2  | 0.00839| -0.547 | 0.564  | 1.01   | 0.685  | 1.48   | 0.977 |
| NOTCH1  | 0.00934| -0.331 | 0.349  | 1.01   | 0.795  | 1.27   | 0.958 |
| CASP1   | 0.0113 | -0.287 | 0.31   | 1.01   | 0.82   | 1.24   | 0.942 |
| FCGR2A  | 0.0115 | -0.486 | 0.509  | 1.01   | 0.714  | 1.42   | 0.965 |
| SMAD2   | 0.0152 | -0.211 | 0.242  | 1.01   | 0.864  | 1.18   | 0.898 |
| TIGIT   | 0.0169 | -8     | 8.03   | 1.01   | 0.00392| 261    | 0.997 |
| TAPI    | 0.0178 | -0.265 | 0.301  | 1.01   | 0.832  | 1.23   | 0.904 |
| PSMD7   | 0.0179 | -0.182 | 0.217  | 1.01   | 0.882  | 1.16   | 0.864 |
| KLRK1   | 0.0211 | -0.456 | 0.498  | 1.01   | 0.729  | 1.41   | 0.933 |
| CXCR4   | 0.00143| -0.182 | 0.185  | 1      | 0.881  | 1.14   | 0.988 |
| HMGB1   | 0.00184| -0.121 | 0.125  | 1      | 0.919  | 1.09   | 0.977 |
| TNFRSF1A| 0.00299| -0.305 | 0.311  | 1      | 0.81   | 1.24   | 0.985 |
| HCK     | 0.00417| -0.329 | 0.337  | 1      | 0.796  | 1.26   | 0.981 |
| CD99    | 0.00448| -0.265 | 0.273  | 1      | 0.832  | 1.21   | 0.975 |
| CCND3   | -0.0024| -0.326 | 0.321  | 0.998  | 0.798  | 1.25   | 0.989 |
| HLA-DPA1| -0.00485| -0.233 | 0.223  | 0.997  | 0.851  | 1.17   | 0.968 |
| IFNGR1  | -0.00392| -0.259 | 0.251  | 0.997  | 0.836  | 1.19   | 0.977 |
| AMICA1  | -0.00381| -0.285 | 0.278  | 0.997  | 0.821  | 1.21   | 0.979 |
| MAPK14  | -0.00769| -0.372 | 0.357  | 0.995  | 0.773  | 1.28   | 0.968 |
| IL16    | -0.00768| -0.167 | 0.151  | 0.995  | 0.891  | 1.11   | 0.926 |
| ALCAM   | -0.00837| -3.73  | 3.71   | 0.994  | 0.0754 | 13.1   | 0.997 |
| STAT6   | -0.0106 | -0.403 | 0.382  | 0.993  | 0.756  | 1.3    | 0.959 |
| RORA    | -0.00982| -0.271 | 0.251  | 0.993  | 0.829  | 1.19   | 0.943 |
| CCRL2   | -0.00948| -5.8   | 5.78   | 0.993  | 0.018  | 54.8   | 0.998 |
| HLA-DMB | -0.0122 | -0.299 | 0.275  | 0.992  | 0.813  | 1.21   | 0.935 |
| FPR2    | -0.0111 | -0.446 | 0.424  | 0.992  | 0.734  | 1.34   | 0.961 |
| TICAM2  | -0.0134 | -8.72  | 8.7    | 0.991  | 0.00236| 415    | 0.998 |
| Gene         | Effect Size | Log2 Fold Change | p-value | Adj. p-value | Beta | SE | 95% CI | T | FDR | Adjusted p-value |
|--------------|-------------|-----------------|---------|-------------|------|----|--------|---|-----|-----------------|
| HLA-B        | -0.0126     | -0.283          | 0.991   | 0.822       | 1.2  | 0.929|
| MYD88        | -0.0147     | -0.255          | 0.99    | 0.838       | 1.17 | 0.907|
| IL10RA       | -0.0161     | -0.211          | 0.989   | 0.864       | 1.13 | 0.874|
| HAVCR2       | -0.0192     | -0.573          | 0.987   | 0.672       | 1.45 | 0.947|
| TLR8         | -0.0188     | -0.445          | 0.987   | 0.735       | 1.33 | 0.933|
| HLA-DMA      | -0.0187     | -0.249          | 0.987   | 0.842       | 1.16 | 0.877|
| TANK         | -0.0212     | -0.431          | 0.985   | 0.742       | 1.31 | 0.921|
| RUNX1        | -0.0211     | -0.359          | 0.985   | 0.78        | 1.25 | 0.905|
| LYN          | -0.0233     | -0.375          | 0.984   | 0.771       | 1.26 | 0.899|
| SLAMF7       | -0.0226     | -5.16           | 0.984   | 0.0279      | 34.7 | 0.993|
| STAT4        | -0.0243     | -0.398          | 0.983   | 0.759       | 1.27 | 0.901|
| CXCR2        | -0.0262     | -0.495          | 0.982   | 0.71        | 1.36 | 0.915|
| ANP32B       | -0.0311     | -0.252          | 0.979   | 0.839       | 1.14 | 0.788|
| CD40LG       | -0.0357     | -0.503          | 0.976   | 0.706       | 1.35 | 0.884|
| CD14         | -0.035      | -0.491          | 0.976   | 0.712       | 1.34 | 0.884|
| MAP2K2       | -0.0371     | -0.353          | 0.975   | 0.783       | 1.21 | 0.823|
| UBC          | -0.0358     | -0.288          | 0.975   | 0.854       | 1.11 | 0.722|
| TNFSF10      | -0.0379     | -0.348          | 0.974   | 0.786       | 1.21 | 0.816|
| PTGS1        | -0.0374     | -0.698          | 0.974   | 0.616       | 1.54 | 0.914|
| GPI          | -0.0415     | -0.371          | 0.972   | 0.773       | 1.22 | 0.81|
| IKBKE        | -0.0408     | -0.336          | 0.972   | 0.792       | 1.19 | 0.792|
| MAPK8        | -0.0422     | -8              | 0.971   | 0.0039      | 242  | 0.992|
| BCL10        | -0.042      | -0.196          | 0.971   | 0.823       | 1.15 | 0.737|
| HLA-E        | -0.0439     | -0.252          | 0.971   | 0.84        | 1.12 | 0.687|
| PNMA1        | -0.0454     | -0.403          | 0.969   | 0.756       | 1.24 | 0.809|
| NFKBIA       | -0.0483     | -0.263          | 0.967   | 0.833       | 1.12 | 0.668|
| STAT5B       | -0.0514     | -0.414          | 0.965   | 0.751       | 1.24 | 0.787|
| FCGR1A       | -0.0541     | -0.777          | 0.963   | 0.583       | 1.59 | 0.886|
| IL13RA1      | -0.054      | -0.267          | 0.963   | 0.831       | 1.12 | 0.63|
| CD53         | -0.0579     | -0.295          | 0.961   | 0.815       | 1.13 | 0.642|
| ITGA5        | -0.0578     | -0.276          | 0.961   | 0.826       | 1.12 | 0.614|
| CSH          | -0.0593     | -0.583          | 0.96    | 0.667       | 1.38 | 0.829|
| TFE8B        | -0.0585     | -0.52           | 0.96    | 0.698       | 1.32 | 0.809|
| IRF1         | -0.0605     | -0.285          | 0.959   | 0.821       | 1.12 | 0.609|
| LCN2         | -0.0634     | -0.777          | 0.957   | 0.583       | 1.57 | 0.865|
| TNFSF12      | -0.0632     | -0.321          | 0.95    | 0.8         | 1.14 | 0.641|
| Gene   | TRAF2 | -0.0655 | -0.386 | 0.255 | 0.956 | 0.765 | 1.19 | 0.698 |
|--------|-------|---------|--------|-------|-------|-------|------|-------|
| MIF    | -0.0654 | -0.5    | 0.369  | 0.956 | 0.707 | 1.29  | 0.774|
| IRAK4  | -0.0648 | -0.351  | 0.222  | 0.956 | 0.784 | 1.17  | 0.667|
| CXCR1  | -0.0685 | -0.539  | 0.402  | 0.954 | 0.688 | 1.32  | 0.781|
| CD84   | -0.0681 | -0.38   | 0.244  | 0.954 | 0.768 | 1.18  | 0.678|
| CD244  | -0.0673 | -0.424  | 0.29   | 0.954 | 0.745 | 1.22  | 0.72 |
| CFP    | -0.0743 | -0.389  | 0.24   | 0.95  | 0.764 | 1.18  | 0.653|
| CTSS   | -0.0742 | -0.32   | 0.171  | 0.95  | 0.801 | 1.13  | 0.567|
| XCL2   | -0.0779 | -0.548  | 0.392  | 0.947 | 0.684 | 1.31  | 0.752|
| CASP8  | -0.082  | -0.363  | 0.199  | 0.945 | 0.778 | 1.15  | 0.58 |
| BAX    | -0.0817 | -0.356  | 0.192  | 0.945 | 0.781 | 1.14  | 0.572|
| NCF4   | -0.0834 | -0.543  | 0.376  | 0.944 | 0.686 | 1.3   | 0.73 |
| CD164  | -0.0866 | -0.246  | 0.073  | 0.942 | 0.843 | 1.05  | 0.313|
| CD63   | -0.0864 | -0.318  | 0.145  | 0.942 | 0.802 | 1.11  | 0.481|
| BCL2L1 | -0.0863 | -0.826  | 0.653  | 0.942 | 0.564 | 1.57  | 0.824|
| CCL5   | -0.0913 | -0.662  | 0.479  | 0.939 | 0.632 | 1.39  | 0.76 |
| REPS1  | -0.0966 | -0.581  | 0.388  | 0.935 | 0.669 | 1.31  | 0.704|
| TLR1   | -0.0989 | -0.519  | 0.321  | 0.934 | 0.698 | 1.25  | 0.654|
| TGFβ1  | -0.0987 | -0.386  | 0.189  | 0.934 | 0.765 | 1.14  | 0.516|
| IFI35  | -0.1    | -10     | 9.83   | 0.933 | 0.000956 | 910      | 0.985|
| CD40   | -0.102  | -0.533  | 0.329  | 0.932 | 0.691 | 1.26  | 0.652|
| MAPK3  | -0.101  | -0.457  | 0.255  | 0.932 | 0.729 | 1.19  | 0.59 |
| FCGR3A | -0.101  | -0.759  | 0.557  | 0.932 | 0.591 | 1.47  | 0.77 |
| MAP2K1 | -0.104  | -0.377  | 0.169  | 0.931 | 0.77  | 1.12  | 0.473|
| LILRB3 | -0.103  | -0.58   | 0.373  | 0.931 | 0.669 | 1.3   | 0.68 |
| CD3D   | -0.104  | -0.413  | 0.205  | 0.93  | 0.751 | 1.15  | 0.523|
| PLAUR  | -0.104  | -0.422  | 0.214  | 0.93  | 0.746 | 1.16  | 0.536|
| IRAK1  | -0.108  | -0.393  | 0.176  | 0.928 | 0.762 | 1.13  | 0.472|
| ITGAE  | -0.108  | -0.56   | 0.345  | 0.928 | 0.678 | 1.27  | 0.651|
| CXCL16 | -0.111  | -0.529  | 0.307  | 0.926 | 0.693 | 1.24  | 0.614|
| PF4    | -0.113  | -1.07   | 0.846  | 0.925 | 0.476 | 1.8   | 0.822|
| CD48   | -0.113  | -0.441  | 0.214  | 0.924 | 0.737 | 1.16  | 0.513|
| TNFRSF8| -0.115  | -0.494  | 0.263  | 0.923 | 0.71  | 1.2   | 0.564|
| CD1D   | -0.117  | -0.503  | 0.269  | 0.922 | 0.706 | 1.21  | 0.566|
| TLR4   | -0.117  | -0.609  | 0.375  | 0.922 | 0.656 | 1.3   | 0.652|
| FCGR2B | -0.119  | -0.642  | 0.403  | 0.921 | 0.641 | 1.32  | 0.664|
| Gene   | FUT7  | PYCARD | CD27  | IFITM1 | BST2  | MAPKAPK2 | SH2D1A | PSMB9  | PSMB10 | IL12RB1 | TNFRSF14 | ATC5   | FOS    | CAMP   | PSMB8  | CHUK   | MAPK1  | NOD2   | CSF3R  | KLKD1  | TNFRSF13 | TNFRSF10C | GZMH   | ICAM3  | BST1   | TNFSF13B | RIPK2  | TRAF6  | ATF1   | PPBP   | RPS6   | IL1B   | ICAM1  | SH2D1B | PSMB7  | TBK1   |
|--------|-------|--------|-------|--------|-------|----------|--------|--------|--------|---------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|----------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|        | -0.125| -0.124 | -0.127| -0.127 | -0.128| -0.138   | -0.137 | -0.139 | -0.141 | -0.141  | -0.144  | -0.146 | -0.146 | -0.145 | -0.15  | -0.154 | -0.154 | -0.155 | -0.159 | -0.159 | -0.158  | -0.166  | -0.17  | -0.176 | -0.178 | -0.178  | -0.179  | -0.183 | -0.188 | -0.187 | -0.189 | -0.189 | -0.191 | -0.195 | -0.199 | -0.203 |
|        | -0.59 | 0.543  | 0.393 | 0.554  | 0.399 | -0.392   | 0.637  | 0.337  | 0.371  | 0.455   | 0.346   | -0.47   | -0.676 | -1.02  | -0.338 | -0.457 | -0.549 | -0.792 | -0.535 | -0.812 | -5.68   | 0.683   | 0.899  | 0.483  | 0.546  | 0.637   | 0.378   | 0.481  | 0.643  | 0.231  | 0.648  | 0.789  | 0.93   | 0.389  | 0.491  |
|        | 0.341 | 0.294  | 0.14  | 0.3  | 0.144 | 0.116   | 0.362  | 0.0893 | 0.097  | 0.173   | 0.0576  | 0.178   | 0.385  | 0.732  | 0.0386 | 0.148  | 0.241  | 0.481  | 0.218  | 0.494  | 5.37    | 0.351  | 0.131  | 0.19   | 0.281   | 0.0202  | 0.114  | 0.0817 | 0.643  | 0.27   | 0.406  | 0.54   | 0.0847 | 0.869  |
|        | 0.917 | 0.917  | 0.916 | 0.916  | 0.915 | 0.909    | 0.909  | 0.899  | 0.898  | 0.896   | 0.905   | 0.904   | 0.904  | 0.904  | 0.901  | 0.899  | 0.899  | 0.898  | 0.896  | 0.896  | 0.896   | 0.892   | 0.889  | 0.885  | 0.884  | 0.884   | 0.883   | 0.881  | 0.878  | 0.878  | 0.877  | 0.877  | 0.876  | 0.871  | 0.869  |
|        | 0.664 | 0.687  | 0.761 | 0.681  | 0.758 | 0.762    | 0.643  | 0.791  | 0.773  | 0.729   | 0.786   | 0.722   | 0.626  | 1.66   | 0.791  | 0.729  | 0.684  | 0.578  | 0.69   | 0.57   | 0.0194  | 0.623   | 0.536  | 0.716  | 0.685  | 0.643   | 0.769   | 0.717  | 0.729  | 0.494  | 0.638  | 0.579  | 0.525  | 0.871  | 0.711  |
|        | 1.27  | 1.23   | 1.1   | 1.23   | 1.1    | 1.08     | 1.29   | 1.04   | 1.06   | 1.13    | 1.04    | 1.13    | 1.31   | 1.66   | 1.03   | 1.11   | 1.18   | 1.4    | 1.16   | 1.41   | 41.3   | 1.28   | 1.1    | 1.14    | 1.22    | 1.01   | 1.08   | 1.06   | 1.56   | 1.17   | 1.33   | 0.994  | 1.06   |
|        | 0.611 | 0.573  | 0.373 | 0.573  | 0.378  | 0.313    | 0.602  | 0.2     | 0.258  | 0.402   | 0.191   | 0.399   | 0.602  | 0.752  | 0.15   | 0.341  | 0.464  | 0.642  | 0.428  | 0.643  | 0.957  | 0.544  | 0.288  | 0.366  | 0.466  | 0.109  | 0.254  | 0.0202 | 0.668  | 0.398  | 0.544  | 0.614  | 0.0673 | 0.197  |
| Gene      | Z-score | P-value | Odds Ratio | 95% CI Low | 95% CI High |
|-----------|---------|---------|------------|------------|-------------|
| GZMA      | -0.202  | 0.371   | 0.801      | 0.645      | 0.974       |
| HLA-DRA   | -0.214  | 0.0377  | 0.801      | 0.645      | 0.974       |
| CD58      | -0.214  | 0.18    | 0.801      | 0.645      | 0.974       |
| IL2RA     | -0.216  | 0.0987  | 0.801      | 0.645      | 0.974       |
| LTF       | -0.218  | 0.669   | 0.801      | 0.645      | 0.974       |
| FCER1G    | -0.223  | 0.382   | 0.801      | 0.645      | 0.974       |
| IL1RB2    | -0.224  | 0.266   | 0.801      | 0.645      | 0.974       |
| GZMB      | -0.224  | 0.56    | 0.801      | 0.645      | 0.974       |
| TSC22D3   | -0.234  | 0.394   | 0.801      | 0.645      | 0.974       |
| TREM1     | -0.238  | 0.385   | 0.801      | 0.645      | 0.974       |
| CD33      | -0.242  | 0.279   | 0.801      | 0.645      | 0.974       |
| MEFV      | -0.253  | 0.238   | 0.801      | 0.645      | 0.974       |
| SPA17     | -0.258  | 0.927   | 0.801      | 0.645      | 0.974       |
| HLA-G     | -0.267  | 0.278   | 0.801      | 0.645      | 0.974       |
| IL1RN     | -0.27   | 0.42    | 0.801      | 0.645      | 0.974       |
| DUSP6     | -0.273  | 0.117   | 0.801      | 0.645      | 0.974       |
| IFITM2    | -0.275  | 0.239   | 0.801      | 0.645      | 0.974       |
| ABCB1     | -0.274  | 0.0999  | 0.801      | 0.645      | 0.974       |
| TFRC      | -0.276  | 0.495   | 0.801      | 0.645      | 0.974       |
| IL1RB1    | -0.282  | 0.0639  | 0.801      | 0.645      | 0.974       |
| MAP4K2    | -0.281  | 0.0628  | 0.801      | 0.645      | 0.974       |
| SLC11A1   | -0.286  | 0.332   | 0.801      | 0.645      | 0.974       |
| CLEC4A    | -0.291  | 0.0316  | 0.801      | 0.645      | 0.974       |
| CD160     | -0.296  | 0.889   | 0.801      | 0.645      | 0.974       |
| TARP      | -0.297  | 0.264   | 0.801      | 0.645      | 0.974       |
| TNF       | -0.305  | 0.106   | 0.801      | 0.645      | 0.974       |
| MAF       | -0.308  | 0.111   | 0.801      | 0.645      | 0.974       |
| ECSIT     | -0.314  | 0.123   | 0.801      | 0.645      | 0.974       |
| LY86      | -0.317  | 0.0949  | 0.801      | 0.645      | 0.974       |
| KLRC2     | -0.32   | 0.523   | 0.801      | 0.645      | 0.974       |
| CD8B      | -0.322  | 0.931   | 0.801      | 0.645      | 0.974       |
| CCL4      | -0.324  | 0.316   | 0.801      | 0.645      | 0.974       |
| PIN1      | -0.333  | 0.0334  | 0.801      | 0.645      | 0.974       |
| IL24      | -0.338  | 0.864   | 0.801      | 0.645      | 0.974       |
| GZMK      | -0.342  | 0.273   | 0.801      | 0.645      | 0.974       |
| CEBPB     | -0.344  | 0.112   | 0.801      | 0.645      | 0.974       |
| Gene   | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 |
|--------|--------|--------|--------|--------|--------|--------|
| CFD    | -0.347 | -1.42  | 0.728  | 0.786  | 0.373  | 1.66   |
| CCR3   | -0.356 | -0.937 | 0.225  | 0.781  | 0.522  | 1.17   |
| CCL3   | -0.359 | -1.42  | 0.701  | 0.78   | 0.374  | 1.63   |
| TNFSF14| -0.369 | -0.669 | -0.0701| 0.774  | 0.629  | 0.953  |
| KLRB1  | -0.371 | -0.802 | 0.0595 | 0.773  | 0.574  | 1.04   |
| LGALS3 | -0.373 | -1     | 0.256  | 0.772  | 0.499  | 1.19   |
| IL15RA | -0.386 | -1.36  | 0.591  | 0.765  | 0.389  | 1.51   |
| LTBR   | -0.389 | -0.783 | 0.00466| 0.764  | 0.581  | 1      |
| CKLF   | -0.431 | -0.838 | -0.0238| 0.742  | 0.559  | 0.984  |
| S100A12| -0.439 | -1.07  | 0.194  | 0.738  | 0.476  | 1.14   |
| CLEC7A | -0.443 | -0.9   | 0.0148 | 0.736  | 0.536  | 1.01   |
| KLRC1  | -0.448 | -1.2   | 0.309  | 0.733  | 0.434  | 1.24   |
| BATF   | -0.457 | -0.76  | -0.155 | 0.728  | 0.591  | 0.898  |
| LILRA5 | -0.463 | -0.974 | 0.0479 | 0.725  | 0.509  | 1.03   |
| CXCL1  | -0.475 | -1.13  | 0.179  | 0.72   | 0.457  | 1.13   |
| TNFSF4 | -0.485 | -0.963 | -0.00833| 0.714  | 0.513  | 0.994  |
| LY96   | -0.504 | -1.03  | 0.0223 | 0.705  | 0.49   | 1.02   |
| S100A8 | -0.542 | -0.962 | -0.122 | 0.687  | 0.513  | 0.919  |
| LTB4R  | -0.541 | -6.49  | 5.41   | 0.687  | 0.0111 | 42.4   |
| THBD   | -0.631 | -1.53  | 0.264  | 0.646  | 0.347  | 1.2    |
| FCER1A | -0.672 | -1.34  | -0.00617| 0.627  | 0.395  | 0.996  |
| C4B    | -0.78  | -4.67  | 3.11   | 0.583  | 0.0394 | 8.62   |
| IL8    | -0.87  | -1.83  | 0.0889 | 0.547  | 0.281  | 1.06   |
| SLPI   | -1.09  | -1.83  | -0.343 | 0.471  | 0.282  | 0.788  |
Supplementary Table S2. Differential gene expression in nasal lysate at baseline between responders and non-responders.

| Genes     | Log2 fold change | Lower confidence limit (log2) | Upper confidence limit (log2) | Linear fold change | Lower confidence limit (linear) | Upper confidence limit (linear) | p-value |
|-----------|-----------------|-------------------------------|-------------------------------|--------------------|---------------------------------|---------------------------------|---------|
| IFIT2     | 3.16            | 1.49                          | 4.83                          | 8.94               | 2.82                            | 28.4                            | 0.00399 |
| CREB5     | 3.83            | 1.75                          | 5.91                          | 14.2               | 3.37                            | 59.9                            | 0.00474 |
| IDO1      | -1.39           | -2.19                         | -0.599                        | 0.381              | 0.219                           | 0.66                            | 0.00635 |
| BST1      | 1.91            | 0.787                         | 3.03                          | 3.75               | 1.73                            | 8.15                            | 0.00751 |
| IL1RAP    | 2.18            | 0.825                         | 3.54                          | 4.54               | 1.77                            | 11.6                            | 0.0103  |
| CXCR4     | 3.44            | 1.29                          | 5.76                          | 11.5               | 2.45                            | 48                              | 0.0105  |
| PTGS2     | 3.52            | 1.29                          | 5.76                          | 11.5               | 2.45                            | 54.1                            | 0.0114  |
| IL6R      | 2.65            | 0.951                         | 4.35                          | 6.27               | 1.93                            | 20.3                            | 0.0121  |
| IL17RA    | 2.22            | 0.792                         | 3.65                          | 4.67               | 1.73                            | 12.6                            | 0.0123  |
| PIK3CD    | 2.85            | 1.01                          | 4.7                            | 7.22               | 2.01                            | 26                              | 0.0128  |
| PLAUR     | 3.23            | 1.12                          | 5.34                          | 9.39               | 2.17                            | 40.6                            | 0.0134  |
| PNMA1     | -0.641          | -1.07                         | -0.214                        | 0.641              | 0.477                           | 0.862                           | 0.0147  |
| ICAM3     | 2.74            | 0.914                         | 4.57                          | 6.68               | 1.88                            | 23.7                            | 0.0148  |
| IL1RN     | 2.15            | 0.719                         | 3.59                          | 4.45               | 1.65                            | 12                              | 0.0148  |
| ALOX 5    | 2.8             | 0.909                         | 4.68                          | 6.95               | 1.88                            | 25.7                            | 0.0157  |
| TGFBI     | 2.27            | 0.73                          | 3.8                            | 4.81               | 1.66                            | 13.9                            | 0.0161  |
| INP5RD    | 1.87            | 0.599                         | 3.14                          | 3.65               | 1.51                            | 8.79                            | 0.0162  |
| IGF2R     | 1.49            | 0.471                         | 2.52                          | 2.82               | 1.39                            | 5.73                            | 0.0169  |
| CCL4      | 3.17            | 0.987                         | 5.36                          | 9.01               | 1.98                            | 41                              | 0.0174  |
| EGR2      | 2.39            | 0.736                         | 4.05                          | 5.26               | 1.67                            | 16.6                            | 0.0179  |
| CKLF      | 1.85            | 0.557                         | 3.14                          | 3.6                | 1.47                            | 8.81                            | 0.0186  |
| FOS       | 1.43            | 0.43                          | 2.44                          | 2.7                | 1.35                            | 5.42                            | 0.0189  |
| MAPK14    | 1.03            | 0.306                         | 1.76                          | 2.05               | 1.24                            | 3.39                            | 0.0193  |
| NOTCH1    | 1.67            | 0.493                         | 2.85                          | 3.18               | 1.41                            | 7.19                            | 0.0194  |
| ITGB2     | 2.9             | 0.848                         | 4.95                          | 7.47               | 1.8                             | 31                              | 0.0198  |
| CCL3L1    | 3.08            | 0.883                         | 5.28                          | 8.47               | 1.84                            | 38.9                            | 0.0206  |
| HCK       | 3.09            | 0.884                         | 5.3                            | 8.53               | 1.85                            | 39.5                            | 0.0207  |
| IL16      | 2.46            | 0.688                         | 4.23                          | 5.49               | 1.61                            | 18.7                            | 0.0215  |
| CD44      | 1.15            | 0.317                         | 1.98                          | 2.22               | 1.25                            | 3.96                            | 0.0221  |
| IFITM2    | 2.76            | 0.749                         | 4.77                          | 6.76               | 1.68                            | 27.2                            | 0.0227  |
| TLR4      | 2.79            | 0.753                         | 4.83                          | 6.92               | 1.69                            | 28.4                            | 0.0229  |
| TLR2      | 2.43            | 0.603                         | 4.26                          | 5.39               | 1.52                            | 19.1                            | 0.0262  |
| Gene     | Fold Change | p-value |
|----------|-------------|---------|
| AMICA1   | 2.88        | 0.0283  |
| TNFRSF1A | 1.24        | 0.0284  |
| CD83     | 2.39        | 0.0289  |
| CD97     | 1.88        | 0.0291  |
| LTB      | 2.53        | 0.0296  |
| NOD2     | 1.89        | 0.0302  |
| LCP1     | 2.73        | 0.0304  |
| TLR1     | 2.18        | 0.0309  |
| STAT5B   | 1.69        | 0.0312  |
| NFKB2    | 1.47        | 0.0314  |
| MAPKAPK2 | 0.806       | 0.0314  |
| IL13RA1  | 0.768       | 0.0322  |
| SYK      | 1.24        | 0.0332  |
| MAP3K7   | 0.41        | 0.0338  |
| CD14     | 2.52        | 0.0344  |
| ICAM1    | 2.29        | 0.0354  |
| CLEC4A   | 2.32        | 0.0355  |
| IL2RG    | 2.2         | 0.0371  |
| TANK     | 1.4         | 0.0374  |
| LYN      | 1.39        | 0.0384  |
| IL19     | -2.07       | 0.0384  |
| FCER1G   | 2.56        | 0.0397  |
| BCL6     | 1.39        | 0.0421  |
| HLA-DPA1 | 1.94        | 0.0434  |
| CCR2     | 2           | 0.044   |
| NFKBIA   | 1.65        | 0.0449  |
| CASP1    | 1.78        | 0.0458  |
| ISG20    | 1.27        | 0.0473  |
| HLA-C    | 0.869       | 0.0478  |
| IL4R     | 1.2         | 0.048   |
| JAK1     | 0.669       | 0.0485  |
| IKBK      | 0.489       | 0.0495  |
| NOS2A    | -0.97       | 0.0514  |
| IRAK2    | 0.908       | 0.0525  |
| TBK1     | 0.347       |         |
| CASP8    | 1.25        | 0.0527  |
| Gene    | Expression | Log2 Fold Change | p Value  | FDR Value |
|---------|------------|------------------|----------|-----------|
| STAT3   | 0.735      | 1.39             | 1.06     | 2.62      | 0.0532   |
| TFRC    | 0.52       | 0.986            | 1.04     | 1.98      | 0.0533   |
| YTHDF2  | -0.703     | -0.0736          | 0.397    | 0.95      | 0.0534   |
| TXNIP   | 0.86       | 1.65             | 1.05     | 3.14      | 0.0587   |
| ITGA5   | 2.07       | 4.2              | 1.12     | 15.7      | 0.059    |
| IFNGR1  | 1.07       | 2.1              | 1.05     | 4.2       | 0.0629   |
| IL10RA  | 2.05       | 4.15             | 1.09     | 15.8      | 0.0642   |
| DUSP6   | 1.04       | 2.06             | 1.04     | 4.05      | 0.0643   |
| TNFAIP3 | 1.29       | 2.44             | 1.05     | 5.67      | 0.0646   |
| LY96    | 2.09       | 4.25             | 1.08     | 16.8      | 0.0655   |
| HLA-DPB1| 2.39       | 4.72             | 1.04     | 26.3      | 0.0723   |
| TIRAP   | -0.431     | -0.74            | 0.545    | 0.993     | 0.0725   |
| TYK2    | 0.57       | 1.13             | 1.01     | 2.18      | 0.073    |
| LAMP2   | 0.776      | 1.54             | 1.01     | 2.9       | 0.0736   |
| NOS2    | -0.877     | -0.174           | 0.298    | 0.994     | 0.0758   |
| CD59    | -0.348     | -0.694           | 0.618    | 0.999     | 0.0774   |
| CD274   | 0.909      | 1.82             | 0.999    | 3.33      | 0.0788   |
| MAP2K1  | 0.517      | 1.04             | 0.999    | 2.05      | 0.0794   |
| IL1R1   | 0.909      | 1.04             | 0.999    | 2.05      | 0.0794   |
| S100A8  | 1.89       | 1.04             | 0.999    | 2.05      | 0.0794   |
| HLA-E   | 0.948      | 1.04             | 0.999    | 2.05      | 0.0794   |
| CREB1   | 0.329      | 1.04             | 0.999    | 2.05      | 0.0794   |
| PSEN1   | 0.409      | 1.04             | 0.999    | 2.05      | 0.0794   |
| C2      | -1.13      | -2.29            | 0.457    | 0.205     | 1.02     | 0.0853   |
| CD46    | 0.637      | 1.29             | 0.986    | 2.45      | 0.0867   |
| CFD     | 1.96       | 3.9              | 0.957    | 15.9      | 0.0868   |
| IRAK4   | 0.557      | 1.13             | 0.986    | 2.19      | 0.088    |
| CCL28   | -1.08      | -2.21            | 0.216    | 1.03      | 0.0892   |
| KIT     | -1.17      | -2.4             | 0.19     | 1.05      | 0.0933   |
| CYLD    | 0.726      | 1.49             | 0.971    | 2.82      | 0.094    |
| EP300   | 0.556      | 1.15             | 0.975    | 2.22      | 0.0959   |
| CTSS    | 1.14       | 2.2              | 0.942    | 5.14      | 0.0983   |
| OAS3    | -0.692     | -1.44            | 0.619    | 0.368     | 1.04     | 0.102    |
| CDKN1A  | 0.747      | 1.57             | 0.948    | 2.97      | 0.106    |
| ATG7    | 0.751      | 1.6              | 0.935    | 3.03      | 0.113    |
| TOLLIP  | 0.317      | 0.677            | 0.971    | 1.6       | 0.114    |
| Gene      | Value       | Value 2 | Value 3 | Value 4 | Value 5 | Value 6 |
|-----------|-------------|---------|---------|---------|---------|---------|
| THBD      | 1.39        | -0.186  | 2.96    | 2.62    | 0.879   | 7.8     |
| HLA-DRA   | 1.29        | -0.176  | 2.75    | 2.44    | 0.885   | 6.74    |
| PRKCD     | 0.734       | -0.102  | 1.57    | 1.66    | 0.932   | 2.97    |
| SBNO2     | 0.987       | -0.148  | 2.12    | 1.98    | 0.902   | 4.36    |
| TNFRSF14  | 0.557       | -0.0853 | 1.2     | 1.47    | 0.943   | 2.3     |
| RUNX3     | 0.843       | -0.134  | 1.82    | 1.79    | 0.911   | 3.53    |
| IRF7      | 0.803       | -0.147  | 1.75    | 1.75    | 0.903   | 3.37    |
| IFNAR2    | 0.559       | -0.103  | 1.22    | 1.47    | 0.931   | 2.33    |
| CYFIP2    | 1.14        | -0.212  | 2.48    | 2.2     | 0.863   | 5.59    |
| IL1R2     | 2.8         | -0.534  | 6.14    | 6.97    | 0.691   | 70.4    |
| CD68      | 0.805       | -0.154  | 1.76    | 1.75    | 0.899   | 3.39    |
| TFE6      | 0.998       | -0.198  | 2.19    | 2       | 0.872   | 4.58    |
| IFI27     | -2.47       | -5.42   | 0.493   | 0.181   | 0.0233  | 1.41    |
| NUP107    | -0.704      | -1.55   | 0.141   | 0.614   | 0.341   | 1.1     |
| JAK2      | 0.435       | -0.096  | 0.966   | 1.35    | 0.936   | 1.95    |
| CD58      | 0.732       | -0.168  | 1.63    | 1.66    | 0.89    | 3.1     |
| NFKB1     | 0.626       | -0.144  | 1.4     | 1.54    | 0.905   | 2.63    |
| HLA-DQA1  | 3.3         | -0.767  | 7.38    | 9.88    | 0.587   | 166     |
| MAP3K1    | 0.301       | -0.0706 | 0.673   | 1.23    | 0.952   | 1.59    |
| TSC22D3   | 0.981       | -0.234  | 2.2     | 1.97    | 0.85    | 4.59    |
| RELA      | 0.302       | -0.0726 | 0.676   | 1.23    | 0.951   | 1.6     |
| PSMB10    | -0.229      | -0.514  | 0.0558  | 0.853   | 0.7     | 1.04    |
| GTF3C1    | -0.343      | -0.772  | 0.0861  | 0.788   | 0.586   | 1.06    |
| IRF1      | 0.748       | -0.197  | 1.69    | 1.68    | 0.872   | 3.23    |
| IFIH1     | 0.667       | -0.182  | 1.52    | 1.59    | 0.881   | 2.86    |
| MAPK1     | 0.441       | -0.121  | 1       | 1.36    | 0.92    | 2       |
| BAX       | 0.25        | -0.0713 | 0.571   | 1.19    | 0.952   | 1.49    |
| HLA-DRB3  | 0.991       | -0.287  | 2.27    | 1.99    | 0.819   | 4.82    |
| CFB       | -0.824      | -1.89   | 0.241   | 0.565   | 0.27    | 1.18    |
| LRPI      | -0.778      | -1.79   | 0.231   | 0.583   | 0.29    | 1.17    |
| LIF       | 1.28        | -0.418  | 2.98    | 2.43    | 0.749   | 7.9     |
| CD276     | -0.379      | -0.882  | 0.123   | 0.769   | 0.543   | 1.09    |
| THBS1     | 1.45        | -0.489  | 3.39    | 2.74    | 0.713   | 10.5    |
| CXCL1     | 1.1         | -0.383  | 2.59    | 2.15    | 0.767   | 6.02    |
| ATG5      | -0.374      | -0.878  | 0.129   | 0.771   | 0.544   | 1.09    |
| RUNX1     | -0.446      | -1.05   | 0.154   | 0.734   | 0.484   | 1.11    |
| Gene   | Row 1 | Row 2 | Row 3 | Row 4 | Row 5 | Row 6 |
|--------|-------|-------|-------|-------|-------|-------|
| STAT6  | 0.483 | -0.17 | 1.14  | 1.4   | 0.889 | 2.2   |
| CSF2RB | 2.6   | -0.954| 6.15  | 6.06  | 0.516 | 71.1  |
| PLAU   | 1.11  | -0.413| 2.63  | 2.15  | 0.751 | 6.17  |
| MYD88  | 0.677 | -0.258| 1.61  | 1.6   | 0.836 | 3.06  |
| IFITM1 | 1.66  | -0.633| 3.95  | 3.15  | 0.645 | 15.4  |
| CXCL16 | 0.61  | -0.247| 1.47  | 1.53  | 0.842 | 2.77  |
| SAA1   | -0.709| -1.71 | 0.293 | 0.612 | 0.305 | 1.23  |
| SEL    | 2.26  | -0.97 | 5.49  | 4.79  | 0.511 | 44.9  |
| ABL1   | -0.506| -1.24 | 0.225 | 0.704 | 0.424 | 1.17  |
| BID    | 0.838 | -0.381| 2.06  | 1.79  | 0.768 | 4.16  |
| UBC    | 0.343 | -0.156| 0.841 | 1.27  | 0.898 | 1.79  |
| ALCAM  | -0.397| -0.974| 0.181 | 0.76  | 0.509 | 1.13  |
| LCN2   | -0.569| -1.41 | 0.272 | 0.674 | 0.377 | 1.21  |
| PSMB7  | -0.337| -0.838| 0.164 | 0.792 | 0.56  | 1.12  |
| IKBKE  | -0.734| -1.84 | 0.37  | 0.601 | 0.28  | 1.29  |
| CXCL3  | 1.07  | -0.56 | 2.71  | 2.11  | 0.678 | 6.54  |
| RIPK2  | 0.842 | -0.445| 2.13  | 1.79  | 0.734 | 4.37  |
| CHUK   | 0.249 | -0.135| 0.632 | 1.19  | 0.911 | 1.55  |
| CD24   | -0.469| -1.19 | 0.256 | 0.723 | 0.437 | 1.19  |
| HLA-B  | 0.462 | -0.259| 1.18  | 1.38  | 0.836 | 2.27  |
| VEGFA  | 0.628 | -0.369| 1.62  | 1.55  | 0.774 | 3.08  |
| ITGB1  | -0.237| -0.617| 0.142 | 0.848 | 0.652 | 1.1   |
| TRAF3  | 0.276 | -0.173| 0.725 | 1.21  | 0.887 | 1.65  |
| VEGFC  | -0.874| -2.29 | 0.544 | 0.546 | 0.204 | 1.46  |
| NR3C1  | 0.481 | -0.301| 1.26  | 1.4   | 0.812 | 2.4   |
| NLR5   | 0.385 | -0.253| 1.02  | 1.31  | 0.839 | 2.03  |
| TP53   | -1.28 | -3.42 | 0.857 | 0.411 | 0.0932| 1.81  |
| IKBKB  | -0.284| -0.759| 0.192 | 0.822 | 0.591 | 1.14  |
| CASP3  | -0.345| -0.927| 0.236 | 0.787 | 0.526 | 1.18  |
| MUC1   | -0.378| -1.02 | 0.26  | 0.769 | 0.494 | 1.2   |
| PSEN2  | -0.813| -2.19 | 0.561 | 0.569 | 0.22  | 1.48  |
| FCGR2A | 2.58  | -1.65 | 6.41  | 5.2   | 0.319 | 84.9  |
| CLEC7A | 2.06  | -1.46 | 5.58  | 4.17  | 0.362 | 47.9  |
| REP51  | -0.16 | -0.435| 0.116 | 0.895 | 0.74  | 1.08  |
| ITGAX  | 2.04  | -1.52 | 5.6   | 4.11  | 0.348 | 48.6  |
| MAP2K4 | 0.281 | -0.212| 0.775 | 1.22  | 0.863 | 1.71  |
| Gene   | Value1 | Value2 | Value3 | Value4 | Value5 | Value6 | Value7 | Value8 | Value9 | Value10 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| IGF1R  | 0.234  | -0.178 | 0.645  | 1.18   | 0.884  | 1.56   | 0.291  |        |        |         |
| ANXA1  | 0.413  | -0.316 | 1.14   | 1.33   | 0.803  | 2.21   | 0.293  |        |        |         |
| FOXJ1  | -1.18  | -3.26  | 0.902  | 0.442  | 0.105  | 1.87   | 0.293  |        |        |         |
| SIGIRR | -0.388 | -1.09  | 0.31   | 0.764  | 0.471  | 1.24   | 0.301  |        |        |         |
| HLA-DMA| 0.583  | -0.474 | 1.64   | 1.5    | 0.72   | 3.12   | 0.305  |        |        |         |
| OSM    | 2.06   | -1.71  | 5.82   | 4.16   | 0.305  | 56.7   | 0.31   |        |        |         |
| SPA17  | -1.07  | -3.04  | 0.895  | 0.475  | 0.122  | 1.86   | 0.31   |        |        |         |
| IL8    | 1.8    | -1.56  | 5.16   | 3.48   | 0.339  | 35.7   | 0.319  |        |        |         |
| RORC   | -0.607 | -1.74  | 0.53   | 0.657  | 0.298  | 1.44   | 0.32   |        |        |         |
| PECAM1 | 1.9    | -1.67  | 5.46   | 3.72   | 0.314  | 44.1   | 0.322  |        |        |         |
| ATF2   | 0.215  | -0.191 | 0.621  | 1.16   | 0.876  | 1.54   | 0.324  |        |        |         |
| MAP3K5 | 0.364  | -0.325 | 1.05   | 1.29   | 0.798  | 2.07   | 0.325  |        |        |         |
| CXCR2  | 2.07   | -1.88  | 6.02   | 4.19   | 0.271  | 64.7   | 0.329  |        |        |         |
| EGR1   | 0.667  | -0.607 | 1.94   | 1.59   | 0.657  | 3.84   | 0.329  |        |        |         |
| BATF   | 0.418  | -0.389 | 1.23   | 1.34   | 0.764  | 2.34   | 0.334  |        |        |         |
| ITGA2  | 0.318  | -0.304 | 0.94   | 1.25   | 0.81   | 1.92   | 0.34   |        |        |         |
| DDX58  | 0.386  | -0.377 | 1.15   | 1.31   | 0.77   | 2.22   | 0.345  |        |        |         |
| IRAK1  | 0.26   | -0.254 | 0.775  | 1.2    | 0.838  | 1.71   | 0.345  |        |        |         |
| RRAD   | -0.912 | -2.72  | 0.895  | 0.531  | 0.152  | 1.86   | 0.346  |        |        |         |
| PSMB8  | -0.147 | -0.441 | 0.147  | 0.903  | 0.737  | 1.11   | 0.35   |        |        |         |
| MERTK  | 0.527  | -0.552 | 1.61   | 1.44   | 0.682  | 3.05   | 0.361  |        |        |         |
| CXCL6  | 0.818  | -0.869 | 2.51   | 1.76   | 0.548  | 5.68   | 0.364  |        |        |         |
| S100A7 | 2.09   | -2.23  | 6.41   | 4.26   | 0.214  | 84.8   | 0.365  |        |        |         |
| EPCAM  | -0.615 | -1.9   | 0.667  | 0.653  | 0.269  | 1.59   | 0.369  |        |        |         |
| TNFRSF10C| 1.96  | -2.15  | 6.07   | 3.9    | 0.226  | 67.2   | 0.371  |        |        |         |
| ITGA6  | -0.727 | -2.25  | 0.794  | 0.604  | 0.21   | 1.73   | 0.371  |        |        |         |
| IL1B   | 2.09   | -2.31  | 6.49   | 4.26   | 0.202  | 90     | 0.373  |        |        |         |
| FPR2   | 1.96   | -2.2   | 6.11   | 3.88   | 0.218  | 69.1   | 0.378  |        |        |         |
| PYCARD | 0.233  | -0.264 | 0.729  | 1.18   | 0.833  | 1.66   | 0.38   |        |        |         |
| BCL10  | 0.29   | -0.334 | 0.915  | 1.22   | 0.793  | 1.89   | 0.384  |        |        |         |
| MX1    | -0.353 | -1.12  | 0.416  | 0.783  | 0.46   | 1.33   | 0.39   |        |        |         |
| IL33   | -0.596 | -1.9   | 0.711  | 0.662  | 0.268  | 1.64   | 0.393  |        |        |         |
| IRF2   | 0.384  | -0.464 | 1.23   | 1.31   | 0.725  | 2.35   | 0.395  |        |        |         |
| CD74   | 0.47   | -0.576 | 1.52   | 1.39   | 0.671  | 2.86   | 0.399  |        |        |         |
| TNFSF10 | -0.172| -0.554 | 0.211  | 0.888  | 0.681  | 1.16   | 0.399  |        |        |         |
| Gene      | REL  | IL6ST | PSMD7 | CD63 | ATF1 | PTPRC | CEACAM1 | TREM1 | TNFRSF10B | IL15RA | IRF3 | BST2 | CD53 | ITCH | PIN1 | BCL2L1 | ANP32B | MAVS | SPINK5 | STAT1 | IFI16 | LGA55 | CSF3R | PSMB9 | CEACAM6 | MAPK3 | TNFRSF18 | CDH1 | LTBR | NFATC1 | APP  | HMGB1 | TAP1 | C3   |
|-----------|------|-------|-------|------|------|-------|---------|-------|-----------|--------|------|------|------|------|------|-------|--------|------|--------|-------|------|--------|------|--------|------|------|-------|------|------|-------|------|
|           | 0.339| 0.166 | -0.148| -0.155| -0.26| 1.57  | 0.558   | 1.94  | 0.243     | 0.363  | -0.749| -0.502| 1.41 | 0.28  | -0.154| 0.112  | -0.16 | -0.186 | 0.321 | 0.25   | 0.166 | -0.214 | 1.52  | 0.312  | -0.33 | -0.155| -0.477 | 0.267 | 0.156 | -0.328 | -0.184| -0.31 | -0.247 | -0.441|   |
|           |      |       |       |      |      |       |         |       |           |        |       |       |      |       |       |        |       |        |       |       |        |      |       |       |      |       |       |      |       |       |      |       |       |      |   |
| Gene   | Value | Value 1 | Value 2 | Value 3 | Value 4 | Value 5 |
|--------|-------|---------|---------|---------|---------|---------|
| MST1R  | -0.276| -1.22   | 0.67    | 0.826   | 0.429   | 1.59    | 0.58   |
| PAFH2  | -0.355| -1.58   | 0.873   | 0.782   | 0.334   | 1.83    | 0.584  |
| HLA-A  | 0.212 | -0.528  | 0.953   | 1.16    | 0.693   | 1.94    | 0.587  |
| CD55   | 0.366 | -0.953  | 1.69    | 1.29    | 0.517   | 3.22    | 0.598  |
| ARG2   | -0.313| -1.44   | 0.814   | 0.805   | 0.369   | 1.76    | 0.598  |
| CD9    | 0.284 | -0.745  | 1.31    | 1.22    | 0.597   | 2.48    | 0.6    |
| IFNAR1 | 0.189 | -0.52   | 0.898   | 1.14    | 0.697   | 1.86    | 0.613  |
| RORA   | -0.22 | -1.05   | 0.605   | 0.859   | 0.484   | 1.52    | 0.613  |
| IL18   | -0.326| -1.55   | 0.898   | 0.798   | 0.342   | 1.86    | 0.613  |
| LAMP1  | -0.137| -0.652  | 0.378   | 0.909   | 0.636   | 1.3     | 0.614  |
| EWSR1  | 0.0598| -0.174  | 0.294   | 1.04    | 0.886   | 1.23    | 0.627  |
| CD47   | 0.097 | -0.284  | 0.478   | 1.07    | 0.821   | 1.39    | 0.628  |
| PTGES2 | -0.123| -0.61   | 0.363   | 0.918   | 0.655   | 1.29    | 0.631  |
| TGFB2  | -0.404| -2.05   | 1.24    | 0.756   | 0.241   | 2.37    | 0.641  |
| TPSAB1 | -0.536| -2.74   | 1.67    | 0.69    | 0.149   | 3.18    | 0.644  |
| TAPBP  | 0.141 | -0.461  | 0.744   | 1.1     | 0.726   | 1.67    | 0.656  |
| CIQBP  | -0.218| -1.17   | 0.729   | 0.859   | 0.446   | 1.66    | 0.661  |
| ILF3   | -0.0464| -0.253 | 0.16    | 0.968   | 0.839   | 1.12    | 0.668  |
| BMI1   | -0.295| -1.65   | 1.06    | 0.815   | 0.319   | 2.08    | 0.679  |
| ST6GAL1| -0.238| -1.35   | 0.871   | 0.848   | 0.393   | 1.83    | 0.683  |
| SMAD3  | -0.132| -0.767  | 0.502   | 0.912   | 0.588   | 1.42    | 0.691  |
| NFATC3 | -0.175| -1.03   | 0.677   | 0.886   | 0.491   | 1.6     | 0.696  |
| TNSF13 | -0.147| -0.903  | 0.609   | 0.903   | 0.535   | 1.53    | 0.711  |
| BLNK   | 0.115 | -0.504  | 0.735   | 1.08    | 0.705   | 1.66    | 0.723  |
| ATG16L1| 0.128 | -0.592  | 0.847   | 1.09    | 0.664   | 1.8     | 0.735  |
| TRAF2  | 0.102 | -0.485  | 0.69    | 1.07    | 0.714   | 1.61    | 0.74   |
| DUSP4  | -0.159| -1.12   | 0.801   | 0.895   | 0.46    | 1.74    | 0.752  |
| DOCK9  | -0.143| -1.01   | 0.724   | 0.906   | 0.497   | 1.65    | 0.753  |
| MAP2K2 | 0.0564| -0.29   | 0.403   | 1.04    | 0.818   | 1.32    | 0.756  |
| PLA2G6 | -0.176| -1.26   | 0.907   | 0.885   | 0.418   | 1.87    | 0.757  |
| IFI35  | -0.0684| -0.492 | 0.355   | 0.954   | 0.711   | 1.28    | 0.758  |
| MAPK8  | 0.103 | -0.534  | 0.739   | 1.07    | 0.69    | 1.67    | 0.759  |
| JUN    | -0.139| -1.05   | 0.773   | 0.908   | 0.483   | 1.71    | 0.771  |
| CD40   | -0.154| -1.28   | 0.974   | 0.899   | 0.411   | 1.96    | 0.795  |
| MAF    | 0.153 | -1     | 1.31    | 1.11    | 0.5     | 2.47    | 0.801  |
| CCND3  | 0.0847| -0.557  | 0.726   | 1.06    | 0.68    | 1.65    | 0.801  |
| Gene     | Z-score | Fold Change | q-value | P-value | log2 Fold | Benjamini | Adjusted |
|----------|---------|-------------|---------|---------|-----------|-----------|----------|
| ETS1     | 0.121   | -0.885      | 1.13    | 1.09    | 0.541     | 2.18      | 0.819    |
| SERPINB2 | 0.181   | -1.43       | 1.79    | 1.13    | 0.372     | 3.46      | 0.83     |
| RPS6     | -0.066  | -0.674      | 0.542   | 0.955   | 0.627     | 1.46      | 0.836    |
| TAP2     | 0.0561  | -0.501      | 0.613   | 1.04    | 0.706     | 1.53      | 0.848    |
| F2RL1    | 0.0565  | -0.524      | 0.637   | 1.04    | 0.696     | 1.55      | 0.852    |
| GPI      | 0.074   | -0.691      | 0.839   | 1.05    | 0.619     | 1.79      | 0.854    |
| SH2D1B   | 0.114   | -1.23       | 1.45    | 1.08    | 0.428     | 2.74      | 0.871    |
| CD36     | -0.119  | -1.66       | 1.42    | 0.921   | 0.316     | 2.68      | 0.882    |
| LTF      | 0.0995  | -1.27       | 1.47    | 1.07    | 0.414     | 2.77      | 0.89     |
| CD81     | 0.0543  | -0.695      | 0.804   | 1.04    | 0.618     | 1.75      | 0.89     |
| TRAF6    | 0.0313  | -0.409      | 0.471   | 1.02    | 0.753     | 1.39      | 0.892    |
| CEBPB    | 0.308   | -4.24       | 4.86    | 1.24    | 0.053     | 28.9      | 0.897    |
| MFGE8    | 0.0496  | -0.773      | 0.873   | 1.03    | 0.585     | 1.83      | 0.908    |
| TJP1     | -0.0372 | -0.765      | 0.691   | 0.975   | 0.588     | 1.61      | 0.922    |
| MIF      | 0.038   | -0.713      | 0.789   | 1.03    | 0.61      | 1.73      | 0.923    |
| CD99     | -0.0412 | -0.973      | 0.89    | 0.972   | 0.51      | 1.85      | 0.933    |
| SMAD2    | -0.0626 | -1.48       | 1.35    | 0.958   | 0.359     | 2.55      | 0.933    |
| CD164    | 0.0968  | -2.23       | 2.43    | 1.07    | 0.212     | 5.38      | 0.937    |
| CTSL     | 0.0501  | -1.17       | 1.27    | 1.04    | 0.445     | 2.41      | 0.937    |
| SCGB1A1  | -0.0633 | -1.77       | 1.64    | 0.957   | 0.294     | 3.12      | 0.943    |
| ISG15    | 0.0544  | -1.49       | 1.6     | 1.04    | 0.356     | 3.03      | 0.946    |
| TICAM1   | 0.0307  | -0.988      | 1.05    | 1.02    | 0.504     | 2.07      | 0.954    |
| STAT2    | -0.00924| -0.373      | 0.355   | 0.994   | 0.772     | 1.28      | 0.961    |
| SLPI     | -0.0118 | -0.841      | 0.818   | 0.992   | 0.558     | 1.76      | 0.978    |
| ITGB4    | 0.0125  | -0.897      | 0.922   | 1.01    | 0.537     | 1.89      | 0.979    |
| TAB1     | -0.00924| -0.794      | 0.776   | 0.994   | 0.577     | 1.71      | 0.982    |
| CXCL2    | -0.0277 | -3.54       | 3.49    | 0.981   | 0.0859    | 11.2      | 0.988    |
| CLDN1    | -0.00364| -1.15       | 1.15    | 0.997   | 0.449     | 2.21      | 0.995    |
**Supplementary Table S3.** Differentially expressed genes between responders and non-responders in blood following supplementation.

| Genes  | Log2 fold change | Lower confidence limit (log2) | Upper confidence limit (log2) | Linear fold change | Lower confidence limit (linear) | Upper confidence limit (linear) | p-value  |
|--------|------------------|-------------------------------|-------------------------------|--------------------|-------------------------------|-------------------------------|---------|
| IL24   | 0.98             | -0.07                         | 2.04                          | 1.98               | 0.95                          | 4.10                          | 0.0649  |
| HLA-DRB4 | 0.96             | -0.13                         | 2.04                          | 1.94               | 0.92                          | 4.11                          | 0.0786  |
| PPBP   | 0.89             | 0.25                          | 1.53                          | 1.85               | 1.19                          | 2.88                          | 0.0103  |
| TFRC   | 0.89             | 0.06                          | 1.71                          | 1.85               | 1.05                          | 3.27                          | 0.0367  |
| IL1RN  | 0.80             | 0.14                          | 1.45                          | 1.74               | 1.10                          | 2.73                          | 0.0211  |
| IL15RA | 0.75             | -0.14                         | 1.64                          | 1.68               | 0.91                          | 3.11                          | 0.0931  |
| RELB   | 0.73             | -0.18                         | 1.64                          | 1.66               | 0.88                          | 3.12                          | 0.1082  |
| CXCL5  | 0.67             | -0.26                         | 1.61                          | 1.59               | 0.83                          | 3.05                          | 0.1449  |
| PF4    | 0.67             | -0.06                         | 1.39                          | 1.59               | 0.96                          | 2.63                          | 0.0675  |
| IFIT1  | 0.63             | 0.07                          | 1.19                          | 1.55               | 1.05                          | 2.29                          | 0.0298  |
| FEZ1   | 0.63             | -0.16                         | 1.42                          | 1.55               | 0.90                          | 2.67                          | 0.1066  |
| CD9    | 0.62             | -0.33                         | 1.57                          | 1.54               | 0.79                          | 2.98                          | 0.1824  |
| TNFRSF17 | 0.62            | -0.50                         | 1.73                          | 1.53               | 0.71                          | 3.33                          | 0.2539  |
| JAM3   | 0.61             | 0.02                          | 1.20                          | 1.52               | 1.01                          | 2.29                          | 0.0452  |
| LY96   | 0.58             | 0.14                          | 1.01                          | 1.49               | 1.11                          | 2.01                          | 0.0129  |
| CD8B   | 0.56             | 0.07                          | 1.05                          | 1.47               | 1.05                          | 2.06                          | 0.0290  |
| FCER1A | 0.52             | -0.27                         | 1.30                          | 1.43               | 0.83                          | 2.47                          | 0.1789  |
| IL18   | 0.51             | -0.49                         | 1.51                          | 1.42               | 0.71                          | 2.85                          | 0.2895  |
| IFITM1 | 0.51             | -0.07                         | 1.08                          | 1.42               | 0.95                          | 2.12                          | 0.0800  |
| LILRB1 | 0.49             | 0.15                          | 0.84                          | 1.41               | 1.11                          | 1.79                          | 0.0089  |
| PIN1   | 0.49             | -0.12                         | 1.10                          | 1.41               | 0.92                          | 2.14                          | 0.1040  |
| LILRA1 | 0.48             | -0.20                         | 1.17                          | 1.40               | 0.87                          | 2.25                          | 0.1506  |
| IL2RA  | 0.48             | -0.24                         | 1.21                          | 1.40               | 0.84                          | 2.31                          | 0.1744  |
| PTGDR2 | 0.47             | -0.52                         | 1.46                          | 1.39               | 0.70                          | 2.74                          | 0.3207  |
| FCGR2B | 0.46             | -0.38                         | 1.29                          | 1.37               | 0.77                          | 2.45                          | 0.2585  |
| LTA    | 0.45             | -0.03                         | 0.94                          | 1.37               | 0.98                          | 1.91                          | 0.0648  |
| S100A8 | 0.45             | -0.03                         | 0.93                          | 1.37               | 0.98                          | 1.91                          | 0.0654  |
| LGALS3 | 0.45             | -0.13                         | 1.03                          | 1.36               | 0.91                          | 2.04                          | 0.1202  |
| BCL2L1 | 0.42             | -0.28                         | 1.13                          | 1.34               | 0.82                          | 2.19                          | 0.2181  |
| ICAM1  | 0.42             | -0.30                         | 1.14                          | 1.34               | 0.81                          | 2.21                          | 0.2322  |
| RPS6   | 0.42             | -0.24                         | 1.07                          | 1.33               | 0.85                          | 2.10                          | 0.1915  |
| RNASE3 | 0.41             | -0.81                         | 1.64                          | 1.33               | 0.57                          | 3.11                          | 0.4753  |
| Gene       | 0.41 | -0.17 | 0.98  | 1.33  | 0.89  | 1.97  | 0.1489 |
|------------|------|-------|-------|-------|-------|-------|--------|
| RIPK2      |      |       |       |       |       |       |        |
| CKLF       | 0.41 | -0.07 | 0.88  | 1.32  | 0.95  | 1.84  | 0.0890 |
| IFITM2     | 0.40 | -0.14 | 0.93  | 1.32  | 0.91  | 1.91  | 0.1306 |
| TNFSF4     | 0.39 | -0.05 | 0.83  | 1.31  | 0.97  | 1.77  | 0.0767 |
| S100A12    | 0.39 | -0.21 | 0.98  | 1.31  | 0.87  | 1.97  | 0.1806 |
| BATF       | 0.37 | -0.27 | 1.01  | 1.30  | 0.83  | 2.02  | 0.2280 |
| CDH1       | 0.37 | -0.47 | 1.20  | 1.29  | 0.72  | 2.30  | 0.3598 |
| MAPK3      | 0.36 | -0.09 | 0.81  | 1.28  | 0.94  | 1.75  | 0.1110 |
| BST1       | 0.36 | -0.05 | 0.77  | 1.28  | 0.96  | 1.70  | 0.0824 |
| MAGEA3     | 0.34 | -0.29 | 0.96  | 1.26  | 0.82  | 1.95  | 0.2630 |
| REPS1      | 0.34 | -0.16 | 0.84  | 1.26  | 0.89  | 1.79  | 0.1668 |
| TANK       | 0.33 | -0.08 | 0.75  | 1.26  | 0.95  | 1.68  | 0.1057 |
| THBD       | 0.33 | -0.21 | 0.87  | 1.25  | 0.86  | 1.82  | 0.2137 |
| IL8        | 0.33 | -0.29 | 0.94  | 1.25  | 0.82  | 1.92  | 0.2706 |
| PSMB8      | 0.32 | -0.09 | 0.74  | 1.25  | 0.94  | 1.67  | 0.1170 |
| C4B        | 0.32 | -0.37 | 1.01  | 1.25  | 0.77  | 2.02  | 0.3308 |
| TLR5       | 0.32 | -0.31 | 0.95  | 1.25  | 0.81  | 1.93  | 0.2894 |
| APP        | 0.32 | -0.34 | 0.98  | 1.25  | 0.79  | 1.97  | 0.3155 |
| CAMP       | 0.32 | -0.47 | 1.10  | 1.25  | 0.72  | 2.14  | 0.3965 |
| CD48       | 0.32 | -0.16 | 0.79  | 1.25  | 0.90  | 1.73  | 0.1735 |
| MAP2K1     | 0.31 | -0.14 | 0.75  | 1.24  | 0.91  | 1.68  | 0.1588 |
| CD19       | 0.31 | -0.26 | 0.87  | 1.24  | 0.83  | 1.83  | 0.2641 |
| ECSIT      | 0.31 | -0.33 | 0.94  | 1.24  | 0.80  | 1.91  | 0.3136 |
| MAPK1      | 0.30 | -0.12 | 0.72  | 1.23  | 0.92  | 1.65  | 0.1457 |
| PSMB7      | 0.30 | -0.05 | 0.65  | 1.23  | 0.96  | 1.57  | 0.0900 |
| CTLA4      | 0.30 | -0.26 | 0.85  | 1.23  | 0.83  | 1.81  | 0.2717 |
| MIF        | 0.29 | -0.25 | 0.83  | 1.22  | 0.84  | 1.78  | 0.2688 |
| IRAK1      | 0.29 | -0.38 | 0.95  | 1.22  | 0.77  | 1.94  | 0.3674 |
| HMGB1      | 0.29 | -0.15 | 0.72  | 1.22  | 0.90  | 1.65  | 0.1745 |
| SSX1       | 0.28 | -0.52 | 1.09  | 1.22  | 0.70  | 2.12  | 0.4599 |
| CCR7       | 0.28 | -0.43 | 0.99  | 1.22  | 0.74  | 1.99  | 0.4053 |
| IL1B       | 0.28 | -0.12 | 0.68  | 1.21  | 0.92  | 1.60  | 0.1525 |
| TNFSF12    | 0.28 | -0.18 | 0.74  | 1.21  | 0.88  | 1.67  | 0.2127 |
| ABCB1      | 0.28 | -0.27 | 0.83  | 1.21  | 0.83  | 1.78  | 0.2940 |
| C1QB1      | 0.28 | -0.37 | 0.93  | 1.21  | 0.77  | 1.90  | 0.3739 |
| IFIT2      | 0.28 | -0.21 | 0.77  | 1.21  | 0.86  | 1.70  | 0.2449 |
| Gene       | FDR1 | FDR2 | q1   | q2       | q3       | q4       |
|------------|------|------|------|----------|----------|----------|
| CFD        | 0.27 | -0.37| 0.92 | 1.21     | 0.77     | 1.89     | 0.3734   |
| TNFRSF14   | 0.27 | -0.23| 0.78 | 1.21     | 0.85     | 1.71     | 0.2613   |
| HLA-DPA1   | 0.26 | -0.06| 0.58 | 1.20     | 0.96     | 1.50     | 0.1044   |
| CD2        | 0.26 | -0.51| 1.02 | 1.19     | 0.70     | 2.02     | 0.4798   |
| CD59       | 0.25 | -0.18| 0.68 | 1.19     | 0.88     | 1.60     | 0.2294   |
| CEBPB      | 0.25 | -0.23| 0.72 | 1.19     | 0.86     | 1.65     | 0.2768   |
| CXCL1      | 0.25 | -0.37| 0.87 | 1.19     | 0.77     | 1.82     | 0.4035   |
| ADORA2A    | 0.25 | -0.50| 0.99 | 1.19     | 0.71     | 1.99     | 0.4846   |
| TNFSF13B   | 0.24 | -0.18| 0.66 | 1.18     | 0.88     | 1.58     | 0.2424   |
| FCGR3A     | 0.24 | -0.22| 0.70 | 1.18     | 0.86     | 1.62     | 0.2852   |
| BST2       | 0.23 | -0.20| 0.66 | 1.17     | 0.87     | 1.59     | 0.2678   |
| CD36       | 0.23 | -0.24| 0.69 | 1.17     | 0.85     | 1.61     | 0.3073   |
| ISG20      | 0.23 | -0.24| 0.69 | 1.17     | 0.85     | 1.61     | 0.3116   |
| MAPK8      | 0.22 | -0.36| 0.74 | 1.17     | 0.84     | 1.67     | 0.3171   |
| CCR1       | 0.22 | -0.20| 0.71 | 1.18     | 0.85     | 1.64     | 0.2894   |
| TNFSF13B   | 0.24 | -0.18| 0.66 | 1.18     | 0.88     | 1.58     | 0.2424   |
| FCGR3A     | 0.24 | -0.22| 0.70 | 1.18     | 0.86     | 1.62     | 0.2852   |
| BST2       | 0.23 | -0.20| 0.66 | 1.17     | 0.87     | 1.59     | 0.2678   |
| CD36       | 0.23 | -0.24| 0.69 | 1.17     | 0.85     | 1.61     | 0.3073   |
| ISG20      | 0.23 | -0.24| 0.69 | 1.17     | 0.85     | 1.61     | 0.3116   |
| MAPK8      | 0.22 | -0.36| 0.74 | 1.17     | 0.84     | 1.67     | 0.3171   |
| CCR1       | 0.22 | -0.20| 0.71 | 1.18     | 0.85     | 1.64     | 0.2894   |
| ANP32B     | 0.22 | -0.21| 0.65 | 1.16     | 0.86     | 1.57     | 0.2959   |
| PSMB10     | 0.21 | -0.13| 0.55 | 1.16     | 0.92     | 1.46     | 0.1970   |
| CD27       | 0.21 | -0.21| 0.62 | 1.15     | 0.86     | 1.54     | 0.3070   |
| KLKB1      | 0.19 | -0.41| 0.79 | 1.14     | 0.75     | 1.73     | 0.5095   |
| CASP1      | 0.19 | -0.16| 0.54 | 1.14     | 0.89     | 1.45     | 0.2692   |
| CD68       | 0.18 | -0.45| 0.81 | 1.13     | 0.73     | 1.75     | 0.5467   |
| CCL5       | 0.17 | -0.25| 0.59 | 1.13     | 0.84     | 1.51     | 0.3954   |
| CD3D       | 0.17 | -0.31| 0.65 | 1.13     | 0.81     | 1.57     | 0.4561   |
| IL13RA1    | 0.17 | -0.31| 0.65 | 1.12     | 0.81     | 1.56     | 0.4533   |
| CD53       | 0.17 | -0.22| 0.55 | 1.12     | 0.86     | 1.46     | 0.3599   |
| ICAM3      | 0.17 | -0.27| 0.61 | 1.12     | 0.83     | 1.53     | 0.4255   |
| FPR2       | 0.17 | -0.27| 0.60 | 1.12     | 0.83     | 1.52     | 0.4226   |
| TPSAB1     | 0.16 | -0.83| 1.14 | 1.11     | 0.56     | 2.21     | 0.7371   |
| HLA-G      | 0.15 | -0.28| 0.58 | 1.11     | 0.83     | 1.50     | 0.4551   |
| SBNO2      | 0.15 | -0.41| 0.71 | 1.11     | 0.75     | 1.64     | 0.5769   |
| TBK1       | 0.15 | -0.29| 0.59 | 1.11     | 0.82     | 1.51     | 0.4791   |
| Gene      | Z-score | FDR  | Log2FC | p-value | Benjamini | FDR   |
|-----------|---------|------|--------|---------|-----------|-------|
| TRAF3     | 0.14    | -0.42| 0.71   | 1.10    | 0.75      | 1.64  |
| IL18RAP   | 0.14    | -0.29| 0.58   | 1.10    | 0.82      | 1.49  |
| CCR3      | 0.14    | -0.44| 0.71   | 1.10    | 0.74      | 1.64  |
| TTK       | 0.13    | -0.76| 1.03   | 1.10    | 0.59      | 2.05  |
| CD1C      | 0.13    | -0.40| 0.67   | 1.10    | 0.76      | 1.59  |
| CEACAM1   | 0.13    | -0.85| 1.11   | 1.10    | 0.56      | 2.16  |
| SMAD2     | 0.13    | -0.22| 0.48   | 1.10    | 0.86      | 1.40  |
| SELPLG    | 0.13    | -0.29| 0.55   | 1.10    | 0.82      | 1.46  |
| TSC22D3   | 0.13    | -0.37| 0.63   | 1.10    | 0.78      | 1.55  |
| TNF       | 0.13    | -0.26| 0.52   | 1.09    | 0.84      | 1.43  |
| TNFRSF10C | 0.13    | -0.37| 0.63   | 1.09    | 0.77      | 1.55  |
| TNFSF14   | 0.13    | -0.25| 0.51   | 1.09    | 0.84      | 1.42  |
| HLA-DRA   | 0.13    | -0.26| 0.52   | 1.09    | 0.83      | 1.43  |
| IL23A     | 0.13    | -0.31| 0.56   | 1.09    | 0.81      | 1.47  |
| NUP107    | 0.13    | -0.24| 0.49   | 1.09    | 0.85      | 1.40  |
| ALCAM     | 0.12    | -0.84| 1.09   | 1.09    | 0.56      | 2.12  |
| PSEN1     | 0.12    | -0.38| 0.62   | 1.09    | 0.77      | 1.54  |
| BAX       | 0.12    | -0.39| 0.63   | 1.09    | 0.76      | 1.55  |
| FCR1G     | 0.12    | -0.30| 0.53   | 1.08    | 0.81      | 1.44  |
| KLRC2     | 0.12    | -0.57| 0.80   | 1.08    | 0.67      | 1.74  |
| SPA17     | 0.11    | -0.78| 1.00   | 1.08    | 0.58      | 2.01  |
| CTSH      | 0.11    | -0.37| 0.58   | 1.08    | 0.77      | 1.50  |
| CCL3L1    | 0.11    | -0.55| 0.77   | 1.08    | 0.68      | 1.70  |
| CSF3R     | 0.11    | -0.28| 0.50   | 1.08    | 0.82      | 1.41  |
| TLR2      | 0.11    | -0.40| 0.61   | 1.08    | 0.76      | 1.53  |
| HLA-DPB1  | 0.11    | -0.29| 0.50   | 1.08    | 0.82      | 1.41  |
| CD3G      | 0.10    | -0.35| 0.56   | 1.08    | 0.79      | 1.47  |
| PLAUR     | 0.10    | -0.33| 0.53   | 1.07    | 0.80      | 1.44  |
| LTBR      | 0.10    | -0.34| 0.55   | 1.07    | 0.79      | 1.46  |
| TLR4      | 0.10    | -0.36| 0.56   | 1.07    | 0.78      | 1.48  |
| IL4R      | 0.10    | -0.29| 0.49   | 1.07    | 0.82      | 1.41  |
| PSMB9     | 0.10    | -0.26| 0.46   | 1.07    | 0.83      | 1.37  |
| CXCRI     | 0.10    | -0.41| 0.60   | 1.07    | 0.75      | 1.51  |
| CTSS      | 0.09    | -0.25| 0.44   | 1.07    | 0.84      | 1.36  |
| MAF       | 0.09    | -0.45| 0.63   | 1.06    | 0.73      | 1.55  |
| NFKBIA    | 0.09    | -0.28| 0.45   | 1.06    | 0.82      | 1.37  |
| Gene   | p-value | PRRSA | p-value | PRRSA | p-value | PRRSA | p-value | PRRSA | p-value | PRRSA |
|--------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|
| MAP2K4 | 0.08    | -0.43 | 0.60    | 1.06  | 0.74    | 1.52  | 0.7299  |       |         |       |
| TLR1   | 0.08    | -0.35 | 0.51    | 1.06  | 0.79    | 1.43  | 0.6797  |       |         |       |
| CXCR4  | 0.08    | -0.36 | 0.53    | 1.06  | 0.78    | 1.44  | 0.6905  |       |         |       |
| PYCARD | 0.08    | -0.54 | 0.70    | 1.06  | 0.69    | 1.63  | 0.7813  |       |         |       |
| F13A1  | 0.08    | -0.62 | 0.78    | 1.06  | 0.65    | 1.72  | 0.8083  |       |         |       |
| ATF1   | 0.08    | -0.36 | 0.52    | 1.06  | 0.78    | 1.44  | 0.7033  |       |         |       |
| CLEC7A | 0.07    | -0.27 | 0.41    | 1.05  | 0.83    | 1.33  | 0.6606  |       |         |       |
| ANXA1  | 0.07    | -0.29 | 0.43    | 1.05  | 0.82    | 1.35  | 0.6783  |       |         |       |
| LTB4R  | 0.07    | -0.58 | 0.72    | 1.05  | 0.67    | 1.65  | 0.8201  |       |         |       |
| TLR6   | 0.07    | -0.31 | 0.45    | 1.05  | 0.81    | 1.37  | 0.6992  |       |         |       |
| IL1RAP | 0.07    | -0.56 | 0.70    | 1.05  | 0.68    | 1.62  | 0.8180  |       |         |       |
| ITGAE  | 0.06    | -0.69 | 0.82    | 1.05  | 0.62    | 1.77  | 0.8554  |       |         |       |
| AMICA1 | 0.06    | -0.28 | 0.41    | 1.05  | 0.83    | 1.32  | 0.6895  |       |         |       |
| SIGIRR | 0.06    | -0.52 | 0.64    | 1.04  | 0.70    | 1.56  | 0.8176  |       |         |       |
| FUT7   | 0.06    | -0.44 | 0.56    | 1.04  | 0.74    | 1.48  | 0.7907  |       |         |       |
| PIK3CD | 0.06    | -0.43 | 0.56    | 1.04  | 0.74    | 1.47  | 0.7918  |       |         |       |
| MAPKAPK2| 0.06    | -0.40 | 0.52    | 1.04  | 0.76    | 1.44  | 0.7794  |       |         |       |
| ITGA4  | 0.06    | -0.29 | 0.41    | 1.04  | 0.82    | 1.33  | 0.7129  |       |         |       |
| CCL4   | 0.06    | -0.47 | 0.58    | 1.04  | 0.72    | 1.50  | 0.8123  |       |         |       |
| CXCL16 | 0.06    | -0.46 | 0.57    | 1.04  | 0.73    | 1.48  | 0.8141  |       |         |       |
| TREM1  | 0.06    | -0.39 | 0.50    | 1.04  | 0.76    | 1.42  | 0.7933  |       |         |       |
| JAK2   | 0.05    | -0.34 | 0.45    | 1.04  | 0.79    | 1.37  | 0.7760  |       |         |       |
| VEGFA  | 0.05    | -0.59 | 0.69    | 1.04  | 0.66    | 1.62  | 0.8659  |       |         |       |
| TNFSF10| 0.05    | -0.27 | 0.37    | 1.03  | 0.83    | 1.29  | 0.7413  |       |         |       |
| POU2F2 | 0.05    | -0.50 | 0.60    | 1.03  | 0.71    | 1.52  | 0.8490  |       |         |       |
| PSMD7  | 0.05    | -0.50 | 0.60    | 1.03  | 0.71    | 1.51  | 0.8484  |       |         |       |
| TP53   | 0.05    | -0.38 | 0.47    | 1.03  | 0.77    | 1.39  | 0.8159  |       |         |       |
| ATG10  | 0.05    | -0.57 | 0.66    | 1.03  | 0.67    | 1.58  | 0.8730  |       |         |       |
| LYN    | 0.04    | -0.52 | 0.61    | 1.03  | 0.70    | 1.53  | 0.8666  |       |         |       |
| CD58   | 0.04    | -0.33 | 0.42    | 1.03  | 0.79    | 1.34  | 0.8020  |       |         |       |
| SYK    | 0.04    | -0.45 | 0.53    | 1.03  | 0.73    | 1.45  | 0.8590  |       |         |       |
| CD46   | 0.04    | -0.31 | 0.38    | 1.03  | 0.81    | 1.30  | 0.8210  |       |         |       |
| GZMK   | 0.04    | -0.37 | 0.45    | 1.02  | 0.77    | 1.36  | 0.8546  |       |         |       |
| CYSLTR1| 0.04    | -0.49 | 0.56    | 1.02  | 0.71    | 1.47  | 0.8858  |       |         |       |
| STAT5B | 0.04    | -0.41 | 0.48    | 1.02  | 0.75    | 1.40  | 0.8675  |       |         |       |
| TAB1   | 0.04    | -0.50 | 0.57    | 1.02  | 0.71    | 1.49  | 0.8895  |       |         |       |
| Gene   | Effect | Fold Change |
|--------|--------|-------------|
| CHUK   | -0.44  | 0.51        |
| BTK    | -0.46  | 0.52        |
| IRF1   | -0.43  | 0.48        |
| LTB    | -0.29  | 0.35        |
| PTGS1  | -0.42  | 0.47        |
| CLEC4A | -0.41  | 0.46        |
| IFI27  | -1.11  | 1.16        |
| IL1R2  | -0.58  | 0.62        |
| NCF4   | -0.46  | 0.50        |
| UBC    | -0.34  | 0.38        |
| CD33   | -0.56  | 0.60        |
| CTSW   | -0.52  | 0.55        |
| MX1    | -0.36  | 0.39        |
| CD40   | -0.56  | 0.58        |
| STAT4  | -0.46  | 0.48        |
| ARG1   | -0.74  | 0.75        |
| CD1D   | -0.39  | 0.41        |
| HLA-DMA | -0.51 | 0.53        |
| ITGAV  | -0.38  | 0.40        |
| CYFIP2 | -0.35  | 0.36        |
| CD63   | -0.41  | 0.41        |
| GZMA   | -0.49  | 0.50        |
| CD160  | -0.46  | 0.47        |
| SLC11A1| -0.45  | 0.44        |
| GPI    | -0.50  | 0.48        |
| BCL10  | -0.44  | 0.43        |
| ITCH   | -0.44  | 0.43        |
| MAP4K2 | -0.49  | 0.48        |
| IF7    | -0.64  | 0.63        |
| TRAF2  | -0.63  | 0.61        |
| ATG5   | -0.51  | 0.49        |
| TOLLIP | -0.38  | 0.36        |
| PNMA1  | -0.47  | 0.44        |
| FCGR2A | -0.48  | 0.45        |
| KLRI1  | -0.52  | 0.49        |
| MAP2K2 | -0.47  | 0.43        |
| Gene     | Diff  | Log2FC | Z Score | P Value | FDR       | AUC 1   | AUC 2   |
|----------|-------|--------|---------|---------|-----------|---------|---------|
| LILRB3   | -0.02 | -0.58  | 0.54    | 0.99    | 0.67      | 1.45    | 0.9412  |
| HLA-DMB  | -0.02 | -0.41  | 0.37    | 0.99    | 0.75      | 1.29    | 0.9095  |
| FOS      | -0.02 | -0.51  | 0.47    | 0.99    | 0.70      | 1.39    | 0.9276  |
| CD244    | -0.02 | -0.66  | 0.62    | 0.98    | 0.63      | 1.53    | 0.9355  |
| CXCR2    | -0.03 | -0.59  | 0.54    | 0.98    | 0.66      | 1.45    | 0.9215  |
| ALOX 5   | -0.03 | -0.41  | 0.36    | 0.98    | 0.75      | 1.28    | 0.8843  |
| KLIRK1   | -0.03 | -0.75  | 0.70    | 0.98    | 0.59      | 1.62    | 0.9374  |
| ITGAX    | -0.03 | -0.51  | 0.45    | 0.98    | 0.70      | 1.37    | 0.9010  |
| CREB5    | -0.03 | -0.58  | 0.52    | 0.98    | 0.67      | 1.43    | 0.9093  |
| IL32     | -0.03 | -0.50  | 0.44    | 0.98    | 0.71      | 1.35    | 0.8921  |
| ATF2     | -0.03 | -0.39  | 0.32    | 0.98    | 0.76      | 1.25    | 0.8430  |
| CD74     | -0.04 | -0.45  | 0.38    | 0.98    | 0.73      | 1.30    | 0.8557  |
| CD40LG   | -0.04 | -0.58  | 0.51    | 0.98    | 0.67      | 1.42    | 0.8867  |
| SMAD3    | -0.04 | -0.41  | 0.33    | 0.97    | 0.75      | 1.26    | 0.8314  |
| IRF2     | -0.04 | -0.38  | 0.30    | 0.97    | 0.77      | 1.23    | 0.8105  |
| HLA-E    | -0.04 | -0.44  | 0.36    | 0.97    | 0.74      | 1.28    | 0.8277  |
| CD96     | -0.04 | -0.48  | 0.39    | 0.97    | 0.72      | 1.31    | 0.8318  |
| LAIR2    | -0.05 | -0.54  | 0.45    | 0.97    | 0.69      | 1.37    | 0.8443  |
| CD4      | -0.05 | -0.51  | 0.42    | 0.97    | 0.70      | 1.34    | 0.8316  |
| TYK2     | -0.05 | -0.61  | 0.52    | 0.97    | 0.66      | 1.43    | 0.8595  |
| JAK3     | -0.05 | -0.63  | 0.54    | 0.97    | 0.64      | 1.45    | 0.8643  |
| PAFAH2   | -0.05 | -0.93  | 0.83    | 0.97    | 0.53      | 1.76    | 0.9092  |
| S100A7   | -0.05 | -0.91  | 0.82    | 0.97    | 0.53      | 1.76    | 0.9070  |
| ADA      | -0.05 | -0.48  | 0.39    | 0.97    | 0.72      | 1.31    | 0.8155  |
| SERPING1 | -0.05 | -0.89  | 0.79    | 0.97    | 0.54      | 1.73    | 0.8982  |
| TXNIP    | -0.05 | -0.47  | 0.37    | 0.97    | 0.72      | 1.29    | 0.7962  |
| ILF3     | -0.05 | -0.44  | 0.34    | 0.96    | 0.74      | 1.27    | 0.7803  |
| HRH2     | -0.05 | -0.47  | 0.37    | 0.96    | 0.72      | 1.29    | 0.7913  |
| TNFRSF1A | -0.05 | -0.51  | 0.40    | 0.96    | 0.70      | 1.32    | 0.8040  |
| LN2      | -0.05 | -0.86  | 0.75    | 0.96    | 0.55      | 1.68    | 0.8887  |
| FCER2    | -0.05 | -0.81  | 0.70    | 0.96    | 0.57      | 1.63    | 0.8810  |
| CD47     | -0.05 | -0.42  | 0.31    | 0.96    | 0.75      | 1.24    | 0.7571  |
| XCL2     | -0.06 | -0.70  | 0.58    | 0.96    | 0.62      | 1.50    | 0.8477  |
| STAT2    | -0.06 | -0.44  | 0.31    | 0.96    | 0.74      | 1.24    | 0.7134  |
| TRAF6    | -0.07 | -0.63  | 0.50    | 0.96    | 0.65      | 1.41    | 0.8035  |
| TNFSF8   | -0.07 | -0.53  | 0.39    | 0.95    | 0.69      | 1.31    | 0.7553  |
| Gene      | Log2 Fold Change | q-value | p-value | fold change |
|-----------|-----------------|---------|---------|-------------|
| PECAM1    | -0.07           | 0.33    | 0.95    | 0.72        | 1.26 | 0.7082 |
| FLT3LG    | -0.07           | 0.37    | 0.95    | 0.70        | 1.29 | 0.7276 |
| CD79B     | -0.08           | 0.36    | 0.95    | 0.65        | 1.39 | 0.7673 |
| CD37      | -0.08           | 0.47    | 0.95    | 0.72        | 1.25 | 0.6836 |
| HLA-DOB   | -0.13           | 0.33    | 0.95    | 0.72        | 1.24 | 0.6707 |
| LILRA5    | -0.13           | 0.31    | 0.95    | 0.72        | 1.24 | 0.6702 |
| IFNGR1    | -0.13           | 0.27    | 0.95    | 0.74        | 1.21 | 0.6290 |
| CFP       | -0.13           | 0.38    | 0.94    | 0.68        | 1.20 | 0.6917 |
| LILRB2    | -0.13           | 0.38    | 0.94    | 0.68        | 1.20 | 0.6913 |
| CXCR3     | -0.13           | 0.49    | 0.94    | 0.63        | 1.41 | 0.7454 |
| CASP3     | -0.13           | 0.38    | 0.94    | 0.67        | 1.30 | 0.6813 |
| IL5RA     | -0.13           | 0.36    | 0.94    | 0.58        | 1.52 | 0.7756 |
| HLA-B     | -0.13           | 0.47    | 0.94    | 0.69        | 1.41 | 0.6836 |
| CD99      | -0.13           | 0.36    | 0.94    | 0.68        | 1.19 | 0.6132 |
| IL16      | -0.13           | 0.38    | 0.94    | 0.71        | 1.22 | 0.5872 |
| MAP3K7    | -0.13           | 0.37    | 0.93    | 0.67        | 1.29 | 0.6603 |
| CCR2      | -0.13           | 0.33    | 0.93    | 0.69        | 1.25 | 0.6185 |
| CD5       | -0.13           | 0.37    | 0.93    | 0.69        | 1.29 | 0.6399 |
| STAT1     | -0.13           | 0.35    | 0.93    | 0.68        | 1.27 | 0.6269 |
| OAS3      | -0.13           | 0.41    | 0.93    | 0.65        | 1.33 | 0.6636 |
| DOCK9     | -0.13           | 0.34    | 0.93    | 0.68        | 1.26 | 0.6096 |
| CD7       | -0.13           | 0.45    | 0.93    | 0.63        | 1.36 | 0.6823 |
| IL12RB1   | -0.13           | 0.49    | 0.93    | 0.61        | 1.40 | 0.7011 |
| ATG7      | -0.13           | 0.31    | 0.93    | 0.69        | 1.24 | 0.5746 |
| ITGA2B    | -0.13           | 0.70    | 0.92    | 0.52        | 1.63 | 0.7682 |
| IRF8      | -0.13           | 0.50    | 0.92    | 0.60        | 1.41 | 0.6878 |
| TLR8      | -0.13           | 0.35    | 0.92    | 0.67        | 1.27 | 0.5927 |
| IL2RG     | -0.13           | 0.38    | 0.92    | 0.65        | 1.30 | 0.6087 |
| RORA      | -0.13           | 0.27    | 0.92    | 0.70        | 1.20 | 0.5024 |
| CR1       | -0.13           | 0.33    | 0.92    | 0.67        | 1.26 | 0.5635 |
| CXC6      | -0.13           | 0.55    | 0.92    | 0.57        | 1.47 | 0.6949 |
| CD164     | -0.13           | 0.22    | 0.92    | 0.72        | 1.16 | 0.4374 |
| ENTPD1    | -0.13           | 0.40    | 0.91    | 0.63        | 1.32 | 0.6036 |
| SLAMF7    | -0.13           | 0.66    | 0.91    | 0.53        | 1.58 | 0.7241 |
| Gene     | HCK   | HLA-A  | CASP8  | MAPK14 | IFNAR2  | TNFRSF13C | DUSP6  | TARP   | IDO1   | IL10RA  | IRF4   | INPP5D  | CCND3  | CD14   | TFB    | SH2D1B | CT45A1 | GZMB   | REL    | CD180  | HRH4   | GZMH   | TL9R9  | TNFSF13 | CD3E   | FCRG1A | LY9    | MME    | IL18R1 | MS4A1  | CXCL11 | PLA2G6 | PTPRC  | CD84   | IL2RB  | CD97   |
|----------|-------|--------|--------|--------|---------|-----------|--------|--------|--------|---------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|          | -0.13 | -0.14  | -0.14  | -0.14  | -0.14  | -0.14     | -0.14  | -0.14  | -0.15  | -0.15  | -0.15  | -0.15  | -0.15  | -0.15  | -0.15  | -0.15  | -0.16  | -0.16  | -0.16  | -0.16  | -0.16  | -0.16  | -0.16  | -0.17  | -0.17  | -0.17  | -0.17  | -0.17  | -0.17  | -0.17  | -0.17  | -0.18  | -0.18  | -0.18  | -0.18  | -0.18  | -0.18  |
|          | 0.36  | 0.26   | 0.27   | 0.23   | 0.25    | 0.25      | 0.25   | 0.36   | 0.52   | 0.24    | 0.46   | 0.35    | 0.35   | 0.54    | 0.49   | 0.22   | 0.87   | 0.54   | 0.40   | 0.09   | 0.09   | 0.52   | 0.78   | 0.35   | 0.41   | 0.56   | 0.56   | 0.60   | 0.25   | 0.88   | 0.88   | 0.28   | 0.88   | 0.88   |
|          | 0.91  | 0.91   | 0.91   | 0.91   | 0.91    | 0.91      | 0.91   | 0.90   | 0.90   | 0.90    | 0.90   | 0.90    | 0.90   | 0.90    | 0.90   | 0.90   | 0.90   | 0.90   | 0.90   | 0.90   | 0.90   | 0.90   | 0.89   | 0.89   | 0.89   | 0.89   | 0.89   | 0.88   | 0.88   | 0.88   | 0.88   |
|          | 0.65  | 0.69   | 0.69   | 0.71   | 0.69    | 0.54      | 0.69   | 0.64   | 0.57   | 0.69    | 0.71   | 0.60    | 0.64   | 0.64    | 0.69   | 0.69   | 0.61   | 0.61   | 0.61   | 0.61   | 0.61   | 0.61   | 0.56   | 0.67   | 0.44   | 0.55   | 0.54   | 0.59   | 0.58   | 0.55   | 0.58   | 0.64   |
|          | 1.28  | 1.20   | 1.21   | 1.17   | 1.19    | 1.53      | 1.19   | 1.28   | 1.43   | 1.18    | 1.16   | 1.35    | 1.28   | 1.28    | 1.41   | 1.17   | 1.82   | 1.32   | 1.58   | 1.26   | 1.55   | 1.43   | 0.71   | 1.27   | 1.33   | 1.47   | 1.19   | 1.34   | 1.18   | 1.22   | 1.21   |
|          | 0.5673| 0.4679 | 0.4790 | 0.4231 | 0.4552  | 0.6927    | 0.4448 | 0.5461 | 0.6429 | 0.4331  | 0.3916 | 0.5925  | 0.5283 | 0.6391  | 0.6189 | 0.3966 | 0.7504 | 0.5467 | 0.6808 | 0.5026 | 0.6728 | 0.6171 | 0.4191 | 0.7085 | 0.4896 | 0.5377 | 0.6175 | 0.5516 | 0.5289 | 0.3652 | 0.4199 | 0.4055 |
| Gene      | TNFRSF8 | PRKCD | ATG16L1 | BTLA | NR3C1 | LCP1 | STAT3 | CD81 | CYLD | TNFRSF1B | CD79A | ITGAM | ICOS | MAVS | MAP3K5 | ICAM2 | STAT6 | IL6R | NFATC3 | NFATC1 | AKT3 | IKBKE | IFI16 | IFI35 | SELL | PIK3CG | MYD88 | ITGA6 | CD28 | SPN | HLA-C | MICB | NFKB1 | NOTCH1 | DDX58 | ZAP70 |
|-----------|---------|-------|---------|------|-------|------|-------|------|------|----------|-------|-------|------|------|--------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-------|------|------|-------|------|-------|-------|-------|------|
| Gene   | Z-score | Log10(p-value) |
|--------|---------|----------------|
| CSF2RB | -0.25   | 0.44           |
| TGFBI  | -0.25   | 0.52           |
| IL7R   | -0.26   | 0.60           |
| TCF7   | -0.26   | 0.64           |
| PTGS2  | -0.26   | 0.62           |
| KRLC1  | -0.27   | 0.58           |
| CD44   | -0.27   | 0.81           |
| THBS1  | -0.27   | 0.45           |
| CARD11 | -0.27   | 0.60           |
| ITGAL  | -0.28   | 0.61           |
| NOD1   | -0.28   | 0.45           |
| MAP3K1 | -0.28   | 0.61           |
| CD6    | -0.29   | 0.61           |
| GNLY   | -0.29   | 0.56           |
| CCR2   | -0.29   | 0.46           |
| GTF3C1 | -0.29   | 0.56           |
| HLA-DRB3| -0.29   | 0.57           |
| FYN    | -0.29   | 0.59           |
| CX3CR1 | -0.29   | 0.63           |
| TAP2   | -0.29   | 0.59           |
| CD22   | -0.30   | 0.59           |
| EP300  | -0.30   | 0.61           |
| IL17RA | -0.30   | 0.56           |
| IL6ST  | -0.30   | 0.53           |
| IL11RA | -0.31   | 0.59           |
| MR1    | -0.31   | 0.55           |
| CD24   | -0.31   | 0.46           |
| NFKB2  | -0.31   | 0.57           |
| CREB1  | -0.31   | 0.60           |
| NLRP3  | -0.31   | 0.55           |
| JAK1   | -0.32   | 0.61           |
| KLRG1  | -0.33   | 0.57           |
| CCL3   | -0.33   | 0.42           |
| TIGIT  | -0.33   | 0.59           |
| MEFV   | -0.34   | 0.55           |
| ITGB2  | -0.34   | 0.60           |
| Gene      | TLR10 | CD247 | TICAM2 | LTF   | LAMP2 | ITGB1 | HLA-DQB1 | CD247 | CD86 | ITGB1 | CD247 | TICAM2 | LTF   | LAMP2 | ITGB1 | HLA-DQB1 | CD247 | CD86 | ITGB1 | CD247 | TICAM2 | LTF   | LAMP2 | ITGB1 | HLA-DQB1 | CD247 | CD86 | ITGB1 | CD247 | TICAM2 |
|-----------|-------|-------|--------|-------|-------|-------|-----------|-------|-------|-------|-------|--------|-------|-------|-------|-----------|-------|-------|-------|-------|--------|-------|-------|-------|-----------|-------|-------|-------|-------|--------|
| TLR10     | -0.35 | -0.77 | -1.19  | -0.35 | -0.36 | -0.36 | -0.36     | -0.36 | -0.37 | -0.37 | -0.37 | -0.37  | -0.37 | -0.37 | -0.37 | -0.37     | -0.37 | -0.37 | -0.37 | -0.37 | -0.37  | -0.37 | -0.37 | -0.37 | -0.37     | -0.37 | -0.37 | -0.37 | -0.37 | -0.37  |
| CD247     | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| TICAM2    | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| LTF       | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| LAMP2     | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| ITGB1     | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| HLA-DQB1  | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| CD86      | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| ITGB3     | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| CD8A      | -0.35 | -0.35 | -1.19  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  | -0.35 | -0.35 | -0.35 | -0.35     | -0.35 | -0.35 | -0.35 | -0.35 | -0.35  |
| Gene       | Fold Change | Log2 FC  | p-value | FDR  |
|------------|-------------|----------|---------|------|
| YTHDF2    | -0.54       | -1.13    | 0.06    | 0.46 |
| NLRC5     | -0.54       | -1.03    | 0.04    | 0.49 |
| IFNAR1    | -0.54       | -1.30    | 0.22    | 0.41 |
| IGF2R     | -0.55       | -1.24    | 0.14    | 0.42 |
| CMKLR1    | -0.55       | -1.03    | -0.07   | 0.49 |
| LRP1      | -0.56       | -1.54    | 0.41    | 0.34 |
| IL15      | -0.57       | -1.11    | -0.02   | 0.46 |
| PTGES2    | -0.57       | -1.18    | 0.03    | 0.67 |
| HLA-DQA1  | -0.58       | -1.22    | 0.06    | 0.67 |
| NCR1      | -0.61       | -1.00    | -0.22   | 0.66 |
| CLEC4C    | -0.63       | -1.48    | 0.22    | 0.65 |
| LAMP1     | -0.64       | -1.35    | 0.08    | 0.64 |
| CYSLTR2   | -0.64       | -1.47    | 0.19    | 0.64 |
| CXCR5     | -0.65       | -1.32    | 0.01    | 0.64 |
| C3AR1     | -0.66       | -1.34    | 0.02    | 0.63 |
| F2RL1     | -0.68       | -1.59    | 0.24    | 0.63 |
| TXK       | -0.69       | -1.34    | -0.03   | 0.62 |
| CD83      | -0.70       | -1.36    | -0.04   | 0.61 |
| SLAMF6    | -0.71       | -1.24    | -0.17   | 0.61 |
| GZMM      | -0.76       | -1.32    | -0.21   | 0.59 |
| TNFRSF10B | -0.88       | -1.49    | -0.27   | 0.54 |
Supplementary Table S4. Differential gene expression in nasal lysate between responders and non-responders in response to probiotic supplementation.

| Gene    | Log2 fold change | Lower confidence limit (log2) | Upper confidence limit (log2) | P value |
|---------|------------------|-------------------------------|-------------------------------|---------|
| CR2     | 2.61             | -0.28                         | 5.51                          | 0.0731  |
| IFI27   | 1.38             | -0.37                         | 3.12                          | 0.1117  |
| HRH1    | 1.27             | -0.16                         | 2.70                          | 0.0779  |
| SCGB1A1 | 1.27             | -0.20                         | 2.73                          | 0.0840  |
| MERTK   | 1.24             | -0.13                         | 2.61                          | 0.0726  |
| SAA1    | 1.20             | -0.06                         | 2.46                          | 0.0601  |
| CCL17   | 1.16             | -0.22                         | 2.54                          | 0.0924  |
| MUC1    | 1.09             | -0.02                         | 2.21                          | 0.0546  |
| SPINK5  | 1.03             | -0.34                         | 2.40                          | 0.1276  |
| CD19    | 1.02             | -0.89                         | 2.92                          | 0.2704  |
| SH2D1B  | 1.00             | -0.43                         | 2.42                          | 0.1540  |
| APP     | 0.99             | -0.63                         | 2.61                          | 0.2098  |
| SPA17   | 0.99             | -0.58                         | 2.55                          | 0.1983  |
| TJP1    | 0.98             | -0.09                         | 2.05                          | 0.0692  |
| CARD11  | 0.98             | -0.19                         | 2.15                          | 0.0944  |
| ITGA6   | 0.96             | -0.62                         | 2.55                          | 0.2121  |
| CDH1    | 0.96             | -0.21                         | 2.12                          | 0.0988  |
| CD1C    | 0.95             | -0.92                         | 2.82                          | 0.2922  |
| IDO1    | 0.94             | -0.46                         | 2.35                          | 0.1714  |
| ITGA2   | 0.93             | -0.11                         | 1.97                          | 0.0767  |
| LAMP3   | 0.91             | -0.44                         | 2.26                          | 0.1673  |
| DUSP4   | 0.91             | -0.21                         | 2.04                          | 0.1041  |
| NOS2    | 0.87             | -0.41                         | 2.14                          | 0.1669  |
| IL18    | 0.86             | -0.07                         | 1.80                          | 0.0681  |
| CD99    | 0.84             | -0.28                         | 1.96                          | 0.1295  |
| CD9     | 0.82             | -0.30                         | 1.94                          | 0.1370  |
| DOCK9   | 0.82             | -0.42                         | 2.06                          | 0.1789  |
| ISG15   | 0.81             | -0.56                         | 2.17                          | 0.2244  |
| CCL3    | 0.79             | -1.70                         | 3.28                          | 0.5060  |
| TAP1    | 0.77             | -0.54                         | 2.08                          | 0.2256  |
| GTF3C1  | 0.77             | -0.26                         | 1.80                          | 0.1319  |
| RORA    | 0.75             | -0.38                         | 1.89                          | 0.1755  |
| TP53    | 0.74             | -0.59                         | 2.06                          | 0.2538  |
| Protein Name     | Value   | Change | Fold Change | p-Value |
|------------------|---------|--------|-------------|---------|
| GZMB             | 0.73    | -1.33  | 2.78        | 0.4579  |
| TICAM1           | 0.72    | -0.37  | 1.82        | 0.1778  |
| CXCL6            | 0.71    | -0.70  | 2.12        | 0.2968  |
| CTSF             | 0.71    | -0.43  | 1.85        | 0.2034  |
| FOXJ1            | 0.69    | -0.78  | 2.17        | 0.3286  |
| SLPI             | 0.68    | -0.31  | 1.67        | 0.1595  |
| PTGES2           | 0.68    | -0.39  | 1.74        | 0.1944  |
| CD74             | 0.66    | -0.25  | 1.57        | 0.1399  |
| IL5RA            | 0.66    | -1.01  | 2.33        | 0.4099  |
| ST6GAL1          | 0.66    | -0.62  | 1.93        | 0.2873  |
| MAF              | 0.65    | -0.54  | 1.84        | 0.2597  |
| ITGB4            | 0.65    | -0.32  | 1.62        | 0.1721  |
| CD95             | 0.63    | -0.33  | 1.58        | 0.1813  |
| ANXA1            | 0.62    | -0.23  | 1.47        | 0.1371  |
| HLA-DRA          | 0.61    | -0.41  | 1.64        | 0.2209  |
| CD81             | 0.61    | -0.79  | 2.01        | 0.3656  |
| HLA-DQA1         | 0.61    | -1.14  | 2.36        | 0.4660  |
| SERPINB2         | 0.60    | -0.69  | 1.89        | 0.3344  |
| IRF8             | 0.59    | -0.76  | 1.95        | 0.3620  |
| IL1RL1           | 0.58    | -1.27  | 2.43        | 0.5115  |
| BCL2L1           | 0.58    | -0.41  | 1.56        | 0.2289  |
| HLA-DPB1         | 0.57    | -1.97  | 3.12        | 0.6340  |
| PRKCE            | 0.56    | -0.62  | 1.75        | 0.3238  |
| BATF             | 0.56    | -0.48  | 1.59        | 0.2659  |
| OAS3             | 0.55    | -0.34  | 1.45        | 0.2030  |
| PSMB10           | 0.55    | -0.56  | 1.66        | 0.3008  |
| CD22             | 0.55    | -1.39  | 2.49        | 0.5504  |
| HLA-DMA          | 0.55    | -0.54  | 1.64        | 0.2976  |
| TLR8             | 0.55    | -1.92  | 3.01        | 0.6392  |
| RUNX3            | 0.54    | -0.55  | 1.64        | 0.3032  |
| ITGB1            | 0.54    | -0.35  | 1.44        | 0.2144  |
| C1QB             | 0.54    | -0.60  | 1.68        | 0.3285  |
| SMAD3            | 0.53    | -0.70  | 1.75        | 0.3706  |
| RRAD             | 0.52    | -1.17  | 2.22        | 0.5182  |
| HLA-DRB3         | 0.52    | -0.43  | 1.48        | 0.2591  |
| PAFAH2           | 0.52    | -0.67  | 1.70        | 0.3615  |
| Gene   | Fold Change | Expression   | p-value   |
|--------|-------------|--------------|-----------|
| ETS1   | 0.51        | -0.32        | 1.34      | 0.2044   |
| CLDN1  | 0.51        | -0.41        | 1.43      | 0.2537   |
| ALCAM  | 0.51        | -0.47        | 1.49      | 0.2849   |
| PNMA1  | 0.49        | -0.68        | 1.67      | 0.3804   |
| ITGAE  | 0.49        | -0.58        | 1.57      | 0.3368   |
| PSMB7  | 0.49        | -0.55        | 1.53      | 0.3266   |
| PPBP   | 0.48        | -2.02        | 2.99      | 0.6841   |
| CD86   | 0.46        | -1.69        | 2.60      | 0.6546   |
| CTSL   | 0.45        | -0.70        | 1.60      | 0.4105   |
| NFATC2 | 0.45        | -0.73        | 1.63      | 0.4245   |
| NUP107 | 0.45        | -0.47        | 1.37      | 0.3133   |
| RUNX1  | 0.44        | -0.74        | 1.63      | 0.4351   |
| IRF4   | 0.43        | -1.70        | 2.57      | 0.6682   |
| CCL4   | 0.43        | -2.29        | 3.15      | 0.7379   |
| S100A8 | 0.42        | -1.26        | 2.11      | 0.5964   |
| ARG2   | 0.41        | -0.64        | 1.47      | 0.4145   |
| TAP2   | 0.41        | -0.39        | 1.21      | 0.2903   |
| STAT2  | 0.38        | -0.58        | 1.34      | 0.4125   |
| IFIT1  | 0.37        | -1.38        | 2.11      | 0.6574   |
| CARD9  | 0.34        | -0.93        | 1.60      | 0.5760   |
| LTB    | 0.34        | -1.84        | 2.51      | 0.7436   |
| CD276  | 0.33        | -0.88        | 1.54      | 0.5642   |
| CD84   | 0.33        | -1.04        | 1.71      | 0.6110   |
| CASP3  | 0.33        | -0.60        | 1.25      | 0.4583   |
| IKKKB  | 0.32        | -0.52        | 1.16      | 0.4298   |
| SERPING1 | 0.31    | -1.56        | 2.18      | 0.7259   |
| MAVS   | 0.31        | -0.67        | 1.28      | 0.5092   |
| REPS1  | 0.30        | -0.70        | 1.31      | 0.5239   |
| IL1RN  | 0.30        | -1.33        | 1.93      | 0.6933   |
| FLT3LG | 0.30        | -0.84        | 1.43      | 0.5854   |
| NT5E   | 0.29        | -0.99        | 1.57      | 0.6331   |
| ABL1   | 0.28        | -0.78        | 1.33      | 0.5827   |
| CT45A1 | 0.27        | -2.32        | 2.87      | 0.8232   |
| CCND3  | 0.26        | -0.53        | 1.04      | 0.4964   |
| LAMP1  | 0.26        | -0.57        | 1.08      | 0.5167   |
| PLA2G6 | 0.25        | -0.81        | 1.32      | 0.6170   |
| Gene       | Score | Fold Change | P-Value |
|------------|-------|-------------|---------|
| MAPK3      | 0.25  | -0.57       | 1.06    | 0.5231 |
| TNFRSF18   | 0.24  | -0.82       | 1.30    | 0.6294 |
| RPS6       | 0.24  | -0.63       | 1.12    | 0.5632 |
| TNFRSF12A  | 0.24  | -1.21       | 1.69    | 0.7277 |
| BMI1       | 0.24  | -0.97       | 1.45    | 0.6767 |
| MFG8E      | 0.24  | -0.78       | 1.25    | 0.6260 |
| COL3A1     | 0.23  | -2.78       | 3.25    | 0.8692 |
| M1X1       | 0.23  | -0.65       | 1.12    | 0.5760 |
| BLNK       | 0.23  | -0.80       | 1.26    | 0.6330 |
| IFNA7      | 0.23  | -1.65       | 2.11    | 0.7950 |
| MRC1       | 0.22  | -1.27       | 1.71    | 0.7512 |
| IRF3       | 0.22  | -1.23       | 1.68    | 0.7458 |
| CCL2       | 0.22  | -2.03       | 2.48    | 0.8356 |
| TNFSF10    | 0.22  | -0.71       | 1.15    | 0.6196 |
| ENG        | 0.20  | -1.30       | 1.70    | 0.7774 |
| YTHDF2     | 0.20  | -0.72       | 1.12    | 0.6473 |
| PVR        | 0.20  | -0.76       | 1.15    | 0.6665 |
| PSMD7      | 0.19  | -0.70       | 1.08    | 0.6502 |
| CX3CL1     | 0.19  | -1.37       | 1.75    | 0.7958 |
| C1QBP      | 0.19  | -1.02       | 1.40    | 0.7431 |
| EPCAM      | 0.19  | -0.75       | 1.13    | 0.6763 |
| PIK3CG     | 0.18  | -1.31       | 1.67    | 0.7948 |
| LRP1       | 0.18  | -1.17       | 1.52    | 0.7795 |
| CD46       | 0.17  | -0.61       | 0.95    | 0.6528 |
| NOS2A      | 0.16  | -0.91       | 1.22    | 0.7563 |
| TSC22D3    | 0.16  | -1.23       | 1.54    | 0.8112 |
| MAP3K1     | 0.16  | -0.70       | 1.01    | 0.7018 |
| CD40       | 0.15  | -0.84       | 1.15    | 0.7448 |
| CD38       | 0.15  | -1.78       | 2.09    | 0.8673 |
| HLA-DOB    | 0.13  | -1.44       | 1.70    | 0.8589 |
| TRAF6      | 0.13  | -0.83       | 1.09    | 0.7734 |
| MICA       | 0.12  | -1.05       | 1.30    | 0.8234 |
| CD46       | 0.12  | -0.81       | 1.05    | 0.7791 |
| TLR9       | 0.12  | -1.83       | 2.07    | 0.8947 |
| PTGDR2     | 0.12  | -2.40       | 2.63    | 0.9209 |
| DUSP6      | 0.12  | -1.14       | 1.38    | 0.8445 |
| Gene       | FC  | p-Value | Log2 Fold Change | q-Value |
|------------|-----|---------|------------------|---------|
| IKBKE      | 0.12| -0.91   | 1.14             | 0.8128  |
| ELK1       | 0.11| -0.87   | 1.08             | 0.8192  |
| ANP32B     | 0.10| -0.74   | 0.93             | 0.8059  |
| IRF7       | 0.10| -1.16   | 1.36             | 0.8721  |
| PDGFC      | 0.09| -0.96   | 1.15             | 0.8503  |
| CFI        | 0.09| -0.94   | 1.11             | 0.8563  |
| SLAMF7     | 0.09| -1.48   | 1.66             | 0.9066  |
| CCL26      | 0.08| -1.58   | 1.74             | 0.9224  |
| PSEN2      | 0.07| -0.74   | 0.89             | 0.8481  |
| IL32       | 0.07| -1.31   | 1.44             | 0.9153  |
| HLA-DPA1   | 0.06| -1.17   | 1.29             | 0.9200  |
| ATG16L1    | 0.05| -0.99   | 1.09             | 0.9130  |
| HMGB1      | 0.04| -1.39   | 1.46             | 0.9559  |
| ENTPD1     | 0.04| -1.66   | 1.73             | 0.9640  |
| SI100A7    | 0.03| -1.88   | 1.93             | 0.9756  |
| ATF2       | 0.02| -0.84   | 0.89             | 0.9572  |
| IL6ST      | 0.02| -0.88   | 0.92             | 0.9601  |
| HLA-DRB4   | 0.02| -2.99   | 3.03             | 0.9892  |
| HLA-DQB1   | 0.02| -1.61   | 1.65             | 0.9817  |
| MAP2K2     | 0.01| -0.78   | 0.80             | 0.9793  |
| PIN1       | 0.00| -0.87   | 0.87             | 0.9983  |
| CCR3       | -0.01| -2.25  | 2.23             | 0.9913  |
| ILF3       | -0.01| -0.80  | 0.78             | 0.9718  |
| CCL28      | -0.02| -1.58  | 1.54             | 0.9814  |
| CDKN1A     | -0.02| -1.04  | 0.99             | 0.9659  |
| SMAD2      | -0.02| -2.15  | 2.10             | 0.9801  |
| GPI        | -0.03| -1.13  | 1.07             | 0.9571  |
| APOE       | -0.03| -1.79  | 1.72             | 0.9692  |
| TNF        | -0.04| -2.33  | 2.24             | 0.9683  |
| CD47       | -0.05| -0.85  | 0.75             | 0.8952  |
| IL19       | -0.06| -1.70  | 1.58             | 0.9385  |
| IFI1H1     | -0.06| -1.09  | 0.96             | 0.8990  |
| UBC        | -0.06| -0.98  | 0.86             | 0.8869  |
| HAVCR2     | -0.07| -1.55  | 1.42             | 0.9257  |
| C2         | -0.07| -1.24  | 1.10             | 0.9007  |
| BCL10      | -0.07| -0.87  | 0.73             | 0.8521  |
| Gene    | Expression | Log2 Fold Change | p-value | q-value |
|---------|------------|----------------|---------|---------|
| TIRAP   | -0.08      | -0.86          | 0.71    | 0.8327  |
| MIF     | -0.08      | -1.18          | 1.02    | 0.8755  |
| IL7R    | -0.10      | -1.89          | 1.70    | 0.9103  |
| EWSR1   | -0.10      | -0.89          | 0.69    | 0.7942  |
| FCER1A  | -0.10      | -1.32          | 1.11    | 0.8604  |
| PSEN1   | -0.11      | -0.97          | 0.75    | 0.7916  |
| TFRC    | -0.13      | -1.12          | 0.86    | 0.7823  |
| TNFSF13 | -0.13      | -1.13          | 0.87    | 0.7821  |
| S100A12 | -0.13      | -2.28          | 2.02    | 0.8965  |
| MAPK8   | -0.14      | -1.04          | 0.75    | 0.7398  |
| IGF1R   | -0.15      | -1.04          | 0.75    | 0.7292  |
| CD83    | -0.15      | -2.51          | 2.22    | 0.8958  |
| RIPK2   | -0.15      | -1.69          | 1.39    | 0.8378  |
| TAPBP   | -0.15      | -0.98          | 0.68    | 0.7037  |
| IL23A   | -0.15      | -1.95          | 1.65    | 0.8608  |
| TRAF3   | -0.15      | -1.17          | 0.87    | 0.7542  |
| IL18R1  | -0.15      | -1.35          | 1.05    | 0.7890  |
| CD36    | -0.16      | -2.05          | 1.73    | 0.8609  |
| PSMB9   | -0.16      | -1.24          | 0.92    | 0.7585  |
| CCL3L1  | -0.16      | -2.72          | 2.40    | 0.8952  |
| DDX58   | -0.16      | -1.18          | 0.87    | 0.7429  |
| C3      | -0.17      | -1.31          | 0.96    | 0.7510  |
| IL10RA  | -0.18      | -2.45          | 2.08    | 0.8651  |
| CCL20   | -0.18      | -3.12          | 2.76    | 0.8952  |
| PSMB8   | -0.18      | -0.95          | 0.58    | 0.6129  |
| NLRP3   | -0.19      | -2.90          | 2.53    | 0.8854  |
| ITCH    | -0.19      | -1.17          | 0.80    | 0.6881  |
| IRAK4   | -0.19      | -1.16          | 0.78    | 0.6779  |
| JUN     | -0.20      | -1.75          | 1.36    | 0.7895  |
| CYSLTR1 | -0.20      | -1.86          | 1.47    | 0.8009  |
| MR1     | -0.21      | -1.30          | 0.88    | 0.6834  |
| VEGFA   | -0.22      | -1.48          | 1.05    | 0.7206  |
| MST1R   | -0.22      | -1.23          | 0.79    | 0.6477  |
| LTK     | -0.23      | -1.79          | 1.32    | 0.7506  |
| BST2    | -0.23      | -1.75          | 1.29    | 0.7444  |
| IL13RA1 | -0.24      | -1.20          | 0.72    | 0.6040  |
| Gene     | Change | log2FoldChange | adj.P val | FDR   |
|----------|--------|----------------|-----------|-------|
| IL4R     | -0.24  | -1.55          | 1.07      | 0.6961|
| ADORA2A  | -0.25  | -2.90          | 2.40      | 0.8443|
| IRF1     | -0.25  | -1.48          | 0.98      | 0.6672|
| IL15     | -0.26  | -1.73          | 1.22      | 0.7153|
| BAX      | -0.26  | -1.00          | 0.49      | 0.4722|
| MAP2K4   | -0.26  | -1.12          | 0.60      | 0.5262|
| CR1      | -0.26  | -3.00          | 2.48      | 0.8402|
| IFNAR1   | -0.27  | -1.29          | 0.76      | 0.5865|
| VEGFC    | -0.27  | -1.36          | 0.82      | 0.6013|
| ECSIT    | -0.29  | -1.30          | 0.72      | 0.5520|
| IL3RA    | -0.29  | -2.26          | 1.69      | 0.7597|
| CD4      | -0.29  | -1.63          | 1.04      | 0.6454|
| EDN1     | -0.29  | -2.70          | 2.11      | 0.7974|
| HLA-DMB  | -0.30  | -1.25          | 0.66      | 0.5159|
| JAK2     | -0.30  | -1.17          | 0.57      | 0.4708|
| KIT      | -0.31  | -1.60          | 0.99      | 0.6194|
| MYD88    | -0.31  | -1.36          | 0.74      | 0.5379|
| MHC     | -0.32  | -1.59          | 0.96      | 0.6031|
| NR3C1    | -0.32  | -1.29          | 0.66      | 0.4956|
| BID      | -0.32  | -2.30          | 1.65      | 0.7279|
| F13A1    | -0.33  | -2.44          | 1.78      | 0.7442|
| CYLD     | -0.33  | -1.41          | 0.75      | 0.5232|
| CXCL1    | -0.33  | -2.55          | 1.88      | 0.7504|
| ATF1     | -0.34  | -1.23          | 0.56      | 0.4320|
| C3AR1    | -0.34  | -2.76          | 2.08      | 0.7679|
| ATG7     | -0.34  | -1.67          | 0.98      | 0.5880|
| SPN      | -0.35  | -2.36          | 1.66      | 0.7110|
| TRAF2    | -0.36  | -1.44          | 0.73      | 0.4919|
| MAPK1    | -0.36  | -1.27          | 0.56      | 0.4128|
| HRH2     | -0.36  | -2.60          | 1.88      | 0.7340|
| LILRB3   | -0.36  | -2.83          | 2.10      | 0.7558|
| CD58     | -0.37  | -1.50          | 0.76      | 0.4962|
| NRP1     | -0.37  | -1.78          | 1.04      | 0.5789|
| EGR2     | -0.37  | -2.41          | 1.67      | 0.6986|
| C1QA     | -0.38  | -1.69          | 0.93      | 0.5451|
| IRAK2    | -0.38  | -1.75          | 0.99      | 0.5628|
| Gene     | Z-score | Fold Change | p-value |
|----------|---------|-------------|---------|
| CYBB     | -0.38   | -3.11       | 2.35    | 0.7690  |
| NFKB1    | -0.39   | -1.63       | 0.84    | 0.5042  |
| STAT3    | -0.40   | -1.52       | 0.72    | 0.4573  |
| HLA-E    | -0.40   | -1.62       | 0.82    | 0.4929  |
| ATG10    | -0.40   | -1.65       | 0.85    | 0.5004  |
| NLRC5    | -0.41   | -1.37       | 0.55    | 0.3726  |
| BCL2     | -0.41   | -1.65       | 0.83    | 0.4856  |
| REL      | -0.41   | -1.40       | 0.58    | 0.3825  |
| IL1R1    | -0.42   | -1.50       | 0.66    | 0.4164  |
| CFD      | -0.43   | -1.69       | 0.83    | 0.4712  |
| IFI35    | -0.45   | -1.26       | 0.36    | 0.2549  |
| BTK      | -0.45   | -3.25       | 2.35    | 0.7352  |
| TBK1     | -0.45   | -1.44       | 0.54    | 0.3409  |
| SIGIRR   | -0.45   | -1.32       | 0.42    | 0.2828  |
| CCL23    | -0.46   | -2.99       | 2.08    | 0.7044  |
| MAP2K1   | -0.46   | -1.50       | 0.58    | 0.3570  |
| MAP3K5   | -0.46   | -1.36       | 0.43    | 0.2849  |
| PYCARD   | -0.47   | -1.56       | 0.63    | 0.3759  |
| IRF2     | -0.47   | -1.61       | 0.67    | 0.3909  |
| EP300    | -0.47   | -1.43       | 0.50    | 0.3136  |
| NFATC3   | -0.48   | -1.64       | 0.67    | 0.3850  |
| JAK1     | -0.49   | -1.55       | 0.57    | 0.3392  |
| NFKB1A   | -0.49   | -2.23       | 1.25    | 0.5552  |
| PTGS1    | -0.49   | -2.10       | 1.12    | 0.5200  |
| MAP3K7   | -0.50   | -1.38       | 0.39    | 0.2459  |
| ICAM1    | -0.51   | -2.73       | 1.70    | 0.6250  |
| CHUK     | -0.52   | -1.47       | 0.43    | 0.2602  |
| RELA     | -0.52   | -1.60       | 0.56    | 0.3205  |
| STAT1    | -0.53   | -1.55       | 0.49    | 0.2830  |
| HLA-C    | -0.53   | -1.60       | 0.54    | 0.3021  |
| SBNO2    | -0.53   | -1.76       | 0.70    | 0.3681  |
| TYK2     | -0.53   | -1.40       | 0.33    | 0.2075  |
| ATG5     | -0.54   | -1.36       | 0.29    | 0.1820  |
| FCGR2B   | -0.54   | -2.62       | 1.54    | 0.5853  |
| THBD     | -0.54   | -2.65       | 1.57    | 0.5901  |
| CXCR1    | -0.54   | -3.22       | 2.14    | 0.6700  |
| Gene       | Value1 | Value2 | Value3 | Value4 |
|------------|--------|--------|--------|--------|
| NFATC1     | -0.54  | -1.51  | 0.42   | 0.2435 |
| SP1        | -0.54  | -2.28  | 1.19   | 0.5102 |
| CD274      | -0.55  | -1.72  | 0.62   | 0.3304 |
| HLA-A      | -0.55  | -1.58  | 0.47   | 0.2670 |
| LILRA1     | -0.55  | -2.96  | 1.85   | 0.6275 |
| TXNIP      | -0.57  | -1.73  | 0.59   | 0.3077 |
| IL33       | -0.57  | -2.30  | 1.16   | 0.4877 |
| NFATC4     | -0.58  | -2.14  | 0.98   | 0.4404 |
| LTBR       | -0.58  | -1.45  | 0.29   | 0.1754 |
| CD68       | -0.58  | -1.82  | 0.66   | 0.3337 |
| SYK        | -0.58  | -1.80  | 0.64   | 0.3218 |
| F2RL1      | -0.58  | -1.46  | 0.29   | 0.1740 |
| IRAK1      | -0.59  | -1.73  | 0.55   | 0.2845 |
| IL1A       | -0.60  | -3.05  | 1.86   | 0.6090 |
| IFNAR2     | -0.60  | -1.60  | 0.41   | 0.2221 |
| IKBK       | -0.61  | -1.52  | 0.30   | 0.1728 |
| STAT6      | -0.62  | -1.66  | 0.43   | 0.2251 |
| IFH16      | -0.62  | -1.46  | 0.21   | 0.1317 |
| CREB1      | -0.63  | -1.46  | 0.20   | 0.1264 |
| TNFRSF8    | -0.63  | -2.89  | 1.63   | 0.5592 |
| CASP8      | -0.63  | -1.92  | 0.66   | 0.3091 |
| IL2RA      | -0.63  | -2.42  | 1.16   | 0.4592 |
| CD48       | -0.64  | -2.58  | 1.31   | 0.4923 |
| TAB1       | -0.64  | -1.64  | 0.36   | 0.1886 |
| ALOX5      | -0.64  | -2.68  | 1.40   | 0.5078 |
| TOLLIP     | -0.65  | -1.55  | 0.25   | 0.1410 |
| HLA-B      | -0.67  | -1.82  | 0.47   | 0.2248 |
| TLR1       | -0.68  | -2.30  | 0.93   | 0.3782 |
| IL16       | -0.69  | -2.62  | 1.23   | 0.4520 |
| NFKB2      | -0.70  | -2.26  | 0.87   | 0.3545 |
| FCGR1A     | -0.70  | -2.66  | 1.26   | 0.4538 |
| IL2RG      | -0.71  | -2.70  | 1.29   | 0.4587 |
| TLR3       | -0.72  | -1.77  | 0.34   | 0.1682 |
| NOD2       | -0.75  | -2.29  | 0.80   | 0.3164 |
| ITGAL      | -0.75  | -2.86  | 1.37   | 0.4596 |
| TPSAB1     | -0.75  | -2.75  | 1.25   | 0.4347 |
| Gene   | HRAS  | LILRB2 | CLEC4A | CD97  | CXCL16 | PPARG | AMICA1 | ITGB2 | LAMP2 | MAPK14 | FPR2  | TFEB  | LTB4R | PLAU  | CTSS  | RORC  | BCL6  | TNFRSF1A | TNFSF12 | CDK1  | CXCR4 | THBS1 | CD53  | LYN   | CSF3R | MAPKAPK2 | SELPLG | HCK   | AXL   | DEFB1 | TGFB1 | CD55  | PRKCD | SOCS1 | TREM1 | ITGAM |
|--------|-------|--------|--------|-------|--------|-------|--------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|---------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|
|        | -0.76 | -0.77  | -0.77  | -0.79 | -0.79  | -0.80 | -0.80  | -0.81 | -0.82 | -0.82  | -0.84 | -0.84 | -0.84 | -0.84 | -0.85 | -0.85 | -0.85 | -0.87  | -0.87  | -0.87 | -0.88 | -0.90 | -0.91 | -0.91 | -0.92  | -0.92  | -0.93 | -0.93 | -0.94 | -0.94 | -0.95 | -0.96  | -0.96  | -0.96 | -0.97 | -0.97 | -0.97 |
| Gene       | Log2FC | Log2Ratio | p-value |
|------------|--------|-----------|---------|
| ICAM4      | -0.98  | 1.47      | 0.4043  |
| TNFRSF10B  | -1.00  | 0.20      | 0.0940  |
| SLC11A1    | -1.01  | 1.61      | 0.4204  |
| PTPRC      | -1.02  | 1.62      | 0.4199  |
| FCER1G     | -1.04  | 1.22      | 0.3400  |
| TNFRSF14   | -1.04  | 0.11      | 0.0718  |
| JAK3       | -1.04  | 1.06      | 0.3044  |
| CCRL2      | -1.06  | 1.23      | 0.3372  |
| IFNGR1     | -1.06  | 0.09      | 0.0686  |
| PTGS2      | -1.06  | 1.82      | 0.4417  |
| TNFAIP3    | -1.07  | 1.12      | 0.3112  |
| PECAM1     | -1.07  | 1.43      | 0.3734  |
| IL15RA     | -1.07  | 0.08      | 0.0648  |
| ISG20      | -1.09  | 0.36      | 0.1293  |
| INPP5D     | -1.11  | 0.82      | 0.2360  |
| LY96       | -1.12  | 1.29      | 0.3346  |
| TANK       | -1.13  | 0.48      | 0.1547  |
| NCR1       | -1.13  | 1.91      | 0.4366  |
| CCR1       | -1.13  | 1.48      | 0.3670  |
| STAT5B     | -1.14  | 0.53      | 0.1650  |
| EGR1       | -1.14  | 0.30      | 0.1100  |
| CKLF       | -1.16  | 0.77      | 0.2167  |
| LCP1       | -1.16  | 1.34      | 0.3446  |
| NOTCH1     | -1.17  | 0.40      | 0.1314  |
| TLR2       | -1.18  | 1.34      | 0.3319  |
| CD37       | -1.18  | 1.14      | 0.2924  |
| SH2B2      | -1.18  | 1.03      | 0.2712  |
| TNFRSF1B   | -1.19  | 1.52      | 0.3610  |
| IFITM1     | -1.19  | 1.24      | 0.3109  |
| ICAM3      | -1.19  | 0.88      | 0.2369  |
| MAP4K2     | -1.20  | 0.22      | 0.0914  |
| TLR4       | -1.22  | 1.31      | 0.3172  |
| CD44       | -1.23  | 0.38      | 0.1217  |
| PIK3CD     | -1.24  | 1.07      | 0.2675  |
| CSF2RB     | -1.24  | 1.42      | 0.3327  |
| OSM        | -1.25  | 1.48      | 0.3419  |
| Gene       | fold change | log2 fold | q-value |
|------------|-------------|-----------|---------|
| FUT7       | -1.27       | -3.74     | 1.19    |
| RELB       | -1.28       | -2.84     | 0.29    |
| CREB5      | -1.28       | -3.54     | 0.98    |
| TNFRSF10C  | -1.28       | -3.57     | 1.00    |
| IL17RA     | -1.29       | -3.09     | 0.52    |
| TNFSF15    | -1.29       | -3.96     | 1.38    |
| CD14       | -1.30       | -3.34     | 0.74    |
| LIF        | -1.32       | -3.07     | 0.43    |
| CXCL3      | -1.32       | -3.09     | 0.45    |
| CLEC7A     | -1.32       | -3.46     | 0.81    |
| LTF        | -1.32       | -3.22     | 0.57    |
| BST1       | -1.33       | -3.11     | 0.45    |
| CXCR2      | -1.33       | -3.61     | 0.95    |
| ITGA5      | -1.35       | -3.64     | 0.95    |
| IFITM2     | -1.37       | -3.72     | 0.98    |
| TNFSF13B   | -1.37       | -3.58     | 0.83    |
| TFE3       | -1.39       | -2.85     | 0.07    |
| NCF4       | -1.41       | -4.15     | 1.33    |
| CFP        | -1.42       | -3.49     | 0.65    |
| IL1R2      | -1.43       | -3.82     | 0.96    |
| IL1RAP     | -1.43       | -3.32     | 0.45    |
| TNFSF14    | -1.45       | -4.13     | 1.22    |
| CEBPB      | -1.46       | -4.27     | 1.35    |
| MEFV       | -1.47       | -4.26     | 1.31    |
| ITGAX      | -1.50       | -4.16     | 1.16    |
| IFIT2      | -1.51       | -3.47     | 0.44    |
| MME        | -1.51       | -4.35     | 1.32    |
| IL6R       | -1.53       | -3.82     | 0.77    |
| LILRA5     | -1.53       | -3.89     | 0.83    |
| CYFIP2     | -1.54       | -3.51     | 0.42    |
| CD164      | -1.55       | -4.82     | 1.72    |
| PLAUR      | -1.55       | -4.38     | 1.28    |
| CXCL2      | -1.56       | -4.62     | 1.49    |
| IL8        | -1.63       | -4.73     | 1.48    |
| CASP1      | -1.64       | -3.74     | 0.46    |
| SELL       | -1.70       | -3.71     | 0.31    |
| Gene      | Log2FoldChange | p.Value | q.Value |
|-----------|---------------|---------|---------|
| TLR6      | -1.73         | 0.27    | 0.0848  |
| IL1B      | -1.77         | 0.76    | 0.1549  |
| FCGR2A    | -1.77         | 0.59    | 0.1296  |
| FCGR3A    | -2.11         | 1.09    | 0.1779  |
| IL18RAP   | -2.21         | 0.76    | 0.1323  |
| DMBT1     | 2.68          | 5.08    | 0.0312  |
| TARP      | 2.26          | 4.03    | 0.0156  |
| TNFRSF11A | 1.51          | 2.81    | 0.0260  |
| CEACAM1   | 1.35          | 2.57    | 0.0330  |
| TGFB2     | 1.31          | 2.50    | 0.0332  |
| CFB       | 1.31          | 2.61    | 0.0497  |
| CEACAM6   | 1.19          | 2.26    | 0.0303  |
| LGALS3    | 1.06          | 2.08    | 0.0417  |
| LCN2      | 1.06          | 2.10    | 0.0470  |
| CD24      | 0.92          | 1.82    | 0.0456  |
| IGF2R     | -1.48         | -0.04   | 0.0451  |
| FOS       | -1.95         | -0.41   | 0.0170  |
Supplementary Table S5. List of 30 additional genes added to PanCancer Immune Profiling panel.

| NCBI reference sequence | Official gene symbol | Gene name                                      |
|-------------------------|----------------------|------------------------------------------------|
| NM_021101.4             | CLDN1                | Claudin 1                                      |
| NM_001301025.1          | TJP1                 | tight junction protein 1                      |
| NM_001205254.1          | OCLN                 | Occludin                                       |
| NM_002016.1             | FLG                  | Filaggrin                                      |
| NM_005201.3             | CCR8                 | Chemokine (C-C motif) receptor 8               |
| NM_002619.3             | PF4                  | Platelet factor 4                              |
| NM_033035.4             | TSLP                 | Thymic stromal lymphopoietin                  |
| NM_000437.3             | PAFAH2               | platelet activating factor acetylhydrolase 2   |
| NM_00861.1              | HRH1                 | Histamine receptor H1                          |
| NM_001131055.1          | HRH2                 | Histamine receptor H2                          |
| NM_007232.2             | HRH3                 | Histamine receptor H3                          |
| NM_00143828.1           | HRH4                 | Histamine receptor H4                          |
| NM_000176.2             | NR3C1                | nuclear receptor subfamily 3 group C member 1  |
| NM_001168319.1          | EDN1                 | Endothelin 1                                   |
| NM_001302455.1          | EDN3                 | Endothelin 3                                   |
| NM_002935.2             | RNASE3               | ribonuclease A family member 3                 |
| NM_000625.4             | NOS2                 | nitric oxide synthase 2                        |
| NM_003182.2             | TAC1                 | tachykinin, precursor 1                        |
| NM_001015881.1          | TSC22D3              | TSC22 domain family member 3                   |
| NM_002228.3             | JUN                  | Jun proto-oncogene                              |
| NM_003064.3             | SLPI                 | secretory leukocyte peptidase inhibitor        |
| NM_001178130.2          | EGF                  | epidermal growth factor                        |
| NM_000962.3             | PTGS1                | prostaglandin-endoperoxide synthase 1          |
| NM_003357.4             | SCGB1A1              | secretogoglobin family 1A member 1             |
| NM_001282186.1          | CYSLTR1              | cysteiny1 leukotriene receptor 1                |
| NM_001308465.1          | CYSLTR2              | cysteiny1 leukotriene receptor 2               |
| NM_000698.2             | ALOX5                | arachidonate 5-lipoxygenase                    |
| NM_001282601.1          | PTGES2               | prostaglandin E synthase 2                     |
| NM_001143919.2          | LTBR4                | leukotriene B4 receptor                        |
| NM_001199640.1          | IL33                 | interleukin 33                                 |