

Supplementary Table S2.

Ingenuity Canonical Pathways	-log(p-value)	p-value	z-score
Cardiac Hypertrophy Signaling	12.6	2.51E-13	1.195
CCR3 Signaling in Eosinophils	11.2	6.31E-12	1.183
Colorectal Cancer Metastasis Signaling	10.7	2E-11	2.425
Cardiac Hypertrophy Signaling (Enhanced)	10.3	5.01E-11	1.237
Pulmonary Fibrosis Idiopathic Signaling Pathway	10.3	5.01E-11	3.637
Opioid Signaling Pathway	10.1	7.94E-11	-0.465
Hepatic Fibrosis Signaling Pathway	10.1	7.94E-11	2.44
Senescence Pathway	9.72	1.91E-10	-1
Glioblastoma Multiforme Signaling	9.49	3.24E-10	1.697
MYC Mediated Apoptosis Signaling	9.31	4.9E-10	1.732
G-Protein Coupled Receptor Signaling	9.26	5.5E-10	1.436
CREB Signaling in Neurons	9.1	7.94E-10	2.629
Epithelial Adherens Junction Signaling	8.98	1.05E-09	0.927
Glioma Signaling	8.5	3.16E-09	1.134
Role of NFAT in Cardiac Hypertrophy	8.45	3.55E-09	0.762
Endocannabinoid Developing Neuron Pathway	8.45	3.55E-09	0.949
Neuroinflammation Signaling Pathway	8.33	4.68E-09	1.565
GNRH Signaling	8.32	4.79E-09	0.566
Endocannabinoid Cancer Inhibition Pathway	8.2	6.31E-09	-0.849
ERBB Signaling	8.14	7.24E-09	0.493
PEDF Signaling	8.07	8.51E-09	0.845
IL-8 Signaling	7.92	1.2E-08	2.252
CLEAR Signaling Pathway	7.88	1.32E-08	-2.182

Cholecystokinin/Gastrin-mediated Signaling	7.7	2E-08	0.156
NGF Signaling	7.66	2.19E-08	0.617
Ovarian Cancer Signaling	7.26	5.5E-08	1
Pancreatic Adenocarcinoma Signaling	7.12	7.59E-08	0.898
Pulmonary Healing Signaling Pathway	7.01	9.77E-08	2.032
Breast Cancer Regulation by Stathmin1	6.93	1.17E-07	1.781
Tumor Microenvironment Pathway	6.86	1.38E-07	0.927
CXCR4 Signaling	6.85	1.41E-07	1.809
FAK Signaling	6.85	1.41E-07	2.49
p38 MAPK Signaling	6.84	1.45E-07	0.48
Acute Myeloid Leukemia Signaling	6.8	1.58E-07	0.365
Endothelin-1 Signaling	6.78	1.66E-07	1.069
Factors Promoting Cardiogenesis in Vertebrates	6.73	1.86E-07	2.263
Oxytocin In Brain Signaling Pathway	6.6	2.51E-07	0.651
PTEN Signaling	6.52	3.02E-07	-0.617
Regulation Of The Epithelial Mesenchymal Transition By Growth Factors Pathway	6.52	3.02E-07	0.272
Thrombin Signaling	6.48	3.31E-07	0.42
Apoptosis Signaling	6.44	3.63E-07	0.493
Renal Cell Carcinoma Signaling	6.34	4.57E-07	0.626
Oxytocin Signaling Pathway	6.31	4.9E-07	0.798
ERK/MAPK Signaling	6.31	4.9E-07	1.483
SAPK/JNK Signaling	6.26	5.5E-07	1.333
Non-Small Cell Lung Cancer Signaling	6.24	5.75E-07	1.043
14-3-3-mediated Signaling	6.22	6.03E-07	0.667
Gαq Signaling	6.16	6.92E-07	1.809
CDK5 Signaling	6.14	7.24E-07	0.667
Role Of Osteoclasts In Rheumatoid Arthritis Signaling Pathway	6.12	7.59E-07	2.621

LPS-stimulated MAPK Signaling	6.08	8.32E-07	1.616
Inhibition of Angiogenesis by TSP1	5.95	1.12E-06	1.807
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	5.92	1.2E-06	0.412
Endometrial Cancer Signaling	5.92	1.2E-06	1.606
Melanoma Signaling	5.9	1.26E-06	0.655
Renin-Angiotensin Signaling	5.89	1.29E-06	0.845
STAT3 Pathway	5.78	1.66E-06	1.808
TGF- β Signaling	5.75	1.78E-06	1.347
Systemic Lupus Erythematosus In T Cell Signaling Pathway	5.72	1.91E-06	0.75
G α i Signaling	5.58	2.63E-06	0.507
B Cell Receptor Signaling	5.47	3.39E-06	-0.412
ERB2-ERBB3 Signaling	5.43	3.72E-06	0.6
Small Cell Lung Cancer Signaling	5.38	4.17E-06	0.471
CDX Gastrointestinal Cancer Signaling Pathway	5.38	4.17E-06	1.313
Cell Cycle: G1/S Checkpoint Regulation	5.37	4.27E-06	-2.294
HGF Signaling	5.37	4.27E-06	1.298
PDGF Signaling	5.31	4.9E-06	1.616
P2Y Purigenic Receptor Signaling Pathway	5.27	5.37E-06	0.667
Role of NANOG in Mammalian Embryonic Stem Cell Pluripotency	5.25	5.62E-06	0.655
ID1 Signaling Pathway	5.15	7.08E-06	-0.263
Mouse Embryonic Stem Cell Pluripotency	5.14	7.24E-06	0.686
Thyroid Cancer Signaling	5.14	7.24E-06	1.671
T Cell Exhaustion Signaling Pathway	5.03	9.33E-06	-0.174
Reelin Signaling in Neurons	5	0.00001	0.617
FLT3 Signaling in Hematopoietic Progenitor Cells	4.98	1.05E-05	0.557
p70S6K Signaling	4.97	1.07E-05	0.649
Fc Epsilon RI Signaling	4.93	1.17E-05	1.521

Phagosome Formation	4.91	1.23E-05	2.959
IL-3 Signaling	4.88	1.32E-05	1.134
Endocannabinoid Neuronal Synapse Pathway	4.86	1.38E-05	-0.156
IGF-1 Signaling	4.82	1.51E-05	0.928
Integrin Signaling	4.81	1.55E-05	1.483
Dopamine-DARPP32 Feedback in cAMP Signaling	4.78	1.66E-05	-1.265
Angiopoietin Signaling	4.78	1.66E-05	-0.218
Neurotrophin/TRK Signaling	4.78	1.66E-05	0.408
Macropinocytosis Signaling	4.78	1.66E-05	2.236
Chemokine Signaling	4.78	1.66E-05	2.502
WNT/ β -catenin Signaling	4.7	2E-05	1.508
MicroRNA Biogenesis Signaling Pathway	4.65	2.24E-05	1.54
BMP signaling pathway	4.62	2.4E-05	1.134
Synaptogenesis Signaling Pathway	4.61	2.45E-05	-0.465
Ceramide Signaling	4.61	2.45E-05	0.186
Necroptosis Signaling Pathway	4.56	2.75E-05	0.302
Natural Killer Cell Signaling	4.55	2.82E-05	-0.849
HMGB1 Signaling	4.55	2.82E-05	0.949
Sphingosine-1-phosphate Signaling	4.53	2.95E-05	0.174
Systemic Lupus Erythematosus In B Cell Signaling Pathway	4.5	3.16E-05	-0.12
G Beta Gamma Signaling	4.48	3.31E-05	0.973
GM-CSF Signaling	4.44	3.63E-05	0.853
AMPK Signaling	4.42	3.8E-05	-0.309
TEC Kinase Signaling	4.42	3.8E-05	0.686
BEX2 Signaling Pathway	4.41	3.89E-05	0.192
Semaphorin Neuronal Repulsive Signaling Pathway	4.39	4.07E-05	-1.067
FGF Signaling	4.39	4.07E-05	0.73

HIF1 α Signaling	4.37	4.27E-05	1.483
Agrin Interactions at Neuromuscular Junction	4.34	4.57E-05	-0.426
IL-7 Signaling Pathway	4.32	4.79E-05	0.218
GDNF Family Ligand-Receptor Interactions	4.3	5.01E-05	1.633
UVA-Induced MAPK Signaling	4.29	5.13E-05	0.471
VEGF Family Ligand-Receptor Interactions	4.29	5.13E-05	1.347
Cyclins and Cell Cycle Regulation	4.28	5.25E-05	0.853
Actin Nucleation by ARP-WASP Complex	4.28	5.25E-05	2.711
PCP (Planar Cell Polarity) Pathway	4.27	5.37E-05	2.132
PI3K/AKT Signaling	4.2	6.31E-05	0.156
IL-1 Signaling	4.19	6.46E-05	0.243
Protein Kinase A Signaling	4.14	7.24E-05	0.226
PAK Signaling	4.14	7.24E-05	0.898
Synaptic Long Term Potentiation	4.11	7.76E-05	-0.649
Role of MAPK Signaling in Promoting the Pathogenesis of Influenza	4.11	7.76E-05	1.567
IL-13 Signaling Pathway	4.09	8.13E-05	0.354
IL-17 Signaling	4.06	8.71E-05	-0.295
PKC θ Signaling in T Lymphocytes	4.03	9.33E-05	0.169
mTOR Signaling	4.01	9.77E-05	3.042
Huntington's Disease Signaling	3.97	0.000107	0.457
Insulin Secretion Signaling Pathway	3.95	0.000112	-1.069
fMLP Signaling in Neutrophils	3.95	0.000112	1.616
Bladder Cancer Signaling	3.94	0.000115	1.291
Estrogen-mediated S-phase Entry	3.93	0.000117	1.941
Cell Cycle Regulation by BTG Family Proteins	3.92	0.00012	0.632
Telomerase Signaling	3.91	0.000123	0.408
GADD45 Signaling	3.9	0.000126	0.426

HER-2 Signaling in Breast Cancer	3.9	0.000126	0.802
Synaptic Long Term Depression	3.81	0.000155	0.866
Acute Phase Response Signaling	3.8	0.000158	-0.457
EGF Signaling	3.8	0.000158	1.091
Wound Healing Signaling Pathway	3.8	0.000158	1.408
Melanocyte Development and Pigmentation Signaling	3.79	0.000162	0.756
Xenobiotic Metabolism General Signaling Pathway	3.77	0.00017	1.093
Autophagy	3.74	0.000182	-1.336
ERK5 Signaling	3.74	0.000182	0.408
Paxillin Signaling	3.73	0.000186	0.557
IL-17A Signaling in Airway Cells	3.64	0.000229	0.853
UVB-Induced MAPK Signaling	3.59	0.000257	1.606
Signaling by Rho Family GTPases	3.56	0.000275	0.566
cAMP-mediated signaling	3.56	0.000275	0.674
Role of MAPK Signaling in Inhibiting the Pathogenesis of Influenza	3.53	0.000295	1.043
Gα12/13 Signaling	3.53	0.000295	1.151
NF-κB Activation by Viruses	3.53	0.000295	1.4
Glioma Invasiveness Signaling	3.53	0.000295	1.964
Amyotrophic Lateral Sclerosis Signaling	3.5	0.000316	0.2
Cardiac β-adrenergic Signaling	3.48	0.000331	1.46
Polyamine Regulation in Colon Cancer	3.43	0.000372	0.655
Estrogen Receptor Signaling	3.42	0.00038	0.113
Induction of Apoptosis by HIV1	3.42	0.00038	1.279
Sumoylation Pathway	3.41	0.000389	0.6
3-phosphoinositide Biosynthesis	3.39	0.000407	1.809
α-Adrenergic Signaling	3.37	0.000427	1.807
ILK Signaling	3.34	0.000457	0.152

Neuregulin Signaling	3.34	0.000457	0.557
Corticotropin Releasing Hormone Signaling	3.34	0.000457	0.822
CNTF Signaling	3.32	0.000479	0.688
Ephrin B Signaling	3.32	0.000479	1.213
RHO GDI Signaling	3.3	0.000501	-1.265
Apelin Muscle Signaling Pathway	3.23	0.000589	-1.134
Regulation of IL-2 Expression in Activated and Anergic T Lymphocytes	3.21	0.000617	-0.186
Role Of Osteoblasts In Rheumatoid Arthritis Signaling Pathway	3.2	0.000631	-2.889
ERBB4 Signaling	3.2	0.000631	0.447
RANK Signaling in Osteoclasts	3.19	0.000646	0.756
Superpathway of Inositol Phosphate Compounds	3.15	0.000708	1
Amyloid Processing	3.1	0.000794	-0.333
Insulin Receptor Signaling	3.1	0.000794	0.822
Adrenomedullin signaling pathway	3.05	0.000891	-0.146
CCR5 Signaling in Macrophages	3.02	0.000955	1.732
D-myo-inositol (1,4,5,6)-Tetrakisphosphate Biosynthesis	3.02	0.000955	1.808
D-myo-inositol (3,4,5,6)-tetrakisphosphate Biosynthesis	3.02	0.000955	1.808
UVC-Induced MAPK Signaling	2.98	0.001047	2.183
VEGF Signaling	2.97	0.001072	0.784
Actin Cytoskeleton Signaling	2.95	0.001122	1.043
HOTAIR Regulatory Pathway	2.95	0.001122	1.406
Role of NFAT in Regulation of the Immune Response	2.94	0.001148	-0.632
Sperm Motility	2.93	0.001175	0.784
Gas Signaling	2.93	0.001175	0.816
D-myo-inositol-5-phosphate Metabolism	2.91	0.00123	1.265
Role of p14/p19ARF in Tumor Suppression	2.9	0.001259	-0.302
IL-15 Signaling	2.87	0.001349	0.6

PI3K Signaling in B Lymphocytes	2.84	0.001445	-1.029
Prolactin Signaling	2.83	0.001479	0.853
Erythropoietin Signaling Pathway	2.83	0.001479	1.809
RAC Signaling	2.81	0.001549	1.219
Glutamate Receptor Signaling	2.79	0.001622	-0.447
Pyridoxal 5'-phosphate Salvage Pathway	2.79	0.001622	-0.229
CD27 Signaling in Lymphocytes	2.76	0.001738	-0.229
Death Receptor Signaling	2.75	0.001778	0.962
Coronavirus Pathogenesis Pathway	2.73	0.001862	1.043
Leptin Signaling in Obesity	2.65	0.002239	0.577
GPCR-Mediated Nutrient Sensing in Enteroendocrine Cells	2.63	0.002344	-0.365
DNA Methylation and Transcriptional Repression Signaling	2.63	0.002344	0.626
GPCR-Mediated Integration of Enteroendocrine Signaling Exemplified by an L Cell	2.62	0.002399	1.606
Th2 Pathway	2.6	0.002512	1.414
Thrombopoietin Signaling	2.58	0.00263	1.147
Apelin Adipocyte Signaling Pathway	2.57	0.002692	-1.043
MSP-RON Signaling In Cancer Cells Pathway	2.53	0.002951	0.333
Melatonin Signaling	2.51	0.00309	-0.218
NF-κB Signaling	2.51	0.00309	0.762
Pathogen Induced Cytokine Storm Signaling Pathway	2.48	0.003311	1.434
ICOS-ICOSL Signaling in T Helper Cells	2.46	0.003467	-0.962
RHOA Signaling	2.44	0.003631	1.257
PD-1, PD-L1 cancer immunotherapy pathway	2.42	0.003802	-0.853
Phospholipase C Signaling	2.41	0.00389	1.18
VDR/RXR Activation	2.4	0.003981	0.5
Nitric Oxide Signaling in the Cardiovascular System	2.4	0.003981	1.043
CTLA4 Signaling in Cytotoxic T Lymphocytes	2.39	0.004074	-0.59

Type I Diabetes Mellitus Signaling	2.39	0.004074	0.408
3-phosphoinositide Degradation	2.39	0.004074	1.808
FcγRIIB Signaling in B Lymphocytes	2.36	0.004365	0.775
Estrogen-Dependent Breast Cancer Signaling	2.33	0.004677	0.894
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	2.32	0.004786	-0.894
PPARα/RXRα Activation	2.25	0.005623	-0.649
Aryl Hydrocarbon Receptor Signaling	2.22	0.006026	0.186
Regulation of Actin-based Motility by Rho	2.2	0.00631	1.4
Neuropathic Pain Signaling In Dorsal Horn Neurons	2.19	0.006457	-0.577
SPINK1 General Cancer Pathway	2.16	0.006918	0.5
Role Of Chondrocytes In Rheumatoid Arthritis Signaling Pathway	2.15	0.007079	-0.507
Neurovascular Coupling Signaling Pathway	2.14	0.007244	0.566
Cell Cycle: G2/M DNA Damage Checkpoint Regulation	2.13	0.007413	1.604
Role of WNT/GSK-3β Signaling in the Pathogenesis of Influenza	2.13	0.007413	1.897
PFKFB4 Signaling Pathway	2.12	0.007586	-1.604
Relaxin Signaling	2.12	0.007586	1.279
Basal Cell Carcinoma Signaling	2.08	0.008318	0.832
Osteoarthritis Pathway	2.02	0.00955	1.043
Regulation of eIF4 and p70S6K Signaling	2.01	0.009772	0.655
Tumoricidal Function of Hepatic Natural Killer Cells	1.99	0.010233	0.378
MSP-RON Signaling In Macrophages Pathway	1.99	0.010233	0.378
Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses	1.95	0.01122	-0.426
Netrin Signaling	1.93	0.011749	-1.342
CD28 Signaling in T Helper Cells	1.91	0.012303	0.756
Toll-like Receptor Signaling	1.9	0.012589	-1.291
Antiproliferative Role of Somatostatin Receptor 2	1.9	0.012589	1.291
PPAR Signaling	1.89	0.012882	0.784

IL-22 Signaling	1.86	0.013804	0.333
nNOS Signaling in Neurons	1.82	0.015136	-0.378
ATM Signaling	1.81	0.015488	1.279
Oncostatin M Signaling	1.79	0.016218	-0.577
4-1BB Signaling in T Lymphocytes	1.75	0.017783	0.905
Apelin Liver Signaling Pathway	1.74	0.018197	1.667
Role of CHK Proteins in Cell Cycle Checkpoint Control	1.72	0.019055	0.277
Dendritic Cell Maturation	1.71	0.019498	-0.973
T Cell Receptor Signaling	1.71	0.019498	0.149
Fcγ Receptor-mediated Phagocytosis in Macrophages and Monocytes	1.71	0.019498	1.225
Antioxidant Action of Vitamin C	1.69	0.020417	-0.218
Type II Diabetes Mellitus Signaling	1.68	0.020893	0.408
Androgen Signaling	1.67	0.02138	0.688
GP6 Signaling Pathway	1.66	0.021878	3.157
Antiproliferative Role of TOB in T Cell Signaling	1.65	0.022387	-0.905
SNARE Signaling Pathway	1.65	0.022387	0.18
White Adipose Tissue Browning Pathway	1.56	0.027542	0.707
Lymphotoxin β Receptor Signaling	1.54	0.02884	0.535
Pyroptosis Signaling Pathway	1.53	0.029512	-0.655
Growth Hormone Signaling	1.53	0.029512	1
Apelin Cardiac Fibroblast Signaling Pathway	1.5	0.031623	-1.414
MIF Regulation of Innate Immunity	1.5	0.031623	0.577
NRF2-mediated Oxidative Stress Response	1.49	0.032359	0.898
Regulation of Cellular Mechanics by Calpain Protease	1.47	0.033884	-0.535
Apelin Pancreas Signaling Pathway	1.46	0.034674	-0.832
Dermatan Sulfate Biosynthesis	1.43	0.037154	0.535
eNOS Signaling	1.43	0.037154	1.3

Dermatan Sulfate Biosynthesis (Late Stages)	1.39	0.040738	0.302
Heparan Sulfate Biosynthesis	1.39	0.040738	0.688
IL-17A Signaling in Gastric Cells	1.39	0.040738	0.816
Inhibition of ARE-Mediated mRNA Degradation Pathway	1.36	0.043652	0.354
CD40 Signaling	1.31	0.048978	1
Activation of IRF by Cytosolic Pattern Recognition Receptors	1.3	0.050119	-0.535