Electronic Supplementary information

The network pharmacology and RNA sequencing studies on Triterpenoid saponins from *Bupleurum Chinese* for the treatment of breast cancer

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Figure S1 $^{13}$C-NMR spectrum (100 MHz, pyridine-$d_5$) of saikosaponin-d

Figure S2 HR-ESI-MS spectrum of saikosaponin-d
| Number | Name          | Structure |
|--------|---------------|-----------|
| 1      | saikogenin F  | ![Structure](image1) |
| 2      | saikogenin G  | ![Structure](image2) |
| 3      | prosaikogenin G | ![Structure](image3) |
| 4      | prosaikogenin F | ![Structure](image4) |
| 5      | saikosaponin-a | ![Structure](image5) |
|   | Formula |
|---|---------|
| 6 | 2''-O-acetylsaikosaponin-a |
| 7 | 3''-O-acetylsaikosaponin-a |
| 8 | 4''-O-acetylsaikosaponin-a |
| 9 | 6''-O-acetylsaikosaponin-a |
| 10| 23-O-acetylsaikosaponin-a |
|   | Name                        | Structure |
|---|-----------------------------|-----------|
| 11| 2'', 3''-O-diacetylsaikosaponin-a | ![Structure](image1.png) |
| 12| 3'', 4''-O-diacetylsaikosaponin-a | ![Structure](image2.png) |
| 13| 3'', 6''-O-diacetylsaikosaponin-a | ![Structure](image3.png) |
| 14| saikosaponin-d               | ![Structure](image4.png) |
|   | Structural Formula | Description                        |
|---|-------------------|------------------------------------|
| 15 | ![Structure](image1.png) | 2''-O-acetylsaikosaponin-d          |
| 16 | ![Structure](image2.png) | 3''-O-acetylsaikosaponin-d          |
| 17 | ![Structure](image3.png) | 6''-O-acetylsaikosaponin-d          |
| 18 | ![Structure](image4.png) | 2'',3''-O-diacetylsaikosaponin-d    |
| 19 | ![Structure](image5.png) | 3'',4''-O-diacetylsaikosaponin-d    |
| No. | Compound                                      | Structure |
|-----|-----------------------------------------------|-----------|
| 20  | 3''-6''-O-diacetylsaikosaponin-d              | ![Structure](image1.png) |
| 21  | 4''-6''-O-diacetylsaikosaponin-d              | ![Structure](image2.png) |
| 22  | saikosaponins-e                               | ![Structure](image3.png) |
| 23  | 3''-O-acetylsaikosaponin-e                    | ![Structure](image4.png) |
| 24  | 6''-O-acetylsaikosaponin-e                    | ![Structure](image5.png) |
|   | Chemical Structure | Description |
|---|-------------------|-------------|
| 25 | ![23-hydroxy-13β, 28β-epoxy-olean-11-ene-16-one 3-O-β-D-glucopyranosyl-(1→3)-β-D-fucopyranoside](image) | 23-hydroxy-13β, 28β-epoxy-olean-11-ene-16-one 3-O-β-D-glucopyranosyl-(1→3)-β-D-fucopyranoside |
| 26 | ![saikosaponin-c](image) | saikosaponin-c |
| 27 | ![rotundioside F](image) | rotundioside F |
| 28 | ![saikosaponin-i](image) | saikosaponin-i |
| 29 | ![bupleurosides I](image) | bupleurosides I |
|   |   |   |
|---|---|---|
| 30 | saikosaponin-b$_3$ | ![Saikosaponin-b$_3$](image) |
| 31 | 6″-O-acetylsaikosaponin-b$_3$ | ![6″-O-acetylsaikosaponin-b$_3$](image) |
| 32 | saikosaponin-b$_4$ | ![Saikosaponin-b$_4$](image) |
| 33 | 3″, 4″-diacetylsaikosaponin-b$_4$ | ![3″, 4″-diacetylsaikosaponin-b$_4$](image) |
| 34 | saikosaponin-w | ![Saikosaponin-w](image) |
|   | Compound               | Structure |
|---|------------------------|-----------|
| 41| saikosaponin-g         | ![Structure](image1) |
| 42| prosaikogenin H        | ![Structure](image2) |
| 43| saikogenin D           | ![Structure](image3) |
| 44| saikogenin A           | ![Structure](image4) |
| 45| prosaikogenin D        | ![Structure](image5) |
| 46| prosaikogenin A        | ![Structure](image6) |
47. saikosaponin-b₁

48. 6"-O-acetylsaikosaponin-b₁

49. saikosaponin-b₂

50. 2"-O-acetylsaikosaponin-b₂

51. 3"-O-acetylsaikosaponin-b₂
|   |   |   |
|---|---|---|
| 52 | 21β-hydroxy saikosaponin-b<sub>2</sub> | ![Structure 1](image1.png) |
| 53 | 3″,6″-O-acetylsaikosaponin-b<sub>2</sub> | ![Structure 2](image2.png) |
| 54 | saikosaponin-h | ![Structure 3](image3.png) |
| 55 | saikosaponin-k | ![Structure 4](image4.png) |
| 56 | saikosaponin-l | ![Structure 5](image5.png) |
|   | Name                        | Structure       |
|---|-----------------------------|-----------------|
| 57| saikosaponin-m              | ![Saikosaponin-m](image) |
| 58| saikosaponin-s              | ![Saikosaponin-s](image) |
| 59| saikosaponin-v              | ![Saikosaponin-v](image) |
| 60| scorzoneroside A            | ![Scorzoneroside A](image) |
| 61| scorzonerosides B           | ![Scorzonerosides B](image) |
| 62 | scorzonerosides C | 
|----|------------------|
| NO. | Protein names                        | Gene names | Protein codes | Resolution | Degrees of target proteins | Betweenness of target proteins |
|-----|--------------------------------------|------------|---------------|------------|---------------------------|------------------------------|
| 1   | Insulin-like growth factor 1 receptor | IGF1R      | 3NW7          | 2.11 Å     | 1                         | 0                            |
| 2   | Heat shock protein HSP 90-alpha      | HSP90AA1   | 4YKZ          | 1.85 Å     | 2                         | 9.39E-04                     |
| 3   | Phosphatidylinositol 4,5-            | PIK3CA     | 4JPS          | 2.2 Å      | 1                         | 0                            |
| Protein Name | PDB Code | Resolution | Chain Length | Z-score |
|--------------|----------|-------------|--------------|---------|
| Biphosphate 3-kinase catalytic subunit alpha | | | | |
| Proto-oncogene tyrosine-protein kinase Src | SRC 4MXO | 2.105 Å | 10 | 0.08361207 |
| Probable ATP-dependent RNA helicase DDX5 | DDX5 3FE2 | 2.6 Å | 14 | 0.09386843 |
| Hepatocyte growth factor receptor | c-Met 5EYD | 1.85 Å | 0 | 0 |
| Prostaglandin G/H synthase 2 | COX2 5KIR | 2.697 Å | 2 | 4.25E-04 |
| Neutrophil gelatinase-associated lipocalin | LCN2 3DSZ | 2 Å | 3 | 0.00454735 |
| Protein-glutamine gamma-glutamyltransferase 2 | TGM2 4PYG | 2.8 Å | 0 | 0 |
| Protein kinase C alpha | PRKCA 4RA4 | 2.63 Å | 12 | 0.07004885 |
| Serine/threonine-protein kinase mTOR | mTOR 4JT5 | 3.45 Å | 3 | 0.00282128 |
| Estrogen receptor | ESR1 5FQV | 1.74 Å | 0 | 0 |
| Disintegrin and metalloproteinase domain-containing protein 17 | ADAM17 3LEA | 2 Å | 8 | 0.01679009 |
| Receptor tyrosine-protein kinase erbB-2 | ERBB2 3PP0 | 2.25 Å | 0 | 0 |
| Tumor Protein P53 | TP53 5G4O | 1.48 Å | 0 | 0 |
| Epidermal Growth Factor Receptor | EGFR 5JEB | 3.298 Å | 3 | 0.00394928 |
| Cadherin 1 | CDH1 4ZTE | 2.13 Å | 5 | 0.02783261 |
|   | Protein Name                              | Gene Symbol | PDB Code | Distance (Å) | e-value |
|---|------------------------------------------|-------------|----------|--------------|---------|
| 18| Catenin Beta 1                           | CTNNB1      | 3TX7     | 2.76         | 0       |
| 19| Fibroblast Growth Factor Receptor 2      | FGFR2       | 5EG3     | 2.606        | 6       | 0.01547412 |
| 20| Progesterone Receptor                    | PGR         | 1SR7     | 1.46         | 0       | 0          |
| 21| Prostaglandin-Endoperoxide Synthase 2    | PTGS2       | 5IKT     | 2.451        | 3       | 0.00170749 |
| 22| Erb-B2 Receptor Tyrosine Kinase 3        | ERBB3       | 6OP9     | 2.501        | 10      | 0.05911205 |
| 23| Apoptosis regulator Bel-2               | BCL2        | 4LXD     | 1.9          | 26      | 0.2472     |
| 24| Aromatase                               | CYP19A1     | 3EQM     | 2.9          | 0       | 0          |
| 25| Proto-oncogene c-Abl                     | ABL1        | 4ZOG     | 2.3          | 3       | 0.00661283 |
| 26| Estrogen receptor beta                   | ESR2        | 4ZI1     | 2.1          | 0       | 0          |
| 27| Vascular endothelial growth factor receptor 2 | KDR      | 3EWH     | 1.6          | 0       | 0          |
| 28| Cytochrome P450 11B1                     | CYP11B1     | 6M7X     | 2.095        | 0       | 0          |
| 29| PI3K delta                               | PIK3CD      | 5T8F     | 2.91         | 8       | 0.02876791 |
| 30| Carbonic anhydrase IV                    | CA4         | 3F7B     | 2.05         | 4       | 0.00616844 |
| 31| Carbonic anhydrase II                    | CA2         | 4PZH     | 1.06         | 1       | 0          |
| 32| Urokinase-type plasminogen activator     | PLAU        | 1SQT     | 1.9          | 9       | 0.03517613 |
| 33| DNA topoisomerase I                      | TOP1MT      | 1T8I     | 3            | 6       | 0.01743362 |
| 34| Insulin receptor                         | INSR        | 5HHW     | 1.79         | 4       | 0.00569398 |
| 35| FL cytokine receptor                     | FLT3        | 4XUF     | 3.2          |         |            |
| 36| Protein kinase C gamma type              | PRKCG       | 2UZP     | 2            | 1       | 0          |
|     | Protein Name                          | Accession | Resolution | Z-Score | P-Value          |
|-----|--------------------------------------|-----------|------------|---------|-----------------|
| 37  | Androgen receptor                     | AR        | 5V8Q       | 1.44 Å  | 0               |
| 38  | Mast/stem cell growth factor receptor | KIT       | 3G0E       | 1.6 Å   | 0               |
| 39  | Tyrosine-protein kinase JAK2          | JAK2      | 5UT6       | 1.645 Å | 2               | 0.00165432   |
| 40  | FL cytokine receptor                  | FLT3      | 4RT7       | 3.1 Å   | 0               |
| 41  | Cyclin-dependent kinase 6             | CDK6      | 5L2T       | 2.37 Å  | 3               | 0.00186753   |
| 42  | Dihydrofolate reductase               | DHFR      | 4QJC       | 1.62 Å  | 9               | 0.02963539   |
| 43  | Urokinase plasminogen activator surface receptor | PLAUR | 3U74       | 2.39 Å  | 0               |
| 44  | Ephrin type-A receptor 2              | EPHA2     | 5IA5       | 1.776 Å | 0               |
| 45  | Dual specificity mitogen-activated protein kinase 1 | MAP2K1 | 5EYM       | 2.7 Å   | 0               |
| 46  | C-X-C chemokine receptor type 4       | CXCR4     | 3OE9       | 3.1 Å   | 18              | 0.11203831   |
| 47  | Cathepsin D                           | CTSD      | 4OD9       | 1.9 Å   | 9               | 0.03673176   |
| 48  | Ubiquitin-protein ligase E3 Mdm2      | MDM2      | 5LAW       | 1.64 Å  | 4               | 0.00974686   |
| 49  | Stromal cell-derived factor 1         | CXCL12    | 4UA1       | 1.9 Å   | 2               | 0.00127425   |
| 50  | Steryl-sulfatase                      | STS       | 1P49       | 2.6 Å   | 0               |
| 51  | Cytochrome P450 2C19                  | CYP2C19   | 4GQS       | 2.87 Å  | 0               |
| 52  | Thymidine phosphorylase               | TYMP      | 1UOU       | 2.11 Å  | 0               |
| 53  | Steroid hormone receptor ERR1         | ESRR1     | 3K6P       | 1.996 Å | 0               |
| Protein          | Domain          | Accession | Resolution | Z-score |
|------------------|-----------------|-----------|------------|---------|
| RAC-alpha        | serine/threonine-protein kinase | AKT1      | 4GV1       | 1.49 Å  | 0.01464801 |
Table S3 targets proteins and related signaling pathways

| Protein names | Gene names | Protein codes | Related pathways                                      |
|---------------|------------|---------------|------------------------------------------------------|
| Insulin-like growth factor 1 receptor | IGFR | 3NW7 | hsa01521 EGFR tyrosine kinase inhibitor resistance |
|               |            |               | hsa01522 Endocrine resistance                        |
|               |            |               | hsa04010 MAPK signaling pathway                      |
|               |            |               | hsa04014 Ras signaling pathway                       |
|               |            |               | hsa04015 Rap1 signaling pathway                      |
|               |            |               | hsa04066 HIF-1 signaling pathway                     |
|               |            |               | hsa04068 FoxO signaling pathway                      |
|               |            |               | hsa04114 Oocyte meiosis                              |
|               |            |               | hsa04140 Autophagy - animal                          |
|               |            |               | hsa04144 Endocytosis                                 |
|               |            |               | hsa04150 mTOR signaling pathway                      |
|               |            |               | hsa04151 PI3K-Akt signaling pathway                  |
|               |            |               | hsa04152 AMPK signaling pathway                      |
|               |            |               | hsa04211 Longevity regulating pathway                |
hsa04213 Longevity regulating pathway - multiple species

hsa04510 Focal adhesion

hsa04520 Adherens junction

hsa04550 Signaling pathways regulating pluripotency of stem cells

hsa04730 Long-term depression

hsa04913 Ovarian steroidogenesis

hsa04914 Progesterone-mediated oocyte maturation

hsa05200 Pathways in cancer

hsa05202 Transcriptional misregulation in cancer

hsa05205 Proteoglycans in cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa04141 Protein processing in endoplasmic reticulum

hsa04151 PI3K-Akt signaling pathway

hsa04217 Necroptosis

hsa04612 Antigen processing and presentation

hsa04621 NOD-like receptor signaling pathway

hsa04657 IL-17 signaling pathway

hsa04659 Th17 cell differentiation

hsa04914 Progesterone-mediated oocyte maturation
hsa04915 Estrogen signaling pathway
hsa05200 Pathways in cancer
hsa05215 Prostate cancer
hsa05418 Fluid shear stress and atherosclerosis
hsa00562 Inositol phosphate metabolism
hsa01100 Metabolic pathways
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa01522 Endocrine resistance
hsa01524 Platinum drug resistance
hsa04012 ErbB signaling pathway
hsa04014 Ras signaling pathway
hsa04015 Rap1 signaling pathway
hsa04024 cAMP signaling pathway
hsa04062 Chemokine signaling pathway
hsa04066 HIF-1 signaling pathway
hsa04068 FoxO signaling pathway
hsa04070 Phosphatidylinositol signaling system
hsa04071 Sphingolipid signaling pathway
hsa04072 Phospholipase D signaling pathway
hsa04140 Autophagy - animal
hsa04150 mTOR signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa04152 AMPK signaling pathway
hsa04210 Apoptosis
hsa04211 Longevity regulating pathway
hsa04213 Longevity regulating pathway - multiple species
hsa04218 Cellular senescence
hsa04360 Axon guidance
hsa04370 VEGF signaling pathway
hsa04380 Osteoclast differentiation
hsa04510 Focal adhesion
hsa04550 Signaling pathways regulating pluripotency of stem cells
hsa04611 Platelet activation
hsa04620 Toll-like receptor signaling pathway
hsa04625 C-type lectin receptor signaling pathway
hsa04630 Jak-STAT signaling pathway
hsa04650 Natural killer cell mediated cytotoxicity
hsa04660 T cell receptor signaling pathway
hsa04662 B cell receptor signaling pathway
hsa04664 Fc epsilon RI signaling pathway
hsa04666 Fc gamma R-mediated phagocytosis
hsa04668 TNF signaling pathway
hsa04670 Leukocyte transendothelial migration
hsa04722 Neurotrophin signaling pathway
hsa04725 Cholinergic synapse
hsa04750 Inflammatory mediator regulation of TRP channels
hsa04810 Regulation of actin cytoskeleton
hsa04910 Insulin signaling pathway
hsa04914 Progesterone-mediated oocyte maturation
hsa04915 Estrogen signaling pathway
hsa04917 Prolactin signaling pathway
hsa04919 Thyroid hormone signaling pathway
hsa04923 Regulation of lipolysis in adipocytes
hsa04926 Relaxin signaling pathway
hsa04929 GnRH secretion
hsa04930 Type II diabetes mellitus
hsa04931 Insulin resistance
hsa04932 Non-alcoholic fatty liver disease (NAFLD)
hsa04933 AGE-RAGE signaling pathway in diabetic complications
hsa04960 Aldosterone-regulated sodium reabsorption
hsa04973 Carbohydrate digestion and absorption
hsa05100 Bacterial invasion of epithelial cells
hsa05135 Yersinia infection
hsa05142 Chagas disease (American trypanosomiasis)
hsa05146 Amoebiasis
hsa05160 Hepatitis C
hsa05161 Hepatitis B
hsa05162 Measles
hsa05164 Influenza A
hsa05165 Human papillomavirus infection
hsa05166 Human T-cell leukemia virus 1 infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05168 Herpes simplex virus 1 infection
hsa05169 Epstein-Barr virus infection
hsa05170 Human immunodeficiency virus 1 infection
hsa05200 Pathways in cancer
hsa05203 Viral carcinogenesis
hsa05205 Proteoglycans in cancer
hsa05206 MicroRNAs in cancer
hsa05210 Colorectal cancer
hsa05211 Renal cell carcinoma
hsa05212 Pancreatic cancer
hsa05213 Endometrial cancer
hsa05214 Glioma
hsa05215 Prostate cancer
hsa05218 Melanoma
hsa05220 Chronic myeloid leukemia
hsa05221 Acute myeloid leukemia
hsa05222 Small cell lung cancer
hsa05223 Non-small cell lung cancer
hsa05224 Breast cancer
hsa05225 Hepatocellular carcinoma
hsa05226 Gastric cancer
hsa05230 Central carbon metabolism in cancer
hsa05231 Choline metabolism in cancer
hsa05235 PD-L1 expression and PD-1 checkpoint pathway in cancer
hsa05418 Fluid shear stress and atherosclerosis
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa01522 Endocrine resistance
hsa04012 ErbB signaling pathway
hsa04015 Rap1 signaling pathway
hsa04062 Chemokine signaling pathway
hsa04137 Mitophagy - animal
hsa04144 Endocytosis
hsa04360 Axon guidance
hsa04370 VEGF signaling pathway
hsa04510 Focal adhesion
hsa04520 Adherens junction
hsa04530 Tight junction
hsa04540 Gap junction
hsa04611 Platelet activation
hsa04625 C-type lectin receptor signaling pathway
hsa04727 GABAergic synapse
hsa04750 Inflammatory mediator regulation of TRP channels
hsa04810 Regulation of actin cytoskeleton
hsa04912 GnRH signaling pathway
hsa04915 Estrogen signaling pathway
hsa04917 Prolactin signaling pathway
hsa04919 Thyroid hormone signaling pathway
hsa04921 Oxytocin signaling pathway
hsa04926 Relaxin signaling pathway

hsa05100 Bacterial invasion of epithelial cells

hsa05120 Epithelial cell signaling in Helicobacter pylori infection

hsa05131 Shigellosis

hsa05135 Yersinia infection

hsa05152 Tuberculosis

hsa05161 Hepatitis B

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05168 Herpes simplex virus 1 infection

hsa05203 Viral carcinogenesis

hsa05205 Proteoglycans in cancer

hsa05219 Bladder cancer

hsa05418 Fluid shear stress and atherosclerosis

Probable ATP-dependent RNA helicase DDX5

hsa03040 Spliceosome

hsa05205 Proteoglycans in cancer

hsa00590 Arachidonic acid metabolism

hsa01100 Metabolic pathways

hsa04064 NF-kappa B signaling pathway

hsa04370 VEGF signaling pathway

hsa04625 C-type lectin receptor signaling pathway

hsa04657 IL-17 signaling pathway

hsa04668 TNF signaling pathway

hsa04723 Retrograde endocannabinoid signaling
hsa04726 Serotonergic synapse
hsa04913 Ovarian steroidogenesis
hsa04921 Oxytocin signaling pathway
hsa04923 Regulation of lipolysis in adipocytes
hsa05140 Leishmaniasis
hsa05163 Human cytomegalovirus infection
hsa05165 Human papillomavirus infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05200 Pathways in cancer
hsa05204 Chemical carcinogenesis
hsa05206 MicroRNAs in cancer
hsa05222 Small cell lung cancer

Neutrophil gelatinase-associated lipocalin

| Protein | Accession | Signaling Pathway |
|---------|-----------|------------------|
| Neutrophil gelatinase-associated lipocalin | LCN2, 3DSZ | hsa04657 IL-17 signaling pathway |
| Protein kinase C alpha type | 4RA4, PRKCA | hsa04015 Rap1 signaling pathway |

hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa04010 MAPK signaling pathway
hsa04012 ErbB signaling pathway
hsa04014 Ras signaling pathway
hsa04020 Calcium signaling pathway
hsa04066 HIF-1 signaling pathway
hsa04070 Phosphatidylinositol signaling system
hsa04071 Sphingolipid signaling pathway
hsa04072 Phospholipase D signaling pathway
hsa04150 mTOR signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa04261 Adrenergic signaling in cardiomyocytes
hsa04270 Vascular smooth muscle contraction
hsa04310 Wnt signaling pathway
hsa04360 Axon guidance
hsa04370 VEGF signaling pathway
hsa04510 Focal adhesion
hsa04540 Gap junction
hsa04650 Natural killer cell mediated cytotoxicity
hsa04664 Fc epsilon RI signaling pathway
hsa04666 Fc gamma R-mediated phagocytosis
hsa04670 Leukocyte transendothelial migration
hsa04713 Circadian entrainment
hsa04720 Long-term potentiation
hsa04723 Retrograde endocannabinoid signaling
hsa04724 Glutamatergic synapse
hsa04725 Cholinergic synapse
hsa04726 Serotonergic synapse
hsa04727 GABAergic synapse
hsa04728 Dopaminergic synapse
hsa04730 Long-term depression
hsa04750 Inflammatory mediator regulation of TRP channels
hsa04911 Insulin secretion
hsa04912 GnRH signaling pathway
hsa04916 Melanogenesis
hsa04918 Thyroid hormone synthesis
hsa04919 Thyroid hormone signaling pathway
hsa04921 Oxytocin signaling pathway
hsa04925 Aldosterone synthesis and secretion
hsa04926 Relaxin signaling pathway
hsa04928 Parathyroid hormone synthesis, secretion and action
hsa04929 GnRH secretion
hsa04933 AGE-RAGE signaling pathway in diabetic complications
hsa04960 Aldosterone-regulated sodium reabsorption
hsa04961 Endocrine and other factor-regulated calcium reabsorption
hsa04970 Salivary secretion
hsa04971 Gastric acid secretion
hsa04972 Pancreatic secretion
hsa05031 Amphetamine addiction
hsa05032 Morphine addiction
hsa05110 Vibrio cholerae infection
hsa05143 African trypanosomiasis
hsa05146 Amoebiasis
hsa05161 Hepatitis B
hsa05164 Influenza A
hsa05170 Human immunodeficiency virus 1 infection
hsa05200 Pathways in cancer
hsa05205 Proteoglycans in cancer
hsa05206 MicroRNAs in cancer
hsa05214 Glioma
hsa05223 Non-small cell lung cancer
hsa05225 Hepatocellular carcinoma
hsa05231 Choline metabolism in cancer
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa01522 Endocrine resistance
hsa04012 ErbB signaling pathway
hsa04066 HIF-1 signaling pathway
hsa04072 Phospholipase D signaling pathway
hsa04136 Autophagy - other
hsa04140 Autophagy - animal
hsa04150 mTOR signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa04152 AMPK signaling pathway
hsa04211 Longevity regulating pathway
hsa04213 Longevity regulating pathway - multiple species
hsa04218 Cellular senescence
hsa04371 Apelin signaling pathway
hsa04630 Jak-STAT signaling pathway
hsa04659 Th17 cell differentiation
hsa04714 Thermogenesis
hsa04910 Insulin signaling pathway
hsa04919 Thyroid hormone signaling pathway
hsa04920 Adipocytokine signaling pathway
hsa04930 Type II diabetes mellitus
hsa04931 Insulin resistance
hsa05165 Human papillomavirus infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05168 Herpes simplex virus 1 infection
hsa05170 Human immunodeficiency virus 1 infection
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hsa05212 Pancreatic cancer
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hsa05221 Acute myeloid leukemia
hsa05224 Breast cancer
hsa05225 Hepatocellular carcinoma
hsa05226 Gastric cancer
hsa05230 Central carbon metabolism in cancer
hsa05231 Choline metabolism in cancer
hsa05235 PD-L1 expression and PD-1 checkpoint pathway in cancer
Disintegrin and metallocproteinase domain-containing protein 17 (ADAM17) and Epidermal Growth Factor Receptor (EGFR) are associated with several signaling pathways. ADAM17 is linked to Notch signaling pathway (hsa04330) and Alzheimer disease (hsa05010), among others. EGFR is involved in EGFR tyrosine kinase inhibitor resistance (hsa01521) and Endocrine resistance (hsa01522). EGFR is also important in the MAPK signaling pathway (hsa04010), ErbB signaling pathway (hsa04012), Ras signaling pathway (hsa04014), and Rap1 signaling pathway (hsa04015). EGFR is also associated with the Calcium signaling pathway (hsa04020), HIF-1 signaling pathway (hsa04066), FoxO signaling pathway (hsa04068), and Phospholipase D signaling pathway (hsa04072). EGFR is involved in Endocytosis (hsa04144), PI3K-Akt signaling pathway (hsa04151), Focal adhesion (hsa04510), Adherens junction (hsa04520), Gap junction (hsa04540), Jak-STAT signaling pathway (hsa04630), Regulation of actin cytoskeleton (hsa04810), GnRH signaling pathway (hsa04912), Estrogen signaling pathway (hsa04915), Oxytocin signaling pathway (hsa04921), and Relaxin signaling pathway (hsa04926).
hsa04928 Parathyroid hormone synthesis, secretion and action

hsa04934 Cushing syndrome

hsa05120 Epithelial cell signaling in Helicobacter pylori infection

hsa05160 Hepatitis C

hsa05165 Human papillomavirus infection

hsa05200 Pathways in cancer

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05210 Colorectal cancer

hsa05212 Pancreatic cancer

hsa05213 Endometrial cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05219 Bladder cancer

hsa05223 Non-small cell lung cancer

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

hsa05231 Choline metabolism in cancer

hsa05235 PD-L1 expression and PD-1 checkpoint pathway in cancer

Cadherin 1  CDH1  4ZTE  hsa04015 Rap1 signaling pathway
hsa04371 Apelin signaling pathway
hsa04390 Hippo signaling pathway
hsa04514 Cell adhesion molecules (CAMs)
hsa04520 Adherens junction
hsa05100 Bacterial invasion of epithelial cells
hsa05200 Pathways in cancer
hsa05213 Endometrial cancer
hsa05216 Thyroid cancer
hsa05218 Melanoma
hsa05219 Bladder cancer
hsa05226 Gastric cancer
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa04010 MAPK signaling pathway
hsa04014 Ras signaling pathway
hsa04015 Rap1 signaling pathway
hsa04144 Endocytosis
hsa04151 PI3K-Akt signaling pathway
hsa04550 Signaling pathways regulating pluripotency of stem cells
hsa04810 Regulation of actin cytoskeleton
hsa05200 Pathways in cancer
hsa05215 Prostate cancer
hsa05226 Gastric cancer
hsa05230 Central carbon metabolism in cancer

Fibroblast Growth Factor Receptor 2 FGFR2
5EG3

Prostaglandin-PTGS2 5IKT
hsa00590 Arachidonic acid metabolism
Endoperoxide Synthase 2

hsa01100 Metabolic pathways

hsa04064 NF-kappa B signaling pathway

hsa04370 VEGF signaling pathway

hsa04625 C-type lectin receptor signaling pathway

hsa04657 IL-17 signaling pathway

hsa04668 TNF signaling pathway

hsa04723 Retrograde endocannabinoid signaling

hsa04726 Serotonergic synapse

hsa04913 Ovarian steroidogenesis

hsa04921 Oxytocin signaling pathway

hsa04923 Regulation of lipolysis in adipocytes

hsa05140 Leishmaniasis

hsa05165 Human papillomavirus infection

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05200 Pathways in cancer

hsa05204 Chemical carcinogenesis

hsa05206 MicroRNAs in cancer

hsa05222 Small cell lung cancer

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa04010 MAPK signaling pathway

hsa04012 ErbB signaling pathway

hsa04020 Calcium signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa05205 Proteoglycans in cancer
hsa05206 MicroRNAs in cancer
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa01522 Endocrine resistance
hsa01524 Platinum drug resistance
hsa04064 NF-kappa B signaling pathway
hsa04066 HIF-1 signaling pathway
hsa04071 Sphingolipid signaling pathway
hsa04115 p53 signaling pathway
hsa04140 Autophagy - animal
hsa04141 Protein processing in endoplasmic reticulum
hsa04151 PI3K-Akt signaling pathway
hsa04210 Apoptosis
hsa04215 Apoptosis - multiple species
hsa04217 Necroptosis
hsa04261 Adrenergic signaling in cardiomyocytes
hsa04340 Hedgehog signaling pathway
hsa04510 Focal adhesion
hsa04621 NOD-like receptor signaling pathway
hsa04630 Jak-STAT signaling pathway
hsa04722 Neurotrophin signaling pathway
hsa04725 Cholinergic synapse
hsa04915 Estrogen signaling pathway
hsa04928 Parathyroid hormone synthesis, secretion and action
hsa04933 AGE-RAGE signaling pathway in diabetic complications

Apoptosis regulator Bcl-2 BCL2 4LXD
hsa05014 Amyotrophic lateral sclerosis (ALS)
hsa05145 Toxoplasmosis
hsa05152 Tuberculosis
hsa05161 Hepatitis B
hsa05162 Measles
hsa05168 Herpes simplex virus 1 infection
hsa05169 Epstein-Barr virus infection
hsa05170 Human immunodeficiency virus 1 infection
hsa05200 Pathways in cancer
hsa05206 MicroRNAs in cancer
hsa05210 Colorectal cancer
hsa05215 Prostate cancer
hsa05222 Small cell lung cancer
hsa05226 Gastric cancer
hsa05418 Fluid shear stress and atherosclerosis
hsa04012 ErbB signaling pathway
hsa04014 Ras signaling pathway
hsa04110 Cell cycle
hsa04360 Axon guidance

Proto-oncogene c-Abl ABL1 4ZOG hsa04722 Neurotrophin signaling pathway
hsa05130 Pathogenic Escherichia coli infection
hsa05131 Shigellosis
hsa05200 Pathways in cancer
hsa05206 MicroRNAs in cancer
hsa05220 Chronic myeloid leukemia

hsa05416 Viral myocarditis

hsa00562 Inositol phosphate metabolism

hsa01100 Metabolic pathways

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa01522 Endocrine resistance

hsa01524 Platinum drug resistance

hsa04012 ErbB signaling pathway

hsa04014 Ras signaling pathway

hsa04015 Rap1 signaling pathway

hsa04024 cAMP signaling pathway

hsa04062 Chemokine signaling pathway

hsa04066 HIF-1 signaling pathway

hsa04068 FoxO signaling pathway

hsa04070 Phosphatidylinositol signaling system

hsa04071 Sphingolipid signaling pathway

hsa04072 Phospholipase D signaling pathway

hsa04140 Autophagy - animal

hsa04150 mTOR signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa04152 AMPK signaling pathway

hsa04210 Apoptosis

hsa04211 Longevity regulating pathway

hsa04213 Longevity regulating pathway - multiple species
hsa04218 Cellular senescence
hsa04360 Axon guidance
hsa04370 VEGF signaling pathway
hsa04380 Osteoclast differentiation
hsa04510 Focal adhesion
hsa04550 Signaling pathways regulating pluripotency of stem cells
hsa04611 Platelet activation
hsa04620 Toll-like receptor signaling pathway
hsa04625 C-type lectin receptor signaling pathway
hsa04630 Jak-STAT signaling pathway
hsa04650 Natural killer cell mediated cytotoxicity
hsa04660 T cell receptor signaling pathway
hsa04662 B cell receptor signaling pathway
hsa04664 Fc epsilon RI signaling pathway
hsa04666 Fc gamma R-mediated phagocytosis
hsa04668 TNF signaling pathway
hsa04670 Leukocyte transendothelial migration
hsa04722 Neurotrophin signaling pathway
hsa04725 Cholinergic synapse
hsa04750 Inflammatory mediator regulation of TRP channels
hsa04810 Regulation of actin cytoskeleton
hsa04910 Insulin signaling pathway
hsa04914 Progesterone-mediated oocyte maturation
hsa04915 Estrogen signaling pathway
hsa04917 Prolactin signaling pathway
hsa04919 Thyroid hormone signaling pathway
hsa04923 Regulation of lipolysis in adipocytes
hsa04926 Relaxin signaling pathway
hsa04929 GnRH secretion
hsa04930 Type II diabetes mellitus
hsa04931 Insulin resistance
hsa04932 Non-alcoholic fatty liver disease (NAFLD)
hsa04933 AGE-RAGE signaling pathway in diabetic complications
hsa04960 Aldosterone-regulated sodium reabsorption
hsa04973 Carbohydrate digestion and absorption
hsa05100 Bacterial invasion of epithelial cells
hsa05135 Yersinia infection
hsa05142 Chagas disease (American trypanosomiasis)
hsa05146 Amoebiasis
hsa05160 Hepatitis C
hsa05161 Hepatitis B
hsa05162 Measles
hsa05164 Influenza A
hsa05165 Human papillomavirus infection
hsa05166 Human T-cell leukemia virus 1 infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05168 Herpes simplex virus 1 infection
hsa05169 Epstein-Barr virus infection
hsa05170 Human immunodeficiency virus 1 infection
hsa05200 Pathways in cancer
hsa05203 Viral carcinogenesis
hsa05205 Proteoglycans in cancer
hsa05206 MicroRNAs in cancer
hsa05210 Colorectal cancer
hsa05211 Renal cell carcinoma
hsa05212 Pancreatic cancer
hsa05213 Endometrial cancer
hsa05214 Glioma
hsa05215 Prostate cancer
hsa05218 Melanoma
hsa05220 Chronic myeloid leukemia
hsa05221 Acute myeloid leukemia
hsa05222 Small cell lung cancer
hsa05223 Non-small cell lung cancer
hsa05224 Breast cancer
hsa05225 Hepatocellular carcinoma
hsa05226 Gastric cancer
hsa05230 Central carbon metabolism in cancer
hsa05231 Choline metabolism in cancer
hsa05235 PD-L1 expression and PD-1 checkpoint pathway in cancer
hsa05418 Fluid shear stress and atherosclerosis

Phosphatidylinositol 4,5-bisphosphate (PI(4,5)P2) or PI(4,5)P2, also known as phosphatidylinositol 4,5-bisphosphate, is a lipid molecule that plays a role in various biological processes, including cell signaling and membrane trafficking. It is produced by the action of phosphatidylinositol 4-kinase on phosphatidylinositol 4-phosphate (PI(4)P), and it is hydrolyzed by phosphatidylinositol 4,5-bisphosphate 3-kinase (PI(3,4,5)P3K) to form phosphatidylinositol 3,4,5-trisphosphate (PI(3,4,5)P3). PI(4,5)P2 is also a substrate for phosphatidylinositol 3-kinase (PI(3)K), which further phosphorylates PI(4,5)P2 to PI(3,4,5)P3, leading to the activation of certain protein kinases.
| Gene/Protein Name                      | Accession       | Pathway                                             |
|---------------------------------------|-----------------|-----------------------------------------------------|
| ol 4,5-bisphosphate 3-kinase catalytic subunit gamma isoform |                | hsa01100 Metabolic pathways                         |
|                                       |                 | hsa04022 cGMP-PKG signaling pathway                 |
|                                       |                 | hsa04062 Chemokine signaling pathway                |
|                                       |                 | hsa04072 Phospholipase D signaling pathway          |
|                                       |                 | hsa04151 PI3K-Akt signaling pathway                 |
|                                       |                 | hsa04261 Adrenergic signaling in cardiomyocytes     |
|                                       |                 | hsa04371 Apelin signaling pathway                   |
|                                       |                 | hsa04611 Platelet activation                        |
|                                       |                 | hsa04725 Cholinergic synapse                        |
|                                       |                 | hsa04921 Oxytocin signaling pathway                 |
|                                       |                 | hsa05145 Toxoplasmosis                              |
|                                       |                 | hsa05167 Kaposi sarcoma-associated herpesvirus infection |
| Carbonic anhydrase IV                 | CA4 3F7B        | hsa01100 Metabolic pathways                         |
|                                       |                 | hsa04964 Proximal tubule bicarbonate reclamation    |
|                                       |                 | hsa00910 Nitrogen metabolism                        |
|                                       |                 | hsa01100 Metabolic pathways                         |
| Carbonic anhydrase II                 | CA2 4PZH        | hsa04964 Proximal tubule bicarbonate reclamation    |
|                                       |                 | hsa00910 Nitrogen metabolism                        |
|                                       |                 | hsa01100 Metabolic pathways                         |
| Urokinase-type plasminogen activator  | PLAU 1SQT      | hsa04064 NF-kappa B signaling pathway               |
|                                       |                 | hsa04610 Complement and coagulation cascades         |
hsa05202 Transcriptional misregulation in cancer
hsa05205 Proteoglycans in cancer
hsa05206 MicroRNAs in cancer
hsa05215 Prostate cancer
hsa03440 Homologous recombination

DNA

hsa03460 Fanconi anemia pathway
hsa01524 Platinum drug resistance
hsa04010 MAPK signaling pathway
hsa04014 Ras signaling pathway
hsa04015 Rap1 signaling pathway
hsa04022 cGMP-PKG signaling pathway
hsa04066 HIF-1 signaling pathway
hsa04068 FoxO signaling pathway
hsa04072 Phospholipase D signaling pathway
hsa04150 mTOR signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa04152 AMPK signaling pathway
hsa04211 Longevity regulating pathway
hsa04213 Longevity regulating pathway - multiple species
hsa04520 Adherens junction
hsa04910 Insulin signaling pathway
hsa04913 Ovarian steroidogenesis
hsa04923 Regulation of lipolysis in adipocytes
hsa04930 Type II diabetes mellitus
hsa04931 Insulin resistance  
hsa04932 Non-alcoholic fatty liver disease (NAFLD)  
hsa04960 Aldosterone-regulated sodium reabsorption  
hsa01521 EGFR tyrosine kinase inhibitor resistance  
hsa04010 MAPK signaling pathway  
hsa04012 ErbB signaling pathway  
hsa04014 Ras signaling pathway  
hsa04015 Rap1 signaling pathway  
hsa04020 Calcium signaling pathway  
hsa04066 HIF-1 signaling pathway  
hsa04070 Phosphatidylinositol signaling system  
hsa04071 Sphingolipid signaling pathway  
hsa04150 mTOR signaling pathway  
hsa04270 Vascular smooth muscle contraction  
hsa04310 Wnt signaling pathway  
hsa04370 VEGF signaling pathway  
hsa04510 Focal adhesion  
hsa04540 Gap junction  
hsa04650 Natural killer cell mediated cytotoxicity  
hsa04666 Fc gamma R-mediated phagocytosis  
hsa04670 Leukocyte transendothelial migration  
hsa04713 Circadian entrainment  
hsa04720 Long-term potentiation  
hsa04723 Retrograde endocannabinoid signaling  

Protein kinase C gamma type PRKCG 2UZP
hsa04724 Glutamatergic synapse
hsa04725 Cholinergic synapse
hsa04726 Serotonergic synapse
hsa04727 GABAergic synapse
hsa04728 Dopaminergic synapse
hsa04730 Long-term depression
hsa04750 Inflammatory mediator regulation of TRP channels
hsa04911 Insulin secretion
hsa04916 Melanogenesis
hsa04918 Thyroid hormone synthesis
hsa04919 Thyroid hormone signaling pathway
hsa04921 Oxytocin signaling pathway
hsa04925 Aldosterone synthesis and secretion
hsa04928 Parathyroid hormone synthesis, secretion and action
hsa04929 GnRH secretion
hsa04960 Aldosterone-regulated sodium reabsorption
hsa04961 Endocrine and other factor-regulated calcium reabsorption
hsa04970 Salivary secretion
hsa04971 Gastric acid secretion
hsa04972 Pancreatic secretion
hsa05031 Amphetamine addiction
hsa05032 Morphine addiction
hsa05143 African trypanosomiasis
hsa05146 Amoebiasis
hsa05161 Hepatitis B

hsa05170 Human immunodeficiency virus 1 infection

hsa05200 Pathways in cancer

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05214 Glioma

hsa05223 Non-small cell lung cancer

hsa05225 Hepatocellular carcinoma

hsa05231 Choline metabolism in cancer

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa04062 Chemokine signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa04217 Necroptosis

hsa04550 Signaling pathways regulating pluripotency of stem cells

hsa04630 Jak-STAT signaling pathway

hsa04658 Th1 and Th2 cell differentiation

hsa04659 Th17 cell differentiation

hsa04725 Cholinergic synapse

hsa04917 Prolactin signaling pathway

hsa04920 Adipocytokine signaling pathway

hsa04933 AGE-RAGE signaling pathway in diabetic complications

hsa05140 Leishmaniasis

hsa05145 Toxoplasmosis
hsa05152 Tuberculosis
hsa05161 Hepatitis B
hsa05164 Influenza A
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05168 Herpes simplex virus 1 infection
hsa05200 Pathways in cancer
hsa05235 PD-L1 expression and PD-1 checkpoint pathway in cancer
hsa04110 Cell cycle
hsa04115 p53 signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa04218 Cellular senescence
hsa04934 Cushing syndrome
hsa05160 Hepatitis C
hsa05162 Measles
hsa05164 Influenza A

Cyclin-dependent kinase 6
CDK6
5L2T
hsa05165 Human papillomavirus infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05169 Epstein-Barr virus infection
hsa05200 Pathways in cancer
hsa05203 Viral carcinogenesis
hsa05206 MicroRNAs in cancer
hsa05212 Pancreatic cancer
hsa05214 Glioma
hsa05218 Melanoma
hsa05220 Chronic myeloid leukemia
hsa05222 Small cell lung cancer
hsa05223 Non-small cell lung cancer
hsa05224 Breast cancer
hsa05225 Hepatocellular carcinoma
hsa00670 One carbon pool by folate

Dihydrofolate reductase DHFR 4QJC
hsa00790 Folate biosynthesis
hsa01100 Metabolic pathways
hsa01523 Antifolate resistance
hsa04020 Calcium signaling pathway
hsa04060 Cytokine-cytokine receptor interaction
hsa04061 Viral protein interaction with cytokine and cytokine receptor
hsa04062 Chemokine signaling pathway
hsa04144 Endocytosis
hsa04360 Axon guidance
hsa04670 Leukocyte transendothelial migration
hsa04672 Intestinal immune network for IgA production
hsa04810 Regulation of actin cytoskeleton
hsa05170 Human immunodeficiency virus 1 infection
hsa05200 Pathways in cancer
hsa04071 Sphingolipid signaling pathway
hsa04140 Autophagy - animal
hsa04210 Apoptosis
hsa04915 Estrogen signaling pathway
hsa05152 Tuberculosis
hsa01522 Endocrine resistance
hsa01524 Platinum drug resistance
hsa04068 FoxO signaling pathway
hsa04110 Cell cycle
hsa04115 p53 signaling pathway
hsa04120 Ubiquitin mediated proteolysis
hsa04144 Endocytosis
hsa04151 PI3K-Akt signaling pathway
hsa04218 Cellular senescence
hsa04625 C-type lectin receptor signaling pathway
hsa04919 Thyroid hormone signaling pathway
hsa05165 Human papillomavirus infection
hsa05169 Epstein-Barr virus infection
hsa05200 Pathways in cancer
hsa05202 Transcriptional misregulation in cancer
hsa05203 Viral carcinogenesis
hsa05205 Proteoglycans in cancer
hsa05206 MicroRNAs in cancer
hsa05214 Glioma
hsa05215 Prostate cancer
hsa05218 Melanoma
hsa05219 Bladder cancer
hsa05220 Chronic myeloid leukemia

hsa04060 Cytokine-cytokine receptor interaction

hsa04061 Viral protein interaction with cytokine and cytokine receptor

hsa04062 Chemokine signaling pathway

hsa04064 NF-kappa B signaling pathway

Stromal cell-derived factor 1 (CXCL1) 2

hsa04360 Axon guidance

hsa04670 Leukocyte transendothelial migration

hsa04672 Intestinal immune network for IgA production

hsa04810 Regulation of actin cytoskeleton

hsa05200 Pathways in cancer

hsa05323 Rheumatoid arthritis

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa01522 Endocrine resistance

hsa01524 Platinum drug resistance

hsa04010 MAPK signaling pathway

hsa04012 ErbB signaling pathway

hsa04014 Ras signaling pathway

RAC-alpha serine/threonine-protein kinase (AKT1) 4GV1

hsa04015 Rap1 signaling pathway

hsa04022 cGMP-PKG signaling pathway

hsa04024 cAMP signaling pathway

hsa04062 Chemokine signaling pathway

hsa04066 HIF-1 signaling pathway

hsa04068 FoxO signaling pathway

hsa04071 Sphingolipid signaling pathway
hsa04072 Phospholipase D signaling pathway
hsa04140 Autophagy - animal
hsa04150 mTOR signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa04152 AMPK signaling pathway
hsa04210 Apoptosis
hsa04211 Longevity regulating pathway
hsa04213 Longevity regulating pathway - multiple species
hsa04218 Cellular senescence
hsa04261 Adrenergic signaling in cardiomyocytes
hsa04370 VEGF signaling pathway
hsa04371 Apelin signaling pathway
hsa04380 Osteoclast differentiation
hsa04510 Focal adhesion
hsa04550 Signaling pathways regulating pluripotency of stem cells
hsa04611 Platelet activation
hsa04620 Toll-like receptor signaling pathway
hsa04625 C-type lectin receptor signaling pathway
hsa04630 Jak-STAT signaling pathway
hsa04660 T cell receptor signaling pathway
hsa04662 B cell receptor signaling pathway
hsa04664 Fc epsilon RI signaling pathway
hsa04666 Fc gamma R-mediated phagocytosis
hsa04668 TNF signaling pathway
hsa04722 Neurotrophin signaling pathway
hsa04725 Cholinergic synapse
hsa04728 Dopaminergic synapse
hsa04910 Insulin signaling pathway
hsa04914 Progesterone-mediated oocyte maturation
hsa04915 Estrogen signaling pathway
hsa04917 Prolactin signaling pathway
hsa04919 Thyroid hormone signaling pathway
hsa04920 Adipocytokine signaling pathway
hsa04922 Glucagon signaling pathway
hsa04923 Regulation of lipolysis in adipocytes
hsa04926 Relaxin signaling pathway
hsa04929 GnRH secretion
hsa04931 Insulin resistance
hsa04932 Non-alcoholic fatty liver disease (NAFLD)
hsa04933 AGE-RAGE signaling pathway in diabetic complications
hsa04973 Carbohydrate digestion and absorption
hsa05135 Yersinia infection
hsa05142 Chagas disease (American trypanosomiasis)
hsa05145 Toxoplasmosis
hsa05152 Tuberculosis
hsa05160 Hepatitis C
hsa05161 Hepatitis B
hsa05162 Measles
hsa05164 Influenza A
hsa05165 Human papillomavirus infection
hsa05166 Human T-cell leukemia virus 1 infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05168 Herpes simplex virus 1 infection
hsa05169 Epstein-Barr virus infection
hsa05170 Human immunodeficiency virus 1 infection
hsa05200 Pathways in cancer
hsa05205 Proteoglycans in cancer
hsa05210 Colorectal cancer
hsa05211 Renal cell carcinoma
hsa05212 Pancreatic cancer
hsa05213 Endometrial cancer
hsa05214 Glioma
hsa05215 Prostate cancer
hsa05218 Melanoma
hsa05220 Chronic myeloid leukemia
hsa05221 Acute myeloid leukemia
hsa05222 Small cell lung cancer
hsa05223 Non-small cell lung cancer
hsa05224 Breast cancer
hsa05225 Hepatocellular carcinoma
hsa05226 Gastric cancer
hsa05230 Central carbon metabolism in cancer
hsa05231 Choline metabolism in cancer

hsa05235 PD-L1 expression and PD-1 checkpoint pathway in cancer

hsa05418 Fluid shear stress and atherosclerosis
