## ADDITIONAL FILE 3.
Canonical pathways analysis performed for all genes (Ingenuity Canonical Pathways)

| Ingenuity Canonical Pathways                                                                 | -log(p-value) | Ratio  | Molecules                                      |
|---------------------------------------------------------------------------------------------|---------------|--------|------------------------------------------------|
| Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses                | 3.74E00       | 4.65E-02 | EIF2AK2, OAS1, IFIH1, OAS2, DDX58, RNASEL |
| Death Receptor Signaling                                                                    | 3.5E00        | 5.43E-02 | PARP12, NAIP, TNFSF10, PARP9, PARP14          |
| Retinoic acid Mediated Apoptosis Signaling                                                  | 3.34E00       | 7.14E-02 | PARP12, TNFSF10, PARP9, PARP14              |
| Activation of IRF by Cytosolic Pattern Recognition Receptors                                | 3.28E00       | 6.9E-02 | IFIH1, DDX58, ZBP1, IFIT2                    |
| Role of RIGI-like Receptors in Antiviral Innate Immunity                                    | 2.7E00        | 7.69E-02 | IFIH1, TRIM25, DDX58                        |
| Role of PKR in Interferon Induction and Antiviral Response                                 | 2.67E00       | 7.5E-02 | EIF2AK2, MAPK14, RNASEL                     |
| Salvage Pathways of Pyrimidine Ribonucleotides                                               | 2.5E00        | 4.26E-02 | EIF2AK2, APOBEC3B, UPP1, CMPK2              |
| UVA-Induced MAPK Signaling                                                                 | 2.34E00       | 3.85E-02 | PARP12, MAPK14, PARP9, PARP14              |
| Inflammamson pathway                                                                        | 2.1E00        | 9.52E-02 | NAIP, AIM2                                  |
| Role of JAK family kinases in IL-6-type Cytokine Signaling                                  | 1.95E00       | 0.08   | MAPK14, IL6R                                |
| Thiosulfate Disproportionation III (Rhodanese)                                              | 1.72E00       | 3.33E-01 | MOCS3                                       |
| Dopamine-DARPP32 Feedback in cAMP Signaling                                                 | 1.71E00       | 2.52E-02 | KCN12, PPP1R14A, CACNA1C, KCN1J5            |
| Interferon Signaling                                                                        | 1.7E00        | 5.88E-02 | OAS1, IFIT3                                 |
| Spermine and Spermidine Degradation I                                                       | 1.59E00       | 2.5E-01 | SAT1                                        |
| Molybdenum Cofactor Biosynthesis                                                           | 1.59E00       | 2.5E-01 | MOCS3                                       |
| Trehalose Degradation II (Trehalase)                                                        | 1.5E00        | 0.2    | HK3                                         |
| Protein Citrullination                                                                     | 1.5E00        | 0.2    | PADI2                                       |
| Galactose Degradation I (Leloir Pathway)                                                    | 1.5E00        | 0.2    | GALT                                         |
| Sucrose Degradation V (Mammalian)                                                           | 1.3E00        | 1.25E-01 | GALT                                        |
| Salvage Pathways of Pyrimidine Deoxyribonucleotides                                          | 1.3E00        | 1.25E-01 | APOBEC3B                                    |
| GDP-glucose Biosynthesis                                                                    | 1.3E00        | 1.25E-01 | HK3                                        |
| Glucose and Glucose-1-phosphate Degradation                                                | 1.25E00       | 1.1E-01 | HK3                                         |
| UDP-N-acetyl-D-galactosamine Biosynthesis II                                                 | 1.17E00       | 9.09E-02 | HK3                                         |
| Toll-like Receptor Signaling                                                                | 1.09E00       | 2.7E-02 | EIF2AK2, MAPK14                             |
| Telomere Extension by Telomerase                                                            | 1.04E00       | 6.67E-02 | POT1                                        |
| Granzyme B Signaling                                                                        | 1.01E00       | 6.25E-02 | LMNB1                                       |
| Parkinson's Signaling                                                                       | 1.01E00       | 6.25E-02 | MAPK14                                      |
| GPCR-Mediated Nutrient Sensing in Enteroendocrine Cells                                     | 9.85E-01      | 2.35E-02 | FFAR2, TAS1R3                               |
| PEDF Signaling                                                                              | 9.68E-01      | 2.3E-02 | MAPK14, TCF7                                |
| The Visual Cycle                                                                            | 9.39E-01      | 5.26E-02 | DHR9                                       |
| Putrescine Degradation III                                                                  | 9.39E-01      | 5.26E-02 | SAT1                                        |
| Acute Myeloid Leukemia Signaling                                                            | 9.36E-01      | 2.2E-02 | PML, CSF2RA                                 |
| RAR Activation                                                                              | 9.3E-01       | 1.61E-02 | PML, MAPK14, DHR9                           |
| Maturity Onset Diabetes of Young (MODY) Signaling                                            | 9.18E-01      | 0.05   | CACNA1C                                     |
| CDK5 Signaling                                                                              | 8.84E-01      | 2.04E-02 | PPP1R14A, MAPK14                            |
| Ingenuity Canonical Pathways                                      | -log(p-value) | Ratio     | Molecules                  |
|-----------------------------------------------------------------|--------------|-----------|---------------------------|
| Polyamine Regulation in Colon Cancer                            | 8.79E-01     | 4.55E-02  | SAT1                      |
| Pyrimidine Deoxyribonucleotides De Novo Biosynthesis I           | 8.61E-01     | 4.35E-02  | CMPK2                     |
| Antioxidant Action of Vitamin C                                  | 8.49E-01     | 1.94E-02  | MAPK14, CSF2RA             |
| IL-22 Signaling                                                 | 8.44E-01     | 4.17E-02  | MAPK14                    |
| IL-17A Signaling in Gastric Cells                                | 8.28E-01     | 0.04      | MAPK14                    |
| Amyotrophic Lateral Sclerosis Signaling                         | 8.04E-01     | 1.82E-02  | NAIP, CACNA1C              |
| p53 Signaling                                                   | 7.97E-01     | 1.8E-02   | PML, MAPK14                |
| TNFR2 Signaling                                                 | 7.69E-01     | 3.45E-02  | NAIP                      |
| Synaptic Long Term Potentiation                                 | 7.56E-01     | 1.69E-02  | PPP1R14A, CACNA1C          |
| Retinoate Biosynthesis I                                        | 7.42E-01     | 3.23E-02  | DHRS9                     |
| 4-1BB Signaling in T Lymphocytes                                | 7.3E-01      | 3.12E-02  | MAPK14                    |
| Inhibition of Angiogenesis by TSP1                              | 7.3E-01      | 3.12E-02  | MAPK14                    |
| Ethanol Degradation II                                          | 7.3E-01      | 3.12E-02  | DHRS9                     |
| Cardiac Hypertrophy Signaling                                   | 7.28E-01     | 1.29E-02  | MAPK14, IL6R, CACNA1C      |
| TWEAK Signaling                                                 | 7.06E-01     | 2.94E-02  | NAIP                      |
| IL-6 Signaling                                                  | 7.02E-01     | 1.56E-02  | MAPK14, IL6R              |
| IL-17A Signaling in Fibroblasts                                 | 6.95E-01     | 2.86E-02  | MAPK14                    |
| Noradrenaline and Adrenaline Degradation                        | 6.95E-01     | 2.86E-02  | DHRS9                     |
| Retinol Biosynthesis                                            | 6.84E-01     | 2.78E-02  | DHRS9                     |
| Cardiac β-adrenergic Signaling                                  | 6.63E-01     | 1.47E-02  | PPP1R14A, CACNA1C          |
| Insulin Receptor Signaling                                      | 6.63E-01     | 1.47E-02  | GRB10, PPP1R14A            |
| April Mediated Signaling                                        | 6.53E-01     | 2.56E-02  | MAPK14                    |
| B Cell Activating Factor Signaling                              | 6.34E-01     | 2.44E-02  | MAPK14                    |
| Mechanisms of Viral Exit from Host Cells                        | 6.34E-01     | 2.44E-02  | LMNB1                     |
| Pyrimidine Ribonucleotides Interconversion                     | 6.34E-01     | 2.44E-02  | CMPK2                     |
| Pyrimidine Ribonucleotides De Novo Biosynthesis                | 6.16E-01     | 2.33E-02  | CMPK2                     |
| UVC-Induced MAPK Signaling                                      | 6.16E-01     | 2.33E-02  | MAPK14                    |
| iNOS Signaling                                                  | 6.07E-01     | 2.27E-02  | MAPK14                    |
| Role of Oct4 in Mammalian Embryonic Stem Cell Pluripotency      | 5.99E-01     | 2.22E-02  | TDRD7                     |
| TNFR1 Signaling                                                 | 5.75E-01     | 2.08E-02  | NAIP                      |
| Amyloid Processing                                              | 5.6E-01      | 0.02      | MAPK14                    |
| Semaphorin Signaling in Neurons                                 | 5.45E-01     | 1.92E-02  | SEMA4D                    |
| PPARα/RXRα Activation                                           | 5.33E-01     | 1.19E-02  | MAPK14, HELZ2              |
| Acute Phase Response Signaling                                  | 5.33E-01     | 1.19E-02  | MAPK14, IL6R               |
| Unfolded protein response                                       | 5.32E-01     | 1.85E-02  | HSPA6                     |
| Serotonin Degradation                                           | 5.12E-01     | 1.75E-02  | DHRS9                     |
| Induction of Apoptosis by HIV1                                  | 4.94E-01     | 1.67E-02  | NAIP                      |
| CCR5 Signaling in Macrophages                                   | 4.88E-01     | 1.64E-02  | MAPK14                    |
| Ingenuity Canonical Pathways                                                                 | -log(p-value) | Ratio     | Molecules                      |
|-------------------------------------------------------------------------------------------|---------------|-----------|-------------------------------|
| T Helper Cell Differentiation                                                              | 4.71E-01      | 1.56E-02  | IL6R                          |
| Pyridoxal 5'-phosphate Salvage Pathway                                                     | 4.71E-01      | 1.56E-02  | EIF2AK2                       |
| UVB-Induced MAPK Signaling                                                                  | 4.65E-01      | 1.54E-02  | MAPK14                        |
| Production of Nitric Oxide and Reactive Oxygen Species in Macrophages                      | 4.56E-01      | 1.04E-02  | PPP1R14A, MAPK14              |
| Lymphotixin β Receptor Signaling                                                           | 4.55E-01      | 1.49E-02  | TNFSF14                       |
| Chemokine Signaling                                                                        | 4.55E-01      | 1.49E-02  | MAPK14                        |
| EGF Signaling                                                                              | 4.5E-01       | 1.47E-02  | MAPK14                        |
| IL-10 Signaling                                                                            | 4.45E-01      | 1.45E-02  | MAPK14                        |
| Role of MAPK Signaling in the Pathogenesis of Influenza                                    | 4.45E-01      | 1.45E-02  | MAPK14                        |
| Role of IL-17A in Arthritis                                                                | 4.45E-01      | 1.45E-02  | MAPK14                        |
| GM-CSF Signaling                                                                            | 4.25E-01      | 1.37E-02  | CSF2RA                        |
| STAT3 Pathway                                                                              | 4.21E-01      | 1.35E-02  | MAPK14                        |
| BMP Signaling Pathway                                                                       | 4.21E-01      | 1.35E-02  | MAPK14                        |
| IL-15 Signaling                                                                             | 4.12E-01      | 1.32E-02  | MAPK14                        |
| Dopamine Receptor Signaling                                                                 | 4.12E-01      | 1.32E-02  | PPP1R14A                      |
| CD40 Signaling                                                                              | 4.03E-01      | 1.28E-02  | MAPK14                        |
| IL-17A Signaling in Airway Cells                                                           | 4.03E-01      | 1.28E-02  | MAPK14                        |
| ATM Signaling                                                                              | 3.99E-01      | 1.27E-02  | MAPK14                        |
| Macropinocytosis Signaling                                                                  | 3.9E-01       | 1.23E-02  | ANKFY1                        |
| FLT3 Signaling in Hematopoietic Progenitor Cells                                           | 3.86E-01      | 1.22E-02  | MAPK14                        |
| Prolactin Signaling                                                                        | 3.82E-01      | 1.2E-02   | TCF7                          |
| IL-17 Signaling                                                                             | 3.75E-01      | 1.18E-02  | MAPK14                        |
| Crosstalk between Dendritic Cells and Natural Killer Cells                                  | 3.75E-01      | 1.18E-02  | TNFSF10                       |
| HIPPO Signaling                                                                             | 3.71E-01      | 1.16E-02  | PPP1R14A                      |
| NF-xB Activation by Viruses                                                                | 3.67E-01      | 1.15E-02  | EIF2AK2                       |
| TGF-β Signaling                                                                             | 3.67E-01      | 1.15E-02  | MAPK14                        |
| Role of Osteoblasts, Osteoclasts and Chondrocytes in Rheumatoid Arthritis                  | 3.65E-01      | 8.77E-03  | NAIP, MAPK14                  |
| Factors Promoting Cardiogenesis in Vertebrates                                             | 3.6E-01       | 1.12E-02  | MAPK14                        |
| Apoptosis Signaling                                                                         | 3.6E-01       | 1.12E-02  | NAIP                          |
| FGF Signaling                                                                              | 3.56E-01      | 1.11E-02  | MAPK14                        |
| PDGF Signaling                                                                              | 3.56E-01      | 1.11E-02  | MAPK14                        |
| IL-1 Signaling                                                                              | 3.49E-01      | 1.09E-02  | MAPK14                        |
| Sumoylation Pathway                                                                         | 3.39E-01      | 1.05E-02  | PML                           |
| ErbB Signaling                                                                              | 3.32E-01      | 1.03E-02  | MAPK14                        |
| TR/RXR Activation                                                                          | 3.29E-01      | 1.02E-02  | UCP3                          |
| Cholecystokinin/Gastrin-mediated Signaling                                                 | 3.23E-01      | 0.01      | MAPK14                        |
| RANK Signaling in Osteoclasts                                                               | 3.23E-01      | 0.01      | MAPK14                        |
| Ingenuity Canonical Pathways                                      | -log(p-value) | Ratio   | Molecules       |
|-----------------------------------------------------------------|---------------|---------|-----------------|
| Type I Diabetes Mellitus Signaling                              | 3.17E-01      | 9.8E-03 | MAPK14          |
| Mouse Embryonic Stem Cell Pluripotency                         | 3.08E-01      | 9.52E-03| MAPK14          |
| IGF-1 Signaling                                                 | 3.08E-01      | 9.52E-03| GRB10           |
| Corticotropin Releasing Hormone Signaling                      | 3.05E-01      | 9.43E-03| MAPK14          |
| Telomerase Signaling                                           | 2.99E-01      | 9.26E-03| POT1            |
| Nitric Oxide Signaling in the Cardiovascular System            | 2.99E-01      | 9.26E-03| CACNA1C         |
| Paxillin Signaling                                              | 2.94E-01      | 9.09E-03| MAPK14          |
| p38 MAPK Signaling                                             | 2.81E-01      | 8.7E-03 | MAPK14          |
| HIF1α Signaling                                                 | 2.78E-01      | 8.62E-03| MAPK14          |
| Natural Killer Cell Signaling                                  | 2.76E-01      | 8.55E-03| KLRB1           |
| Fc Epsilon RI Signaling                                        | 2.73E-01      | 8.47E-03| MAPK14          |
| Role of Tissue Factor in Cancer                                 | 2.68E-01      | 8.33E-03| MAPK14          |
| Glucocorticoid Receptor Signaling                              | 2.67E-01      | 7.12E-03| MAPK14, HSPA6   |
| Renin-Angiotensin Signaling                                    | 2.66E-01      | 8.26E-03| MAPK14          |
| Gustation Pathway                                               | 2.66E-01      | 8.26E-03| TAS1R3          |
| Atherosclerosis Signaling                                       | 2.63E-01      | 8.2E-03 | TNFSF14         |
| Cdc42 Signaling                                                 | 2.61E-01      | 8.13E-03| MAPK14          |
| Th1 Pathway                                                     | 2.61E-01      | 8.13E-03| IL6R            |
| CCR3 Signaling in Eosinophils                                   | 2.57E-01      | 0.008   | MAPK14          |
| Cellular Effects of Sildenafil (Viagra)                         | 2.54E-01      | 7.94E-03| CACNA1C         |
| GNRH Signaling                                                  | 2.52E-01      | 7.87E-03| MAPK14          |
| Adipogenesis pathway                                           | 2.52E-01      | 7.87E-03| TCF7            |
| Role of Macrophages, Fibroblasts and Endothelial Cells in Rheumatoid Arthritis | 2.44E-01 | 6.73E-03 | MAPK14, IL6R |
| HMGB1 Signaling                                                 | 2.43E-01      | 7.63E-03| MAPK14          |
| Phagosome Maturation                                           | 2.35E-01      | 7.41E-03| DYNLT1          |
| D-myoinositol (1,4,5,6)-Tetakisphosphate Biosynthesis           | 2.31E-01      | 7.3E-03 | PPP1R14A       |
| D-myoinositol (3,4,5,6)-tetakisphosphate Biosynthesis           | 2.31E-01      | 7.3E-03 | PPP1R14A       |
| IL-12 Signaling and Production in Macrophages                  | 2.25E-01      | 7.14E-03| MAPK14          |
| Regulation of eIF4 and p70S6K Signaling                        | 2.05E-01      | 6.62E-03| MAPK14          |
| 3-phosphoinositide Degradation                                  | 2.05E-01      | 6.62E-03| PPP1R14A       |
| D-myoinositol-5-phosphate Metabolism                            | 1.99E-01      | 6.45E-03| PPP1R14A       |