# ToPASeq: an R package for topology-based pathway analysis of microarray and RNAseq data

Ivana Ihnatova, Eva Budinska [1]

May 3, 2016

[1]This work was supported by the project INBIOR (CZ.1.07/2.3.00/20.0042) co-financed by the European Social Fund and the state budget of the Czech Republic.

# Contents

# Chapter 1

# Introduction

This package de-novo implements or adjusts the existing implementations of several different methods for topology-based pathway analysis of gene expression data from microarray and RNA-Seq technologies.

These high-throughput technologies are used for measuring of expression levels of thousands genes in one experiment often with the aim to find pathways and biological processes affected between two conditions. The information which biological processes are affected helps investigators to set-up biologically relevant hypotheses for further research.

To this end, a differential gene expression between conditions is assessed - by the means of specific methods, such as limma for instance, which produce lists of differentially expressed genes with specific statistics and p-values for each gene, as well as fold change of mean expression between compared groups.

Pathway analysis is the next step, where these differentially expressed genes are mapped to reference pathways derived from databases and relative enrichment is assessed. Methods of topology-based pathway analysis are the last generation of pathway analysis methods that take into account the topological structure of a pathway, which helps to increase specificity and sensitivity of the results.

This package implements seven topology-based pathway analysis methods that focus on identification of the pathways that are differentially affected between two conditions (Table **??**). Each method is implemented as a single wrapper function which allows the user to call a method in a single command. In addition, this package offers a visualization of the results. The visualization is based on the `Rgraphviz` package and displays distribution of differential expression and topological significance of the nodes from one pathway. The user can simplify the pathway topology by merging selected sets of nodes into one (individual gene names is the only information that is lost in it).

Table 1.1: Methods included in the package.

| Method | Ref. | Type | Implementation |
|---|---|---|---|
| TopologyGSA | [?] | M | imported |
| DEGraph | [?] | M | imported |
| clipper | [?] | M | imported |
| SPIA | [?], [?] | U | imported |
| TBS | [?] | U | de novo |
| PWEA | [?] | U | de novo |
| TAPPA | [?] | U | de novo |

M - multivariable, U - univariable

## 1.1 Input, output and general functionalities

The input data are either normalized (count) data or gene expression data as well as pathway topological structure.

For the sake of simplicity, our package offers in each wrapper function a preprocessing step for RNA-seq normalization - TMM [?] and DESeq [?]. If necessary, the functions also performs differential gene expression analysis through calling limma and DESeq2 packages.

Since some of the methods (SPIA, PRS, PWEA) work with the results of the differentiall expression analysis, the user can prepare the data by his preffered method and skip the built-in normalization and/or differential expression analysis.

To summarize, the wrapper functions give options to: 1) normalize the count data (for RNAseq) 2) apply differential expression analysis on gene-level, if applicable, and finally 3) perform topologifal pathway analysis. The functions provides output in a uniform format defined as a new S3 class topResult with basic methods (print, plot, summary) and methods for obtaining the individual parts of the output.

## 1.2 Pathway topological structure

Pathways and their topological structures are an important input for the analysis. They are represented as graphs $G = (V, E)$, where $V$ denotes a set of vertices or nodes represented by genes and $E \subseteq V \times V$ is a set of edges between nodes (oriented or not, depending on the method) representing the interaction between genes. These structures can be downloaded from public databases such as KEGG or Biocarta or are available through other packages such as `graphite`.

ToPASeq is build upon `graphite` R-package where pathways from seven public databases: KEGG, Biocarta, Reactome, NCI, SPIKE, HumanCyc, Panther were downloaded and parsed into a new S4 class `pathway` (up to version 1.12.0). The parsing process deals also with a special type of nodes that can be found in biological pathways. Protein complexes are expanded into cliques

since it is assumed that all units from one complex interact with each other. A clique, from graph theory, is a subset of vertices such that every two vertices in the subset are connected by an edge. On the other hand, gene families are expanded into separate nodes with same incoming and/or outgoing edges, because they are believed to be interchangable. The most important modification is the propagation of signal through the so called compound-mediated interactions. By compound-mediated interaction we mean an interaction that engages not only genes or their product but also other chemical compounds e.g. calcium ions. `graphite` is the first package that propagates signal through such interactions. For example, if gene $A$ interacts with compound $c$ and compound $c$ with gene $B$ then in a pathway topology gene $A$ should interact with gene $B$. Please see [**?**] for more details.

```
> library(ToPASeq)
> pathways<-pathways("hsapiens", "kegg")[1:5]
> pathways[[1]]

"Acute myeloid leukemia" pathway
Native ID           = hsa:05221
Database            = KEGG
Species             = hsapiens
Type of identifiers = ENTREZID
Number of nodes     = 57
Number of edges     = 177
Retrieved on        = 03-05-2016

> str(pathways[[1]])

Formal class 'Pathway' [package "graphite"] with 7 slots
  ..@ id        : chr "hsa:05221"
  ..@ title     : chr "Acute myeloid leukemia"
  ..@ edges     :'data.frame':        177 obs. of  4 variables:
  .. ..$ src      : chr [1:177] "10000" "10000" "10000" "10000" ...
  .. ..$ dest     : chr [1:177] "1147" "1147" "2475" "2475" ...
  .. ..$ direction: Factor w/ 1 level "directed": 1 1 1 1 1 1 1 1 1 1 ...
  .. ..$ type     : chr [1:177] "Process(activation)" "Process(phosphorylation)" "Process(ac
  ..@ database  : chr "KEGG"
  ..@ species   : chr "hsapiens"
  ..@ identifier: chr "ENTREZID"
  ..@ timestamp : Date[1:1], format: "2016-05-03"
```

## 1.3 Preparing and manipulating pathways

The easiest way is to use pathway available through `graphite`. However, you might need to use your own pathway - the easiest way is to download it from

some database (do not forget this pathway needs to contain topological information!) and convert it to the correct format using our specific functions for pathway conversion and manipulation.

Functions `AdjacencyMatrix2Pathway` and `graphNEL2Pathway` coerce either an adjacency matrix (binary matrix, where 1 means an edge between two genes) or `graphNEL` into `Pathway`. For a reduction of a specified set of nodes (e.g. genes from the same class with similar function), which helps to simply the graphical graph representation, you can use function `reduceGraph`.

Any other topological manipulations or basic topological analysis can be achieved through `graphNEL` and conversion from and to `Pathway`. Or directly with the following functions:

**intersection** compute the intersection of the two supplied graphs. They must have identical nodes.

**join** returns the joining of the two graphs. It is similar to `intersection` but does not require the identical nodes

**union** compute the union of the two supplied graphs. They must have identical nodes.

**subGraph** Given a set of nodes and a pathway this function creates and returns subgraph with only the supplied nodes and any edges between them

**clearNode** Clears all edges incoming and outgoing edges from node(s)

**removeEdge** removes all edges between two subsets of nodes (starting in one subset and ending in the other)

**removeNode** removes node(s) from a pathway

**nodes<-** sets node labels of pathway to a specific value

**degree** Returns the number of incoming or outgoing edges for specified nodes

**numNoEdges** Returns the number of nodes without any edge

**mostEdges** Returns the nodes with most edges

**acc** Returns the set of nodes accessible from a subset of nodes. The undirected edges are considered as bidirected (directed in both directions)

**connComp** Returns the connected components present in a pathway. They are returned as list where each slot refers to one component and contains the relevant nodes. The undirected edges are considered as bidirected (directed in both directions)

**edges** Returns the edges relevant to node or all edges in the pathway

**isAdjacent** Checks whether two nodes are adjacent (there is an edge starting in first node and ending in the second)

**isConnected** Checks if a pathway contains only one connected component

**isDirected** Checks if all edges in a pathway are directed

**edgemode** Returns the type of edges in a pathway: `directed`, `undirected` or both

**numEdges** Returns the number of edges in a pathway

**numNodes** Returns the number of nodes in a pathway

**edgeNames** Returns the names of the edges in a following format: starting node ending node

We also especially designed function `prepareData` that converts the idendifiers of pathways, compares them agains the supplied vector of the identifiers from expression data and filters pathways with too many nodes, too few edges, not enought identifiers common with the expression data and transforms the pathways into formats reqiured in individual methods.

The normalized gene expression data or count data can be in two formats. One is an simple matrix were rows refer to genes and the other one is an `ExpressionSet`. There are four acceptable formats for the clincal data: the name or number of `phenoData` of `ExpressionSet` or a character or numeric vector that is coerced to factor. We will demonstrate the features of the package on the example of analysis of two datasets. For microarray data we will use the log2-transformed normalized expression data from the `DEGraph` package and for RNA-Seq data we will use the count data from `gageData` package. The pathway topologies are available via function `pathways()` from `graphite` package. For this demonstrantion we will use human pathways from KEGG or Biocarta.

# Chapter 2

# Analysis of microarray data

In our example we will use the dataset `Loi2008_DEGraphVignette` from `DEGraph` package. It conatains the expression profiles of 255 patients with hormone-dependent breast cancer stored as a matrix. The aim of the study was to determine which genes are differentially expressed between tamoxifen-resistant and tamoxifen-sensitive samples. Gene expression data matrix and vector of class labels is stored as separate objects `exprLoi2008` and `classLoi2008`, respectively. In `classLoi2008`, `0` refers to a tamoxifen-resistant sample and `1` to a tamoxifen-sensitive one. We will not need the annotation data (`annLoi2008`) or KEGG pathways `grListKEGG` in our example. On the other hand, we will use a few first pathways from `KEGG`. The pathways were selected only in order to reduce the computational complexity of the analysis. Also, the outputs from the most computationaly complex methods are displayed as comments.

We will load the package, the data and subset of the pathways with

```
> library(ToPASeq)
> library(DEGraph)
> data(Loi2008_DEGraphVignette)
> pathways<-pathways("hsapiens", "kegg")[1:5]
> ls()
```

```
[1] "annLoi2008"   "classLoi2008" "exprLoi2008"
[4] "grListKEGG"   "pathways"
```

## 2.1 TopologyGSA

TopologyGSA represents a multivariable method in which the expression of genes is modelled with Gausian Graphical Models with covariance matrix reflecting the pathway topology. It uses the the Iterative Proportional Scaling algorithm to estimate the covariance matrices. The testing procedure is a two-step process. First the equality of covariance matrices is tested via a likelihood ratio test. Then, when the null hypothesis of equality of covariance matrices

is not rejected, the differential expression is tested via multivariate analysis of variance. On the other hand, when the convariance matrices are not equal, then Behrens-Fisher method for testing the equality of means in a two sample problem with unequal covariance matrices is employed. This method was first implemented in the `TopologyGSA` package. In ToPASeq we have optimalized its performance by using different function for obtaining cliques from each pathway.

The method can be used with a single command

```
> top<-TopologyGSA(exprLoi2008, classLoi2008, pathways, type="MA", perms=200)
> #99 node labels mapped to the expression data
> #Average coverage 31.47657 %
> #0 (out of 5) pathways without a mapped node
> #Acute myeloid leukemia
> #Adherens junction
> #Adipocytokine signaling pathway
> #Adrenergic signaling in cardiomyocytes
> #African trypanosomiasis
> res(top)
> #$results
> #                                      t.value df.mean1 df.mean2 p.value
> #Acute myeloid leukemia                3024.796       30      224       0
> #Adherens junction                     1102.830       10      244       0
> #Adipocytokine signaling pathway       3196.432       25      229       0
> #Adrenergic signaling in cardiomyocytes 2178.476       26      228       0
> #African trypanosomiasis               1404.259        8      246       0
> #                                     lambda.value df.var  p.value.var
> #Acute myeloid leukemia                  213.01437    156 1.649509e-03
> #Adherens junction                        39.92094     10 1.749659e-05
> #Adipocytokine signaling pathway         192.81336    121 3.595452e-05
> #Adrenergic signaling in cardiomyocytes  169.47418     80 2.211953e-08
> #African trypanosomiasis                  13.02808     12 3.670031e-01
> #                                     qchisq.value var.equal q.value
> #Acute myeloid leukemia                  186.14575         1       0
> #Adherens junction                        18.30704         1       0
> #Adipocytokine signaling pathway         147.67353         1       0
> #Adrenergic signaling in cardiomyocytes  101.87947         1       0
> #African trypanosomiasis                  21.02607         0       0
> #
> #$errors
> #named list()
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. The `perms` argument sets the number of permutations to be used in the statistical

tests. By default both mean and variance tests are run, this can be changed to only variance test by setting `method="var"`. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The threshold for variance test is specified with `alpha` argument. The implementation allows also testing of all the cliques present in the graph by setting `testCliques=TRUE`. Please note that these tests may take quite a long time. The implementation returns also a gene-level statistics of the differential expression of genes performed via moderated t-test from `limma` package. These statistics are later used in the visualization of a selected pathway.

## 2.2 DEGraph

Another multivariable method implemented in the package is DEGraph. This method assumes the same direction in the differential expresion of genes belonging to a pathway. It performs the regular Hotelling's T2 test in the graph-Fourier space restricted to its first $k$ components which is more powerful than test in the full graph-Fourier space or in the original space.

We apply the method with

```
> deg<-DEGraph(exprLoi2008, classLoi2008, pathways, type="MA")

98 node labels mapped to the expression data
Average coverage 31.32477 %
0 (out of 5) pathways without a mapped node
0 denoted as 0
 1 denoted as 1
 Contrasts:  1 - 0

> res(deg)

$results
$results[[1]]
                                        Overall.p
Acute myeloid leukemia                 0.026081586
Adherens junction                               NA
Adipocytokine signaling pathway        0.008440407
Adrenergic signaling in cardiomyocytes 0.057391182
African trypanosomiasis                0.234212387
                                       Overall.q.value
Acute myeloid leukemia                      0.05216317
Adherens junction                                   NA
Adipocytokine signaling pathway             0.03376163
Adrenergic signaling in cardiomyocytes      0.07652158
African trypanosomiasis                     0.23421239
```

```
                                        Comp1.p
Acute myeloid leukemia                 0.09184337
Adherens junction                              NA
Adipocytokine signaling pathway        0.03920983
Adrenergic signaling in cardiomyocytes 0.15382925
African trypanosomiasis                0.04727610
                                       Comp1.pFourier
Acute myeloid leukemia                    0.026081586
Adherens junction                                  NA
Adipocytokine signaling pathway           0.008440407
Adrenergic signaling in cardiomyocytes    0.057391182
African trypanosomiasis                   0.234212387
                                       Comp1.k     Comp2.p
Acute myeloid leukemia                       4 0.006982534
Adherens junction                           NA          NA
Adipocytokine signaling pathway              1          NA
Adrenergic signaling in cardiomyocytes       3 0.492055041
African trypanosomiasis                      1          NA
                                       Comp2.pFourier
Acute myeloid leukemia                   0.0004994694
Adherens junction                                  NA
Adipocytokine signaling pathway                    NA
Adrenergic signaling in cardiomyocytes   0.7744589408
African trypanosomiasis                            NA
                                       Comp2.k
Acute myeloid leukemia                       1
Adherens junction                           NA
Adipocytokine signaling pathway             NA
Adrenergic signaling in cardiomyocytes       1
African trypanosomiasis                     NA

$results$graphs
                                       Comp1.graph
Acute myeloid leukemia                 ?
Adherens junction                      NA
Adipocytokine signaling pathway        ?
Adrenergic signaling in cardiomyocytes ?
African trypanosomiasis                ?
                                       Comp2.graph
Acute myeloid leukemia                 ?
Adherens junction                      NA
Adipocytokine signaling pathway        NA
Adrenergic signaling in cardiomyocytes ?
African trypanosomiasis                NA
```

```
$errors
named list()
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. Since, the DEGraph method runs a statistical test for each connected component of a pathway, a method for assigning a global p-value for whole pathway is needed. The user can select from three approaches: the minimum, the mean and the p-value of the biggest component. This is specified via `overall` argument. The implementation returns also a gene-level statistics of the differential expression of genes performed via moderated t-test from `limma` package. These statistics are later used in the visualization of a selected pathway.

## 2.3 clipper

The last multivariable method available within this package is called clipper. This method is similar to the topologyGSA as it uses the same two-step approach. However, the Iterative Proportional Scaling algorithm was subsituted with a shrinkage procedure of James-Stein-type which additionally allows proper estimates also in the situation when number of samples is smaller than the number of genes in a pathway. The tests on a pathway-level are follwed with a search for the most affected path in the graph.

The method can be applied with

```
> cli<-clipper( exprLoi2008, classLoi2008, pathways,type="MA", method="mean")
> #99 node labels mapped to the expression data
> #Average coverage 31.47657 %
> #0 (out of 5) pathways without a mapped node
> #0  pathways were filtered out
> #Analysing pathway:
> #
> #Acute myeloid leukemia
> #Adherens junction
> #Adipocytokine signaling pathway
> #Adrenergic signaling in cardiomyocytes
> #African trypanosomiasis
> #0 denoted as 0
> # 1 denoted as 1
> # Contrasts:  1 - 0
> #Warning messages:
```

```
> #1: In getJunctionTreePaths(graph, root) :
> #  The DAG presents cliques that are not connected.
> #2: In prunePaths(clipped, pruneLevel) : pathSummary is NULL
> #3: In getJunctionTreePaths(graph, root) :
> #  The DAG presents cliques that are not connected.
> #4: In prunePaths(clipped, pruneLevel) : pathSummary is NULL
> res(cli)$results[[1]]
> #                                      alphaVar alphaMean mean.q.value var.q.value
> #Acute myeloid leukemia                   0.735     0.009       0.0150     0.91875
> #Adherens junction                        0.101     0.022       0.0275     0.26500
> #Adipocytokine signaling pathway          0.656     0.001       0.0050     0.91875
> #Adrenergic signaling in cardiomyocytes   0.106     0.061       0.0610     0.26500
> #African trypanosomiasis                  0.953     0.007       0.0150     0.95300
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. Also, both mean and variance tests are run, this can be changed to only variance test by setting `method="var"`. The `nperm` controls the number of permutations in the statistical tests. Similarly as in topologyGSA, the implementation allows testing of all the cliques present in the graph by setting `testCliques=TRUE`. Please note that these tests may take quite a long time. The implementation returns also a gene-level statistics of the differential expression of genes performed via moderated t-test from `limma` package. These statistics are later used in the visualization of a selected pathway.

The function returns two types of the results on pathway-level. The first (printed above), is a table of p-values and q-values related to the differential expression and concentration of the pathways. The second one, is a list contating the most affected paths in each pathway - these are obtained via `easyClip` function from `clipper` package.

## 2.4 SPIA

The most well-known topology-based pathway analysis method is SPIA. In there, two evidences of differential expression of a pathway are combined. The first evidence is a regular so called overrepresentation analysis in which the statistical significance of the number of differentially expressed genes belonging to a pathway is assessed. The second evidence reflects the pathway topology and it is called the pertubation factor. The authors assume that a differentially expressed gene at the begining of a pathway topology (e.g. a receptor in a signaling pathway) has a stronger effect on the functionality of a pathway than a

differentially expressed gene at the end of a pathway (e.g. a transcription factor in a signaling pathway). The pertubation factors of all genes are calculated from a system of linear equations and then combined within a pathway. The two evidences in a form of p-values are finally combined into a global p-value, which is used to rank the pathways.

```
> spi<-SPIA(exprLoi2008, classLoi2008,pathways , type="MA", logFC.th=-1)
```

```
0 denoted as 0
 1 denoted as 1
 Contrasts:  1 - 0
98 node labels mapped to the expression data
Average coverage 31.32477 %
0 (out of 5) pathways without a mapped node
0 denoted as 0
 1 denoted as 1
 Contrasts:  1 - 0
```

```
> res(spi)
```

```
$results
                                      pSize NDE  pNDE
Acute myeloid leukemia                   30   5 0.643
Adherens junction                        10   3 0.249
Adipocytokine signaling pathway          25   8 0.049
Adrenergic signaling in cardiomyocytes   25   4 0.679
African trypanosomiasis                   8   3 0.150
                                         tA pPERT    pG
Acute myeloid leukemia               -0.511 0.276 0.484
Adherens junction                    -0.242 0.626 0.446
Adipocytokine signaling pathway       0.164 0.682 0.147
Adrenergic signaling in cardiomyocytes -0.340 0.472 0.685
African trypanosomiasis              -0.018 0.974 0.427
                                     pGFdr pGFWER
Acute myeloid leukemia               0.605  1.000
Adherens junction                    0.605  1.000
Adipocytokine signaling pathway      0.605  0.735
Adrenergic signaling in cardiomyocytes 0.685  1.000
African trypanosomiasis              0.605  1.000
                                        Status
Acute myeloid leukemia               Inhibited
Adherens junction                    Inhibited
Adipocytokine signaling pathway      Activated
Adrenergic signaling in cardiomyocytes Inhibited
African trypanosomiasis              Inhibited

$errors
named list()
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). Alternatively, the user can supply the results of the differential expression analysis of genes in two forms:

1. a data.frame with columns: *ID* gene identifiers (they must match with the node labels), *logFC* log fold-changes, *t* - t-statistics, *pval* p-values, *padj* adjusted p-values. Then the user sets `type` to `DEtable`

2. a list with two slots: named vector of log fold-changes of differentially expressed genes and a vector of names of all genes analysed. Then the user sets `type` to `DElist`

The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The default thresholds for the differential expression analysis of genes (the moderated t-test from `limma` is used) are set with arguments `logFC.th` and `p.val.th`. The user can omit one of these criteria by setting the agrument negative value, as is shown also in the example. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway.

## 2.5 TAPPA

TAPPA was among the first topology-based pathway analysis methods. It was inspired in chemointformatics and their models for predicting the structure of molecules. In TAPPA, the gene expression values are standardized and sigma-transformed within a samples. Then, a pathway is seen a molecule, individual genes as atoms and the energy of a molecule is a score defined for one sample. This score is called Pathway Connectivity Index. The difference of expression is assessed via a common univariable two sample test - Mann-Whitney in our implemetation.

```
> tap<-TAPPA(exprLoi2008, classLoi2008, pathways, type="MA")

98 node labels mapped to the expression data
Average coverage 31.32477 %
0 (out of 5) pathways without a mapped node
0 denoted as 0
 1 denoted as 1
 Contrasts:  1 - 0

> res(tap)
```

```
$results
                                      X0.N X0.Min.
Acute myeloid leukemia                  68 -0.2909
Adherens junction                       68 -0.1521
Adipocytokine signaling pathway         68 -0.3464
Adrenergic signaling in cardiomyocytes  68 -0.1848
African trypanosomiasis                 68 -0.2150
                                      X0.1st.Qu. X0.Median
Acute myeloid leukemia                  -0.07893  0.034980
Adherens junction                       -0.05562 -0.021800
Adipocytokine signaling pathway         -0.13940 -0.002325
Adrenergic signaling in cardiomyocytes  -0.06417  0.006781
African trypanosomiasis                 -0.08672 -0.037130
                                        X0.Mean X0.3rd.Qu.
Acute myeloid leukemia                 0.019060    0.12270
Adherens junction                     -0.016930    0.02244
Adipocytokine signaling pathway       -0.011370    0.09997
Adrenergic signaling in cardiomyocytes -0.007017    0.04800
African trypanosomiasis               -0.023710    0.03819
                                      X0.Max. X1.N X1.Min.
Acute myeloid leukemia                 0.3199  187 -0.4077
Adherens junction                      0.1334  187 -0.1536
Adipocytokine signaling pathway        0.3573  187 -0.4469
Adrenergic signaling in cardiomyocytes 0.1527  187 -0.2247
African trypanosomiasis                0.1801  187 -0.2400
                                      X1.1st.Qu.
Acute myeloid leukemia                  -0.15430
Adherens junction                       -0.03624
Adipocytokine signaling pathway         -0.12690
Adrenergic signaling in cardiomyocytes  -0.05528
African trypanosomiasis                 -0.05886
                                       X1.Median   X1.Mean
Acute myeloid leukemia                -0.0490500 -0.046460
Adherens junction                     -0.0027600 -0.006503
Adipocytokine signaling pathway        0.0009355  0.008730
Adrenergic signaling in cardiomyocytes -0.0147700 -0.014400
African trypanosomiasis               -0.0036970  0.010750
                                      X1.3rd.Qu. X1.Max.
Acute myeloid leukemia                   0.06715  0.3696
Adherens junction                        0.02827  0.1240
Adipocytokine signaling pathway          0.14160  0.5097
Adrenergic signaling in cardiomyocytes   0.03123  0.1951
African trypanosomiasis                  0.06799  0.4001
                                          p.value
Acute myeloid leukemia                0.001672774
Adherens junction                     0.209738211
```

```
Adipocytokine signaling pathway        0.405572919
Adrenergic signaling in cardiomyocytes 0.514258706
African trypanosomiasis                0.014492732
                                           q.value
Acute myeloid leukemia                 0.008363871
Adherens junction                      0.349563684
Adipocytokine signaling pathway        0.506966149
Adrenergic signaling in cardiomyocytes 0.514258706
African trypanosomiasis                0.036231830

$errors
named list()
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The user can also specified whether the normalization step (standardization and sigma-transformation) should be perfomed (`normalize=TRUE`). If `verbose=TRUE`, function prints out the titles of pathways as their are analysed. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway.

## 2.6 PRS

PRS is another method that works with gene-level statistics and a list of differentially expresed genes. The pathway topology is incorporated as the number of downstream differentially expressed genes. The gene-level log fold-changes are weigted by this number and sumed up into a pathway-level score. A statistical significance is assessed by a permutations of genes.

```
> Prs<-PRS( exprLoi2008, classLoi2008, pathways, type="MA",  logFC.th=-1, nperm=100)
```

```
0 denoted as 0
 1 denoted as 1
 Contrasts:  1 - 0
98 node labels mapped to the expression data
Average coverage 31.32477 %
0 (out of 5) pathways without a mapped node
0 denoted as 0
 1 denoted as 1
 Contrasts:  1 - 0
```

```
> res(Prs)

$results
                                          nPRS p.value
Acute myeloid leukemia                -0.9625959    0.96
Adherens junction                      1.9250161    0.04
Adipocytokine signaling pathway        0.2552609    0.28
Adrenergic signaling in cardiomyocytes -0.8096414    0.84
African trypanosomiasis                1.5650164    0.08
                                        q.value
Acute myeloid leukemia                0.9600000
Adherens junction                     0.2000000
Adipocytokine signaling pathway       0.4666667
Adrenergic signaling in cardiomyocytes 0.9600000
African trypanosomiasis               0.2000000

$errors
named list()

>
```

Arguments of this functions are almost the same as in `SPIA`. Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). Alternatively, the user can supply the results of the differential expression analysis of genes in two forms:

1. a data.frame with columns: *ID* gene identifiers (they must match with the node labels), *logFC* log fold-changes, *t* - t-statistics, *pval* p-values, *padj* adjusted p-values. Then the user sets `type` to `DEtable`

2. a list with two slots: named vector of log fold-changes of differentially expressed genes and a vector of names of all genes analysed. Then the user sets `type` to `DElist`

The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The default thresholds for the differential expression analysis of genes (the moderated t-test from `limma` is used) are set with arguments `logFC.th` and `p.val.th`. The user can omit one of these criteria by setting the agrument negative value, as is shown also in the example. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway. There is one extra argument `nperm` which controls the number of permutations.

## 2.7 PWEA

The last method available in this package is called PathWay Enrichment Analysis (PWEA). This is actually a weigthed form of common Gene Set Enrichment Analysis (GSEA). The weights are called Topological Influence Factor (TIF) and are defined as a geometic mean of ratios of Pearson's correlation coefficient and the distance of two genes in a pathway. The weights of genes outside a pathway are assigned randomly from normal distribution with parameters estimated from the weights of genes in all pathways. A statistical significance of a pathway is assessed via Kolmogorov-Simirnov-like test statistic comparing two cumulative distribution functions with class label permutations.

```
> pwe<-PWEA(exprLoi2008, classLoi2008, pathways,  type="MA", nperm=100)
> #0 denoted as 0
> # 1 denoted as 1
> # Contrasts:  1 - 0
> #29 node labels mapped to the expression data
> #Average coverage 5.752782 %
> #1 (out of 5) pathways without a mapped node
> #1  pathways were filtered out
> # Preparing permutations..
> res(pwe)
> #$results
> #                                          ES p.value   q.value
> #Acute myeloid leukemia                -0.1516072    0.36 0.5066667
> #Adherens junction                      0.2576037    1.00 1.0000000
> #Adipocytokine signaling pathway        0.2221782    0.38 0.5066667
> #Adrenergic signaling in cardiomyocytes -0.2265755    0.05 0.2000000
> #
> #$errors
> #named list()
>
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). Alternatively, the user can supply a list of observed and random gene-level statistics and set `type` to `DEtable`. The observed gene-level statistics are expected as data frame with columns: *ID* gene identifiers (they must match with the node labels), *logFC* log fold-changes, *t* - t-statistics, *pval* p-values, *padj* adjusted p-values.. A data.frame of similar data.frames is expected for random statistics (it is an output from sapply function when the applied function returns a data frame). Columns should refer to the results from individual analyses after class label permutation. The others arguments are optional.Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels

should be the same as the rownames of gene expression data matrix. The `alpha` parameter sets a threshold for gene weights. The purpose of this filtering is to reduce the possiblity that a weight of a gene that is tighly correlated with a few genes are lowered by the weak correlation with other genes in a pathway. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway. The `nperm` argument controls the number of permutations.

# Chapter 3

# Analysis of RNA-Seq data

All of the methods metioned in the previus chapter were designed for the microarray data. However, the RNA-Seq technology is gaining popularity and becomes widely used. Unfortunatelly, the topology-based pathway analysis methods are not available for this type of the data. Therefore, we adapted the selected methods for RNA-Seq count matrices. Two types of adaptations were used. If a method works directly with the expression profiles (multivariable methods and TAPPA), then the count matrix is normalized and transformed either by TMM or DESeq2 method. The remaining methods use also or only the gene-level statistics like log fold-change. The differential expression analysis of genes with either `DESeq2` or `limma` package is a part of their implementation.

We will use the data from `gageData` for an example analysis.

```
> library(gageData)
> data(hnrnp.cnts)
> hnrnp.cnts<-hnrnp.cnts[rowSums(hnrnp.cnts)>0,]
> group<-c(rep("sample",4), rep("control",4))
> pathways<-pathways("hsapiens", "kegg")
>
```

## 3.1 TopologyGSA

TopologyGSA represents a multivariable method in which the expression of genes is modelled with Gausian Graphical Models with covariance matrix reflecting the pathway topology. It uses the the Iterative Proportional Scaling algorithm to estimate the covariance matrices. The testing procedure is a two-step process. First the equality of covariance matrices is testes via a likelihood ratio test. Then, when the null hypothesis of equality of covariance matrices is not rejected, the differential expression is testes via multivariate analysis of variance. On the other hand, when the convariance matrices are not equal, then Behrens-Fisher method for testing the equality of means in a two sample problem with unequal covariance matrices is employed.

The method can be used with a single command

```
> top<-TopologyGSA(hnrnp.cnts, group, pathways[1:3], type="RNASeq", nperm=1000)
> #528 node labels mapped to the expression data
> #Average coverage 83.16538
> #0 (out of 10) pathways without a mapped node
> #Normalization method was not specified. TMM used as default
> #Acute myeloid leukemia
> #Adherens junction
> #Adipocytokine signaling pathway
>
>
> res(top)
> #data frame with 0 columns and 1 rows
>
>
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. The `perms` argument sets the number of permutations to be used in the statistical tests. By default both mean and variance tests are run, this can be changed to only variance test by setting `method="var"`. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The threshold for variance test is specified with `alpha` argument. The implementation allows also testing of all the cliques present in the graph by setting `testCliques=TRUE`. Please note that these tests may take quite a long time. The implementation returns also a gene-level statistics of the differential expression of genes performed via moderated t-test from `limma` package. These statistics are later used in the visualization of a selected pathway.

Unfortunatelly, this method requires more samples than nodes in a pathway. Therefore there is an empty output in the example above.

## 3.2 DEGraph

Another multivariable method implemented in the package is DEGraph. This method assumes the same direction in the differential expresion of genes belonging to a pathway. It performs the regular Hotelling's T2 test in the graph-Fourier space restricted to its first $k$ components which is more powerful than test in the full graph-Fourier space or in the original space.

We apply the method with

```
> deg<-DEGraph(hnrnp.cnts, group, pathways, type="RNASeq")
```

```
14329 node labels mapped to the expression data
Average coverage 84.40644 %
0 (out of 267) pathways without a mapped node
```

```
> res(deg)[[1]][[1]]
```

| | Overall.p |
|---|---|
| Acute myeloid leukemia | 2.683394e-02 |
| Adherens junction | 1.343409e-01 |
| Adipocytokine signaling pathway | 8.665537e-02 |
| African trypanosomiasis | 2.078754e-01 |
| AGE-RAGE signaling pathway in diabetic complications | 3.297610e-04 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 1.269940e-02 |
| Aldosterone-regulated sodium reabsorption | 1.738535e-01 |
| Allograft rejection | 8.546771e-01 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1.276149e-04 |
| Amino sugar and nucleotide sugar metabolism | 9.186695e-03 |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 6.280109e-02 |
| AMPK signaling pathway | 2.345083e-03 |
| Amyotrophic lateral sclerosis (ALS) | 4.057960e-03 |
| Antigen processing and presentation | 1.196358e-01 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | 1.858306e-01 |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 1.193991e-03 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | 2.734131e-01 |
| Autoimmune thyroid disease | 8.546771e-01 |
| B cell receptor signaling pathway | 1.407039e-01 |
| beta-Alanine metabolism | 4.594303e-02 |
| Bile secretion | 3.022706e-02 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 6.071317e-04 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | 6.730337e-04 |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 8.138020e-02 |
| Central carbon metabolism in cancer | 5.702963e-03 |
| Chagas disease (American trypanosomiasis) | 8.702790e-04 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 2.612321e-01 |

| | |
|---|---|
| Chronic myeloid leukemia | 5.581007e-02 |
| Circadian rhythm | 5.341162e-02 |
| Citrate cycle (TCA cycle) | 1.796427e-03 |
| Cocaine addiction | 6.684496e-03 |
| Colorectal cancer | 8.763833e-02 |
| Cysteine and methionine metabolism | 1.023640e-01 |
| Cytosolic DNA-sensing pathway | 3.299765e-02 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 1.527982e-03 |
| Dorso-ventral axis formation | 2.675513e-02 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 5.465861e-01 |
| Endocytosis | 2.077984e-03 |
| Endometrial cancer | 3.359916e-02 |
| Epstein-Barr virus infection | 3.434329e-01 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 4.090170e-02 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 1.418699e-02 |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | 1.983813e-02 |
| Gastric acid secretion | 8.445878e-03 |
| Glucagon signaling pathway | 1.713701e-02 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | 3.922077e-03 |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 1.938295e-04 |
| Glycolysis / Gluconeogenesis | 6.199374e-03 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 9.608565e-01 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 3.813981e-06 |
| GnRH signaling pathway | 3.515292e-01 |
| Graft-versus-host disease | 8.546771e-01 |
| Hepatitis C | 1.605871e-02 |
| Herpes simplex infection | 4.689919e-02 |
| Histidine metabolism | NA |
| Huntington's disease | 1.576390e-03 |

| | |
|---|---|
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 7.856899e-01 |
| Inflammatory mediator regulation of TRP channels | 1.691544e-01 |
| Influenza A | 1.365372e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 8.889484e-02 |
| Insulin secretion | 2.152774e-01 |
| Insulin signaling pathway | 3.825402e-02 |
| Intestinal immune network for IgA production | 2.279272e-01 |
| Legionellosis | 3.846843e-01 |
| Leishmaniasis | 9.648594e-01 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 7.552792e-01 |
| Maturity onset diabetes of the young | 8.656706e-01 |
| Measles | 2.467815e-01 |
| Melanogenesis | 3.257857e-02 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | 3.950384e-01 |
| mRNA surveillance pathway | 1.448173e-04 |
| mTOR signaling pathway | 4.081232e-03 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 4.306460e-01 |
| Neuroactive ligand-receptor interaction | 7.259594e-01 |
| Neurotrophin signaling pathway | 4.308852e-01 |
| Nicotinate and nicotinamide metabolism | 1.104539e-02 |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 1.438629e-02 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.115275e-01 |
| One carbon pool by folate | 1.128339e-03 |
| Oocyte meiosis | 7.217088e-02 |
| Osteoclast differentiation | 1.019221e-02 |
| Ovarian steroidogenesis | 8.075149e-01 |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 2.747913e-01 |
| Pancreatic secretion | 3.022706e-02 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 3.731617e-03 |
| Pathogenic Escherichia coli infection | 4.183095e-01 |
| Pentose and glucuronate interconversions | 1.689197e-01 |
| Pentose phosphate pathway | 9.607221e-01 |
| Peroxisome | NA |
| Pertussis | 1.710487e-02 |
| Phagosome | 3.106467e-02 |

| | |
|---|---|
| Phenylalanine metabolism | 1.766262e-02 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 2.467377e-02 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 6.085264e-03 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | 5.563929e-05 |
| Pyruvate metabolism | 3.017727e-03 |
| Regulation of autophagy | 8.275166e-04 |
| Regulation of lipolysis in adipocytes | 2.270281e-01 |
| Renal cell carcinoma | 2.426642e-02 |
| Renin secretion | 3.308961e-03 |
| Renin-angiotensin system | 3.720312e-01 |
| Retinol metabolism | NA |
| Rheumatoid arthritis | 8.546771e-01 |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 7.688811e-01 |
| RNA degradation | 8.761521e-03 |
| RNA transport | 1.201860e-01 |
| Salivary secretion | 8.569712e-01 |
| Salmonella infection | 6.001921e-02 |
| Selenocompound metabolism | NA |
| Shigellosis | 3.666778e-01 |
| SNARE interactions in vesicular transport | 7.232946e-02 |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 1.553210e-01 |
| Starch and sucrose metabolism | 3.103412e-03 |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 1.792871e-02 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 2.073505e-02 |
| T cell receptor signaling pathway | 4.019857e-02 |
| Taste transduction | 1.446835e-01 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 2.335354e-04 |
| Thyroid hormone synthesis | 4.534803e-01 |
| Tight junction | 1.763080e-01 |

| | |
|---|---|
| TNF signaling pathway | 1.998218e-01 |
| Toxoplasmosis | 9.648594e-01 |
| Transcriptional misregulation in cancer | 8.000109e-02 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | 8.546771e-01 |
| Type II diabetes mellitus | 1.590204e-01 |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | 1.049775e-01 |
| Vasopressin-regulated water reabsorption | 8.245162e-03 |
| VEGF signaling pathway | 4.728829e-02 |
| Vibrio cholerae infection | 3.317853e-01 |
| Viral carcinogenesis | 1.429658e-03 |
| Viral myocarditis | 4.157033e-01 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | 1.032858e-01 |

| | Overall.q.value |
|---|---|
| Acute myeloid leukemia | 0.0686948776 |
| Adherens junction | 0.2149455150 |
| Adipocytokine signaling pathway | 0.1558014683 |
| African trypanosomiasis | 0.2892179055 |
| AGE-RAGE signaling pathway in diabetic complications | 0.0060299151 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 0.0439330505 |
| Aldosterone-regulated sodium reabsorption | 0.2528778655 |
| Allograft rejection | 0.8918073802 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 0.0046341528 |
| Amino sugar and nucleotide sugar metabolism | 0.0345852065 |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 0.1217960532 |
| AMPK signaling pathway | 0.0157984548 |
| Amyotrophic lateral sclerosis (ALS) | 0.0200922183 |
| Antigen processing and presentation | 0.1947317720 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | 0.2642924298 |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.0117562172 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | 0.3552856637 |
| Autoimmune thyroid disease | 0.8918073802 |
| B cell receptor signaling pathway | 0.2196353046 |
| beta-Alanine metabolism | 0.0976274338 |
| Bile secretion | 0.0744050727 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |

| | |
|---|---|
| Bladder cancer | 0.0095720351 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | 0.0095720351 |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.1488095131 |
| Central carbon metabolism in cancer | 0.0270362676 |
| Chagas disease (American trypanosomiasis) | 0.0101268831 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 0.3447186596 |
| Chronic myeloid leukemia | 0.1116201315 |
| Circadian rhythm | 0.1085188410 |
| Citrate cycle (TCA cycle) | 0.0135260369 |
| Cocaine addiction | 0.0285205154 |
| Colorectal cancer | 0.1558014683 |
| Cysteine and methionine metabolism | 0.1762744362 |
| Cytosolic DNA-sensing pathway | 0.0767945307 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 0.0126111212 |
| Dorso-ventral axis formation | 0.0686948776 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 0.6246697961 |
| Endocytosis | 0.0147767738 |
| Endometrial cancer | 0.0767980823 |
| Epstein-Barr virus infection | 0.4352416867 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 0.0887358821 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 0.0472165281 |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | 0.0564284582 |
| Gastric acid secretion | 0.0337835138 |
| Glucagon signaling pathway | 0.0521562591 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | 0.0200922183 |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 0.0049620354 |
| Glycolysis / Gluconeogenesis | 0.0273627539 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |

| | |
|---|---|
| Glycosphingolipid biosynthesis - globo series | 0.9648593562 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 0.0004881896 |
| GnRH signaling pathway | 0.4411347127 |
| Graft-versus-host disease | 0.8918073802 |
| Hepatitis C | 0.0513878609 |
| Herpes simplex infection | 0.0976274338 |
| Histidine metabolism | NA |
| Huntington's disease | 0.0126111212 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 0.8669681576 |
| Inflammatory mediator regulation of TRP channels | 0.2488708658 |
| Influenza A | 0.2157625579 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 0.1558704081 |
| Insulin secretion | 0.2962958289 |
| Insulin signaling pathway | 0.0859037555 |
| Intestinal immune network for IgA production | 0.3071018608 |
| Legionellosis | 0.4689484659 |
| Leishmaniasis | 0.9648593562 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 0.8480327691 |
| Maturity onset diabetes of the young | 0.8935954539 |
| Measles | 0.3290420480 |
| Melanogenesis | 0.0767945307 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | 0.4770274501 |
| mRNA surveillance pathway | 0.0046341528 |
| mTOR signaling pathway | 0.0200922183 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 0.5013937091 |
| Neuroactive ligand-receptor interaction | 0.8223256592 |
| Neurotrophin signaling pathway | 0.5013937091 |
| Nicotinate and nicotinamide metabolism | 0.0392724961 |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 0.0472165281 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.1853962872 |
| One carbon pool by folate | 0.0117562172 |
| Oocyte meiosis | 0.1361495803 |
| Osteoclast differentiation | 0.0372743834 |
| Ovarian steroidogenesis | 0.8834350695 |
| Oxidative phosphorylation | NA |

| | |
|---|---|
| Pancreatic cancer | 0.3552856637 |
| Pancreatic secretion | 0.0744050727 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 0.0200922183 |
| Pathogenic Escherichia coli infection | 0.4957742601 |
| Pentose and glucuronate interconversions | 0.2488708658 |
| Pentose phosphate pathway | 0.9648593562 |
| Peroxisome | NA |
| Pertussis | 0.0521562591 |
| Phagosome | 0.0750241025 |
| Phenylalanine metabolism | 0.0521562591 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 0.0657967307 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 0.0273627539 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | 0.0035609144 |
| Pyruvate metabolism | 0.0189160355 |
| Regulation of autophagy | 0.0101268831 |
| Regulation of lipolysis in adipocytes | 0.3071018608 |
| Renal cell carcinoma | 0.0657967307 |
| Renin secretion | 0.0192521393 |
| Renin-angiotensin system | 0.4578846088 |
| Retinol metabolism | NA |
| Rheumatoid arthritis | 0.8918073802 |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 0.8557981017 |
| RNA degradation | 0.0339840820 |
| RNA transport | 0.1947317720 |
| Salivary secretion | 0.8918073802 |
| Salmonella infection | 0.1181916724 |
| Selenocompound metabolism | NA |
| Shigellosis | 0.4556773018 |
| SNARE interactions in vesicular transport | 0.1361495803 |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 0.2366796794 |
| Starch and sucrose metabolism | 0.0189160355 |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 0.0521562591 |
| Synaptic vesicle cycle | NA |

| | |
|---|---|
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 0.0576975363 |
| T cell receptor signaling pathway | 0.0887140947 |
| Taste transduction | 0.2231264091 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 0.0049820882 |
| Thyroid hormone synthesis | 0.5229322780 |
| Tight junction | 0.2535666134 |
| TNF signaling pathway | 0.2810679609 |
| Toxoplasmosis | 0.9648593562 |
| Transcriptional misregulation in cancer | 0.1484078265 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | 0.8918073802 |
| Type II diabetes mellitus | 0.2394659645 |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | 0.1768041406 |
| Vasopressin-regulated water reabsorption | 0.0337835138 |
| VEGF signaling pathway | 0.0976274338 |
| Vibrio cholerae infection | 0.4246851598 |
| Viral carcinogenesis | 0.0126111212 |
| Viral myocarditis | 0.4957742601 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | 0.1762744362 |

| | Comp1.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | 3.321571e-01 |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | 7.337280e-01 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | 4.755887e-02 |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | 6.922096e-03 |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | 2.409016e-02 |

| | |
|---|---|
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 4.625094e-02 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | 9.033627e-02 |
| Autoimmune thyroid disease | 7.337280e-01 |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | 9.137767e-02 |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 1.684380e-01 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | 4.851462e-03 |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | 1.306564e-02 |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | 1.886335e-04 |
| Cytosolic DNA-sensing pathway | 1.973568e-03 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | 5.540730e-03 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | 2.779362e-03 |
| Gastric acid secretion | NA |

| | |
|---|---|
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | 9.739993e-02 |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 6.812957e-05 |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 2.725203e-01 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 4.975241e-05 |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | 7.337280e-01 |
| Hepatitis C | NA |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | 2.520118e-01 |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 7.793022e-01 |
| Maturity onset diabetes of the young | 4.820172e-01 |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | 5.837847e-03 |
| mRNA surveillance pathway | 4.352991e-02 |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |

| | |
|---|---|
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | 1.274495e-03 |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | 7.946070e-04 |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 2.003296e-04 |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | 4.659743e-01 |
| Pentose phosphate pathway | 6.671947e-02 |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | 9.307516e-05 |
| Pyruvate metabolism | 7.213830e-05 |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | 3.785431e-01 |
| Retinol metabolism | NA |
| Rheumatoid arthritis | 7.337280e-01 |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |

| | |
|---|---|
| Shigellosis | 9.048986e-02 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | 7.428724e-04 |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 3.861644e-04 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 3.693798e-02 |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 9.869721e-02 |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | 7.341611e-02 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | 7.337280e-01 |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | 4.321249e-02 |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | 1.083861e-04 |
| Viral carcinogenesis | 8.268046e-03 |
| Viral myocarditis | 3.240477e-01 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | 3.001528e-01 |

| | Comp1.pFourier |
|---|---|
| Acute myeloid leukemia | 2.683394e-02 |
| Adherens junction | 1.343409e-01 |
| Adipocytokine signaling pathway | 8.665537e-02 |
| African trypanosomiasis | 2.078754e-01 |
| AGE-RAGE signaling pathway in diabetic complications | 3.297610e-04 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 1.269940e-02 |
| Aldosterone-regulated sodium reabsorption | 1.738535e-01 |
| Allograft rejection | 8.546771e-01 |

| | |
|---|---|
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1.276149e-04 |
| Amino sugar and nucleotide sugar metabolism | 9.186695e-03 |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 6.280109e-02 |
| AMPK signaling pathway | 2.345083e-03 |
| Amyotrophic lateral sclerosis (ALS) | 4.057960e-03 |
| Antigen processing and presentation | 1.196358e-01 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | 1.858306e-01 |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 1.193991e-03 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | 2.734131e-01 |
| Autoimmune thyroid disease | 8.546771e-01 |
| B cell receptor signaling pathway | 1.407039e-01 |
| beta-Alanine metabolism | 4.594303e-02 |
| Bile secretion | 3.022706e-02 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 6.071317e-04 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | 6.730337e-04 |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 8.138020e-02 |
| Central carbon metabolism in cancer | 5.702963e-03 |
| Chagas disease (American trypanosomiasis) | 8.702790e-04 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 2.612321e-01 |
| Chronic myeloid leukemia | 5.581007e-02 |
| Circadian rhythm | 5.341162e-02 |
| Citrate cycle (TCA cycle) | 1.796427e-03 |
| Cocaine addiction | 6.684496e-03 |
| Colorectal cancer | 8.763833e-02 |
| Cysteine and methionine metabolism | 1.023640e-01 |
| Cytosolic DNA-sensing pathway | 3.299765e-02 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 1.527982e-03 |
| Dorso-ventral axis formation | 2.675513e-02 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 5.465861e-01 |
| Endocytosis | 2.077984e-03 |
| Endometrial cancer | 3.359916e-02 |
| Epstein-Barr virus infection | 3.434329e-01 |

| | |
|---|---|
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 4.090170e-02 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 1.418699e-02 |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | 1.983813e-02 |
| Gastric acid secretion | 8.445878e-03 |
| Glucagon signaling pathway | 1.713701e-02 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | 3.922077e-03 |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 1.938295e-04 |
| Glycolysis / Gluconeogenesis | 6.199374e-03 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 9.608565e-01 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 3.813981e-06 |
| GnRH signaling pathway | 3.515292e-01 |
| Graft-versus-host disease | 8.546771e-01 |
| Hepatitis C | 1.605871e-02 |
| Herpes simplex infection | 4.689919e-02 |
| Histidine metabolism | NA |
| Huntington's disease | 1.576390e-03 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 7.856899e-01 |
| Inflammatory mediator regulation of TRP channels | 1.691544e-01 |
| Influenza A | 1.365372e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 8.889484e-02 |
| Insulin secretion | 2.152774e-01 |
| Insulin signaling pathway | 3.825402e-02 |
| Intestinal immune network for IgA production | 2.279272e-01 |
| Legionellosis | 3.846843e-01 |
| Leishmaniasis | 9.648594e-01 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 7.552792e-01 |

| | |
|---|---|
| Maturity onset diabetes of the young | 8.656706e-01 |
| Measles | 2.467815e-01 |
| Melanogenesis | 3.257857e-02 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | 3.950384e-01 |
| mRNA surveillance pathway | 1.448173e-04 |
| mTOR signaling pathway | 4.081232e-03 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 4.306460e-01 |
| Neuroactive ligand-receptor interaction | 7.259594e-01 |
| Neurotrophin signaling pathway | 4.308852e-01 |
| Nicotinate and nicotinamide metabolism | 1.104539e-02 |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 1.438629e-02 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.115275e-01 |
| One carbon pool by folate | 1.128339e-03 |
| Oocyte meiosis | 7.217088e-02 |
| Osteoclast differentiation | 1.019221e-02 |
| Ovarian steroidogenesis | 8.075149e-01 |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 2.747913e-01 |
| Pancreatic secretion | 3.022706e-02 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 3.731617e-03 |
| Pathogenic Escherichia coli infection | 4.183095e-01 |
| Pentose and glucuronate interconversions | 1.689197e-01 |
| Pentose phosphate pathway | 9.607221e-01 |
| Peroxisome | NA |
| Pertussis | 1.710487e-02 |
| Phagosome | 3.106467e-02 |
| Phenylalanine metabolism | 1.766262e-02 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 2.467377e-02 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 6.085264e-03 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | 5.563929e-05 |
| Pyruvate metabolism | 3.017727e-03 |
| Regulation of autophagy | 8.275166e-04 |
| Regulation of lipolysis in adipocytes | 2.270281e-01 |
| Renal cell carcinoma | 2.426642e-02 |
| Renin secretion | 3.308961e-03 |
| Renin-angiotensin system | 3.720312e-01 |

| | |
|---|---|
| Retinol metabolism | NA |
| Rheumatoid arthritis | 8.546771e-01 |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 7.688811e-01 |
| RNA degradation | 8.761521e-03 |
| RNA transport | 1.201860e-01 |
| Salivary secretion | 8.569712e-01 |
| Salmonella infection | 6.001921e-02 |
| Selenocompound metabolism | NA |
| Shigellosis | 3.666778e-01 |
| SNARE interactions in vesicular transport | 7.232946e-02 |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 1.553210e-01 |
| Starch and sucrose metabolism | 3.103412e-03 |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 1.792871e-02 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 2.073505e-02 |
| T cell receptor signaling pathway | 4.019857e-02 |
| Taste transduction | 1.446835e-01 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 2.335354e-04 |
| Thyroid hormone synthesis | 4.534803e-01 |
| Tight junction | 1.763080e-01 |
| TNF signaling pathway | 1.998218e-01 |
| Toxoplasmosis | 9.648594e-01 |
| Transcriptional misregulation in cancer | 8.000109e-02 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | 8.546771e-01 |
| Type II diabetes mellitus | 1.590204e-01 |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | 1.049775e-01 |
| Vasopressin-regulated water reabsorption | 8.245162e-03 |
| VEGF signaling pathway | 4.728829e-02 |
| Vibrio cholerae infection | 3.317853e-01 |
| Viral carcinogenesis | 1.429658e-03 |
| Viral myocarditis | 4.157033e-01 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | 1.032858e-01 |

| | Comp1.k |
|---|---|
| Acute myeloid leukemia | 3 |
| Adherens junction | 4 |
| Adipocytokine signaling pathway | 3 |
| African trypanosomiasis | 1 |
| AGE-RAGE signaling pathway in diabetic complications | 6 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 3 |
| Aldosterone-regulated sodium reabsorption | 3 |
| Allograft rejection | 1 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2 |
| Amino sugar and nucleotide sugar metabolism | 1 |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 2 |
| AMPK signaling pathway | 3 |
| Amyotrophic lateral sclerosis (ALS) | 1 |
| Antigen processing and presentation | 2 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | 1 |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 1 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | 1 |
| Autoimmune thyroid disease | 1 |
| B cell receptor signaling pathway | 3 |
| beta-Alanine metabolism | 1 |
| Bile secretion | 2 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 2 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | 1 |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 2 |
| Central carbon metabolism in cancer | 4 |
| Chagas disease (American trypanosomiasis) | 2 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 6 |
| Chronic myeloid leukemia | 6 |
| Circadian rhythm | 4 |
| Citrate cycle (TCA cycle) | 1 |
| Cocaine addiction | 3 |
| Colorectal cancer | 5 |
| Cysteine and methionine metabolism | 1 |

| | |
|---|---|
| Cytosolic DNA-sensing pathway | 1 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 4 |
| Dorso-ventral axis formation | 1 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 2 |
| Endocytosis | 2 |
| Endometrial cancer | 4 |
| Epstein-Barr virus infection | 2 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 4 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 2 |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | 1 |
| Gastric acid secretion | 3 |
| Glucagon signaling pathway | 5 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | 2 |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 1 |
| Glycolysis / Gluconeogenesis | 2 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 1 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 1 |
| GnRH signaling pathway | 4 |
| Graft-versus-host disease | 1 |
| Hepatitis C | 2 |
| Herpes simplex infection | 2 |
| Histidine metabolism | NA |
| Huntington's disease | 2 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 3 |
| Inflammatory mediator regulation of TRP channels | 4 |
| Influenza A | 3 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 2 |

| | |
|---|---|
| Insulin secretion | 5 |
| Insulin signaling pathway | 4 |
| Intestinal immune network for IgA production | 1 |
| Legionellosis | 2 |
| Leishmaniasis | 2 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 1 |
| Maturity onset diabetes of the young | 1 |
| Measles | 2 |
| Melanogenesis | 3 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | 1 |
| mRNA surveillance pathway | 2 |
| mTOR signaling pathway | 2 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 2 |
| Neuroactive ligand-receptor interaction | 2 |
| Neurotrophin signaling pathway | 5 |
| Nicotinate and nicotinamide metabolism | 1 |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 2 |
| Non-alcoholic fatty liver disease (NAFLD) | 4 |
| One carbon pool by folate | 1 |
| Oocyte meiosis | 4 |
| Osteoclast differentiation | 2 |
| Ovarian steroidogenesis | 3 |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 6 |
| Pancreatic secretion | 2 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 1 |
| Pathogenic Escherichia coli infection | 3 |
| Pentose and glucuronate interconversions | 2 |
| Pentose phosphate pathway | 1 |
| Peroxisome | NA |
| Pertussis | 2 |
| Phagosome | 4 |
| Phenylalanine metabolism | 2 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 2 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |

| | |
|---|---|
| Prion diseases | 2 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | 1 |
| Pyruvate metabolism | 1 |
| Regulation of autophagy | 2 |
| Regulation of lipolysis in adipocytes | 4 |
| Renal cell carcinoma | 4 |
| Renin secretion | 2 |
| Renin-angiotensin system | 1 |
| Retinol metabolism | NA |
| Rheumatoid arthritis | 1 |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 2 |
| RNA degradation | 2 |
| RNA transport | 2 |
| Salivary secretion | 2 |
| Salmonella infection | 3 |
| Selenocompound metabolism | NA |
| Shigellosis | 1 |
| SNARE interactions in vesicular transport | 4 |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 3 |
| Starch and sucrose metabolism | 1 |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 1 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 2 |
| T cell receptor signaling pathway | 3 |
| Taste transduction | 2 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 2 |
| Thyroid hormone synthesis | 4 |
| Tight junction | 2 |
| TNF signaling pathway | 6 |
| Toxoplasmosis | 2 |
| Transcriptional misregulation in cancer | 1 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | 1 |
| Type II diabetes mellitus | 3 |

| | |
|---|---|
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | 1 |
| Vasopressin-regulated water reabsorption | 3 |
| VEGF signaling pathway | 2 |
| Vibrio cholerae infection | 1 |
| Viral carcinogenesis | 1 |
| Viral myocarditis | 1 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | 1 |

| | Comp2.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | 1.481186e-03 |
| Adipocytokine signaling pathway | 1.374063e-02 |
| African trypanosomiasis | 3.743224e-02 |
| AGE-RAGE signaling pathway in diabetic complications | 1.293286e-02 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | 9.033627e-02 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1.493874e-02 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 7.524637e-02 |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | 1.388958e-02 |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | 9.033627e-02 |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | 3.453946e-01 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 2.652803e-07 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |

| | |
|---|---|
| Central carbon metabolism in cancer | 1.971067e-03 |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 4.655277e-03 |
| Chronic myeloid leukemia | 2.429064e-02 |
| Circadian rhythm | 4.771821e-03 |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | 7.548896e-05 |
| Cytosolic DNA-sensing pathway | 5.007935e-03 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | 1.812216e-03 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 6.102416e-02 |
| Endocytosis | NA |
| Endometrial cancer | 9.869721e-02 |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 1.767816e-01 |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 3.651105e-05 |
| Glycolysis / Gluconeogenesis | 2.017917e-03 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 2.126348e-03 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 2.697094e-02 |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |

| | |
|---|---|
| Hepatitis C | 4.408723e-02 |
| Herpes simplex infection | 7.392980e-03 |
| Histidine metabolism | NA |
| Huntington's disease | 2.559033e-02 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 1.461611e-02 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | 1.667720e-01 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 7.113984e-01 |
| Leishmaniasis | 3.887577e-01 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 8.607069e-01 |
| Maturity onset diabetes of the young | NA |
| Measles | 1.772913e-01 |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 3.930594e-02 |
| mTOR signaling pathway | 1.572668e-03 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 5.956817e-03 |
| Neuroactive ligand-receptor interaction | 3.503275e-02 |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 2.896892e-02 |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | 5.527719e-02 |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | 1.521317e-01 |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1.089600e-03 |
| Pancreatic secretion | 6.307811e-02 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 2.848925e-01 |
| Pathogenic Escherichia coli infection | 1.128429e-01 |
| Pentose and glucuronate interconversions | 2.931817e-02 |

| | |
|---|---|
| Pentose phosphate pathway | 8.149323e-04 |
| Peroxisome | NA |
| Pertussis | 2.016979e-01 |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 1.063318e-01 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 2.175494e-05 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | 2.782924e-02 |
| Salivary secretion | NA |
| Salmonella infection | 3.362306e-02 |
| Selenocompound metabolism | NA |
| Shigellosis | 2.896892e-02 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 5.462572e-02 |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 1.566007e-01 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 7.337280e-01 |
| T cell receptor signaling pathway | 6.226573e-03 |
| Taste transduction | 2.333172e-01 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |

| | |
|---|---|
| Thiamine metabolism | NA |
| Thyroid cancer | 2.009437e-03 |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | 1.255121e-03 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | 1.264990e-02 |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | 8.646299e-02 |
| Viral carcinogenesis | 5.896532e-02 |
| Viral myocarditis | 4.189248e-02 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp2.pFourier |
|---|---|
| Acute myeloid leukemia | 8.546789e-01 |
| Adherens junction | 5.196806e-04 |
| Adipocytokine signaling pathway | 4.230508e-02 |
| African trypanosomiasis | 2.922056e-02 |
| AGE-RAGE signaling pathway in diabetic complications | 4.353248e-05 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 2.105152e-01 |
| Aldosterone-regulated sodium reabsorption | 1.750243e-01 |
| Allograft rejection | 2.734131e-01 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 4.394902e-02 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 1.974748e-02 |
| AMPK signaling pathway | 4.581910e-02 |
| Amyotrophic lateral sclerosis (ALS) | 2.391120e-01 |
| Antigen processing and presentation | 3.023482e-01 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | 2.734131e-01 |
| B cell receptor signaling pathway | 3.948262e-02 |

| | |
|---|---|
| beta-Alanine metabolism | NA |
| Bile secretion | 7.805723e-01 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 1.033828e-02 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 9.822004e-01 |
| Central carbon metabolism in cancer | 1.861212e-04 |
| Chagas disease (American trypanosomiasis) | 8.475496e-02 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 7.119866e-01 |
| Chronic myeloid leukemia | 6.038602e-02 |
| Circadian rhythm | 3.360055e-01 |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | 7.260976e-01 |
| Colorectal cancer | 5.946140e-03 |
| Cysteine and methionine metabolism | 7.548123e-05 |
| Cytosolic DNA-sensing pathway | 6.826353e-03 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 7.306609e-02 |
| Dorso-ventral axis formation | 1.023159e-01 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 1.163920e-01 |
| Endocytosis | 3.549273e-01 |
| Endometrial cancer | 2.335354e-04 |
| Epstein-Barr virus infection | 3.696621e-03 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 8.074759e-05 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 4.361522e-01 |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | 1.629596e-01 |
| Glucagon signaling pathway | 5.354515e-02 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 2.772092e-06 |
| Glycolysis / Gluconeogenesis | 2.488998e-02 |

| | |
|---|---|
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 7.575652e-02 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 1.894697e-02 |
| GnRH signaling pathway | 1.808112e-03 |
| Graft-versus-host disease | NA |
| Hepatitis C | 1.098787e-02 |
| Herpes simplex infection | 1.198945e-02 |
| Histidine metabolism | NA |
| Huntington's disease | 6.140781e-01 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 3.089862e-01 |
| Inflammatory mediator regulation of TRP channels | 6.205323e-03 |
| Influenza A | 8.594545e-04 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 3.896294e-03 |
| Insulin secretion | 8.556072e-02 |
| Insulin signaling pathway | 3.383035e-02 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 1.287291e-01 |
| Leishmaniasis | 6.191867e-01 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 6.785390e-01 |
| Maturity onset diabetes of the young | NA |
| Measles | 8.070942e-02 |
| Melanogenesis | 1.788867e-01 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 5.259391e-03 |
| mTOR signaling pathway | 4.267400e-04 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 2.261001e-01 |
| Neuroactive ligand-receptor interaction | 9.669939e-01 |
| Neurotrophin signaling pathway | 1.967410e-02 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 5.104709e-02 |
| Non-alcoholic fatty liver disease (NAFLD) | 3.438317e-03 |
| One carbon pool by folate | 2.197171e-01 |

| | |
|---|---|
| Oocyte meiosis | 1.827773e-02 |
| Osteoclast differentiation | 4.134982e-01 |
| Ovarian steroidogenesis | 7.138747e-01 |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 3.095555e-03 |
| Pancreatic secretion | 6.968137e-01 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 4.952981e-01 |
| Pathogenic Escherichia coli infection | 6.738207e-01 |
| Pentose and glucuronate interconversions | 1.873539e-03 |
| Pentose phosphate pathway | 2.154682e-03 |
| Peroxisome | NA |
| Pertussis | 1.333941e-03 |
| Phagosome | 3.053383e-02 |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 1.146469e-01 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 1.648858e-05 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | 7.061067e-03 |
| Renal cell carcinoma | 2.205904e-03 |
| Renin secretion | 1.276149e-04 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1.639718e-02 |
| RNA degradation | NA |
| RNA transport | 1.354497e-01 |
| Salivary secretion | 1.966754e-01 |
| Salmonella infection | 3.407628e-02 |
| Selenocompound metabolism | NA |
| Shigellosis | 5.104709e-02 |
| SNARE interactions in vesicular transport | 5.729370e-02 |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 2.509147e-02 |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |

| | |
|---|---|
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 4.681311e-01 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 8.546771e-01 |
| T cell receptor signaling pathway | 6.678164e-03 |
| Taste transduction | 7.498701e-02 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 3.714533e-04 |
| Thyroid hormone synthesis | 2.430070e-01 |
| Tight junction | 8.262934e-03 |
| TNF signaling pathway | 2.793647e-01 |
| Toxoplasmosis | 4.107125e-02 |
| Transcriptional misregulation in cancer | 9.587589e-01 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | 5.772512e-01 |
| VEGF signaling pathway | 3.494582e-03 |
| Vibrio cholerae infection | 9.807019e-01 |
| Viral carcinogenesis | 4.027179e-02 |
| Viral myocarditis | 2.894027e-01 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp2.k |
|---|---|
| Acute myeloid leukemia | 2 |
| Adherens junction | 1 |
| Adipocytokine signaling pathway | 1 |
| African trypanosomiasis | 1 |
| AGE-RAGE signaling pathway in diabetic complications | 1 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 3 |
| Aldosterone-regulated sodium reabsorption | 2 |
| Allograft rejection | 1 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 1 |
| AMPK signaling pathway | 3 |

| | |
|---|---|
| Amyotrophic lateral sclerosis (ALS) | 1 |
| Antigen processing and presentation | 2 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | 1 |
| B cell receptor signaling pathway | 2 |
| beta-Alanine metabolism | NA |
| Bile secretion | 1 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 1 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 2 |
| Central carbon metabolism in cancer | 1 |
| Chagas disease (American trypanosomiasis) | 2 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 1 |
| Chronic myeloid leukemia | 2 |
| Circadian rhythm | 1 |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | 2 |
| Colorectal cancer | 2 |
| Cysteine and methionine metabolism | 1 |
| Cytosolic DNA-sensing pathway | 1 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 2 |
| Dorso-ventral axis formation | 1 |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 2 |
| Endocytosis | 2 |
| Endometrial cancer | 2 |
| Epstein-Barr virus infection | 2 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 2 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | 2 |
| Fatty acid elongation | NA |

| | |
|---|---|
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | 3 |
| Glucagon signaling pathway | 2 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | 1 |
| Glycolysis / Gluconeogenesis | 2 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | 1 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | 1 |
| GnRH signaling pathway | 2 |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | 1 |
| Histidine metabolism | NA |
| Huntington's disease | 1 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 2 |
| Inflammatory mediator regulation of TRP channels | 3 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 2 |
| Insulin secretion | 2 |
| Insulin signaling pathway | 2 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 1 |
| Leishmaniasis | 1 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 1 |
| Maturity onset diabetes of the young | NA |
| Measles | 2 |
| Melanogenesis | 2 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 1 |

| | |
|---|---|
| mTOR signaling pathway | 1 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 1 |
| Neuroactive ligand-receptor interaction | 1 |
| Neurotrophin signaling pathway | 4 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 1 |
| Non-alcoholic fatty liver disease (NAFLD) | 2 |
| One carbon pool by folate | 1 |
| Oocyte meiosis | 3 |
| Osteoclast differentiation | 2 |
| Ovarian steroidogenesis | 1 |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1 |
| Pancreatic secretion | 2 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 1 |
| Pathogenic Escherichia coli infection | 1 |
| Pentose and glucuronate interconversions | 1 |
| Pentose phosphate pathway | 1 |
| Peroxisome | NA |
| Pertussis | 2 |
| Phagosome | 2 |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 2 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 1 |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | 2 |
| Renal cell carcinoma | 3 |
| Renin secretion | 2 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 2 |
| RNA degradation | NA |

| | |
|---|---|
| RNA transport | 1 |
| Salivary secretion | 2 |
| Salmonella infection | 1 |
| Selenocompound metabolism | NA |
| Shigellosis | 1 |
| SNARE interactions in vesicular transport | 2 |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | 1 |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 1 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 1 |
| T cell receptor signaling pathway | 1 |
| Taste transduction | 1 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | 1 |
| Thyroid hormone synthesis | 3 |
| Tight junction | 2 |
| TNF signaling pathway | 3 |
| Toxoplasmosis | 2 |
| Transcriptional misregulation in cancer | 1 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | 1 |
| VEGF signaling pathway | 2 |
| Vibrio cholerae infection | 1 |
| Viral carcinogenesis | 1 |
| Viral myocarditis | 1 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp3.p |
|---|---|
| Acute myeloid leukemia | 4.904284e-02 |
| Adherens junction | 2.292748e-05 |
| Adipocytokine signaling pathway | 1.147263e-02 |
| African trypanosomiasis | 9.670449e-01 |
| AGE-RAGE signaling pathway in diabetic complications | 2.292748e-05 |

| | |
|---|---|
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2.559033e-02 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 6.397253e-03 |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | 2.003296e-04 |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 6.171019e-04 |
| beta-Alanine metabolism | NA |
| Bile secretion | 7.812008e-06 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 7.564743e-05 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 6.501366e-02 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 1.040329e-02 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 8.665990e-02 |
| Chronic myeloid leukemia | 5.859868e-04 |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | 6.827015e-02 |
| Colorectal cancer | 1.642179e-05 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |

| | |
|---|---|
| Endocrine and other factor-regulated calcium reabsorption | 1.156150e-02 |
| Endocytosis | NA |
| Endometrial cancer | 1.100060e-01 |
| Epstein-Barr virus infection | 5.587546e-02 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 3.427673e-03 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | 6.307811e-02 |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1.772990e-01 |
| Herpes simplex infection | 5.089027e-02 |
| Histidine metabolism | NA |
| Huntington's disease | 4.221786e-04 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 1.499595e-02 |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 5.904718e-02 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1.446356e-01 |
| Insulin secretion | NA |
| Insulin signaling pathway | 7.626221e-03 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 2.003296e-04 |
| Leishmaniasis | 3.502073e-02 |
| Linoleic acid metabolism | NA |

| | |
|---|---|
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 5.045211e-02 |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 1.697150e-02 |
| mTOR signaling pathway | 1.736289e-02 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 6.726537e-02 |
| Neuroactive ligand-receptor interaction | 3.606624e-02 |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 3.210491e-01 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.853509e-02 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | 7.315402e-02 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 4.271506e-04 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | 6.397253e-03 |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 2.850790e-01 |
| Phagosome | 2.370887e-03 |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 5.276505e-01 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |

| | |
|---|---|
| Regulation of lipolysis in adipocytes | 5.410172e-03 |
| Renal cell carcinoma | 1.987117e-02 |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1.139148e-02 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | 5.409121e-01 |
| Salmonella infection | 7.113984e-01 |
| Selenocompound metabolism | NA |
| Shigellosis | 1.596866e-01 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 9.033627e-02 |
| T cell receptor signaling pathway | 6.171019e-04 |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | 3.730385e-01 |
| Tight junction | 9.440231e-03 |
| TNF signaling pathway | 1.820035e-02 |
| Toxoplasmosis | 2.921922e-03 |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 1.362697e-03 |
| Vibrio cholerae infection | NA |

| | |
|---|---|
| Viral carcinogenesis | NA |
| Viral myocarditis | 4.198956e-05 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |
| | Comp3.pFourier |
| Acute myeloid leukemia | 8.403137e-02 |
| Adherens junction | 6.690442e-02 |
| Adipocytokine signaling pathway | 1.279352e-01 |
| African trypanosomiasis | 7.953202e-01 |
| AGE-RAGE signaling pathway in diabetic complications | 4.380652e-02 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 7.282288e-02 |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 6.140781e-01 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 9.778295e-02 |
| AMPK signaling pathway | 5.242030e-01 |
| Amyotrophic lateral sclerosis (ALS) | 3.731617e-03 |
| Antigen processing and presentation | 1.067731e-01 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 3.033232e-01 |
| beta-Alanine metabolism | NA |
| Bile secretion | 1.508331e-03 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 4.356788e-01 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 5.519550e-02 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 9.491520e-01 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 5.595241e-01 |
| Chronic myeloid leukemia | 1.186274e-03 |
| Circadian rhythm | NA |

| | |
|---|---|
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | 4.391963e-01 |
| Colorectal cancer | 3.759383e-02 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 2.780326e-02 |
| Endocytosis | 3.080663e-01 |
| Endometrial cancer | 3.626109e-01 |
| Epstein-Barr virus infection | 4.253858e-02 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 5.081139e-03 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | 6.968137e-01 |
| Glucagon signaling pathway | 8.931956e-01 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | 1.571789e-01 |
| Graft-versus-host disease | NA |
| Hepatitis C | 3.200578e-01 |
| Herpes simplex infection | 5.412498e-03 |
| Histidine metabolism | NA |
| Huntington's disease | 7.621257e-03 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 3.691518e-03 |

| | |
|---|---|
| Inflammatory mediator regulation of TRP channels | 2.375714e-01 |
| Influenza A | 1.308912e-02 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 2.938004e-02 |
| Insulin secretion | 2.881541e-01 |
| Insulin signaling pathway | 1.046551e-02 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 3.731617e-03 |
| Leishmaniasis | 5.826237e-01 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 4.911423e-01 |
| Melanogenesis | 4.848867e-02 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 3.446334e-02 |
| mTOR signaling pathway | 5.362409e-02 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 7.188636e-02 |
| Neuroactive ligand-receptor interaction | 5.023725e-02 |
| Neurotrophin signaling pathway | 1.571789e-01 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 1.417019e-01 |
| Non-alcoholic fatty liver disease (NAFLD) | 8.441988e-06 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 7.073635e-02 |
| Osteoclast differentiation | 3.058004e-02 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 8.096576e-02 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | 9.778295e-02 |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 7.128266e-02 |
| Phagosome | 4.853406e-02 |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |

| | |
|---|---|
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 3.789732e-01 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | 2.562359e-03 |
| Renal cell carcinoma | 1.021018e-03 |
| Renin secretion | 9.329192e-01 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 8.002334e-04 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | 8.479994e-01 |
| Salmonella infection | 1.287291e-01 |
| Selenocompound metabolism | NA |
| Shigellosis | 2.107395e-01 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 2.734131e-01 |
| T cell receptor signaling pathway | 3.033232e-01 |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | 4.026018e-01 |
| Tight junction | 8.748215e-01 |
| TNF signaling pathway | 4.675764e-03 |
| Toxoplasmosis | 8.016575e-01 |

| | |
|---|---|
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 2.349180e-01 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 1.356273e-04 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp3.k |
|---|---|
| Acute myeloid leukemia | 1 |
| Adherens junction | 1 |
| Adipocytokine signaling pathway | 1 |
| African trypanosomiasis | 1 |
| AGE-RAGE signaling pathway in diabetic complications | 1 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 2 |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 1 |
| AMPK signaling pathway | 3 |
| Amyotrophic lateral sclerosis (ALS) | 1 |
| Antigen processing and presentation | 2 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 1 |
| beta-Alanine metabolism | NA |
| Bile secretion | 1 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 1 |
| Butanoate metabolism | NA |

| | |
|---|---|
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 2 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 1 |
| Chronic myeloid leukemia | 2 |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | 1 |
| Colorectal cancer | 1 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | 1 |
| Endocytosis | 2 |
| Endometrial cancer | 1 |
| Epstein-Barr virus infection | 1 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 1 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | 2 |
| Glucagon signaling pathway | 2 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |

| | |
|---|---|
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | 2 |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | 1 |
| Histidine metabolism | NA |
| Huntington's disease | 1 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 1 |
| Inflammatory mediator regulation of TRP channels | 2 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 2 |
| Insulin secretion | 2 |
| Insulin signaling pathway | 1 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 1 |
| Leishmaniasis | 1 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 1 |
| Melanogenesis | 2 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 1 |
| mTOR signaling pathway | 1 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | 1 |
| Neuroactive ligand-receptor interaction | 1 |
| Neurotrophin signaling pathway | 2 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 1 |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 3 |
| Osteoclast differentiation | 2 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1 |
| Pancreatic secretion | NA |

| | |
|---|---|
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | 1 |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 1 |
| Phagosome | 1 |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 1 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | 1 |
| Renal cell carcinoma | 2 |
| Renin secretion | 2 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | 1 |
| Salmonella infection | 1 |
| Selenocompound metabolism | NA |
| Shigellosis | 1 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 1 |

| | |
|---|---|
| T cell receptor signaling pathway | 1 |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | 1 |
| Tight junction | 1 |
| TNF signaling pathway | 1 |
| Toxoplasmosis | 1 |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 2 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 1 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp4.p |
|---|---|
| Acute myeloid leukemia | 0.1028037044 |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | 0.0118846447 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 0.1165044772 |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 0.0023446943 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | 0.0664524475 |
| Antigen processing and presentation | 0.0105250744 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |

| | |
|---|---|
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 0.0289689238 |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 0.0030029610 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.1778522302 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 0.0069582588 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | 0.0165556603 |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | 0.0972827518 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 0.0937144802 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 0.0042520141 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 0.2196986243 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | 0.0054101722 |
| Glutathione metabolism | NA |

| | |
|---|---|
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.0289689238 |
| Herpes simplex infection | 0.0028533350 |
| Histidine metabolism | NA |
| Huntington's disease | 0.0006918987 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 0.2182500129 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 0.0731754117 |
| Insulin secretion | NA |
| Insulin signaling pathway | 0.0042489869 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 0.0653135251 |
| Leishmaniasis | 0.0609946529 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 0.1772989782 |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 0.0024895785 |
| mTOR signaling pathway | 0.0936906504 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | 0.4099728734 |
| Neurotrophin signaling pathway | 0.1219609340 |
| Nicotinate and nicotinamide metabolism | NA |

| | |
|---|---|
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 0.0010590124 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.0768456266 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | 0.0020589939 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 0.0165556603 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 0.2209078568 |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 0.3296079460 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | 0.1356989861 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 0.0035455987 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | 0.0653135251 |
| Selenocompound metabolism | NA |
| Shigellosis | 0.0126620392 |
| SNARE interactions in vesicular transport | NA |

| | |
|---|---|
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | 0.0289689238 |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | 0.0030945278 |
| TNF signaling pathway | 0.0040275539 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 0.0056768404 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 0.7337279566 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp4.pFourier |
|---|---|
| Acute myeloid leukemia | 9.865616e-01 |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | 1.078994e-01 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 1.496570e-01 |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2.018559e-06 |

| | |
|---|---|
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 8.862120e-03 |
| Amyotrophic lateral sclerosis (ALS) | 4.430039e-01 |
| Antigen processing and presentation | 7.350070e-02 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 5.104709e-02 |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 9.155713e-02 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1.085773e-01 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 3.639962e-02 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | 1.279443e-03 |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | 2.282664e-02 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 1.208309e-01 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 3.619171e-01 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 9.056752e-02 |

| | |
|---|---|
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | 2.562359e-03 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 5.104709e-02 |
| Herpes simplex infection | 1.151402e-02 |
| Histidine metabolism | NA |
| Huntington's disease | 4.334308e-02 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 7.786257e-02 |
| Influenza A | 1.263807e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1.079104e-02 |
| Insulin secretion | NA |
| Insulin signaling pathway | 2.094260e-01 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 3.088718e-01 |
| Leishmaniasis | 1.664549e-01 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 3.200578e-01 |

| | |
|---|---|
| Melanogenesis | 1.571789e-01 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 2.544490e-03 |
| mTOR signaling pathway | 3.644533e-02 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | 1.633723e-01 |
| Neurotrophin signaling pathway | 2.412372e-02 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 3.718071e-02 |
| Non-alcoholic fatty liver disease (NAFLD) | 2.523456e-02 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 7.841720e-04 |
| Osteoclast differentiation | 1.677263e-02 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1.279443e-03 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 1.640716e-01 |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 7.988713e-01 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | 2.564463e-01 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |

| | |
|---|---|
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 4.765610e-02 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | 3.088718e-01 |
| Selenocompound metabolism | NA |
| Shigellosis | 2.373188e-03 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | 5.104709e-02 |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | 3.080366e-03 |
| TNF signaling pathway | 5.684114e-05 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 2.970863e-06 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 8.546771e-01 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |
| | Comp4.k |
| Acute myeloid leukemia | 1 |

| | |
|---|---|
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | 1 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 2 |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 2 |
| Amyotrophic lateral sclerosis (ALS) | 1 |
| Antigen processing and presentation | 1 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 1 |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 1 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 1 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | 1 |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | 1 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |

| | |
|---|---|
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 1 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 1 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 1 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | 1 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | 1 |
| Histidine metabolism | NA |
| Huntington's disease | 1 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 2 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1 |
| Insulin secretion | NA |
| Insulin signaling pathway | 1 |

| | |
|---|---|
| Intestinal immune network for IgA production | NA |
| Legionellosis | 1 |
| Leishmaniasis | 1 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 1 |
| Melanogenesis | 2 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | 1 |
| mTOR signaling pathway | 1 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | 1 |
| Neurotrophin signaling pathway | 1 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 1 |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 2 |
| Osteoclast differentiation | 1 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 1 |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | 1 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |

| | |
|---|---|
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | 2 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | 1 |
| Selenocompound metabolism | NA |
| Shigellosis | 1 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | 1 |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | 1 |
| TNF signaling pathway | 1 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |

| | |
|---|---|
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 1 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 1 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp5.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2.003296e-04 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 2.889050e-03 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 5.123194e-02 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 5.404006e-04 |

| | |
|---|---|
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 2.878791e-03 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 1.946053e-04 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1.397149e-03 |
| Herpes simplex infection | 2.609499e-03 |

| | |
|---|---|
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 3.114562e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 3.078118e-03 |
| Insulin secretion | NA |
| Insulin signaling pathway | 6.813498e-02 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 2.227131e-02 |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 7.392980e-03 |
| Melanogenesis | 4.655827e-02 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 4.655277e-03 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 6.051296e-04 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 3.274527e-03 |
| Osteoclast differentiation | 1.993417e-01 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 3.635533e-04 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |

| | |
|---|---|
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 8.023023e-05 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | 6.099465e-02 |
| Selenocompound metabolism | NA |
| Shigellosis | 1.387118e-02 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |

| | |
|---|---|
| Thyroid hormone synthesis | NA |
| Tight junction | 5.501854e-03 |
| TNF signaling pathway | 3.966609e-03 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 1.398632e-04 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 2.578241e-04 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp5.pFourier |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 3.731617e-03 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 4.260475e-02 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |

| | |
|---|---|
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 2.836896e-01 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 1.011855e-03 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 1.871346e-03 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 5.583817e-01 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |

| | |
|---|---|
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1.537225e-01 |
| Herpes simplex infection | 4.620056e-01 |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 1.571789e-01 |
| Influenza A | 2.451161e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1.720397e-03 |
| Insulin secretion | NA |
| Insulin signaling pathway | 7.800867e-01 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 8.164932e-01 |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 1.198945e-02 |
| Melanogenesis | 9.602093e-03 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 7.119866e-01 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 5.371660e-03 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 1.605020e-04 |
| Osteoclast differentiation | 7.383287e-02 |

| | |
|---|---|
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1.534091e-01 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 2.369698e-01 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | 1.664549e-01 |
| Selenocompound metabolism | NA |
| Shigellosis | 5.209966e-03 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |

| | |
|---|---|
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | 6.287270e-01 |
| TNF signaling pathway | 7.641047e-01 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 7.591212e-06 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 2.014797e-04 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp5.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 1 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |

| | |
|---|---|
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 1 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 1 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 1 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |

| | |
|---|---|
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | 1 |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 2 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1 |
| Insulin secretion | NA |
| Insulin signaling pathway | 1 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | 1 |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 1 |
| Melanogenesis | 1 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |

| | |
|---|---|
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 1 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 1 |
| Osteoclast differentiation | 1 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | 1 |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |

| | |
|---|---|
| Salmonella infection | 1 |
| Selenocompound metabolism | NA |
| Shigellosis | 1 |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | 1 |
| TNF signaling pathway | 1 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | 1 |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 1 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp6.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |

| | |
|---|---|
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1.537627e-04 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 6.079290e-03 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 8.612618e-03 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 9.728275e-02 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 5.229261e-01 |

| | |
|---|---|
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 1.755161e-01 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 7.712749e-03 |
| Herpes simplex infection | 9.670449e-01 |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 2.270304e-02 |
| Influenza A | 1.105806e-02 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1.854994e-03 |
| Insulin secretion | NA |
| Insulin signaling pathway | 1.572668e-03 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |

| | |
|---|---|
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 2.609499e-03 |
| Melanogenesis | 1.971067e-03 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 3.114995e-02 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 3.525411e-05 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 3.314963e-03 |
| Osteoclast differentiation | 5.998769e-02 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |

| | |
|---|---|
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1.721992e-04 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | 1.512026e-02 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 9.033627e-02 |

| | |
|---|---|
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |
| | Comp6.pFourier |
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2.069767e-02 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 2.166146e-03 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 5.808492e-01 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 2.282664e-02 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |

| | |
|---|---|
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 3.559239e-01 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 8.144986e-02 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 6.073678e-01 |
| Herpes simplex infection | 7.953202e-01 |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 1.641130e-04 |
| Influenza A | 6.218025e-01 |

| | |
|---|---|
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1.704876e-01 |
| Insulin secretion | NA |
| Insulin signaling pathway | 4.267400e-04 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 4.620056e-01 |
| Melanogenesis | 1.861212e-04 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 1.507586e-03 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 2.045709e-06 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 9.429127e-04 |
| Osteoclast differentiation | 6.458810e-02 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |

| | |
|---|---|
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 2.239921e-03 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | 5.739834e-03 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |

| | |
|---|---|
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 2.734131e-01 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp6.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 1 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |

| | |
|---|---|
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 1 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | 1 |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | 1 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |

| | |
|---|---|
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | 1 |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 1 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1 |
| Insulin secretion | NA |
| Insulin signaling pathway | 1 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | 1 |
| Melanogenesis | 1 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 1 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 1 |
| Osteoclast differentiation | 1 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |

| | |
|---|---|
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |

| | |
|---|---|
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | 1 |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | 1 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp7.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2.138043e-04 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 1.147263e-02 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |

| | |
|---|---|
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 4.284359e-02 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 4.767311e-06 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |

| | |
|---|---|
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 3.519424e-05 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 1.027267e-01 |
| Influenza A | 4.592931e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 5.954206e-03 |
| Insulin secretion | NA |
| Insulin signaling pathway | 5.271242e-02 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 2.416589e-05 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |

| | |
|---|---|
| Non-alcoholic fatty liver disease (NAFLD) | 1.147263e-02 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 1.521317e-01 |
| Osteoclast differentiation | 1.049829e-01 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 7.702696e-03 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |

| | |
|---|---|
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp7.pFourier |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 2.084033e-02 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |

| | |
|---|---|
| Amoebiasis | NA |
| AMPK signaling pathway | 1.279352e-01 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 4.043465e-01 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 9.057618e-05 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |

| | |
|---|---|
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 2.385081e-02 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 6.835374e-02 |
| Influenza A | 1.951185e-01 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 2.184496e-02 |
| Insulin secretion | NA |
| Insulin signaling pathway | 6.234188e-02 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |

| | |
|---|---|
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 3.637256e-06 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 1.279352e-01 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 7.138747e-01 |
| Osteoclast differentiation | 1.157787e-01 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |

| | |
|---|---|
| RIG-I-like receptor signaling pathway | 2.002900e-03 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp7.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |

| | |
|---|---|
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 1 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | 1 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |

| | |
|---|---|
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 1 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1 |
| Insulin secretion | NA |
| Insulin signaling pathway | 1 |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |

| | |
|---|---|
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | 1 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | 1 |
| Osteoclast differentiation | 1 |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |

| | |
|---|---|
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 1 |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |

| | |
|---|---|
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |
| | Comp8.p |
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 0.014168963 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 0.044182378 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.170398904 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |

| | |
|---|---|
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.005007935 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |

| | |
|---|---|
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 0.061724757 |
| Influenza A | 0.002921922 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 0.108534881 |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 0.036066242 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |

| | |
|---|---|
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |

| | |
|---|---|
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp8.pFourier |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 0.016614655 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 0.032429411 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |

| | |
|---|---|
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.895719464 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |

| | |
|---|---|
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.006826353 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 0.098468241 |
| Influenza A | 0.801657547 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 0.397665252 |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 0.050237254 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |

| | |
|---|---|
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |

| | |
|---|---|
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp8.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 1 |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 1 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |

| | |
|---|---|
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |

| | |
|---|---|
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | 1 |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 1 |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |

| | |
|---|---|
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |

| | |
|---|---|
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp9.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |

| | |
|---|---|
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 3.606624e-02 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1.574914e-01 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |

| | |
|---|---|
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 2.609499e-03 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 2.383015e-05 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |

| | |
|---|---|
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 2.578241e-04 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |

| | |
|---|---|
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp9.pFourier |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 0.0502372536 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.1890873374 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |

| | |
|---|---|
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.4620055564 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 0.0009004874 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |

| | |
|---|---|
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 0.0002014797 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |

| | |
|---|---|
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |

| | |
|---|---|
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp9.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | 1 |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |

| | |
|---|---|
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |

| | |
|---|---|
| Hepatitis C | 1 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | 1 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | 1 |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |

| | |
|---|---|
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |

| | |
|---|---|
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp10.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |

| | |
|---|---|
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.0903362659 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |

| | |
|---|---|
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.0004686003 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |

| | |
|---|---|
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |

| | |
|---|---|
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp10.pFourier |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |

| | |
|---|---|
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.2734131 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |

| | |
|---|---|
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.5986167 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |

| | |
|---|---|
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |

| | |
|---|---|
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp10.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |

| | |
|---|---|
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 1 |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |

| | |
|---|---|
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |

| | |
|---|---|
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |

| | |
|---|---|
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |

| | |
|---|---|
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp11.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |

| | |
|---|---|
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 4.767311e-06 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |

| | |
|---|---|
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |

| | |
|---|---|
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |

| | |
|---|---|
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp11.pFourier |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |

| | |
|---|---|
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |

| | |
|---|---|
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 9.057618e-05 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |

| | |
|---|---|
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |

| | |
|---|---|
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp11.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |

| | |
|---|---|
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |

| | |
|---|---|
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |

| | |
|---|---|
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |

| | |
|---|---|
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp12.p |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |

| | |
|---|---|
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |

| | |
|---|---|
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1.653004e-05 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |

| | |
|---|---|
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |

| | |
|---|---|
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |
| | Comp12.pFourier |
| Acute myeloid leukemia | NA |

| | |
|---|---|
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |

| | |
|---|---|
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 0.01509456 |
| Herpes simplex infection | NA |
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |

| | |
|---|---|
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |

| | |
|---|---|
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |
| Thyroid hormone synthesis | NA |
| Tight junction | NA |
| TNF signaling pathway | NA |
| Toxoplasmosis | NA |
| Transcriptional misregulation in cancer | NA |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | NA |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |

| | |
|---|---|
| Valine, leucine and isoleucine degradation | NA |
| Vasopressin-regulated water reabsorption | NA |
| VEGF signaling pathway | NA |
| Vibrio cholerae infection | NA |
| Viral carcinogenesis | NA |
| Viral myocarditis | NA |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | Comp12.k |
|---|---|
| Acute myeloid leukemia | NA |
| Adherens junction | NA |
| Adipocytokine signaling pathway | NA |
| African trypanosomiasis | NA |
| AGE-RAGE signaling pathway in diabetic complications | NA |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | NA |
| Aldosterone-regulated sodium reabsorption | NA |
| Allograft rejection | NA |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | NA |
| Amino sugar and nucleotide sugar metabolism | NA |
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | NA |
| AMPK signaling pathway | NA |
| Amyotrophic lateral sclerosis (ALS) | NA |
| Antigen processing and presentation | NA |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | NA |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | NA |
| beta-Alanine metabolism | NA |
| Bile secretion | NA |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | NA |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | NA |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | NA |
| Central carbon metabolism in cancer | NA |
| Chagas disease (American trypanosomiasis) | NA |

| | |
|---|---|
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | NA |
| Chronic myeloid leukemia | NA |
| Circadian rhythm | NA |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | NA |
| Colorectal cancer | NA |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | NA |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | NA |
| Dorso-ventral axis formation | NA |
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| Endocrine and other factor-regulated calcium reabsorption | NA |
| Endocytosis | NA |
| Endometrial cancer | NA |
| Epstein-Barr virus infection | NA |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | NA |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Folate biosynthesis | NA |
| Fructose and mannose metabolism | NA |
| Galactose metabolism | NA |
| Gastric acid secretion | NA |
| Glucagon signaling pathway | NA |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | NA |
| Graft-versus-host disease | NA |
| Hepatitis C | 1 |
| Herpes simplex infection | NA |

| | |
|---|---|
| Histidine metabolism | NA |
| Huntington's disease | NA |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | NA |
| Inflammatory mediator regulation of TRP channels | NA |
| Influenza A | NA |
| Inositol phosphate metabolism | NA |
| Insulin resistance | NA |
| Insulin secretion | NA |
| Insulin signaling pathway | NA |
| Intestinal immune network for IgA production | NA |
| Legionellosis | NA |
| Leishmaniasis | NA |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | NA |
| Maturity onset diabetes of the young | NA |
| Measles | NA |
| Melanogenesis | NA |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | NA |
| mRNA surveillance pathway | NA |
| mTOR signaling pathway | NA |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Neuroactive ligand-receptor interaction | NA |
| Neurotrophin signaling pathway | NA |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | NA |
| Non-alcoholic fatty liver disease (NAFLD) | NA |
| One carbon pool by folate | NA |
| Oocyte meiosis | NA |
| Osteoclast differentiation | NA |
| Ovarian steroidogenesis | NA |
| Oxidative phosphorylation | NA |
| Pancreatic cancer | NA |
| Pancreatic secretion | NA |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | NA |
| Pathogenic Escherichia coli infection | NA |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |

| | |
|---|---|
| Pertussis | NA |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phototransduction | NA |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | NA |
| Propanoate metabolism | NA |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | NA |
| Regulation of lipolysis in adipocytes | NA |
| Renal cell carcinoma | NA |
| Renin secretion | NA |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Rheumatoid arthritis | NA |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | NA |
| RNA degradation | NA |
| RNA transport | NA |
| Salivary secretion | NA |
| Salmonella infection | NA |
| Selenocompound metabolism | NA |
| Shigellosis | NA |
| SNARE interactions in vesicular transport | NA |
| Sphingolipid metabolism | NA |
| Staphylococcus aureus infection | NA |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | NA |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | NA |
| T cell receptor signaling pathway | NA |
| Taste transduction | NA |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| Thiamine metabolism | NA |
| Thyroid cancer | NA |

```
Thyroid hormone synthesis                                                NA
Tight junction                                                           NA
TNF signaling pathway                                                    NA
Toxoplasmosis                                                            NA
Transcriptional misregulation in cancer                                  NA
Tryptophan metabolism                                                    NA
Type I diabetes mellitus                                                 NA
Type II diabetes mellitus                                                NA
Tyrosine metabolism                                                      NA
Ubiquinone and other terpenoid-quinone biosynthesis                      NA
Valine, leucine and isoleucine degradation                               NA
Vasopressin-regulated water reabsorption                                 NA
VEGF signaling pathway                                                   NA
Vibrio cholerae infection                                                NA
Viral carcinogenesis                                                     NA
Viral myocarditis                                                        NA
Vitamin B6 metabolism                                                    NA
Vitamin digestion and absorption                                         NA
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. Since, the DEGraph method runs a statistical test for each connected component of a pathway, a method for assigning a global p-value for whole pathway is needed. The user can select from three approaches: the minimum, the mean and the p-value of the biggest component. This is specified via `overall` argument. The implementation returns also a gene-level statistics of the differential expression of genes performed via moderated t-test from `limma` package. These statistics are later used in the visualization of a selected pathway.

## 3.3 clipper

The last multivariable method available within this package is called clipper. This method is similar to the topologyGSA as it uses the same two-step approach. However, the Iterative Proportional Scaling algorithm was subsituted with a shrinkage procedure of James-Stein-type which additionally allows proper estimates also in the situation when number of samples is smaller than the number of genes in a pathway. The tests on a pathway-level are follwed with a search for the most affected path in the graph.

The method can be applied with

```
> cli<-clipper(hnrnp.cnts, group, pathways, type="RNASeq", method="mean")
> #530 node labels mapped to the expression data
> #Average coverage 82.98681 %
> #0 (out of 10) pathways without a mapped node
> #1  pathways were filtered out
> #Analysing pathway:
> #
> #Acute myeloid leukemia
> #Adherens junction
> #Adipocytokine signaling pathway
> #Adrenergic signaling in cardiomyocytes
> #African trypanosomiasis
> #Alanine, aspartate and glutamate metabolism
> #Alcoholism
> #Aldosterone-regulated sodium reabsorption
> #Allograft rejection
> #alpha-Linolenic acid metabolism
> res(cli)$results[[1]][1:2,]
> #                       alphaVar alphaMean mean.q.value var.q.value
> #Acute myeloid leukemia    0.026     0.010        0.016       0.033
> #Adherens junction         0.030     0.009        0.016       0.033
>
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. Also, both mean and variance tests are run, this can be changed to only variance test by setting `method="var"`. The `nperm` controls the number of permutations in the statistical tests. Similarly as in topologyGSA, the implementation allows testing of all the cliques present in the graph by setting `testCliques=TRUE`. Please note that these tests may take quite a long time. The implementation returns also a gene-level statistics of the differential expression of genes performed via moderated t-test from `limma` package. These statistics are later used in the visualization of a selected pathway.

## 3.4 SPIA

The most well-known topology-based pathway analysis method is SPIA. In there, two evidences of differential expression of a pathway are combined. The first evidence is a regular so called overrepresentation analysis in which the statistical significance of the number of differentially expressed genes belonging to

a pathway is assessed. The second evidence reflects the pathway topology and it is called the pertubation factor. The authors assume that a differentially expressed gene at the begining of a pathway topology (e.g. a receptor in a signaling pathway) has a stronger effect on the functionality of a pathway than a differentially expressed gene at the end of a pathway (e.g. a transcription factor in a signaling pathway). The pertubation factors of all genes are calculated from a system of linear equations and then combined within a pathway. The two evidences in a form of p-values are finally combined into a global p-value, which is used to rank the pathways.

```
> spi<-SPIA(hnrnp.cnts, group, pathways, type="RNASeq", logFC.th=-1)

14329 node labels mapped to the expression data
Average coverage 84.40644 %
0 (out of 267) pathways without a mapped node

> res(spi)

$results
                                                                    pSize
Acute myeloid leukemia                                                 50
Adherens junction                                                      66
Adipocytokine signaling pathway                                        57
Adrenergic signaling in cardiomyocytes                                124
African trypanosomiasis                                                20
AGE-RAGE signaling pathway in diabetic complications                   85
Alanine, aspartate and glutamate metabolism                            30
Aldosterone synthesis and secretion                                    54
Aldosterone-regulated sodium reabsorption                              25
Allograft rejection                                                    15
alpha-Linolenic acid metabolism                                        15
Alzheimer's disease                                                    44
Amino sugar and nucleotide sugar metabolism                            40
Aminoacyl-tRNA biosynthesis                                            13
Amoebiasis                                                             34
Amphetamine addiction                                                  51
AMPK signaling pathway                                                 87
Amyotrophic lateral sclerosis (ALS)                                    34
Antigen processing and presentation                                    33
Apoptosis                                                             119
Arachidonic acid metabolism                                            39
Arginine and proline metabolism                                        45
Arginine biosynthesis                                                  18
Arrhythmogenic right ventricular cardiomyopathy (ARVC)                  9
Ascorbate and aldarate metabolism                                       7
Asthma                                                                  3
Autoimmune thyroid disease                                              7
```

| | |
|---|---|
| B cell receptor signaling pathway | 64 |
| Bacterial invasion of epithelial cells | 51 |
| Basal cell carcinoma | 41 |
| beta-Alanine metabolism | 28 |
| Bile secretion | 20 |
| Biosynthesis of unsaturated fatty acids | 6 |
| Biotin metabolism | 2 |
| Bladder cancer | 29 |
| Butanoate metabolism | 20 |
| Caffeine metabolism | 3 |
| Carbohydrate digestion and absorption | 14 |
| Cardiac muscle contraction | 10 |
| Cell adhesion molecules (CAMs) | 66 |
| Cell cycle | 123 |
| Central carbon metabolism in cancer | 55 |
| Chagas disease (American trypanosomiasis) | 77 |
| Chemical carcinogenesis | 38 |
| Choline metabolism in cancer | 72 |
| Cholinergic synapse | 78 |
| Chronic myeloid leukemia | 69 |
| Circadian entrainment | 75 |
| Circadian rhythm | 29 |
| Citrate cycle (TCA cycle) | 29 |
| Cocaine addiction | 35 |
| Colorectal cancer | 45 |
| Complement and coagulation cascades | 38 |
| Cysteine and methionine metabolism | 35 |
| Cytosolic DNA-sensing pathway | 18 |
| D-Glutamine and D-glutamate metabolism | 4 |
| Dilated cardiomyopathy | 61 |
| Dopaminergic synapse | 105 |
| Dorso-ventral axis formation | 12 |
| Drug metabolism - cytochrome P450 | 39 |
| Drug metabolism - other enzymes | 27 |
| ECM-receptor interaction | 69 |
| Endocrine and other factor-regulated calcium reabsorption | 32 |
| Endocytosis | 93 |
| Endometrial cancer | 42 |
| Epithelial cell signaling in Helicobacter pylori infection | 32 |
| Epstein-Barr virus infection | 76 |
| ErbB signaling pathway | 77 |
| Estrogen signaling pathway | 77 |
| Ether lipid metabolism | 33 |
| Fanconi anemia pathway | 38 |
| Fat digestion and absorption | 8 |
| Fatty acid biosynthesis | 12 |

| | |
|---|---|
| Fatty acid degradation | 34 |
| Fatty acid elongation | 24 |
| Fc epsilon RI signaling pathway | 51 |
| Fc gamma R-mediated phagocytosis | 81 |
| Folate biosynthesis | 13 |
| FoxO signaling pathway | 115 |
| Fructose and mannose metabolism | 31 |
| GABAergic synapse | 45 |
| Galactose metabolism | 20 |
| Gap junction | 74 |
| Gastric acid secretion | 47 |
| Glioma | 59 |
| Glucagon signaling pathway | 76 |
| Glutamatergic synapse | 70 |
| Glutathione metabolism | 40 |
| Glycerolipid metabolism | 45 |
| Glycerophospholipid metabolism | 80 |
| Glycine, serine and threonine metabolism | 31 |
| Glycolysis / Gluconeogenesis | 56 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 9 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 5 |
| Glycosaminoglycan degradation | 18 |
| Glycosphingolipid biosynthesis - ganglio series | 12 |
| Glycosphingolipid biosynthesis - globo series | 11 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 20 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 23 |
| Glyoxylate and dicarboxylate metabolism | 23 |
| GnRH signaling pathway | 76 |
| Graft-versus-host disease | 11 |
| Hepatitis B | 116 |
| Hepatitis C | 80 |
| Herpes simplex infection | 87 |
| HIF-1 signaling pathway | 91 |
| Histidine metabolism | 21 |
| Huntington's disease | 26 |
| Hypertrophic cardiomyopathy (HCM) | 22 |
| Inflammatory bowel disease (IBD) | 33 |
| Inflammatory mediator regulation of TRP channels | 72 |
| Influenza A | 96 |
| Inositol phosphate metabolism | 64 |
| Insulin resistance | 85 |
| Insulin secretion | 43 |
| Insulin signaling pathway | 123 |
| Intestinal immune network for IgA production | 20 |
| Legionellosis | 37 |
| Leishmaniasis | 43 |

| | |
|---|---|
| Leukocyte transendothelial migration | 73 |
| Linoleic acid metabolism | 16 |
| Lipoic acid metabolism | 3 |
| Long-term depression | 47 |
| Long-term potentiation | 55 |
| Longevity regulating pathway | 72 |
| Longevity regulating pathway - multiple species | 54 |
| Lysine biosynthesis | 2 |
| Lysine degradation | 47 |
| Malaria | 10 |
| Maturity onset diabetes of the young | 11 |
| Measles | 74 |
| Melanogenesis | 87 |
| Melanoma | 56 |
| Metabolism of xenobiotics by cytochrome P450 | 43 |
| Mineral absorption | 4 |
| Morphine addiction | 43 |
| mRNA surveillance pathway | 63 |
| mTOR signaling pathway | 50 |
| Mucin type O-Glycan biosynthesis | 24 |
| N-Glycan biosynthesis | 46 |
| Natural killer cell mediated cytotoxicity | 88 |
| Neuroactive ligand-receptor interaction | 14 |
| Neurotrophin signaling pathway | 105 |
| NF-kappa B signaling pathway | 69 |
| Nicotinate and nicotinamide metabolism | 23 |
| Nitrogen metabolism | 4 |
| NOD-like receptor signaling pathway | 44 |
| Non-alcoholic fatty liver disease (NAFLD) | 68 |
| Non-small cell lung cancer | 50 |
| Notch signaling pathway | 46 |
| One carbon pool by folate | 18 |
| Oocyte meiosis | 102 |
| Osteoclast differentiation | 97 |
| Ovarian steroidogenesis | 26 |
| Oxidative phosphorylation | 40 |
| p53 signaling pathway | 67 |
| Pancreatic cancer | 62 |
| Pancreatic secretion | 24 |
| Pantothenate and CoA biosynthesis | 11 |
| Parkinson's disease | 26 |
| Pathogenic Escherichia coli infection | 39 |
| Pentose and glucuronate interconversions | 18 |
| Pentose phosphate pathway | 28 |
| Peroxisome | 8 |
| Pertussis | 45 |

| | |
|---|---|
| Phagosome | 29 |
| Phenylalanine metabolism | 12 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 3 |
| Phosphatidylinositol signaling system | 78 |
| Phospholipase D signaling pathway | 90 |
| Phototransduction | 21 |
| Platelet activation | 95 |
| Porphyrin and chlorophyll metabolism | 24 |
| Primary bile acid biosynthesis | 14 |
| Prion diseases | 20 |
| Progesterone-mediated oocyte maturation | 74 |
| Prolactin signaling pathway | 61 |
| Propanoate metabolism | 30 |
| Prostate cancer | 79 |
| Protein processing in endoplasmic reticulum | 50 |
| Proximal tubule bicarbonate reclamation | 7 |
| Pyrimidine metabolism | 98 |
| Pyruvate metabolism | 37 |
| Regulation of autophagy | 17 |
| Regulation of lipolysis in adipocytes | 42 |
| Renal cell carcinoma | 52 |
| Renin secretion | 39 |
| Renin-angiotensin system | 2 |
| Retinol metabolism | 39 |
| Retrograde endocannabinoid signaling | 49 |
| Rheumatoid arthritis | 13 |
| Riboflavin metabolism | 3 |
| Ribosome biogenesis in eukaryotes | 3 |
| RIG-I-like receptor signaling pathway | 48 |
| RNA degradation | 14 |
| RNA transport | 122 |
| Salivary secretion | 36 |
| Salmonella infection | 69 |
| Selenocompound metabolism | 14 |
| Serotonergic synapse | 61 |
| Shigellosis | 48 |
| Signaling pathways regulating pluripotency of stem cells | 103 |
| Small cell lung cancer | 79 |
| SNARE interactions in vesicular transport | 26 |
| Sphingolipid metabolism | 44 |
| Sphingolipid signaling pathway | 91 |
| Staphylococcus aureus infection | 24 |
| Starch and sucrose metabolism | 28 |
| Steroid biosynthesis | 20 |
| Steroid hormone biosynthesis | 34 |
| Sulfur metabolism | 9 |

| | |
|---|---|
| Sulfur relay system | 8 |
| Synaptic vesicle cycle | 18 |
| Synthesis and degradation of ketone bodies | 9 |
| Systemic lupus erythematosus | 13 |
| T cell receptor signaling pathway | 79 |
| Taste transduction | 24 |
| Taurine and hypotaurine metabolism | 8 |
| Terpenoid backbone biosynthesis | 21 |
| TGF-beta signaling pathway | 69 |
| Thiamine metabolism | 3 |
| Thyroid cancer | 26 |
| Thyroid hormone signaling pathway | 102 |
| Thyroid hormone synthesis | 39 |
| Tight junction | 102 |
| TNF signaling pathway | 69 |
| Toll-like receptor signaling pathway | 76 |
| Toxoplasmosis | 85 |
| Transcriptional misregulation in cancer | 17 |
| Tryptophan metabolism | 36 |
| Type I diabetes mellitus | 4 |
| Type II diabetes mellitus | 39 |
| Tyrosine metabolism | 24 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 9 |
| Valine, leucine and isoleucine degradation | 45 |
| Vascular smooth muscle contraction | 87 |
| Vasopressin-regulated water reabsorption | 20 |
| VEGF signaling pathway | 53 |
| Vibrio cholerae infection | 15 |
| Viral carcinogenesis | 6 |
| Viral myocarditis | 26 |
| Vitamin B6 metabolism | 5 |
| Vitamin digestion and absorption | 2 |
| Wnt signaling pathway | 124 |
| | NDE |
| Acute myeloid leukemia | 20 |
| Adherens junction | 33 |
| Adipocytokine signaling pathway | 20 |
| Adrenergic signaling in cardiomyocytes | 42 |
| African trypanosomiasis | 3 |
| AGE-RAGE signaling pathway in diabetic complications | 32 |
| Alanine, aspartate and glutamate metabolism | 11 |
| Aldosterone synthesis and secretion | 19 |
| Aldosterone-regulated sodium reabsorption | 9 |
| Allograft rejection | 6 |
| alpha-Linolenic acid metabolism | 6 |
| Alzheimer's disease | 20 |

| | |
|---|---|
| Amino sugar and nucleotide sugar metabolism | 20 |
| Aminoacyl-tRNA biosynthesis | 6 |
| Amoebiasis | 10 |
| Amphetamine addiction | 20 |
| AMPK signaling pathway | 42 |
| Amyotrophic lateral sclerosis (ALS) | 18 |
| Antigen processing and presentation | 16 |
| Apoptosis | 48 |
| Arachidonic acid metabolism | 15 |
| Arginine and proline metabolism | 15 |
| Arginine biosynthesis | 6 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 5 |
| Ascorbate and aldarate metabolism | 0 |
| Asthma | 0 |
| Autoimmune thyroid disease | 0 |
| B cell receptor signaling pathway | 23 |
| Bacterial invasion of epithelial cells | 15 |
| Basal cell carcinoma | 20 |
| beta-Alanine metabolism | 12 |
| Bile secretion | 5 |
| Biosynthesis of unsaturated fatty acids | 3 |
| Biotin metabolism | 0 |
| Bladder cancer | 15 |
| Butanoate metabolism | 6 |
| Caffeine metabolism | 1 |
| Carbohydrate digestion and absorption | 6 |
| Cardiac muscle contraction | 4 |
| Cell adhesion molecules (CAMs) | 19 |
| Cell cycle | 61 |
| Central carbon metabolism in cancer | 24 |
| Chagas disease (American trypanosomiasis) | 29 |
| Chemical carcinogenesis | 11 |
| Choline metabolism in cancer | 32 |
| Cholinergic synapse | 22 |
| Chronic myeloid leukemia | 28 |
| Circadian entrainment | 22 |
| Circadian rhythm | 10 |
| Citrate cycle (TCA cycle) | 15 |
| Cocaine addiction | 12 |
| Colorectal cancer | 23 |
| Complement and coagulation cascades | 19 |
| Cysteine and methionine metabolism | 14 |
| Cytosolic DNA-sensing pathway | 7 |
| D-Glutamine and D-glutamate metabolism | 2 |
| Dilated cardiomyopathy | 15 |
| Dopaminergic synapse | 33 |

| | |
|---|---|
| Dorso-ventral axis formation | 6 |
| Drug metabolism - cytochrome P450 | 10 |
| Drug metabolism - other enzymes | 13 |
| ECM-receptor interaction | 31 |
| Endocrine and other factor-regulated calcium reabsorption | 7 |
| Endocytosis | 33 |
| Endometrial cancer | 19 |
| Epithelial cell signaling in Helicobacter pylori infection | 15 |
| Epstein-Barr virus infection | 28 |
| ErbB signaling pathway | 30 |
| Estrogen signaling pathway | 29 |
| Ether lipid metabolism | 11 |
| Fanconi anemia pathway | 20 |
| Fat digestion and absorption | 5 |
| Fatty acid biosynthesis | 4 |
| Fatty acid degradation | 15 |
| Fatty acid elongation | 7 |
| Fc epsilon RI signaling pathway | 20 |
| Fc gamma R-mediated phagocytosis | 30 |
| Folate biosynthesis | 9 |
| FoxO signaling pathway | 49 |
| Fructose and mannose metabolism | 22 |
| GABAergic synapse | 9 |
| Galactose metabolism | 13 |
| Gap junction | 24 |
| Gastric acid secretion | 13 |
| Glioma | 23 |
| Glucagon signaling pathway | 23 |
| Glutamatergic synapse | 20 |
| Glutathione metabolism | 17 |
| Glycerolipid metabolism | 25 |
| Glycerophospholipid metabolism | 42 |
| Glycine, serine and threonine metabolism | 15 |
| Glycolysis / Gluconeogenesis | 24 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 7 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 2 |
| Glycosaminoglycan degradation | 11 |
| Glycosphingolipid biosynthesis - ganglio series | 6 |
| Glycosphingolipid biosynthesis - globo series | 4 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 4 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 10 |
| Glyoxylate and dicarboxylate metabolism | 12 |
| GnRH signaling pathway | 29 |
| Graft-versus-host disease | 5 |
| Hepatitis B | 48 |
| Hepatitis C | 39 |

| | |
|---|---|
| Herpes simplex infection | 38 |
| HIF-1 signaling pathway | 35 |
| Histidine metabolism | 8 |
| Huntington's disease | 13 |
| Hypertrophic cardiomyopathy (HCM) | 7 |
| Inflammatory bowel disease (IBD) | 6 |
| Inflammatory mediator regulation of TRP channels | 24 |
| Influenza A | 32 |
| Inositol phosphate metabolism | 22 |
| Insulin resistance | 29 |
| Insulin secretion | 12 |
| Insulin signaling pathway | 47 |
| Intestinal immune network for IgA production | 5 |
| Legionellosis | 10 |
| Leishmaniasis | 15 |
| Leukocyte transendothelial migration | 26 |
| Linoleic acid metabolism | 4 |
| Lipoic acid metabolism | 1 |
| Long-term depression | 16 |
| Long-term potentiation | 22 |
| Longevity regulating pathway | 24 |
| Longevity regulating pathway - multiple species | 20 |
| Lysine biosynthesis | 1 |
| Lysine degradation | 14 |
| Malaria | 1 |
| Maturity onset diabetes of the young | 4 |
| Measles | 24 |
| Melanogenesis | 31 |
| Melanoma | 21 |
| Metabolism of xenobiotics by cytochrome P450 | 15 |
| Mineral absorption | 1 |
| Morphine addiction | 6 |
| mRNA surveillance pathway | 38 |
| mTOR signaling pathway | 22 |
| Mucin type O-Glycan biosynthesis | 8 |
| N-Glycan biosynthesis | 19 |
| Natural killer cell mediated cytotoxicity | 34 |
| Neuroactive ligand-receptor interaction | 5 |
| Neurotrophin signaling pathway | 38 |
| NF-kappa B signaling pathway | 19 |
| Nicotinate and nicotinamide metabolism | 13 |
| Nitrogen metabolism | 2 |
| NOD-like receptor signaling pathway | 16 |
| Non-alcoholic fatty liver disease (NAFLD) | 28 |
| Non-small cell lung cancer | 20 |
| Notch signaling pathway | 17 |

| | |
|---|---|
| One carbon pool by folate | 9 |
| Oocyte meiosis | 46 |
| Osteoclast differentiation | 34 |
| Ovarian steroidogenesis | 8 |
| Oxidative phosphorylation | 22 |
| p53 signaling pathway | 25 |
| Pancreatic cancer | 29 |
| Pancreatic secretion | 6 |
| Pantothenate and CoA biosynthesis | 5 |
| Parkinson's disease | 7 |
| Pathogenic Escherichia coli infection | 8 |
| Pentose and glucuronate interconversions | 6 |
| Pentose phosphate pathway | 17 |
| Peroxisome | 5 |
| Pertussis | 17 |
| Phagosome | 6 |
| Phenylalanine metabolism | 6 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 1 |
| Phosphatidylinositol signaling system | 27 |
| Phospholipase D signaling pathway | 32 |
| Phototransduction | 4 |
| Platelet activation | 32 |
| Porphyrin and chlorophyll metabolism | 6 |
| Primary bile acid biosynthesis | 5 |
| Prion diseases | 8 |
| Progesterone-mediated oocyte maturation | 32 |
| Prolactin signaling pathway | 25 |
| Propanoate metabolism | 11 |
| Prostate cancer | 39 |
| Protein processing in endoplasmic reticulum | 21 |
| Proximal tubule bicarbonate reclamation | 3 |
| Pyrimidine metabolism | 37 |
| Pyruvate metabolism | 17 |
| Regulation of autophagy | 10 |
| Regulation of lipolysis in adipocytes | 12 |
| Renal cell carcinoma | 26 |
| Renin secretion | 12 |
| Renin-angiotensin system | 0 |
| Retinol metabolism | 12 |
| Retrograde endocannabinoid signaling | 11 |
| Rheumatoid arthritis | 2 |
| Riboflavin metabolism | 1 |
| Ribosome biogenesis in eukaryotes | 1 |
| RIG-I-like receptor signaling pathway | 26 |
| RNA degradation | 6 |
| RNA transport | 55 |

| | |
|---|---|
| Salivary secretion | 9 |
| Salmonella infection | 22 |
| Selenocompound metabolism | 5 |
| Serotonergic synapse | 15 |
| Shigellosis | 14 |
| Signaling pathways regulating pluripotency of stem cells | 41 |
| Small cell lung cancer | 36 |
| SNARE interactions in vesicular transport | 9 |
| Sphingolipid metabolism | 20 |
| Sphingolipid signaling pathway | 35 |
| Staphylococcus aureus infection | 10 |
| Starch and sucrose metabolism | 11 |
| Steroid biosynthesis | 5 |
| Steroid hormone biosynthesis | 10 |
| Sulfur metabolism | 2 |
| Sulfur relay system | 2 |
| Synaptic vesicle cycle | 10 |
| Synthesis and degradation of ketone bodies | 3 |
| Systemic lupus erythematosus | 4 |
| T cell receptor signaling pathway | 31 |
| Taste transduction | 5 |
| Taurine and hypotaurine metabolism | 3 |
| Terpenoid backbone biosynthesis | 8 |
| TGF-beta signaling pathway | 29 |
| Thiamine metabolism | 1 |
| Thyroid cancer | 13 |
| Thyroid hormone signaling pathway | 39 |
| Thyroid hormone synthesis | 12 |
| Tight junction | 30 |
| TNF signaling pathway | 27 |
| Toll-like receptor signaling pathway | 25 |
| Toxoplasmosis | 31 |
| Transcriptional misregulation in cancer | 5 |
| Tryptophan metabolism | 14 |
| Type I diabetes mellitus | 0 |
| Type II diabetes mellitus | 13 |
| Tyrosine metabolism | 8 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 3 |
| Valine, leucine and isoleucine degradation | 16 |
| Vascular smooth muscle contraction | 30 |
| Vasopressin-regulated water reabsorption | 7 |
| VEGF signaling pathway | 19 |
| Vibrio cholerae infection | 2 |
| Viral carcinogenesis | 2 |
| Viral myocarditis | 9 |
| Vitamin B6 metabolism | 3 |

| | |
|---|---|
| Vitamin digestion and absorption | 0 |
| Wnt signaling pathway | 45 |
| | pNDE |
| Acute myeloid leukemia | 0.381 |
| Adherens junction | 0.021 |
| Adipocytokine signaling pathway | 0.666 |
| Adrenergic signaling in cardiomyocytes | 0.793 |
| African trypanosomiasis | 0.992 |
| AGE-RAGE signaling pathway in diabetic complications | 0.493 |
| Alanine, aspartate and glutamate metabolism | 0.584 |
| Aldosterone synthesis and secretion | 0.659 |
| Aldosterone-regulated sodium reabsorption | 0.616 |
| Allograft rejection | 0.501 |
| alpha-Linolenic acid metabolism | 0.501 |
| Alzheimer's disease | 0.157 |
| Amino sugar and nucleotide sugar metabolism | 0.064 |
| Aminoacyl-tRNA biosynthesis | 0.339 |
| Amoebiasis | 0.864 |
| Amphetamine addiction | 0.423 |
| AMPK signaling pathway | 0.020 |
| Amyotrophic lateral sclerosis (ALS) | 0.042 |
| Antigen processing and presentation | 0.119 |
| Apoptosis | 0.254 |
| Arachidonic acid metabolism | 0.486 |
| Arginine and proline metabolism | 0.745 |
| Arginine biosynthesis | 0.709 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.207 |
| Ascorbate and aldarate metabolism | 1.000 |
| Asthma | 1.000 |
| Autoimmune thyroid disease | 1.000 |
| B cell receptor signaling pathway | 0.617 |
| Bacterial invasion of epithelial cells | 0.900 |
| Basal cell carcinoma | 0.082 |
| beta-Alanine metabolism | 0.323 |
| Bile secretion | 0.914 |
| Biosynthesis of unsaturated fatty acids | 0.394 |
| Biotin metabolism | 1.000 |
| Bladder cancer | 0.075 |
| Butanoate metabolism | 0.809 |
| Caffeine metabolism | 0.750 |
| Carbohydrate digestion and absorption | 0.421 |
| Cardiac muscle contraction | 0.540 |
| Cell adhesion molecules (CAMs) | 0.937 |
| Cell cycle | 0.003 |
| Central carbon metabolism in cancer | 0.189 |
| Chagas disease (American trypanosomiasis) | 0.496 |

| | |
|---|---|
| Chemical carcinogenesis | 0.886 |
| Choline metabolism in cancer | 0.118 |
| Cholinergic synapse | 0.961 |
| Chronic myeloid leukemia | 0.309 |
| Circadian entrainment | 0.935 |
| Circadian rhythm | 0.677 |
| Citrate cycle (TCA cycle) | 0.075 |
| Cocaine addiction | 0.690 |
| Colorectal cancer | 0.037 |
| Complement and coagulation cascades | 0.070 |
| Cysteine and methionine metabolism | 0.419 |
| Cytosolic DNA-sensing pathway | 0.523 |
| D-Glutamine and D-glutamate metabolism | 0.473 |
| Dilated cardiomyopathy | 0.986 |
| Dopaminergic synapse | 0.903 |
| Dorso-ventral axis formation | 0.259 |
| Drug metabolism - cytochrome P450 | 0.953 |
| Drug metabolism - other enzymes | 0.159 |
| ECM-receptor interaction | 0.108 |
| Endocrine and other factor-regulated calcium reabsorption | 0.979 |
| Endocytosis | 0.657 |
| Endometrial cancer | 0.172 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.165 |
| Epstein-Barr virus infection | 0.555 |
| ErbB signaling pathway | 0.403 |
| Estrogen signaling pathway | 0.496 |
| Ether lipid metabolism | 0.728 |
| Fanconi anemia pathway | 0.036 |
| Fat digestion and absorption | 0.131 |
| Fatty acid biosynthesis | 0.706 |
| Fatty acid degradation | 0.245 |
| Fatty acid elongation | 0.843 |
| Fc epsilon RI signaling pathway | 0.423 |
| Fc gamma R-mediated phagocytosis | 0.540 |
| Folate biosynthesis | 0.019 |
| FoxO signaling pathway | 0.125 |
| Fructose and mannose metabolism | 0.000 |
| GABAergic synapse | 0.996 |
| Galactose metabolism | 0.010 |
| Gap junction | 0.826 |
| Gastric acid secretion | 0.933 |
| Glioma | 0.425 |
| Glucagon signaling pathway | 0.912 |
| Glutamatergic synapse | 0.946 |
| Glutathione metabolism | 0.286 |
| Glycerolipid metabolism | 0.009 |

| | |
|---|---|
| Glycerophospholipid metabolism | 0.003 |
| Glycine, serine and threonine metabolism | 0.131 |
| Glycolysis / Gluconeogenesis | 0.220 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.016 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.610 |
| Glycosaminoglycan degradation | 0.033 |
| Glycosphingolipid biosynthesis - ganglio series | 0.259 |
| Glycosphingolipid biosynthesis - globo series | 0.629 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 0.970 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.330 |
| Glyoxylate and dicarboxylate metabolism | 0.100 |
| GnRH signaling pathway | 0.461 |
| Graft-versus-host disease | 0.385 |
| Hepatitis B | 0.189 |
| Hepatitis C | 0.021 |
| Herpes simplex infection | 0.120 |
| HIF-1 signaling pathway | 0.426 |
| Histidine metabolism | 0.541 |
| Huntington's disease | 0.122 |
| Hypertrophic cardiomyopathy (HCM) | 0.763 |
| Inflammatory bowel disease (IBD) | 0.995 |
| Inflammatory mediator regulation of TRP channels | 0.778 |
| Influenza A | 0.803 |
| Inositol phosphate metabolism | 0.712 |
| Insulin resistance | 0.746 |
| Insulin secretion | 0.921 |
| Insulin signaling pathway | 0.424 |
| Intestinal immune network for IgA production | 0.914 |
| Legionellosis | 0.926 |
| Leishmaniasis | 0.668 |
| Leukocyte transendothelial migration | 0.640 |
| Linoleic acid metabolism | 0.899 |
| Lipoic acid metabolism | 0.750 |
| Long-term depression | 0.714 |
| Long-term potentiation | 0.371 |
| Longevity regulating pathway | 0.778 |
| Longevity regulating pathway - multiple species | 0.550 |
| Lysine biosynthesis | 0.603 |
| Lysine degradation | 0.882 |
| Malaria | 0.990 |
| Maturity onset diabetes of the young | 0.629 |
| Measles | 0.826 |
| Melanogenesis | 0.644 |
| Melanoma | 0.520 |
| Metabolism of xenobiotics by cytochrome P450 | 0.668 |
| Mineral absorption | 0.843 |

| | |
|---|---|
| Morphine addiction | 1.000 |
| mRNA surveillance pathway | 0.000 |
| mTOR signaling pathway | 0.189 |
| Mucin type O-Glycan biosynthesis | 0.716 |
| N-Glycan biosynthesis | 0.322 |
| Natural killer cell mediated cytotoxicity | 0.415 |
| Neuroactive ligand-receptor interaction | 0.638 |
| Neurotrophin signaling pathway | 0.606 |
| NF-kappa B signaling pathway | 0.963 |
| Nicotinate and nicotinamide metabolism | 0.045 |
| Nitrogen metabolism | 0.473 |
| NOD-like receptor signaling pathway | 0.592 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.276 |
| Non-small cell lung cancer | 0.381 |
| Notch signaling pathway | 0.559 |
| One carbon pool by folate | 0.184 |
| Oocyte meiosis | 0.057 |
| Osteoclast differentiation | 0.691 |
| Ovarian steroidogenesis | 0.804 |
| Oxidative phosphorylation | 0.015 |
| p53 signaling pathway | 0.526 |
| Pancreatic cancer | 0.073 |
| Pancreatic secretion | 0.928 |
| Pantothenate and CoA biosynthesis | 0.385 |
| Parkinson's disease | 0.900 |
| Pathogenic Escherichia coli infection | 0.992 |
| Pentose and glucuronate interconversions | 0.709 |
| Pentose phosphate pathway | 0.009 |
| Peroxisome | 0.131 |
| Pertussis | 0.514 |
| Phagosome | 0.982 |
| Phenylalanine metabolism | 0.259 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.750 |
| Phosphatidylinositol signaling system | 0.709 |
| Phospholipase D signaling pathway | 0.651 |
| Phototransduction | 0.978 |
| Platelet activation | 0.781 |
| Porphyrin and chlorophyll metabolism | 0.928 |
| Primary bile acid biosynthesis | 0.638 |
| Prion diseases | 0.474 |
| Progesterone-mediated oocyte maturation | 0.161 |
| Prolactin signaling pathway | 0.302 |
| Propanoate metabolism | 0.584 |
| Prostate cancer | 0.016 |
| Protein processing in endoplasmic reticulum | 0.277 |
| Proximal tubule bicarbonate reclamation | 0.514 |

| | |
|---|---|
| Pyrimidine metabolism | 0.477 |
| Pyruvate metabolism | 0.169 |
| Regulation of autophagy | 0.056 |
| Regulation of lipolysis in adipocytes | 0.904 |
| Renal cell carcinoma | 0.038 |
| Renin secretion | 0.835 |
| Renin-angiotensin system | 1.000 |
| Retinol metabolism | 0.835 |
| Retrograde endocannabinoid signaling | 0.990 |
| Rheumatoid arthritis | 0.979 |
| Riboflavin metabolism | 0.750 |
| Ribosome biogenesis in eukaryotes | 0.750 |
| RIG-I-like receptor signaling pathway | 0.011 |
| RNA degradation | 0.421 |
| RNA transport | 0.040 |
| Salivary secretion | 0.956 |
| Salmonella infection | 0.844 |
| Selenocompound metabolism | 0.638 |
| Serotonergic synapse | 0.986 |
| Shigellosis | 0.901 |
| Signaling pathways regulating pluripotency of stem cells | 0.311 |
| Small cell lung cancer | 0.073 |
| SNARE interactions in vesicular transport | 0.670 |
| Sphingolipid metabolism | 0.157 |
| Sphingolipid signaling pathway | 0.426 |
| Staphylococcus aureus infection | 0.391 |
| Starch and sucrose metabolism | 0.472 |
| Steroid biosynthesis | 0.914 |
| Steroid hormone biosynthesis | 0.864 |
| Sulfur metabolism | 0.902 |
| Sulfur relay system | 0.859 |
| Synaptic vesicle cycle | 0.085 |
| Synthesis and degradation of ketone bodies | 0.708 |
| Systemic lupus erythematosus | 0.770 |
| T cell receptor signaling pathway | 0.381 |
| Taste transduction | 0.973 |
| Taurine and hypotaurine metabolism | 0.619 |
| Terpenoid backbone biosynthesis | 0.541 |
| TGF-beta signaling pathway | 0.228 |
| Thiamine metabolism | 0.750 |
| Thyroid cancer | 0.122 |
| Thyroid hormone signaling pathway | 0.435 |
| Thyroid hormone synthesis | 0.835 |
| Tight junction | 0.957 |
| TNF signaling pathway | 0.401 |
| Toll-like receptor signaling pathway | 0.805 |

| | |
|---|---|
| Toxoplasmosis | 0.582 |
| Transcriptional misregulation in cancer | 0.815 |
| Tryptophan metabolism | 0.470 |
| Type I diabetes mellitus | 1.000 |
| Type II diabetes mellitus | 0.737 |
| Tyrosine metabolism | 0.716 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.708 |
| Valine, leucine and isoleucine degradation | 0.635 |
| Vascular smooth muscle contraction | 0.724 |
| Vasopressin-regulated water reabsorption | 0.655 |
| VEGF signaling pathway | 0.620 |
| Vibrio cholerae infection | 0.990 |
| Viral carcinogenesis | 0.717 |
| Viral myocarditis | 0.670 |
| Vitamin B6 metabolism | 0.267 |
| Vitamin digestion and absorption | 1.000 |
| Wnt signaling pathway | 0.600 |

| | tA |
|---|---|
| Acute myeloid leukemia | -9794.788 |
| Adherens junction | -23587.177 |
| Adipocytokine signaling pathway | -16235.608 |
| Adrenergic signaling in cardiomyocytes | -12844.283 |
| African trypanosomiasis | -585.250 |
| AGE-RAGE signaling pathway in diabetic complications | -8770.507 |
| Alanine, aspartate and glutamate metabolism | 0.000 |
| Aldosterone synthesis and secretion | 8202.364 |
| Aldosterone-regulated sodium reabsorption | 532.192 |
| Allograft rejection | 0.000 |
| alpha-Linolenic acid metabolism | 0.000 |
| Alzheimer's disease | -22948.875 |
| Amino sugar and nucleotide sugar metabolism | 0.000 |
| Aminoacyl-tRNA biosynthesis | 0.000 |
| Amoebiasis | -160.875 |
| Amphetamine addiction | -445.335 |
| AMPK signaling pathway | 9271.010 |
| Amyotrophic lateral sclerosis (ALS) | -37488.000 |
| Antigen processing and presentation | -15025.500 |
| Apoptosis | -3942.528 |
| Arachidonic acid metabolism | 0.000 |
| Arginine and proline metabolism | 0.000 |
| Arginine biosynthesis | 0.000 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 3006.750 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 4453.682 |

| | |
|---|---|
| Bacterial invasion of epithelial cells | -6290.875 |
| Basal cell carcinoma | -11025.218 |
| beta-Alanine metabolism | 0.000 |
| Bile secretion | -23.000 |
| Biosynthesis of unsaturated fatty acids | 0.000 |
| Biotin metabolism | NA |
| Bladder cancer | -6317.250 |
| Butanoate metabolism | 0.000 |
| Caffeine metabolism | 0.000 |
| Carbohydrate digestion and absorption | 247.625 |
| Cardiac muscle contraction | 0.000 |
| Cell adhesion molecules (CAMs) | -10222.875 |
| Cell cycle | 12537.417 |
| Central carbon metabolism in cancer | -21370.569 |
| Chagas disease (American trypanosomiasis) | -33581.115 |
| Chemical carcinogenesis | 0.000 |
| Choline metabolism in cancer | -4355.525 |
| Cholinergic synapse | 1707.314 |
| Chronic myeloid leukemia | -13143.375 |
| Circadian entrainment | 8361.625 |
| Circadian rhythm | -1425.721 |
| Citrate cycle (TCA cycle) | 0.000 |
| Cocaine addiction | -1029.609 |
| Colorectal cancer | 27399.125 |
| Complement and coagulation cascades | -2728.439 |
| Cysteine and methionine metabolism | 0.000 |
| Cytosolic DNA-sensing pathway | -1602.500 |
| D-Glutamine and D-glutamate metabolism | 0.000 |
| Dilated cardiomyopathy | 0.000 |
| Dopaminergic synapse | -3635.855 |
| Dorso-ventral axis formation | 3685.250 |
| Drug metabolism - cytochrome P450 | 0.000 |
| Drug metabolism - other enzymes | 0.000 |
| ECM-receptor interaction | -159028.625 |
| Endocrine and other factor-regulated calcium reabsorption | 9106.000 |
| Endocytosis | 0.000 |
| Endometrial cancer | 21392.500 |
| Epithelial cell signaling in Helicobacter pylori infection | 7153.917 |
| Epstein-Barr virus infection | 7799.719 |
| ErbB signaling pathway | -13171.366 |
| Estrogen signaling pathway | -15726.862 |
| Ether lipid metabolism | 0.000 |
| Fanconi anemia pathway | -2754.875 |
| Fat digestion and absorption | 0.000 |
| Fatty acid biosynthesis | 0.000 |
| Fatty acid degradation | 0.000 |

| | |
|---|---|
| Fatty acid elongation | 0.000 |
| Fc epsilon RI signaling pathway | -6522.334 |
| Fc gamma R-mediated phagocytosis | 4630.897 |
| Folate biosynthesis | 0.000 |
| FoxO signaling pathway | -5810.995 |
| Fructose and mannose metabolism | 0.000 |
| GABAergic synapse | 290.844 |
| Galactose metabolism | 0.000 |
| Gap junction | 499.125 |
| Gastric acid secretion | 2812.125 |
| Glioma | 1869.705 |
| Glucagon signaling pathway | 819.987 |
| Glutamatergic synapse | 2361.175 |
| Glutathione metabolism | 0.000 |
| Glycerolipid metabolism | 0.000 |
| Glycerophospholipid metabolism | 0.000 |
| Glycine, serine and threonine metabolism | 0.000 |
| Glycolysis / Gluconeogenesis | 0.000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.000 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.000 |
| Glycosaminoglycan degradation | 0.000 |
| Glycosphingolipid biosynthesis - ganglio series | 0.000 |
| Glycosphingolipid biosynthesis - globo series | 0.000 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 0.000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.000 |
| Glyoxylate and dicarboxylate metabolism | 0.000 |
| GnRH signaling pathway | 27848.688 |
| Graft-versus-host disease | 0.000 |
| Hepatitis B | -39490.117 |
| Hepatitis C | -356.125 |
| Herpes simplex infection | -30876.828 |
| HIF-1 signaling pathway | -859.729 |
| Histidine metabolism | 0.000 |
| Huntington's disease | 2513.375 |
| Hypertrophic cardiomyopathy (HCM) | 0.000 |
| Inflammatory bowel disease (IBD) | 1144.548 |
| Inflammatory mediator regulation of TRP channels | -6234.646 |
| Influenza A | 1416.194 |
| Inositol phosphate metabolism | 0.000 |
| Insulin resistance | 59443.929 |
| Insulin secretion | -1584.118 |
| Insulin signaling pathway | 46196.003 |
| Intestinal immune network for IgA production | 336.250 |
| Legionellosis | 2352.000 |
| Leishmaniasis | 9890.275 |
| Leukocyte transendothelial migration | -18400.102 |

| | |
|---|---|
| Linoleic acid metabolism | 0.000 |
| Lipoic acid metabolism | 0.000 |
| Long-term depression | NA |
| Long-term potentiation | -8598.943 |
| Longevity regulating pathway | 18860.519 |
| Longevity regulating pathway - multiple species | 3736.297 |
| Lysine biosynthesis | 0.000 |
| Lysine degradation | 0.000 |
| Malaria | 0.000 |
| Maturity onset diabetes of the young | 519.479 |
| Measles | 9872.475 |
| Melanogenesis | -19084.518 |
| Melanoma | 1659.148 |
| Metabolism of xenobiotics by cytochrome P450 | 0.000 |
| Mineral absorption | -408.500 |
| Morphine addiction | -5.094 |
| mRNA surveillance pathway | 0.000 |
| mTOR signaling pathway | 754.500 |
| Mucin type O-Glycan biosynthesis | 0.000 |
| N-Glycan biosynthesis | 0.000 |
| Natural killer cell mediated cytotoxicity | 15538.657 |
| Neuroactive ligand-receptor interaction | 162.000 |
| Neurotrophin signaling pathway | 15895.907 |
| NF-kappa B signaling pathway | -22031.587 |
| Nicotinate and nicotinamide metabolism | 0.000 |
| Nitrogen metabolism | 0.000 |
| NOD-like receptor signaling pathway | 134.896 |
| Non-alcoholic fatty liver disease (NAFLD) | 2388.470 |
| Non-small cell lung cancer | -13084.539 |
| Notch signaling pathway | 25223.893 |
| One carbon pool by folate | 0.000 |
| Oocyte meiosis | 11084.009 |
| Osteoclast differentiation | -33291.796 |
| Ovarian steroidogenesis | 232.000 |
| Oxidative phosphorylation | 0.000 |
| p53 signaling pathway | 3593.235 |
| Pancreatic cancer | -1930.930 |
| Pancreatic secretion | -23.000 |
| Pantothenate and CoA biosynthesis | 0.000 |
| Parkinson's disease | -42672.375 |
| Pathogenic Escherichia coli infection | 98810.500 |
| Pentose and glucuronate interconversions | 0.000 |
| Pentose phosphate pathway | 0.000 |
| Peroxisome | 0.000 |
| Pertussis | -2861.056 |
| Phagosome | 0.000 |

| | |
|---|---|
| Phenylalanine metabolism | 0.000 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.000 |
| Phosphatidylinositol signaling system | 0.000 |
| Phospholipase D signaling pathway | 14810.974 |
| Phototransduction | -2582.125 |
| Platelet activation | 5036.247 |
| Porphyrin and chlorophyll metabolism | 0.000 |
| Primary bile acid biosynthesis | 0.000 |
| Prion diseases | -11389.375 |
| Progesterone-mediated oocyte maturation | 142002.625 |
| Prolactin signaling pathway | -15309.375 |
| Propanoate metabolism | 0.000 |
| Prostate cancer | 75250.792 |
| Protein processing in endoplasmic reticulum | 8951.042 |
| Proximal tubule bicarbonate reclamation | 0.000 |
| Pyrimidine metabolism | 0.000 |
| Pyruvate metabolism | 0.000 |
| Regulation of autophagy | 4400.000 |
| Regulation of lipolysis in adipocytes | -8349.250 |
| Renal cell carcinoma | -6060.057 |
| Renin secretion | 3090.812 |
| Renin-angiotensin system | NA |
| Retinol metabolism | 0.000 |
| Retrograde endocannabinoid signaling | 11.135 |
| Rheumatoid arthritis | 0.000 |
| Riboflavin metabolism | 0.000 |
| Ribosome biogenesis in eukaryotes | 0.000 |
| RIG-I-like receptor signaling pathway | 8939.792 |
| RNA degradation | 2007.375 |
| RNA transport | -146.375 |
| Salivary secretion | 2770.375 |
| Salmonella infection | -99705.759 |
| Selenocompound metabolism | 0.000 |
| Serotonergic synapse | 1372.816 |
| Shigellosis | 2602.625 |
| Signaling pathways regulating pluripotency of stem cells | NA |
| Small cell lung cancer | -217932.042 |
| SNARE interactions in vesicular transport | -1186.542 |
| Sphingolipid metabolism | 0.000 |
| Sphingolipid signaling pathway | -53178.647 |
| Staphylococcus aureus infection | -15615.596 |
| Starch and sucrose metabolism | 0.000 |
| Steroid biosynthesis | 0.000 |
| Steroid hormone biosynthesis | 0.000 |
| Sulfur metabolism | 0.000 |
| Sulfur relay system | -1333.750 |

| | |
|---|---|
| Synaptic vesicle cycle | 0.000 |
| Synthesis and degradation of ketone bodies | 0.000 |
| Systemic lupus erythematosus | -4248.625 |
| T cell receptor signaling pathway | 11857.979 |
| Taste transduction | 39.250 |
| Taurine and hypotaurine metabolism | 0.000 |
| Terpenoid backbone biosynthesis | 0.000 |
| TGF-beta signaling pathway | -20215.738 |
| Thiamine metabolism | 0.000 |
| Thyroid cancer | 20996.000 |
| Thyroid hormone signaling pathway | -1574.216 |
| Thyroid hormone synthesis | -474.250 |
| Tight junction | -4314.792 |
| TNF signaling pathway | -37098.083 |
| Toll-like receptor signaling pathway | -10806.181 |
| Toxoplasmosis | -9628.500 |
| Transcriptional misregulation in cancer | -388.000 |
| Tryptophan metabolism | 0.000 |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | 1999.656 |
| Tyrosine metabolism | 0.000 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.000 |
| Valine, leucine and isoleucine degradation | 0.000 |
| Vascular smooth muscle contraction | -3661.183 |
| Vasopressin-regulated water reabsorption | -3037.193 |
| VEGF signaling pathway | 596.139 |
| Vibrio cholerae infection | -232.317 |
| Viral carcinogenesis | 2206.000 |
| Viral myocarditis | 6778.875 |
| Vitamin B6 metabolism | 0.000 |
| Vitamin digestion and absorption | NA |
| Wnt signaling pathway | 14865.120 |

| | pPERT |
|---|---|
| Acute myeloid leukemia | 0.22000 |
| Adherens junction | 0.11800 |
| Adipocytokine signaling pathway | 0.08200 |
| Adrenergic signaling in cardiomyocytes | 0.35600 |
| African trypanosomiasis | 0.43800 |
| AGE-RAGE signaling pathway in diabetic complications | 0.54000 |
| Alanine, aspartate and glutamate metabolism | NA |
| Aldosterone synthesis and secretion | 0.25800 |
| Aldosterone-regulated sodium reabsorption | 0.53800 |
| Allograft rejection | 1.00000 |
| alpha-Linolenic acid metabolism | NA |
| Alzheimer's disease | 0.10000 |
| Amino sugar and nucleotide sugar metabolism | NA |

| | |
|---|---|
| Aminoacyl-tRNA biosynthesis | NA |
| Amoebiasis | 0.95200 |
| Amphetamine addiction | 0.93600 |
| AMPK signaling pathway | 0.31200 |
| Amyotrophic lateral sclerosis (ALS) | 0.05200 |
| Antigen processing and presentation | 0.05000 |
| Apoptosis | 0.82400 |
| Arachidonic acid metabolism | NA |
| Arginine and proline metabolism | NA |
| Arginine biosynthesis | NA |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.03200 |
| Ascorbate and aldarate metabolism | NA |
| Asthma | NA |
| Autoimmune thyroid disease | NA |
| B cell receptor signaling pathway | 0.53600 |
| Bacterial invasion of epithelial cells | 0.64800 |
| Basal cell carcinoma | 0.53200 |
| beta-Alanine metabolism | NA |
| Bile secretion | 0.91800 |
| Biosynthesis of unsaturated fatty acids | NA |
| Biotin metabolism | NA |
| Bladder cancer | 0.46800 |
| Butanoate metabolism | NA |
| Caffeine metabolism | NA |
| Carbohydrate digestion and absorption | 0.78400 |
| Cardiac muscle contraction | NA |
| Cell adhesion molecules (CAMs) | 0.45000 |
| Cell cycle | 0.72400 |
| Central carbon metabolism in cancer | 0.42200 |
| Chagas disease (American trypanosomiasis) | 0.11400 |
| Chemical carcinogenesis | NA |
| Choline metabolism in cancer | 0.72800 |
| Cholinergic synapse | 0.82600 |
| Chronic myeloid leukemia | 0.34200 |
| Circadian entrainment | 0.30200 |
| Circadian rhythm | 0.49800 |
| Citrate cycle (TCA cycle) | NA |
| Cocaine addiction | 0.79000 |
| Colorectal cancer | 0.01000 |
| Complement and coagulation cascades | 0.56000 |
| Cysteine and methionine metabolism | NA |
| Cytosolic DNA-sensing pathway | 0.45800 |
| D-Glutamine and D-glutamate metabolism | NA |
| Dilated cardiomyopathy | 1.00000 |
| Dopaminergic synapse | 0.45800 |
| Dorso-ventral axis formation | 0.08200 |

| | |
|---|---|
| Drug metabolism - cytochrome P450 | NA |
| Drug metabolism - other enzymes | NA |
| ECM-receptor interaction | 0.00200 |
| Endocrine and other factor-regulated calcium reabsorption | 0.07400 |
| Endocytosis | NA |
| Endometrial cancer | 0.13800 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.26600 |
| Epstein-Barr virus infection | 0.34600 |
| ErbB signaling pathway | 0.50200 |
| Estrogen signaling pathway | 0.53600 |
| Ether lipid metabolism | NA |
| Fanconi anemia pathway | 0.29800 |
| Fat digestion and absorption | NA |
| Fatty acid biosynthesis | NA |
| Fatty acid degradation | NA |
| Fatty acid elongation | NA |
| Fc epsilon RI signaling pathway | 0.64400 |
| Fc gamma R-mediated phagocytosis | 0.70600 |
| Folate biosynthesis | NA |
| FoxO signaling pathway | 0.70800 |
| Fructose and mannose metabolism | NA |
| GABAergic synapse | 0.79400 |
| Galactose metabolism | NA |
| Gap junction | 0.95000 |
| Gastric acid secretion | 0.22400 |
| Glioma | 0.90600 |
| Glucagon signaling pathway | 0.90400 |
| Glutamatergic synapse | 0.52000 |
| Glutathione metabolism | NA |
| Glycerolipid metabolism | NA |
| Glycerophospholipid metabolism | NA |
| Glycine, serine and threonine metabolism | NA |
| Glycolysis / Gluconeogenesis | NA |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | NA |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | NA |
| Glycosaminoglycan degradation | NA |
| Glycosphingolipid biosynthesis - ganglio series | NA |
| Glycosphingolipid biosynthesis - globo series | NA |
| Glycosphingolipid biosynthesis - lacto and neolacto series | NA |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | NA |
| Glyoxylate and dicarboxylate metabolism | NA |
| GnRH signaling pathway | 0.16600 |
| Graft-versus-host disease | 1.00000 |
| Hepatitis B | 0.26600 |
| Hepatitis C | 0.96000 |
| Herpes simplex infection | 0.14200 |

| | |
|---|---|
| HIF-1 signaling pathway | 0.94600 |
| Histidine metabolism | NA |
| Huntington's disease | 0.22800 |
| Hypertrophic cardiomyopathy (HCM) | NA |
| Inflammatory bowel disease (IBD) | 0.88200 |
| Inflammatory mediator regulation of TRP channels | 0.54800 |
| Influenza A | 0.86200 |
| Inositol phosphate metabolism | NA |
| Insulin resistance | 0.04000 |
| Insulin secretion | 0.69000 |
| Insulin signaling pathway | 0.20600 |
| Intestinal immune network for IgA production | 0.52000 |
| Legionellosis | 0.40200 |
| Leishmaniasis | 0.15600 |
| Leukocyte transendothelial migration | 0.34400 |
| Linoleic acid metabolism | NA |
| Lipoic acid metabolism | NA |
| Long-term depression | NA |
| Long-term potentiation | 0.60000 |
| Longevity regulating pathway | 0.05400 |
| Longevity regulating pathway - multiple species | 0.46600 |
| Lysine biosynthesis | NA |
| Lysine degradation | NA |
| Malaria | 1.00000 |
| Maturity onset diabetes of the young | 0.59400 |
| Measles | 0.21600 |
| Melanogenesis | 0.59200 |
| Melanoma | 0.88000 |
| Metabolism of xenobiotics by cytochrome P450 | NA |
| Mineral absorption | 0.10200 |
| Morphine addiction | 0.99400 |
| mRNA surveillance pathway | 1.00000 |
| mTOR signaling pathway | 0.81000 |
| Mucin type O-Glycan biosynthesis | NA |
| N-Glycan biosynthesis | NA |
| Natural killer cell mediated cytotoxicity | 0.58200 |
| Neuroactive ligand-receptor interaction | 0.77400 |
| Neurotrophin signaling pathway | 0.28200 |
| NF-kappa B signaling pathway | 0.15400 |
| Nicotinate and nicotinamide metabolism | NA |
| Nitrogen metabolism | NA |
| NOD-like receptor signaling pathway | 0.97400 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.86200 |
| Non-small cell lung cancer | 0.47000 |
| Notch signaling pathway | 0.09800 |
| One carbon pool by folate | NA |

| | |
|---|---|
| Oocyte meiosis | 0.53600 |
| Osteoclast differentiation | 0.09800 |
| Ovarian steroidogenesis | 0.71400 |
| Oxidative phosphorylation | NA |
| p53 signaling pathway | 0.35200 |
| Pancreatic cancer | 0.85800 |
| Pancreatic secretion | 0.75200 |
| Pantothenate and CoA biosynthesis | NA |
| Parkinson's disease | 0.02000 |
| Pathogenic Escherichia coli infection | 0.00200 |
| Pentose and glucuronate interconversions | NA |
| Pentose phosphate pathway | NA |
| Peroxisome | NA |
| Pertussis | 0.68800 |
| Phagosome | NA |
| Phenylalanine metabolism | NA |
| Phenylalanine, tyrosine and tryptophan biosynthesis | NA |
| Phosphatidylinositol signaling system | NA |
| Phospholipase D signaling pathway | 0.37400 |
| Phototransduction | 0.25800 |
| Platelet activation | 0.82600 |
| Porphyrin and chlorophyll metabolism | NA |
| Primary bile acid biosynthesis | NA |
| Prion diseases | 0.17400 |
| Progesterone-mediated oocyte maturation | 0.00001 |
| Prolactin signaling pathway | 0.50000 |
| Propanoate metabolism | NA |
| Prostate cancer | 0.01200 |
| Protein processing in endoplasmic reticulum | 0.41800 |
| Proximal tubule bicarbonate reclamation | NA |
| Pyrimidine metabolism | NA |
| Pyruvate metabolism | NA |
| Regulation of autophagy | 0.32800 |
| Regulation of lipolysis in adipocytes | 0.29000 |
| Renal cell carcinoma | 0.47200 |
| Renin secretion | 0.31800 |
| Renin-angiotensin system | NA |
| Retinol metabolism | NA |
| Retrograde endocannabinoid signaling | 0.97600 |
| Rheumatoid arthritis | 1.00000 |
| Riboflavin metabolism | NA |
| Ribosome biogenesis in eukaryotes | NA |
| RIG-I-like receptor signaling pathway | 0.27400 |
| RNA degradation | 0.17200 |
| RNA transport | 0.90600 |
| Salivary secretion | 0.21000 |

| | |
|---|---|
| Salmonella infection | 0.00600 |
| Selenocompound metabolism | NA |
| Serotonergic synapse | 0.65400 |
| Shigellosis | 0.56000 |
| Signaling pathways regulating pluripotency of stem cells | NA |
| Small cell lung cancer | 0.00400 |
| SNARE interactions in vesicular transport | 0.48600 |
| Sphingolipid metabolism | NA |
| Sphingolipid signaling pathway | 0.10800 |
| Staphylococcus aureus infection | 0.14000 |
| Starch and sucrose metabolism | NA |
| Steroid biosynthesis | NA |
| Steroid hormone biosynthesis | NA |
| Sulfur metabolism | NA |
| Sulfur relay system | 0.24800 |
| Synaptic vesicle cycle | NA |
| Synthesis and degradation of ketone bodies | NA |
| Systemic lupus erythematosus | 0.16000 |
| T cell receptor signaling pathway | 0.40000 |
| Taste transduction | 0.76200 |
| Taurine and hypotaurine metabolism | NA |
| Terpenoid backbone biosynthesis | NA |
| TGF-beta signaling pathway | 0.15800 |
| Thiamine metabolism | NA |
| Thyroid cancer | 0.02400 |
| Thyroid hormone signaling pathway | 0.86000 |
| Thyroid hormone synthesis | 0.89800 |
| Tight junction | 0.37200 |
| TNF signaling pathway | 0.06400 |
| Toll-like receptor signaling pathway | 0.49600 |
| Toxoplasmosis | 0.41400 |
| Transcriptional misregulation in cancer | 0.26200 |
| Tryptophan metabolism | NA |
| Type I diabetes mellitus | NA |
| Type II diabetes mellitus | 0.68000 |
| Tyrosine metabolism | NA |
| Ubiquinone and other terpenoid-quinone biosynthesis | NA |
| Valine, leucine and isoleucine degradation | NA |
| Vascular smooth muscle contraction | 0.77400 |
| Vasopressin-regulated water reabsorption | 0.33800 |
| VEGF signaling pathway | 0.93800 |
| Vibrio cholerae infection | 0.56200 |
| Viral carcinogenesis | 0.12800 |
| Viral myocarditis | 0.12200 |
| Vitamin B6 metabolism | NA |
| Vitamin digestion and absorption | NA |

| | |
|---|---|
| Wnt signaling pathway | 0.21600 |
| | pG |
| Acute myeloid leukemia | 0.292 |
| Adherens junction | 0.017 |
| Adipocytokine signaling pathway | 0.213 |
| Adrenergic signaling in cardiomyocytes | 0.639 |
| African trypanosomiasis | 0.797 |
| AGE-RAGE signaling pathway in diabetic complications | 0.619 |
| Alanine, aspartate and glutamate metabolism | 0.584 |
| Aldosterone synthesis and secretion | 0.471 |
| Aldosterone-regulated sodium reabsorption | 0.697 |
| Allograft rejection | 0.847 |
| alpha-Linolenic acid metabolism | 0.501 |
| Alzheimer's disease | 0.081 |
| Amino sugar and nucleotide sugar metabolism | 0.064 |
| Aminoacyl-tRNA biosynthesis | 0.339 |
| Amoebiasis | 0.983 |
| Amphetamine addiction | 0.763 |
| AMPK signaling pathway | 0.038 |
| Amyotrophic lateral sclerosis (ALS) | 0.016 |
| Antigen processing and presentation | 0.036 |
| Apoptosis | 0.537 |
| Arachidonic acid metabolism | 0.486 |
| Arginine and proline metabolism | 0.745 |
| Arginine biosynthesis | 0.709 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.040 |
| Ascorbate and aldarate metabolism | 1.000 |
| Asthma | 1.000 |
| Autoimmune thyroid disease | 1.000 |
| B cell receptor signaling pathway | 0.697 |
| Bacterial invasion of epithelial cells | 0.898 |
| Basal cell carcinoma | 0.180 |
| beta-Alanine metabolism | 0.323 |
| Bile secretion | 0.986 |
| Biosynthesis of unsaturated fatty acids | 0.394 |
| Biotin metabolism | 1.000 |
| Bladder cancer | 0.153 |
| Butanoate metabolism | 0.809 |
| Caffeine metabolism | 0.750 |
| Carbohydrate digestion and absorption | 0.696 |
| Cardiac muscle contraction | 0.540 |
| Cell adhesion molecules (CAMs) | 0.786 |
| Cell cycle | 0.015 |
| Central carbon metabolism in cancer | 0.281 |
| Chagas disease (American trypanosomiasis) | 0.219 |
| Chemical carcinogenesis | 0.886 |

| | |
|---|---|
| Choline metabolism in cancer | 0.297 |
| Cholinergic synapse | 0.977 |
| Chronic myeloid leukemia | 0.343 |
| Circadian entrainment | 0.639 |
| Circadian rhythm | 0.704 |
| Citrate cycle (TCA cycle) | 0.075 |
| Cocaine addiction | 0.876 |
| Colorectal cancer | 0.003 |
| Complement and coagulation cascades | 0.166 |
| Cysteine and methionine metabolism | 0.419 |
| Cytosolic DNA-sensing pathway | 0.582 |
| D-Glutamine and D-glutamate metabolism | 0.473 |
| Dilated cardiomyopathy | 1.000 |
| Dopaminergic synapse | 0.779 |
| Dorso-ventral axis formation | 0.103 |
| Drug metabolism - cytochrome P450 | 0.953 |
| Drug metabolism - other enzymes | 0.159 |
| ECM-receptor interaction | 0.002 |
| Endocrine and other factor-regulated calcium reabsorption | 0.263 |
| Endocytosis | 0.657 |
| Endometrial cancer | 0.113 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.181 |
| Epstein-Barr virus infection | 0.509 |
| ErbB signaling pathway | 0.526 |
| Estrogen signaling pathway | 0.618 |
| Ether lipid metabolism | 0.728 |
| Fanconi anemia pathway | 0.059 |
| Fat digestion and absorption | 0.131 |
| Fatty acid biosynthesis | 0.706 |
| Fatty acid degradation | 0.245 |
| Fatty acid elongation | 0.843 |
| Fc epsilon RI signaling pathway | 0.627 |
| Fc gamma R-mediated phagocytosis | 0.749 |
| Folate biosynthesis | 0.019 |
| FoxO signaling pathway | 0.303 |
| Fructose and mannose metabolism | 0.000 |
| GABAergic synapse | 0.976 |
| Galactose metabolism | 0.010 |
| Gap junction | 0.975 |
| Gastric acid secretion | 0.536 |
| Glioma | 0.753 |
| Glucagon signaling pathway | 0.984 |
| Glutamatergic synapse | 0.841 |
| Glutathione metabolism | 0.286 |
| Glycerolipid metabolism | 0.009 |
| Glycerophospholipid metabolism | 0.003 |

| | |
|---|---|
| Glycine, serine and threonine metabolism | 0.131 |
| Glycolysis / Gluconeogenesis | 0.220 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.016 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.610 |
| Glycosaminoglycan degradation | 0.033 |
| Glycosphingolipid biosynthesis - ganglio series | 0.259 |
| Glycosphingolipid biosynthesis - globo series | 0.629 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 0.970 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.330 |
| Glyoxylate and dicarboxylate metabolism | 0.100 |
| GnRH signaling pathway | 0.273 |
| Graft-versus-host disease | 0.752 |
| Hepatitis B | 0.201 |
| Hepatitis C | 0.099 |
| Herpes simplex infection | 0.086 |
| HIF-1 signaling pathway | 0.769 |
| Histidine metabolism | 0.541 |
| Huntington's disease | 0.127 |
| Hypertrophic cardiomyopathy (HCM) | 0.763 |
| Inflammatory bowel disease (IBD) | 0.992 |
| Inflammatory mediator regulation of TRP channels | 0.790 |
| Influenza A | 0.947 |
| Inositol phosphate metabolism | 0.712 |
| Insulin resistance | 0.135 |
| Insulin secretion | 0.924 |
| Insulin signaling pathway | 0.300 |
| Intestinal immune network for IgA production | 0.829 |
| Legionellosis | 0.740 |
| Leishmaniasis | 0.340 |
| Leukocyte transendothelial migration | 0.553 |
| Linoleic acid metabolism | 0.899 |
| Lipoic acid metabolism | 0.750 |
| Long-term depression | 0.714 |
| Long-term potentiation | 0.557 |
| Longevity regulating pathway | 0.175 |
| Longevity regulating pathway - multiple species | 0.605 |
| Lysine biosynthesis | 0.603 |
| Lysine degradation | 0.882 |
| Malaria | 1.000 |
| Maturity onset diabetes of the young | 0.741 |
| Measles | 0.486 |
| Melanogenesis | 0.749 |
| Melanoma | 0.815 |
| Metabolism of xenobiotics by cytochrome P450 | 0.668 |
| Mineral absorption | 0.297 |
| Morphine addiction | 1.000 |

| | |
|---|---|
| mRNA surveillance pathway | NaN |
| mTOR signaling pathway | 0.440 |
| Mucin type O-Glycan biosynthesis | 0.716 |
| N-Glycan biosynthesis | 0.322 |
| Natural killer cell mediated cytotoxicity | 0.585 |
| Neuroactive ligand-receptor interaction | 0.842 |
| Neurotrophin signaling pathway | 0.473 |
| NF-kappa B signaling pathway | 0.431 |
| Nicotinate and nicotinamide metabolism | 0.045 |
| Nitrogen metabolism | 0.473 |
| NOD-like receptor signaling pathway | 0.894 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.580 |
| Non-small cell lung cancer | 0.487 |
| Notch signaling pathway | 0.214 |
| One carbon pool by folate | 0.184 |
| Oocyte meiosis | 0.137 |
| Osteoclast differentiation | 0.250 |
| Ovarian steroidogenesis | 0.893 |
| Oxidative phosphorylation | 0.015 |
| p53 signaling pathway | 0.497 |
| Pancreatic cancer | 0.236 |
| Pancreatic secretion | 0.949 |
| Pantothenate and CoA biosynthesis | 0.385 |
| Parkinson's disease | 0.090 |
| Pathogenic Escherichia coli infection | 0.014 |
| Pentose and glucuronate interconversions | 0.709 |
| Pentose phosphate pathway | 0.009 |
| Peroxisome | 0.131 |
| Pertussis | 0.721 |
| Phagosome | 0.982 |
| Phenylalanine metabolism | 0.259 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.750 |
| Phosphatidylinositol signaling system | 0.709 |
| Phospholipase D signaling pathway | 0.587 |
| Phototransduction | 0.600 |
| Platelet activation | 0.928 |
| Porphyrin and chlorophyll metabolism | 0.928 |
| Primary bile acid biosynthesis | 0.638 |
| Prion diseases | 0.288 |
| Progesterone-mediated oocyte maturation | 0.000 |
| Prolactin signaling pathway | 0.436 |
| Propanoate metabolism | 0.584 |
| Prostate cancer | 0.002 |
| Protein processing in endoplasmic reticulum | 0.365 |
| Proximal tubule bicarbonate reclamation | 0.514 |
| Pyrimidine metabolism | 0.477 |

| | |
|---|---|
| Pyruvate metabolism | 0.169 |
| Regulation of autophagy | 0.092 |
| Regulation of lipolysis in adipocytes | 0.613 |
| Renal cell carcinoma | 0.090 |
| Renin secretion | 0.618 |
| Renin-angiotensin system | 1.000 |
| Retinol metabolism | 0.835 |
| Retrograde endocannabinoid signaling | 0.999 |
| Rheumatoid arthritis | 1.000 |
| Riboflavin metabolism | 0.750 |
| Ribosome biogenesis in eukaryotes | 0.750 |
| RIG-I-like receptor signaling pathway | 0.021 |
| RNA degradation | 0.263 |
| RNA transport | 0.156 |
| Salivary secretion | 0.523 |
| Salmonella infection | 0.032 |
| Selenocompound metabolism | 0.638 |
| Serotonergic synapse | 0.928 |
| Shigellosis | 0.850 |
| Signaling pathways regulating pluripotency of stem cells | 0.311 |
| Small cell lung cancer | 0.003 |
| SNARE interactions in vesicular transport | 0.691 |
| Sphingolipid metabolism | 0.157 |
| Sphingolipid signaling pathway | 0.188 |
| Staphylococcus aureus infection | 0.214 |
| Starch and sucrose metabolism | 0.472 |
| Steroid biosynthesis | 0.914 |
| Steroid hormone biosynthesis | 0.864 |
| Sulfur metabolism | 0.902 |
| Sulfur relay system | 0.542 |
| Synaptic vesicle cycle | 0.085 |
| Synthesis and degradation of ketone bodies | 0.708 |
| Systemic lupus erythematosus | 0.381 |
| T cell receptor signaling pathway | 0.439 |
| Taste transduction | 0.963 |
| Taurine and hypotaurine metabolism | 0.619 |
| Terpenoid backbone biosynthesis | 0.541 |
| TGF-beta signaling pathway | 0.156 |
| Thiamine metabolism | 0.750 |
| Thyroid cancer | 0.020 |
| Thyroid hormone signaling pathway | 0.742 |
| Thyroid hormone synthesis | 0.966 |
| Tight junction | 0.724 |
| TNF signaling pathway | 0.120 |
| Toll-like receptor signaling pathway | 0.766 |
| Toxoplasmosis | 0.584 |

| | |
|---|---|
| Transcriptional misregulation in cancer | 0.543 |
| Tryptophan metabolism | 0.470 |
| Type I diabetes mellitus | 1.000 |
| Type II diabetes mellitus | 0.847 |
| Tyrosine metabolism | 0.716 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.708 |
| Valine, leucine and isoleucine degradation | 0.635 |
| Vascular smooth muscle contraction | 0.885 |
| Vasopressin-regulated water reabsorption | 0.555 |
| VEGF signaling pathway | 0.897 |
| Vibrio cholerae infection | 0.883 |
| Viral carcinogenesis | 0.311 |
| Viral myocarditis | 0.286 |
| Vitamin B6 metabolism | 0.267 |
| Vitamin digestion and absorption | 1.000 |
| Wnt signaling pathway | 0.394 |

| | pGFdr |
|---|---|
| Acute myeloid leukemia | 0.9090000 |
| Adherens junction | 0.2581875 |
| Adipocytokine signaling pathway | 0.8485714 |
| Adrenergic signaling in cardiomyocytes | 1.0000000 |
| African trypanosomiasis | 1.0000000 |
| AGE-RAGE signaling pathway in diabetic complications | 1.0000000 |
| Alanine, aspartate and glutamate metabolism | 1.0000000 |
| Aldosterone synthesis and secretion | 1.0000000 |
| Aldosterone-regulated sodium reabsorption | 1.0000000 |
| Allograft rejection | 1.0000000 |
| alpha-Linolenic acid metabolism | 1.0000000 |
| Alzheimer's disease | 0.6575294 |
| Amino sugar and nucleotide sugar metabolism | 0.5760000 |
| Aminoacyl-tRNA biosynthesis | 0.9365056 |
| Amoebiasis | 1.0000000 |
| Amphetamine addiction | 1.0000000 |
| AMPK signaling pathway | 0.4014783 |
| Amyotrophic lateral sclerosis (ALS) | 0.2581875 |
| Antigen processing and presentation | 0.3976364 |
| Apoptosis | 1.0000000 |
| Arachidonic acid metabolism | 1.0000000 |
| Arginine and proline metabolism | 1.0000000 |
| Arginine biosynthesis | 1.0000000 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.4050000 |
| Ascorbate and aldarate metabolism | 1.0000000 |
| Asthma | 1.0000000 |
| Autoimmune thyroid disease | 1.0000000 |
| B cell receptor signaling pathway | 1.0000000 |
| Bacterial invasion of epithelial cells | 1.0000000 |

| | |
|---|---|
| Basal cell carcinoma | 0.7984286 |
| beta-Alanine metabolism | 0.9234000 |
| Bile secretion | 1.0000000 |
| Biosynthesis of unsaturated fatty acids | 1.0000000 |
| Biotin metabolism | 1.0000000 |
| Bladder cancer | 0.7727400 |
| Butanoate metabolism | 1.0000000 |
| Caffeine metabolism | 1.0000000 |
| Carbohydrate digestion and absorption | 1.0000000 |
| Cardiac muscle contraction | 1.0000000 |
| Cell adhesion molecules (CAMs) | 1.0000000 |
| Cell cycle | 0.2581875 |
| Central carbon metabolism in cancer | 0.9090000 |
| Chagas disease (American trypanosomiasis) | 0.8485714 |
| Chemical carcinogenesis | 1.0000000 |
| Choline metabolism in cancer | 0.9090000 |
| Cholinergic synapse | 1.0000000 |
| Chronic myeloid leukemia | 0.9365056 |
| Circadian entrainment | 1.0000000 |
| Circadian rhythm | 1.0000000 |
| Citrate cycle (TCA cycle) | 0.6508929 |
| Cocaine addiction | 1.0000000 |
| Colorectal cancer | 0.1041429 |
| Complement and coagulation cascades | 0.7897500 |
| Cysteine and methionine metabolism | 1.0000000 |
| Cytosolic DNA-sensing pathway | 1.0000000 |
| D-Glutamine and D-glutamate metabolism | 1.0000000 |
| Dilated cardiomyopathy | 1.0000000 |
| Dopaminergic synapse | 1.0000000 |
| Dorso-ventral axis formation | 0.6764595 |
| Drug metabolism - cytochrome P450 | 1.0000000 |
| Drug metabolism - other enzymes | 0.7727400 |
| ECM-receptor interaction | 0.1041429 |
| Endocrine and other factor-regulated calcium reabsorption | 0.9090000 |
| Endocytosis | 1.0000000 |
| Endometrial cancer | 0.7226053 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.7984286 |
| Epstein-Barr virus infection | 1.0000000 |
| ErbB signaling pathway | 1.0000000 |
| Estrogen signaling pathway | 1.0000000 |
| Ether lipid metabolism | 1.0000000 |
| Fanconi anemia pathway | 0.5514231 |
| Fat digestion and absorption | 0.7398000 |
| Fatty acid biosynthesis | 1.0000000 |
| Fatty acid degradation | 0.9090000 |
| Fatty acid elongation | 1.0000000 |

| | |
|---|---|
| Fc epsilon RI signaling pathway | 1.0000000 |
| Fc gamma R-mediated phagocytosis | 1.0000000 |
| Folate biosynthesis | 0.2685789 |
| FoxO signaling pathway | 0.9090000 |
| Fructose and mannose metabolism | 0.0000000 |
| GABAergic synapse | 1.0000000 |
| Galactose metabolism | 0.2430000 |
| Gap junction | 1.0000000 |
| Gastric acid secretion | 1.0000000 |
| Glioma | 1.0000000 |
| Glucagon signaling pathway | 1.0000000 |
| Glutamatergic synapse | 1.0000000 |
| Glutathione metabolism | 0.9090000 |
| Glycerolipid metabolism | 0.2430000 |
| Glycerophospholipid metabolism | 0.1041429 |
| Glycine, serine and threonine metabolism | 0.7398000 |
| Glycolysis / Gluconeogenesis | 0.8485714 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.2581875 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 1.0000000 |
| Glycosaminoglycan degradation | 0.3818571 |
| Glycosphingolipid biosynthesis - ganglio series | 0.9090000 |
| Glycosphingolipid biosynthesis - globo series | 1.0000000 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 1.0000000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.9324419 |
| Glyoxylate and dicarboxylate metabolism | 0.6750000 |
| GnRH signaling pathway | 0.9090000 |
| Graft-versus-host disease | 1.0000000 |
| Hepatitis B | 0.8421207 |
| Hepatitis C | 0.6750000 |
| Herpes simplex infection | 0.6575294 |
| HIF-1 signaling pathway | 1.0000000 |
| Histidine metabolism | 1.0000000 |
| Huntington's disease | 0.7398000 |
| Hypertrophic cardiomyopathy (HCM) | 1.0000000 |
| Inflammatory bowel disease (IBD) | 1.0000000 |
| Inflammatory mediator regulation of TRP channels | 1.0000000 |
| Influenza A | 1.0000000 |
| Inositol phosphate metabolism | 1.0000000 |
| Insulin resistance | 0.7398000 |
| Insulin secretion | 1.0000000 |
| Insulin signaling pathway | 0.9090000 |
| Intestinal immune network for IgA production | 1.0000000 |
| Legionellosis | 1.0000000 |
| Leishmaniasis | 0.9365056 |
| Leukocyte transendothelial migration | 1.0000000 |
| Linoleic acid metabolism | 1.0000000 |

| | |
|---|---|
| Lipoic acid metabolism | 1.0000000 |
| Long-term depression | 1.0000000 |
| Long-term potentiation | 1.0000000 |
| Longevity regulating pathway | 0.7984286 |
| Longevity regulating pathway - multiple species | 1.0000000 |
| Lysine biosynthesis | 1.0000000 |
| Lysine degradation | 1.0000000 |
| Malaria | 1.0000000 |
| Maturity onset diabetes of the young | 1.0000000 |
| Measles | 1.0000000 |
| Melanogenesis | 1.0000000 |
| Melanoma | 1.0000000 |
| Metabolism of xenobiotics by cytochrome P450 | 1.0000000 |
| Mineral absorption | 0.9090000 |
| Morphine addiction | 1.0000000 |
| mRNA surveillance pathway | NaN |
| mTOR signaling pathway | 1.0000000 |
| Mucin type O-Glycan biosynthesis | 1.0000000 |
| N-Glycan biosynthesis | 0.9234000 |
| Natural killer cell mediated cytotoxicity | 1.0000000 |
| Neuroactive ligand-receptor interaction | 1.0000000 |
| Neurotrophin signaling pathway | 1.0000000 |
| NF-kappa B signaling pathway | 1.0000000 |
| Nicotinate and nicotinamide metabolism | 0.4374000 |
| Nitrogen metabolism | 1.0000000 |
| NOD-like receptor signaling pathway | 1.0000000 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.0000000 |
| Non-small cell lung cancer | 1.0000000 |
| Notch signaling pathway | 0.8485714 |
| One carbon pool by folate | 0.7984286 |
| Oocyte meiosis | 0.7398000 |
| Osteoclast differentiation | 0.9090000 |
| Ovarian steroidogenesis | 1.0000000 |
| Oxidative phosphorylation | 0.2581875 |
| p53 signaling pathway | 1.0000000 |
| Pancreatic cancer | 0.8960625 |
| Pancreatic secretion | 1.0000000 |
| Pantothenate and CoA biosynthesis | 1.0000000 |
| Parkinson's disease | 0.6575294 |
| Pathogenic Escherichia coli infection | 0.2581875 |
| Pentose and glucuronate interconversions | 1.0000000 |
| Pentose phosphate pathway | 0.2430000 |
| Peroxisome | 0.7398000 |
| Pertussis | 1.0000000 |
| Phagosome | 1.0000000 |
| Phenylalanine metabolism | 0.9090000 |

| | |
|---|---|
| Phenylalanine, tyrosine and tryptophan biosynthesis | 1.0000000 |
| Phosphatidylinositol signaling system | 1.0000000 |
| Phospholipase D signaling pathway | 1.0000000 |
| Phototransduction | 1.0000000 |
| Platelet activation | 1.0000000 |
| Porphyrin and chlorophyll metabolism | 1.0000000 |
| Primary bile acid biosynthesis | 1.0000000 |
| Prion diseases | 0.9090000 |
| Progesterone-mediated oocyte maturation | 0.0000000 |
| Prolactin signaling pathway | 1.0000000 |
| Propanoate metabolism | 1.0000000 |
| Prostate cancer | 0.1041429 |
| Protein processing in endoplasmic reticulum | 0.9855000 |
| Proximal tubule bicarbonate reclamation | 1.0000000 |
| Pyrimidine metabolism | 1.0000000 |
| Pyruvate metabolism | 0.7897500 |
| Regulation of autophagy | 0.6575294 |
| Regulation of lipolysis in adipocytes | 1.0000000 |
| Renal cell carcinoma | 0.6575294 |
| Renin secretion | 1.0000000 |
| Renin-angiotensin system | 1.0000000 |
| Retinol metabolism | 1.0000000 |
| Retrograde endocannabinoid signaling | 1.0000000 |
| Rheumatoid arthritis | 1.0000000 |
| Riboflavin metabolism | 1.0000000 |
| Ribosome biogenesis in eukaryotes | 1.0000000 |
| RIG-I-like receptor signaling pathway | 0.2685789 |
| RNA degradation | 0.9090000 |
| RNA transport | 0.7727400 |
| Salivary secretion | 1.0000000 |
| Salmonella infection | 0.3818571 |
| Selenocompound metabolism | 1.0000000 |
| Serotonergic synapse | 1.0000000 |
| Shigellosis | 1.0000000 |
| Signaling pathways regulating pluripotency of stem cells | 0.9105181 |
| Small cell lung cancer | 0.1041429 |
| SNARE interactions in vesicular transport | 1.0000000 |
| Sphingolipid metabolism | 0.7727400 |
| Sphingolipid signaling pathway | 0.8014737 |
| Staphylococcus aureus infection | 0.8485714 |
| Starch and sucrose metabolism | 1.0000000 |
| Steroid biosynthesis | 1.0000000 |
| Steroid hormone biosynthesis | 1.0000000 |
| Sulfur metabolism | 1.0000000 |
| Sulfur relay system | 1.0000000 |
| Synaptic vesicle cycle | 0.6575294 |

| | |
|---|---|
| Synthesis and degradation of ketone bodies | 1.0000000 |
| Systemic lupus erythematosus | 1.0000000 |
| T cell receptor signaling pathway | 1.0000000 |
| Taste transduction | 1.0000000 |
| Taurine and hypotaurine metabolism | 1.0000000 |
| Terpenoid backbone biosynthesis | 1.0000000 |
| TGF-beta signaling pathway | 0.7727400 |
| Thiamine metabolism | 1.0000000 |
| Thyroid cancer | 0.2685789 |
| Thyroid hormone signaling pathway | 1.0000000 |
| Thyroid hormone synthesis | 1.0000000 |
| Tight junction | 1.0000000 |
| TNF signaling pathway | 0.7398000 |
| Toll-like receptor signaling pathway | 1.0000000 |
| Toxoplasmosis | 1.0000000 |
| Transcriptional misregulation in cancer | 1.0000000 |
| Tryptophan metabolism | 1.0000000 |
| Type I diabetes mellitus | 1.0000000 |
| Type II diabetes mellitus | 1.0000000 |
| Tyrosine metabolism | 1.0000000 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 1.0000000 |
| Valine, leucine and isoleucine degradation | 1.0000000 |
| Vascular smooth muscle contraction | 1.0000000 |
| Vasopressin-regulated water reabsorption | 1.0000000 |
| VEGF signaling pathway | 1.0000000 |
| Vibrio cholerae infection | 1.0000000 |
| Viral carcinogenesis | 0.9105181 |
| Viral myocarditis | 0.9090000 |
| Vitamin B6 metabolism | 0.9090000 |
| Vitamin digestion and absorption | 1.0000000 |
| Wnt signaling pathway | 1.0000000 |
| | pGFWER |
| Acute myeloid leukemia | 1.000 |
| Adherens junction | 1.000 |
| Adipocytokine signaling pathway | 1.000 |
| Adrenergic signaling in cardiomyocytes | 1.000 |
| African trypanosomiasis | 1.000 |
| AGE-RAGE signaling pathway in diabetic complications | 1.000 |
| Alanine, aspartate and glutamate metabolism | 1.000 |
| Aldosterone synthesis and secretion | 1.000 |
| Aldosterone-regulated sodium reabsorption | 1.000 |
| Allograft rejection | 1.000 |
| alpha-Linolenic acid metabolism | 1.000 |
| Alzheimer's disease | 1.000 |
| Amino sugar and nucleotide sugar metabolism | 1.000 |
| Aminoacyl-tRNA biosynthesis | 1.000 |

| | |
|---|---|
| Amoebiasis | 1.000 |
| Amphetamine addiction | 1.000 |
| AMPK signaling pathway | 1.000 |
| Amyotrophic lateral sclerosis (ALS) | 1.000 |
| Antigen processing and presentation | 1.000 |
| Apoptosis | 1.000 |
| Arachidonic acid metabolism | 1.000 |
| Arginine and proline metabolism | 1.000 |
| Arginine biosynthesis | 1.000 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 1.000 |
| Ascorbate and aldarate metabolism | 1.000 |
| Asthma | 1.000 |
| Autoimmune thyroid disease | 1.000 |
| B cell receptor signaling pathway | 1.000 |
| Bacterial invasion of epithelial cells | 1.000 |
| Basal cell carcinoma | 1.000 |
| beta-Alanine metabolism | 1.000 |
| Bile secretion | 1.000 |
| Biosynthesis of unsaturated fatty acids | 1.000 |
| Biotin metabolism | 1.000 |
| Bladder cancer | 1.000 |
| Butanoate metabolism | 1.000 |
| Caffeine metabolism | 1.000 |
| Carbohydrate digestion and absorption | 1.000 |
| Cardiac muscle contraction | 1.000 |
| Cell adhesion molecules (CAMs) | 1.000 |
| Cell cycle | 1.000 |
| Central carbon metabolism in cancer | 1.000 |
| Chagas disease (American trypanosomiasis) | 1.000 |
| Chemical carcinogenesis | 1.000 |
| Choline metabolism in cancer | 1.000 |
| Cholinergic synapse | 1.000 |
| Chronic myeloid leukemia | 1.000 |
| Circadian entrainment | 1.000 |
| Circadian rhythm | 1.000 |
| Citrate cycle (TCA cycle) | 1.000 |
| Cocaine addiction | 1.000 |
| Colorectal cancer | 0.729 |
| Complement and coagulation cascades | 1.000 |
| Cysteine and methionine metabolism | 1.000 |
| Cytosolic DNA-sensing pathway | 1.000 |
| D-Glutamine and D-glutamate metabolism | 1.000 |
| Dilated cardiomyopathy | 1.000 |
| Dopaminergic synapse | 1.000 |
| Dorso-ventral axis formation | 1.000 |
| Drug metabolism - cytochrome P450 | 1.000 |

| | |
|---|---|
| Drug metabolism - other enzymes | 1.000 |
| ECM-receptor interaction | 0.486 |
| Endocrine and other factor-regulated calcium reabsorption | 1.000 |
| Endocytosis | 1.000 |
| Endometrial cancer | 1.000 |
| Epithelial cell signaling in Helicobacter pylori infection | 1.000 |
| Epstein-Barr virus infection | 1.000 |
| ErbB signaling pathway | 1.000 |
| Estrogen signaling pathway | 1.000 |
| Ether lipid metabolism | 1.000 |
| Fanconi anemia pathway | 1.000 |
| Fat digestion and absorption | 1.000 |
| Fatty acid biosynthesis | 1.000 |
| Fatty acid degradation | 1.000 |
| Fatty acid elongation | 1.000 |
| Fc epsilon RI signaling pathway | 1.000 |
| Fc gamma R-mediated phagocytosis | 1.000 |
| Folate biosynthesis | 1.000 |
| FoxO signaling pathway | 1.000 |
| Fructose and mannose metabolism | 0.000 |
| GABAergic synapse | 1.000 |
| Galactose metabolism | 1.000 |
| Gap junction | 1.000 |
| Gastric acid secretion | 1.000 |
| Glioma | 1.000 |
| Glucagon signaling pathway | 1.000 |
| Glutamatergic synapse | 1.000 |
| Glutathione metabolism | 1.000 |
| Glycerolipid metabolism | 1.000 |
| Glycerophospholipid metabolism | 0.729 |
| Glycine, serine and threonine metabolism | 1.000 |
| Glycolysis / Gluconeogenesis | 1.000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 1.000 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 1.000 |
| Glycosaminoglycan degradation | 1.000 |
| Glycosphingolipid biosynthesis - ganglio series | 1.000 |
| Glycosphingolipid biosynthesis - globo series | 1.000 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 1.000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 1.000 |
| Glyoxylate and dicarboxylate metabolism | 1.000 |
| GnRH signaling pathway | 1.000 |
| Graft-versus-host disease | 1.000 |
| Hepatitis B | 1.000 |
| Hepatitis C | 1.000 |
| Herpes simplex infection | 1.000 |
| HIF-1 signaling pathway | 1.000 |

| | |
|---|---|
| Histidine metabolism | 1.000 |
| Huntington's disease | 1.000 |
| Hypertrophic cardiomyopathy (HCM) | 1.000 |
| Inflammatory bowel disease (IBD) | 1.000 |
| Inflammatory mediator regulation of TRP channels | 1.000 |
| Influenza A | 1.000 |
| Inositol phosphate metabolism | 1.000 |
| Insulin resistance | 1.000 |
| Insulin secretion | 1.000 |
| Insulin signaling pathway | 1.000 |
| Intestinal immune network for IgA production | 1.000 |
| Legionellosis | 1.000 |
| Leishmaniasis | 1.000 |
| Leukocyte transendothelial migration | 1.000 |
| Linoleic acid metabolism | 1.000 |
| Lipoic acid metabolism | 1.000 |
| Long-term depression | 1.000 |
| Long-term potentiation | 1.000 |
| Longevity regulating pathway | 1.000 |
| Longevity regulating pathway - multiple species | 1.000 |
| Lysine biosynthesis | 1.000 |
| Lysine degradation | 1.000 |
| Malaria | 1.000 |
| Maturity onset diabetes of the young | 1.000 |
| Measles | 1.000 |
| Melanogenesis | 1.000 |
| Melanoma | 1.000 |
| Metabolism of xenobiotics by cytochrome P450 | 1.000 |
| Mineral absorption | 1.000 |
| Morphine addiction | 1.000 |
| mRNA surveillance pathway | NaN |
| mTOR signaling pathway | 1.000 |
| Mucin type O-Glycan biosynthesis | 1.000 |
| N-Glycan biosynthesis | 1.000 |
| Natural killer cell mediated cytotoxicity | 1.000 |
| Neuroactive ligand-receptor interaction | 1.000 |
| Neurotrophin signaling pathway | 1.000 |
| NF-kappa B signaling pathway | 1.000 |
| Nicotinate and nicotinamide metabolism | 1.000 |
| Nitrogen metabolism | 1.000 |
| NOD-like receptor signaling pathway | 1.000 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.000 |
| Non-small cell lung cancer | 1.000 |
| Notch signaling pathway | 1.000 |
| One carbon pool by folate | 1.000 |
| Oocyte meiosis | 1.000 |

| | |
|---|---|
| Osteoclast differentiation | 1.000 |
| Ovarian steroidogenesis | 1.000 |
| Oxidative phosphorylation | 1.000 |
| p53 signaling pathway | 1.000 |
| Pancreatic cancer | 1.000 |
| Pancreatic secretion | 1.000 |
| Pantothenate and CoA biosynthesis | 1.000 |
| Parkinson's disease | 1.000 |
| Pathogenic Escherichia coli infection | 1.000 |
| Pentose and glucuronate interconversions | 1.000 |
| Pentose phosphate pathway | 1.000 |
| Peroxisome | 1.000 |
| Pertussis | 1.000 |
| Phagosome | 1.000 |
| Phenylalanine metabolism | 1.000 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 1.000 |
| Phosphatidylinositol signaling system | 1.000 |
| Phospholipase D signaling pathway | 1.000 |
| Phototransduction | 1.000 |
| Platelet activation | 1.000 |
| Porphyrin and chlorophyll metabolism | 1.000 |
| Primary bile acid biosynthesis | 1.000 |
| Prion diseases | 1.000 |
| Progesterone-mediated oocyte maturation | 0.000 |
| Prolactin signaling pathway | 1.000 |
| Propanoate metabolism | 1.000 |
| Prostate cancer | 0.486 |
| Protein processing in endoplasmic reticulum | 1.000 |
| Proximal tubule bicarbonate reclamation | 1.000 |
| Pyrimidine metabolism | 1.000 |
| Pyruvate metabolism | 1.000 |
| Regulation of autophagy | 1.000 |
| Regulation of lipolysis in adipocytes | 1.000 |
| Renal cell carcinoma | 1.000 |
| Renin secretion | 1.000 |
| Renin-angiotensin system | 1.000 |
| Retinol metabolism | 1.000 |
| Retrograde endocannabinoid signaling | 1.000 |
| Rheumatoid arthritis | 1.000 |
| Riboflavin metabolism | 1.000 |
| Ribosome biogenesis in eukaryotes | 1.000 |
| RIG-I-like receptor signaling pathway | 1.000 |
| RNA degradation | 1.000 |
| RNA transport | 1.000 |
| Salivary secretion | 1.000 |
| Salmonella infection | 1.000 |

| | |
|---|---|
| Selenocompound metabolism | 1.000 |
| Serotonergic synapse | 1.000 |
| Shigellosis | 1.000 |
| Signaling pathways regulating pluripotency of stem cells | 1.000 |
| Small cell lung cancer | 0.729 |
| SNARE interactions in vesicular transport | 1.000 |
| Sphingolipid metabolism | 1.000 |
| Sphingolipid signaling pathway | 1.000 |
| Staphylococcus aureus infection | 1.000 |
| Starch and sucrose metabolism | 1.000 |
| Steroid biosynthesis | 1.000 |
| Steroid hormone biosynthesis | 1.000 |
| Sulfur metabolism | 1.000 |
| Sulfur relay system | 1.000 |
| Synaptic vesicle cycle | 1.000 |
| Synthesis and degradation of ketone bodies | 1.000 |
| Systemic lupus erythematosus | 1.000 |
| T cell receptor signaling pathway | 1.000 |
| Taste transduction | 1.000 |
| Taurine and hypotaurine metabolism | 1.000 |
| Terpenoid backbone biosynthesis | 1.000 |
| TGF-beta signaling pathway | 1.000 |
| Thiamine metabolism | 1.000 |
| Thyroid cancer | 1.000 |
| Thyroid hormone signaling pathway | 1.000 |
| Thyroid hormone synthesis | 1.000 |
| Tight junction | 1.000 |
| TNF signaling pathway | 1.000 |
| Toll-like receptor signaling pathway | 1.000 |
| Toxoplasmosis | 1.000 |
| Transcriptional misregulation in cancer | 1.000 |
| Tryptophan metabolism | 1.000 |
| Type I diabetes mellitus | 1.000 |
| Type II diabetes mellitus | 1.000 |
| Tyrosine metabolism | 1.000 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 1.000 |
| Valine, leucine and isoleucine degradation | 1.000 |
| Vascular smooth muscle contraction | 1.000 |
| Vasopressin-regulated water reabsorption | 1.000 |
| VEGF signaling pathway | 1.000 |
| Vibrio cholerae infection | 1.000 |
| Viral carcinogenesis | 1.000 |
| Viral myocarditis | 1.000 |
| Vitamin B6 metabolism | 1.000 |
| Vitamin digestion and absorption | 1.000 |
| Wnt signaling pathway | 1.000 |

| | Status |
|---|---|
| Acute myeloid leukemia | Inhibited |
| Adherens junction | Inhibited |
| Adipocytokine signaling pathway | Inhibited |
| Adrenergic signaling in cardiomyocytes | Inhibited |
| African trypanosomiasis | Inhibited |
| AGE-RAGE signaling pathway in diabetic complications | Inhibited |
| Alanine, aspartate and glutamate metabolism | Inhibited |
| Aldosterone synthesis and secretion | Activated |
| Aldosterone-regulated sodium reabsorption | Activated |
| Allograft rejection | Inhibited |
| alpha-Linolenic acid metabolism | Inhibited |
| Alzheimer's disease | Inhibited |
| Amino sugar and nucleotide sugar metabolism | Inhibited |
| Aminoacyl-tRNA biosynthesis | Inhibited |
| Amoebiasis | Inhibited |
| Amphetamine addiction | Inhibited |
| AMPK signaling pathway | Activated |
| Amyotrophic lateral sclerosis (ALS) | Inhibited |
| Antigen processing and presentation | Inhibited |
| Apoptosis | Inhibited |
| Arachidonic acid metabolism | Inhibited |
| Arginine and proline metabolism | Inhibited |
| Arginine biosynthesis | Inhibited |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | Activated |
| Ascorbate and aldarate metabolism | <NA> |
| Asthma | <NA> |
| Autoimmune thyroid disease | <NA> |
| B cell receptor signaling pathway | Activated |
| Bacterial invasion of epithelial cells | Inhibited |
| Basal cell carcinoma | Inhibited |
| beta-Alanine metabolism | Inhibited |
| Bile secretion | Inhibited |
| Biosynthesis of unsaturated fatty acids | Inhibited |
| Biotin metabolism | <NA> |
| Bladder cancer | Inhibited |
| Butanoate metabolism | Inhibited |
| Caffeine metabolism | Inhibited |
| Carbohydrate digestion and absorption | Activated |
| Cardiac muscle contraction | Inhibited |
| Cell adhesion molecules (CAMs) | Inhibited |
| Cell cycle | Activated |
| Central carbon metabolism in cancer | Inhibited |
| Chagas disease (American trypanosomiasis) | Inhibited |
| Chemical carcinogenesis | Inhibited |
| Choline metabolism in cancer | Inhibited |

| | |
|---|---|
| Cholinergic synapse | Activated |
| Chronic myeloid leukemia | Inhibited |
| Circadian entrainment | Activated |
| Circadian rhythm | Inhibited |
| Citrate cycle (TCA cycle) | Inhibited |
| Cocaine addiction | Inhibited |
| Colorectal cancer | Activated |
| Complement and coagulation cascades | Inhibited |
| Cysteine and methionine metabolism | Inhibited |
| Cytosolic DNA-sensing pathway | Inhibited |
| D-Glutamine and D-glutamate metabolism | Inhibited |
| Dilated cardiomyopathy | Inhibited |
| Dopaminergic synapse | Inhibited |
| Dorso-ventral axis formation | Activated |
| Drug metabolism - cytochrome P450 | Inhibited |
| Drug metabolism - other enzymes | Inhibited |
| ECM-receptor interaction | Inhibited |
| Endocrine and other factor-regulated calcium reabsorption | Activated |
| Endocytosis | Inhibited |
| Endometrial cancer | Activated |
| Epithelial cell signaling in Helicobacter pylori infection | Activated |
| Epstein-Barr virus infection | Activated |
| ErbB signaling pathway | Inhibited |
| Estrogen signaling pathway | Inhibited |
| Ether lipid metabolism | Inhibited |
| Fanconi anemia pathway | Inhibited |
| Fat digestion and absorption | Inhibited |
| Fatty acid biosynthesis | Inhibited |
| Fatty acid degradation | Inhibited |
| Fatty acid elongation | Inhibited |
| Fc epsilon RI signaling pathway | Inhibited |
| Fc gamma R-mediated phagocytosis | Activated |
| Folate biosynthesis | Inhibited |
| FoxO signaling pathway | Inhibited |
| Fructose and mannose metabolism | Inhibited |
| GABAergic synapse | Activated |
| Galactose metabolism | Inhibited |
| Gap junction | Activated |
| Gastric acid secretion | Activated |
| Glioma | Activated |
| Glucagon signaling pathway | Activated |
| Glutamatergic synapse | Activated |
| Glutathione metabolism | Inhibited |
| Glycerolipid metabolism | Inhibited |
| Glycerophospholipid metabolism | Inhibited |
| Glycine, serine and threonine metabolism | Inhibited |

| | |
|---|---|
| Glycolysis / Gluconeogenesis | Inhibited |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | Inhibited |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | Inhibited |
| Glycosaminoglycan degradation | Inhibited |
| Glycosphingolipid biosynthesis - ganglio series | Inhibited |
| Glycosphingolipid biosynthesis - globo series | Inhibited |
| Glycosphingolipid biosynthesis - lacto and neolacto series | Inhibited |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | Inhibited |
| Glyoxylate and dicarboxylate metabolism | Inhibited |
| GnRH signaling pathway | Activated |
| Graft-versus-host disease | Inhibited |
| Hepatitis B | Inhibited |
| Hepatitis C | Inhibited |
| Herpes simplex infection | Inhibited |
| HIF-1 signaling pathway | Inhibited |
| Histidine metabolism | Inhibited |
| Huntington's disease | Activated |
| Hypertrophic cardiomyopathy (HCM) | Inhibited |
| Inflammatory bowel disease (IBD) | Activated |
| Inflammatory mediator regulation of TRP channels | Inhibited |
| Influenza A | Activated |
| Inositol phosphate metabolism | Inhibited |
| Insulin resistance | Activated |
| Insulin secretion | Inhibited |
| Insulin signaling pathway | Activated |
| Intestinal immune network for IgA production | Activated |
| Legionellosis | Activated |
| Leishmaniasis | Activated |
| Leukocyte transendothelial migration | Inhibited |
| Linoleic acid metabolism | Inhibited |
| Lipoic acid metabolism | Inhibited |
| Long-term depression | <NA> |
| Long-term potentiation | Inhibited |
| Longevity regulating pathway | Activated |
| Longevity regulating pathway - multiple species | Activated |
| Lysine biosynthesis | Inhibited |
| Lysine degradation | Inhibited |
| Malaria | Inhibited |
| Maturity onset diabetes of the young | Activated |
| Measles | Activated |
| Melanogenesis | Inhibited |
| Melanoma | Activated |
| Metabolism of xenobiotics by cytochrome P450 | Inhibited |
| Mineral absorption | Inhibited |
| Morphine addiction | Inhibited |
| mRNA surveillance pathway | Inhibited |

| | |
|---|---|
| mTOR signaling pathway | Activated |
| Mucin type O-Glycan biosynthesis | Inhibited |
| N-Glycan biosynthesis | Inhibited |
| Natural killer cell mediated cytotoxicity | Activated |
| Neuroactive ligand-receptor interaction | Activated |
| Neurotrophin signaling pathway | Activated |
| NF-kappa B signaling pathway | Inhibited |
| Nicotinate and nicotinamide metabolism | Inhibited |
| Nitrogen metabolism | Inhibited |
| NOD-like receptor signaling pathway | Activated |
| Non-alcoholic fatty liver disease (NAFLD) | Activated |
| Non-small cell lung cancer | Inhibited |
| Notch signaling pathway | Activated |
| One carbon pool by folate | Inhibited |
| Oocyte meiosis | Activated |
| Osteoclast differentiation | Inhibited |
| Ovarian steroidogenesis | Activated |
| Oxidative phosphorylation | Inhibited |
| p53 signaling pathway | Activated |
| Pancreatic cancer | Inhibited |
| Pancreatic secretion | Inhibited |
| Pantothenate and CoA biosynthesis | Inhibited |
| Parkinson's disease | Inhibited |
| Pathogenic Escherichia coli infection | Activated |
| Pentose and glucuronate interconversions | Inhibited |
| Pentose phosphate pathway | Inhibited |
| Peroxisome | Inhibited |
| Pertussis | Inhibited |
| Phagosome | Inhibited |
| Phenylalanine metabolism | Inhibited |
| Phenylalanine, tyrosine and tryptophan biosynthesis | Inhibited |
| Phosphatidylinositol signaling system | Inhibited |
| Phospholipase D signaling pathway | Activated |
| Phototransduction | Inhibited |
| Platelet activation | Activated |
| Porphyrin and chlorophyll metabolism | Inhibited |
| Primary bile acid biosynthesis | Inhibited |
| Prion diseases | Inhibited |
| Progesterone-mediated oocyte maturation | Activated |
| Prolactin signaling pathway | Inhibited |
| Propanoate metabolism | Inhibited |
| Prostate cancer | Activated |
| Protein processing in endoplasmic reticulum | Activated |
| Proximal tubule bicarbonate reclamation | Inhibited |
| Pyrimidine metabolism | Inhibited |
| Pyruvate metabolism | Inhibited |

| | |
|---|---|
| Regulation of autophagy | Activated |
| Regulation of lipolysis in adipocytes | Inhibited |
| Renal cell carcinoma | Inhibited |
| Renin secretion | Activated |
| Renin-angiotensin system | <NA> |
| Retinol metabolism | Inhibited |
| Retrograde endocannabinoid signaling | Activated |
| Rheumatoid arthritis | Inhibited |
| Riboflavin metabolism | Inhibited |
| Ribosome biogenesis in eukaryotes | Inhibited |
| RIG-I-like receptor signaling pathway | Activated |
| RNA degradation | Activated |
| RNA transport | Inhibited |
| Salivary secretion | Activated |
| Salmonella infection | Inhibited |
| Selenocompound metabolism | Inhibited |
| Serotonergic synapse | Activated |
| Shigellosis | Activated |
| Signaling pathways regulating pluripotency of stem cells | <NA> |
| Small cell lung cancer | Inhibited |
| SNARE interactions in vesicular transport | Inhibited |
| Sphingolipid metabolism | Inhibited |
| Sphingolipid signaling pathway | Inhibited |
| Staphylococcus aureus infection | Inhibited |
| Starch and sucrose metabolism | Inhibited |
| Steroid biosynthesis | Inhibited |
| Steroid hormone biosynthesis | Inhibited |
| Sulfur metabolism | Inhibited |
| Sulfur relay system | Inhibited |
| Synaptic vesicle cycle | Inhibited |
| Synthesis and degradation of ketone bodies | Inhibited |
| Systemic lupus erythematosus | Inhibited |
| T cell receptor signaling pathway | Activated |
| Taste transduction | Activated |
| Taurine and hypotaurine metabolism | Inhibited |
| Terpenoid backbone biosynthesis | Inhibited |
| TGF-beta signaling pathway | Inhibited |
| Thiamine metabolism | Inhibited |
| Thyroid cancer | Activated |
| Thyroid hormone signaling pathway | Inhibited |
| Thyroid hormone synthesis | Inhibited |
| Tight junction | Inhibited |
| TNF signaling pathway | Inhibited |
| Toll-like receptor signaling pathway | Inhibited |
| Toxoplasmosis | Inhibited |
| Transcriptional misregulation in cancer | Inhibited |

```
Tryptophan metabolism                                                  Inhibited
Type I diabetes mellitus                                                    <NA>
Type II diabetes mellitus                                             Activated
Tyrosine metabolism                                                   Inhibited
Ubiquinone and other terpenoid-quinone biosynthesis                   Inhibited
Valine, leucine and isoleucine degradation                            Inhibited
Vascular smooth muscle contraction                                    Inhibited
Vasopressin-regulated water reabsorption                              Inhibited
VEGF signaling pathway                                                Activated
Vibrio cholerae infection                                             Inhibited
Viral carcinogenesis                                                  Activated
Viral myocarditis                                                     Activated
Vitamin B6 metabolism                                                 Inhibited
Vitamin digestion and absorption                                            <NA>
Wnt signaling pathway                                                 Activated

$errors
named list()
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). Alternatively, the user can supply the results of the differential expression analysis of genes in two forms:

1. a data.frame with columns: *ID* gene identifiers (they must match with the node labels), *logFC* log fold-changes, *t* - t-statistics, *pval* p-values, *padj* adjusted p-values. Then the user sets `type` to `DEtable`

2. a list with two slots: named vector of log fold-changes of differentially expressed genes and a vector of names of all genes analysed. Then the user sets `type` to `DElist`

The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The default thresholds for the differential expression analysis of genes (the moderated t-test from `limma` is used) are set with arguments `logFC.th` and `p.val.th`. The user can omit one of these criteria by setting the agrument negative value, as is shown also in the example. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway.

## 3.5 TAPPA

TAPPA was among the first topology-based pathway analysis methods. It was inspired in chemointformatics and their models for predicting the structure of molecules. In TAPPA, the gene expression values are standardized and sigma-transformed within a samples. Then, a pathway is seen a molecule, individual genes as atoms and the energy of a molecule is a score defined for one sample. This score is called Pathway Connectivity Index. The difference of expression is assessed via a common univariable two sample test - Mann-Whitney in our implemetation.

```
> tap<-TAPPA(hnrnp.cnts, group, pathways, type="RNASeq")

14329 node labels mapped to the expression data
Average coverage 84.40644 %
0 (out of 267) pathways without a mapped node

> res(tap)

$results
                                                                    control.N
Acute myeloid leukemia                                                      4
Adherens junction                                                           4
Adipocytokine signaling pathway                                             4
Adrenergic signaling in cardiomyocytes                                      4
African trypanosomiasis                                                     4
AGE-RAGE signaling pathway in diabetic complications                        4
Alanine, aspartate and glutamate metabolism                                 4
Aldosterone synthesis and secretion                                         4
Aldosterone-regulated sodium reabsorption                                   4
Allograft rejection                                                         4
alpha-Linolenic acid metabolism                                             4
Alzheimer's disease                                                         4
Amino sugar and nucleotide sugar metabolism                                 4
Aminoacyl-tRNA biosynthesis                                                 4
Amoebiasis                                                                  4
Amphetamine addiction                                                       4
AMPK signaling pathway                                                      4
Amyotrophic lateral sclerosis (ALS)                                         4
Antigen processing and presentation                                         4
Apoptosis                                                                   4
Arachidonic acid metabolism                                                 4
Arginine and proline metabolism                                             4
Arginine biosynthesis                                                       4
Arrhythmogenic right ventricular cardiomyopathy (ARVC)                      4
Ascorbate and aldarate metabolism                                           4
Asthma                                                                      4
```

| | |
|---|---|
| Autoimmune thyroid disease | 4 |
| B cell receptor signaling pathway | 4 |
| Bacterial invasion of epithelial cells | 4 |
| Basal cell carcinoma | 4 |
| beta-Alanine metabolism | 4 |
| Bile secretion | 4 |
| Biosynthesis of unsaturated fatty acids | 4 |
| Biotin metabolism | 4 |
| Bladder cancer | 4 |
| Butanoate metabolism | 4 |
| Caffeine metabolism | 4 |
| Carbohydrate digestion and absorption | 4 |
| Cardiac muscle contraction | 4 |
| Cell adhesion molecules (CAMs) | 4 |
| Cell cycle | 4 |
| Central carbon metabolism in cancer | 4 |
| Chagas disease (American trypanosomiasis) | 4 |
| Chemical carcinogenesis | 4 |
| Choline metabolism in cancer | 4 |
| Cholinergic synapse | 4 |
| Chronic myeloid leukemia | 4 |
| Circadian entrainment | 4 |
| Circadian rhythm | 4 |
| Citrate cycle (TCA cycle) | 4 |
| Cocaine addiction | 4 |
| Colorectal cancer | 4 |
| Complement and coagulation cascades | 4 |
| Cysteine and methionine metabolism | 4 |
| Cytosolic DNA-sensing pathway | 4 |
| D-Glutamine and D-glutamate metabolism | 4 |
| Dilated cardiomyopathy | 4 |
| Dopaminergic synapse | 4 |
| Dorso-ventral axis formation | 4 |
| Drug metabolism - cytochrome P450 | 4 |
| Drug metabolism - other enzymes | 4 |
| ECM-receptor interaction | 4 |
| Endocrine and other factor-regulated calcium reabsorption | 4 |
| Endocytosis | 4 |
| Endometrial cancer | 4 |
| Epithelial cell signaling in Helicobacter pylori infection | 4 |
| Epstein-Barr virus infection | 4 |
| ErbB signaling pathway | 4 |
| Estrogen signaling pathway | 4 |
| Ether lipid metabolism | 4 |
| Fanconi anemia pathway | 4 |
| Fat digestion and absorption | 4 |

| | |
|---|---|
| Fatty acid biosynthesis | 4 |
| Fatty acid degradation | 4 |
| Fatty acid elongation | 4 |
| Fc epsilon RI signaling pathway | 4 |
| Fc gamma R-mediated phagocytosis | 4 |
| Folate biosynthesis | 4 |
| FoxO signaling pathway | 4 |
| Fructose and mannose metabolism | 4 |
| GABAergic synapse | 4 |
| Galactose metabolism | 4 |
| Gap junction | 4 |
| Gastric acid secretion | 4 |
| Glioma | 4 |
| Glucagon signaling pathway | 4 |
| Glutamatergic synapse | 4 |
| Glutathione metabolism | 4 |
| Glycerolipid metabolism | 4 |
| Glycerophospholipid metabolism | 4 |
| Glycine, serine and threonine metabolism | 4 |
| Glycolysis / Gluconeogenesis | 4 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 4 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 4 |
| Glycosaminoglycan degradation | 4 |
| Glycosphingolipid biosynthesis - ganglio series | 4 |
| Glycosphingolipid biosynthesis - globo series | 4 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 4 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 4 |
| Glyoxylate and dicarboxylate metabolism | 4 |
| GnRH signaling pathway | 4 |
| Graft-versus-host disease | 4 |
| Hepatitis B | 4 |
| Hepatitis C | 4 |
| Herpes simplex infection | 4 |
| HIF-1 signaling pathway | 4 |
| Histidine metabolism | 4 |
| Huntington's disease | 4 |
| Hypertrophic cardiomyopathy (HCM) | 4 |
| Inflammatory bowel disease (IBD) | 4 |
| Inflammatory mediator regulation of TRP channels | 4 |
| Influenza A | 4 |
| Inositol phosphate metabolism | 4 |
| Insulin resistance | 4 |
| Insulin secretion | 4 |
| Insulin signaling pathway | 4 |
| Intestinal immune network for IgA production | 4 |
| Legionellosis | 4 |

| | |
|---|---|
| Leishmaniasis | 4 |
| Leukocyte transendothelial migration | 4 |
| Linoleic acid metabolism | 4 |
| Lipoic acid metabolism | 4 |
| Long-term depression | 4 |
| Long-term potentiation | 4 |
| Longevity regulating pathway | 4 |
| Longevity regulating pathway - multiple species | 4 |
| Lysine biosynthesis | 4 |
| Lysine degradation | 4 |
| Malaria | 4 |
| Maturity onset diabetes of the young | 4 |
| Measles | 4 |
| Melanogenesis | 4 |
| Melanoma | 4 |
| Metabolism of xenobiotics by cytochrome P450 | 4 |
| Mineral absorption | 4 |
| Morphine addiction | 4 |
| mRNA surveillance pathway | 4 |
| mTOR signaling pathway | 4 |
| Mucin type O-Glycan biosynthesis | 4 |
| N-Glycan biosynthesis | 4 |
| Natural killer cell mediated cytotoxicity | 4 |
| Neuroactive ligand-receptor interaction | 4 |
| Neurotrophin signaling pathway | 4 |
| NF-kappa B signaling pathway | 4 |
| Nicotinate and nicotinamide metabolism | 4 |
| Nitrogen metabolism | 4 |
| NOD-like receptor signaling pathway | 4 |
| Non-alcoholic fatty liver disease (NAFLD) | 4 |
| Non-small cell lung cancer | 4 |
| Notch signaling pathway | 4 |
| One carbon pool by folate | 4 |
| Oocyte meiosis | 4 |
| Osteoclast differentiation | 4 |
| Ovarian steroidogenesis | 4 |
| Oxidative phosphorylation | 4 |
| p53 signaling pathway | 4 |
| Pancreatic cancer | 4 |
| Pancreatic secretion | 4 |
| Pantothenate and CoA biosynthesis | 4 |
| Parkinson's disease | 4 |
| Pathogenic Escherichia coli infection | 4 |
| Pentose and glucuronate interconversions | 4 |
| Pentose phosphate pathway | 4 |
| Peroxisome | 4 |

| | |
|---|---|
| Pertussis | 4 |
| Phagosome | 4 |
| Phenylalanine metabolism | 4 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 4 |
| Phosphatidylinositol signaling system | 4 |
| Phospholipase D signaling pathway | 4 |
| Phototransduction | 4 |
| Platelet activation | 4 |
| Porphyrin and chlorophyll metabolism | 4 |
| Primary bile acid biosynthesis | 4 |
| Prion diseases | 4 |
| Progesterone-mediated oocyte maturation | 4 |
| Prolactin signaling pathway | 4 |
| Propanoate metabolism | 4 |
| Prostate cancer | 4 |
| Protein processing in endoplasmic reticulum | 4 |
| Proximal tubule bicarbonate reclamation | 4 |
| Pyrimidine metabolism | 4 |
| Pyruvate metabolism | 4 |
| Regulation of autophagy | 4 |
| Regulation of lipolysis in adipocytes | 4 |
| Renal cell carcinoma | 4 |
| Renin secretion | 4 |
| Renin-angiotensin system | 4 |
| Retinol metabolism | 4 |
| Retrograde endocannabinoid signaling | 4 |
| Rheumatoid arthritis | 4 |
| Riboflavin metabolism | 4 |
| Ribosome biogenesis in eukaryotes | 4 |
| RIG-I-like receptor signaling pathway | 4 |
| RNA degradation | 4 |
| RNA transport | 4 |
| Salivary secretion | 4 |
| Salmonella infection | 4 |
| Selenocompound metabolism | 4 |
| Serotonergic synapse | 4 |
| Shigellosis | 4 |
| Signaling pathways regulating pluripotency of stem cells | 4 |
| Small cell lung cancer | 4 |
| SNARE interactions in vesicular transport | 4 |
| Sphingolipid metabolism | 4 |
| Sphingolipid signaling pathway | 4 |
| Staphylococcus aureus infection | 4 |
| Starch and sucrose metabolism | 4 |
| Steroid biosynthesis | 4 |
| Steroid hormone biosynthesis | 4 |

| | |
|---|---|
| Sulfur metabolism | 4 |
| Sulfur relay system | 4 |
| Synaptic vesicle cycle | 4 |
| Synthesis and degradation of ketone bodies | 4 |
| Systemic lupus erythematosus | 4 |
| T cell receptor signaling pathway | 4 |
| Taste transduction | 4 |
| Taurine and hypotaurine metabolism | 4 |
| Terpenoid backbone biosynthesis | 4 |
| TGF-beta signaling pathway | 4 |
| Thiamine metabolism | 4 |
| Thyroid cancer | 4 |
| Thyroid hormone signaling pathway | 4 |
| Thyroid hormone synthesis | 4 |
| Tight junction | 4 |
| TNF signaling pathway | 4 |
| Toll-like receptor signaling pathway | 4 |
| Toxoplasmosis | 4 |
| Transcriptional misregulation in cancer | 4 |
| Tryptophan metabolism | 4 |
| Type I diabetes mellitus | 4 |
| Type II diabetes mellitus | 4 |
| Tyrosine metabolism | 4 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 4 |
| Valine, leucine and isoleucine degradation | 4 |
| Vascular smooth muscle contraction | 4 |
| Vasopressin-regulated water reabsorption | 4 |
| VEGF signaling pathway | 4 |
| Vibrio cholerae infection | 4 |
| Viral carcinogenesis | 4 |
| Viral myocarditis | 4 |
| Vitamin B6 metabolism | 4 |
| Vitamin digestion and absorption | 4 |
| Wnt signaling pathway | 4 |

| | control.Min. |
|---|---|
| Acute myeloid leukemia | 0.43010 |
| Adherens junction | 0.54280 |
| Adipocytokine signaling pathway | 0.23880 |
| Adrenergic signaling in cardiomyocytes | -0.29770 |
| African trypanosomiasis | -0.25060 |
| AGE-RAGE signaling pathway in diabetic complications | 0.21520 |
| Alanine, aspartate and glutamate metabolism | 0.53230 |
| Aldosterone synthesis and secretion | 0.01368 |
| Aldosterone-regulated sodium reabsorption | 0.14740 |
| Allograft rejection | -0.17710 |
| alpha-Linolenic acid metabolism | 0.02627 |

| | |
|---|---|
| Alzheimer's disease | 0.27330 |
| Amino sugar and nucleotide sugar metabolism | 0.45880 |
| Aminoacyl-tRNA biosynthesis | 0.26360 |
| Amoebiasis | -0.11830 |
| Amphetamine addiction | -0.15150 |
| AMPK signaling pathway | 0.47140 |
| Amyotrophic lateral sclerosis (ALS) | 0.17200 |
| Antigen processing and presentation | -0.09176 |
| Apoptosis | 0.32620 |
| Arachidonic acid metabolism | -0.78790 |
| Arginine and proline metabolism | -0.01676 |
| Arginine biosynthesis | 0.26200 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.33120 |
| Ascorbate and aldarate metabolism | -0.63220 |
| Asthma | -0.44750 |
| Autoimmune thyroid disease | -0.42880 |
| B cell receptor signaling pathway | 0.10910 |
| Bacterial invasion of epithelial cells | 0.44080 |
| Basal cell carcinoma | 0.14110 |
| beta-Alanine metabolism | -0.29470 |
| Bile secretion | -0.05664 |
| Biosynthesis of unsaturated fatty acids | 0.16110 |
| Biotin metabolism | 0.26100 |
| Bladder cancer | 0.45500 |
| Butanoate metabolism | 0.13680 |
| Caffeine metabolism | -0.50050 |
| Carbohydrate digestion and absorption | 0.11980 |
| Cardiac muscle contraction | -0.19480 |
| Cell adhesion molecules (CAMs) | -0.22770 |
| Cell cycle | 0.80780 |
| Central carbon metabolism in cancer | 0.53770 |
| Chagas disease (American trypanosomiasis) | 0.28440 |
| Chemical carcinogenesis | -0.92820 |
| Choline metabolism in cancer | 0.33170 |
| Cholinergic synapse | 0.10970 |
| Chronic myeloid leukemia | 0.56810 |
| Circadian entrainment | -0.12730 |
| Circadian rhythm | 0.44840 |
| Citrate cycle (TCA cycle) | 0.91840 |
| Cocaine addiction | -0.02875 |
| Colorectal cancer | 0.38700 |
| Complement and coagulation cascades | -0.21290 |
| Cysteine and methionine metabolism | 0.48580 |
| Cytosolic DNA-sensing pathway | 0.23200 |
| D-Glutamine and D-glutamate metabolism | 0.31340 |
| Dilated cardiomyopathy | 0.21600 |

| | |
|---|---|
| Dopaminergic synapse | -0.04728 |
| Dorso-ventral axis formation | 0.26560 |
| Drug metabolism - cytochrome P450 | -0.51500 |
| Drug metabolism - other enzymes | 0.04654 |
| ECM-receptor interaction | 0.39290 |
| Endocrine and other factor-regulated calcium reabsorption | -0.14700 |
| Endocytosis | 0.65020 |
| Endometrial cancer | 0.48940 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.13030 |
| Epstein-Barr virus infection | 0.33780 |
| ErbB signaling pathway | 0.35490 |
| Estrogen signaling pathway | 0.19060 |
| Ether lipid metabolism | 0.03850 |
| Fanconi anemia pathway | 0.51620 |
| Fat digestion and absorption | 0.35050 |
| Fatty acid biosynthesis | 0.34810 |
| Fatty acid degradation | 0.54190 |
| Fatty acid elongation | 0.25660 |
| Fc epsilon RI signaling pathway | 0.23400 |
| Fc gamma R-mediated phagocytosis | 0.33750 |
| Folate biosynthesis | 0.27450 |
| FoxO signaling pathway | 0.30950 |
| Fructose and mannose metabolism | 0.35070 |
| GABAergic synapse | -0.46700 |
| Galactose metabolism | 0.41000 |
| Gap junction | 0.07133 |
| Gastric acid secretion | 0.09423 |
| Glioma | 0.42320 |
| Glucagon signaling pathway | 0.37340 |
| Glutamatergic synapse | -0.18610 |
| Glutathione metabolism | 0.24970 |
| Glycerolipid metabolism | 0.68560 |
| Glycerophospholipid metabolism | 0.70650 |
| Glycine, serine and threonine metabolism | -0.02037 |
| Glycolysis / Gluconeogenesis | 0.50390 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.42870 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.40150 |
| Glycosaminoglycan degradation | 0.37370 |
| Glycosphingolipid biosynthesis - ganglio series | 0.24680 |
| Glycosphingolipid biosynthesis - globo series | -0.08908 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.28460 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.41310 |
| Glyoxylate and dicarboxylate metabolism | 0.26270 |
| GnRH signaling pathway | 0.22290 |
| Graft-versus-host disease | -0.30010 |
| Hepatitis B | 0.29450 |

| | |
|---|---|
| Hepatitis C | 0.40530 |
| Herpes simplex infection | 0.29450 |
| HIF-1 signaling pathway | 0.50090 |
| Histidine metabolism | -0.33180 |
| Huntington's disease | 0.76240 |
| Hypertrophic cardiomyopathy (HCM) | 0.23640 |
| Inflammatory bowel disease (IBD) | -0.19630 |
| Inflammatory mediator regulation of TRP channels | 0.09881 |
| Influenza A | 0.25720 |
| Inositol phosphate metabolism | 0.99850 |
| Insulin resistance | 0.36720 |
| Insulin secretion | -0.16120 |
| Insulin signaling pathway | 0.47100 |
| Intestinal immune network for IgA production | -0.19980 |
| Legionellosis | -0.10140 |
| Leishmaniasis | -0.03977 |
| Leukocyte transendothelial migration | 0.05000 |
| Linoleic acid metabolism | -1.32900 |
| Lipoic acid metabolism | -0.19870 |
| Long-term depression | 0.15910 |
| Long-term potentiation | 0.09908 |
| Longevity regulating pathway | 0.61600 |
| Longevity regulating pathway - multiple species | 0.56580 |
| Lysine biosynthesis | -0.15300 |
| Lysine degradation | 0.60710 |
| Malaria | -0.26520 |
| Maturity onset diabetes of the young | -0.18110 |
| Measles | 0.16990 |
| Melanogenesis | 0.11890 |
| Melanoma | 0.16840 |
| Metabolism of xenobiotics by cytochrome P450 | -1.17100 |
| Mineral absorption | -0.03678 |
| Morphine addiction | -0.34300 |
| mRNA surveillance pathway | 0.56860 |
| mTOR signaling pathway | 0.29450 |
| Mucin type O-Glycan biosynthesis | -0.41130 |
| N-Glycan biosynthesis | 0.61800 |
| Natural killer cell mediated cytotoxicity | 0.05655 |
| Neuroactive ligand-receptor interaction | -0.43350 |
| Neurotrophin signaling pathway | 0.32100 |
| NF-kappa B signaling pathway | 0.16290 |
| Nicotinate and nicotinamide metabolism | -0.19140 |
| Nitrogen metabolism | 0.58700 |
| NOD-like receptor signaling pathway | 0.20350 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.20710 |
| Non-small cell lung cancer | 0.47750 |

| | |
|---|---|
| Notch signaling pathway | 0.39260 |
| One carbon pool by folate | 0.71230 |
| Oocyte meiosis | 0.54680 |
| Osteoclast differentiation | 0.09978 |
| Ovarian steroidogenesis | -0.03102 |
| Oxidative phosphorylation | 0.47500 |
| p53 signaling pathway | 0.29230 |
| Pancreatic cancer | 0.45480 |
| Pancreatic secretion | 0.04474 |
| Pantothenate and CoA biosynthesis | 0.11630 |
| Parkinson's disease | 0.12100 |
| Pathogenic Escherichia coli infection | 0.25100 |
| Pentose and glucuronate interconversions | -0.30620 |
| Pentose phosphate pathway | 0.13540 |
| Peroxisome | 0.13180 |
| Pertussis | 0.08010 |
| Phagosome | 1.04700 |
| Phenylalanine metabolism | -0.13950 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.30820 |
| Phosphatidylinositol signaling system | 1.24500 |
| Phospholipase D signaling pathway | 0.33820 |
| Phototransduction | -0.51770 |
| Platelet activation | 0.24720 |
| Porphyrin and chlorophyll metabolism | -0.05215 |
| Primary bile acid biosynthesis | -0.29410 |
| Prion diseases | 0.31550 |
| Progesterone-mediated oocyte maturation | 0.20720 |
| Prolactin signaling pathway | 0.31730 |
| Propanoate metabolism | 0.31390 |
| Prostate cancer | 0.46960 |
| Protein processing in endoplasmic reticulum | 0.38010 |
| Proximal tubule bicarbonate reclamation | 0.16240 |
| Pyrimidine metabolism | 0.93980 |
| Pyruvate metabolism | 0.47000 |
| Regulation of autophagy | 0.24820 |
| Regulation of lipolysis in adipocytes | 0.17750 |
| Renal cell carcinoma | 0.42280 |
| Renin secretion | 0.19160 |
| Renin-angiotensin system | -0.13250 |
| Retinol metabolism | -1.76000 |
| Retrograde endocannabinoid signaling | -0.07501 |
| Rheumatoid arthritis | -0.20130 |
| Riboflavin metabolism | 0.37590 |
| Ribosome biogenesis in eukaryotes | 0.29940 |
| RIG-I-like receptor signaling pathway | 0.25990 |
| RNA degradation | 0.68450 |

| | |
|---|---|
| RNA transport | 0.37970 |
| Salivary secretion | 0.01503 |
| Salmonella infection | 0.37530 |
| Selenocompound metabolism | 0.35340 |
| Serotonergic synapse | -0.17050 |
| Shigellosis | 0.32500 |
| Signaling pathways regulating pluripotency of stem cells | 0.36140 |
| Small cell lung cancer | 0.59260 |
| SNARE interactions in vesicular transport | 0.40260 |
| Sphingolipid metabolism | 0.67400 |
| Sphingolipid signaling pathway | 0.41640 |
| Staphylococcus aureus infection | -0.15660 |
| Starch and sucrose metabolism | 0.19670 |
| Steroid biosynthesis | 0.37480 |
| Steroid hormone biosynthesis | -1.08800 |
| Sulfur metabolism | 0.50160 |
| Sulfur relay system | 0.28280 |
| Synaptic vesicle cycle | 0.58440 |
| Synthesis and degradation of ketone bodies | 0.10350 |
| Systemic lupus erythematosus | -0.29480 |
| T cell receptor signaling pathway | 0.18990 |
| Taste transduction | -0.36880 |
| Taurine and hypotaurine metabolism | -0.28520 |
| Terpenoid backbone biosynthesis | 0.35260 |
| TGF-beta signaling pathway | 0.21450 |
| Thiamine metabolism | 0.15000 |
| Thyroid cancer | 0.34550 |
| Thyroid hormone signaling pathway | 0.59810 |
| Thyroid hormone synthesis | -0.08284 |
| Tight junction | 0.28510 |
| TNF signaling pathway | 0.28450 |
| Toll-like receptor signaling pathway | 0.07903 |
| Toxoplasmosis | 0.29220 |
| Transcriptional misregulation in cancer | 0.08348 |
| Tryptophan metabolism | -0.29260 |
| Type I diabetes mellitus | -0.43100 |
| Type II diabetes mellitus | 0.16630 |
| Tyrosine metabolism | -0.40810 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.28200 |
| Valine, leucine and isoleucine degradation | 0.50680 |
| Vascular smooth muscle contraction | 0.16990 |
| Vasopressin-regulated water reabsorption | -0.02112 |
| VEGF signaling pathway | 0.29660 |
| Vibrio cholerae infection | 0.39990 |
| Viral carcinogenesis | 0.32470 |
| Viral myocarditis | 0.11220 |

| | |
|---|---|
| Vitamin B6 metabolism | 0.11830 |
| Vitamin digestion and absorption | -0.51070 |
| Wnt signaling pathway | 0.17930 |
| | control.1st.Qu. |
| Acute myeloid leukemia | 0.436600 |
| Adherens junction | 0.543400 |
| Adipocytokine signaling pathway | 0.252200 |
| Adrenergic signaling in cardiomyocytes | -0.293300 |
| African trypanosomiasis | -0.237600 |
| AGE-RAGE signaling pathway in diabetic complications | 0.249300 |
| Alanine, aspartate and glutamate metabolism | 0.537800 |
| Aldosterone synthesis and secretion | 0.047200 |
| Aldosterone-regulated sodium reabsorption | 0.152300 |
| Allograft rejection | -0.172600 |
| alpha-Linolenic acid metabolism | 0.054380 |
| Alzheimer's disease | 0.297200 |
| Amino sugar and nucleotide sugar metabolism | 0.465700 |
| Aminoacyl-tRNA biosynthesis | 0.264600 |
| Amoebiasis | -0.108500 |
| Amphetamine addiction | -0.143000 |
| AMPK signaling pathway | 0.473400 |
| Amyotrophic lateral sclerosis (ALS) | 0.174300 |
| Antigen processing and presentation | -0.071850 |
| Apoptosis | 0.330900 |
| Arachidonic acid metabolism | -0.767600 |
| Arginine and proline metabolism | -0.015640 |
| Arginine biosynthesis | 0.264100 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.331700 |
| Ascorbate and aldarate metabolism | -0.608000 |
| Asthma | -0.434900 |
| Autoimmune thyroid disease | -0.420000 |
| B cell receptor signaling pathway | 0.120100 |
| Bacterial invasion of epithelial cells | 0.452100 |
| Basal cell carcinoma | 0.162900 |
| beta-Alanine metabolism | -0.224600 |
| Bile secretion | -0.043030 |
| Biosynthesis of unsaturated fatty acids | 0.163700 |
| Biotin metabolism | 0.262200 |
| Bladder cancer | 0.457800 |
| Butanoate metabolism | 0.186500 |
| Caffeine metabolism | -0.460900 |
| Carbohydrate digestion and absorption | 0.132500 |
| Cardiac muscle contraction | -0.194600 |
| Cell adhesion molecules (CAMs) | -0.224500 |
| Cell cycle | 0.810800 |
| Central carbon metabolism in cancer | 0.546600 |

| | |
|---|---|
| Chagas disease (American trypanosomiasis) | 0.295200 |
| Chemical carcinogenesis | -0.888500 |
| Choline metabolism in cancer | 0.332700 |
| Cholinergic synapse | 0.147600 |
| Chronic myeloid leukemia | 0.568900 |
| Circadian entrainment | -0.066160 |
| Circadian rhythm | 0.451100 |
| Citrate cycle (TCA cycle) | 0.919400 |
| Cocaine addiction | 0.001475 |
| Colorectal cancer | 0.394000 |
| Complement and coagulation cascades | -0.210900 |
| Cysteine and methionine metabolism | 0.492500 |
| Cytosolic DNA-sensing pathway | 0.232900 |
| D-Glutamine and D-glutamate metabolism | 0.313700 |
| Dilated cardiomyopathy | 0.216700 |
| Dopaminergic synapse | -0.003590 |
| Dorso-ventral axis formation | 0.266000 |
| Drug metabolism - cytochrome P450 | -0.507500 |
| Drug metabolism - other enzymes | 0.082450 |
| ECM-receptor interaction | 0.416300 |
| Endocrine and other factor-regulated calcium reabsorption | -0.134300 |
| Endocytosis | 0.666700 |
| Endometrial cancer | 0.495500 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.136500 |
| Epstein-Barr virus infection | 0.349700 |
| ErbB signaling pathway | 0.357500 |
| Estrogen signaling pathway | 0.208200 |
| Ether lipid metabolism | 0.044530 |
| Fanconi anemia pathway | 0.539400 |
| Fat digestion and absorption | 0.358400 |
| Fatty acid biosynthesis | 0.348900 |
| Fatty acid degradation | 0.614500 |
| Fatty acid elongation | 0.260600 |
| Fc epsilon RI signaling pathway | 0.234100 |
| Fc gamma R-mediated phagocytosis | 0.365400 |
| Folate biosynthesis | 0.275200 |
| FoxO signaling pathway | 0.309800 |
| Fructose and mannose metabolism | 0.442500 |
| GABAergic synapse | -0.461800 |
| Galactose metabolism | 0.418100 |
| Gap junction | 0.098390 |
| Gastric acid secretion | 0.135500 |
| Glioma | 0.438300 |
| Glucagon signaling pathway | 0.385400 |
| Glutamatergic synapse | -0.173700 |
| Glutathione metabolism | 0.256300 |

| | |
|---|---|
| Glycerolipid metabolism | 0.714300 |
| Glycerophospholipid metabolism | 0.741600 |
| Glycine, serine and threonine metabolism | -0.016280 |
| Glycolysis / Gluconeogenesis | 0.512700 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.429200 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.401800 |
| Glycosaminoglycan degradation | 0.378500 |
| Glycosphingolipid biosynthesis - ganglio series | 0.251600 |
| Glycosphingolipid biosynthesis - globo series | -0.086650 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.271700 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.424700 |
| Glyoxylate and dicarboxylate metabolism | 0.264300 |
| GnRH signaling pathway | 0.235000 |
| Graft-versus-host disease | -0.296400 |
| Hepatitis B | 0.298700 |
| Hepatitis C | 0.407600 |
| Herpes simplex infection | 0.298700 |
| HIF-1 signaling pathway | 0.516500 |
| Histidine metabolism | -0.331300 |
| Huntington's disease | 0.779700 |
| Hypertrophic cardiomyopathy (HCM) | 0.237800 |
| Inflammatory bowel disease (IBD) | -0.192800 |
| Inflammatory mediator regulation of TRP channels | 0.112800 |
| Influenza A | 0.276400 |
| Inositol phosphate metabolism | 1.006000 |
| Insulin resistance | 0.385100 |
| Insulin secretion | -0.138600 |
| Insulin signaling pathway | 0.471900 |
| Intestinal immune network for IgA production | -0.196100 |
| Legionellosis | -0.099270 |
| Leishmaniasis | -0.036290 |
| Leukocyte transendothelial migration | 0.057320 |
| Linoleic acid metabolism | -1.325000 |
| Lipoic acid metabolism | -0.180100 |
| Long-term depression | 0.193400 |
| Long-term potentiation | 0.145000 |
| Longevity regulating pathway | 0.624500 |
| Longevity regulating pathway - multiple species | 0.571900 |
| Lysine biosynthesis | -0.137100 |
| Lysine degradation | 0.607700 |
| Malaria | -0.257600 |
| Maturity onset diabetes of the young | -0.170000 |
| Measles | 0.178400 |
| Melanogenesis | 0.162100 |
| Melanoma | 0.253800 |
| Metabolism of xenobiotics by cytochrome P450 | -1.154000 |

| | |
|---|---|
| Mineral absorption | -0.029660 |
| Morphine addiction | -0.311900 |
| mRNA surveillance pathway | 0.572000 |
| mTOR signaling pathway | 0.312300 |
| Mucin type O-Glycan biosynthesis | -0.409800 |
| N-Glycan biosynthesis | 0.621100 |
| Natural killer cell mediated cytotoxicity | 0.076680 |
| Neuroactive ligand-receptor interaction | -0.429600 |
| Neurotrophin signaling pathway | 0.327200 |
| NF-kappa B signaling pathway | 0.164900 |
| Nicotinate and nicotinamide metabolism | -0.113100 |
| Nitrogen metabolism | 0.588300 |
| NOD-like receptor signaling pathway | 0.212900 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.211000 |
| Non-small cell lung cancer | 0.484700 |
| Notch signaling pathway | 0.414200 |
| One carbon pool by folate | 0.770300 |
| Oocyte meiosis | 0.547600 |
| Osteoclast differentiation | 0.101600 |
| Ovarian steroidogenesis | -0.021440 |
| Oxidative phosphorylation | 0.491900 |
| p53 signaling pathway | 0.294900 |
| Pancreatic cancer | 0.458400 |
| Pancreatic secretion | 0.052070 |
| Pantothenate and CoA biosynthesis | 0.131600 |
| Parkinson's disease | 0.146300 |
| Pathogenic Escherichia coli infection | 0.257900 |
| Pentose and glucuronate interconversions | -0.234800 |
| Pentose phosphate pathway | 0.269000 |
| Peroxisome | 0.132400 |
| Pertussis | 0.094210 |
| Phagosome | 1.052000 |
| Phenylalanine metabolism | -0.133200 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.312100 |
| Phosphatidylinositol signaling system | 1.261000 |
| Phospholipase D signaling pathway | 0.339600 |
| Phototransduction | -0.437000 |
| Platelet activation | 0.250100 |
| Porphyrin and chlorophyll metabolism | -0.030440 |
| Primary bile acid biosynthesis | -0.280200 |
| Prion diseases | 0.318800 |
| Progesterone-mediated oocyte maturation | 0.218600 |
| Prolactin signaling pathway | 0.326200 |
| Propanoate metabolism | 0.328700 |
| Prostate cancer | 0.470000 |
| Protein processing in endoplasmic reticulum | 0.405400 |

| | |
|---|---|
| Proximal tubule bicarbonate reclamation | 0.162500 |
| Pyrimidine metabolism | 0.959300 |
| Pyruvate metabolism | 0.490300 |
| Regulation of autophagy | 0.250400 |
| Regulation of lipolysis in adipocytes | 0.197200 |
| Renal cell carcinoma | 0.432100 |
| Renin secretion | 0.203100 |
| Renin-angiotensin system | -0.129700 |
| Retinol metabolism | -1.736000 |
| Retrograde endocannabinoid signaling | -0.042410 |
| Rheumatoid arthritis | -0.199200 |
| Riboflavin metabolism | 0.378300 |
| Ribosome biogenesis in eukaryotes | 0.300800 |
| RIG-I-like receptor signaling pathway | 0.268600 |
| RNA degradation | 0.688500 |
| RNA transport | 0.381800 |
| Salivary secretion | 0.040560 |
| Salmonella infection | 0.382200 |
| Selenocompound metabolism | 0.355000 |
| Serotonergic synapse | -0.132100 |
| Shigellosis | 0.331400 |
| Signaling pathways regulating pluripotency of stem cells | 0.366700 |
| Small cell lung cancer | 0.595100 |
| SNARE interactions in vesicular transport | 0.402900 |
| Sphingolipid metabolism | 0.703600 |
| Sphingolipid signaling pathway | 0.435000 |
| Staphylococcus aureus infection | -0.154900 |
| Starch and sucrose metabolism | 0.232300 |
| Steroid biosynthesis | 0.396600 |
| Steroid hormone biosynthesis | -1.056000 |
| Sulfur metabolism | 0.505100 |
| Sulfur relay system | 0.287800 |
| Synaptic vesicle cycle | 0.587000 |
| Synthesis and degradation of ketone bodies | 0.162800 |
| Systemic lupus erythematosus | -0.292600 |
| T cell receptor signaling pathway | 0.190800 |
| Taste transduction | -0.364200 |
| Taurine and hypotaurine metabolism | -0.285200 |
| Terpenoid backbone biosynthesis | 0.353700 |
| TGF-beta signaling pathway | 0.229300 |
| Thiamine metabolism | 0.151800 |
| Thyroid cancer | 0.364100 |
| Thyroid hormone signaling pathway | 0.603900 |
| Thyroid hormone synthesis | -0.037400 |
| Tight junction | 0.324400 |
| TNF signaling pathway | 0.295200 |

| | |
|---|---|
| Toll-like receptor signaling pathway | 0.084100 |
| Toxoplasmosis | 0.293100 |
| Transcriptional misregulation in cancer | 0.086670 |
| Tryptophan metabolism | -0.287100 |
| Type I diabetes mellitus | -0.428300 |
| Type II diabetes mellitus | 0.172600 |
| Tyrosine metabolism | -0.390100 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.284000 |
| Valine, leucine and isoleucine degradation | 0.547200 |
| Vascular smooth muscle contraction | 0.176700 |
| Vasopressin-regulated water reabsorption | 0.027050 |
| VEGF signaling pathway | 0.303800 |
| Vibrio cholerae infection | 0.401500 |
| Viral carcinogenesis | 0.328700 |
| Viral myocarditis | 0.134300 |
| Vitamin B6 metabolism | 0.134500 |
| Vitamin digestion and absorption | -0.499100 |
| Wnt signaling pathway | 0.189000 |

| | control.Median |
|---|---|
| Acute myeloid leukemia | 0.4399000 |
| Adherens junction | 0.5491000 |
| Adipocytokine signaling pathway | 0.2637000 |
| Adrenergic signaling in cardiomyocytes | -0.2834000 |
| African trypanosomiasis | -0.2299000 |
| AGE-RAGE signaling pathway in diabetic complications | 0.2667000 |
| Alanine, aspartate and glutamate metabolism | 0.5444000 |
| Aldosterone synthesis and secretion | 0.1026000 |
| Aldosterone-regulated sodium reabsorption | 0.1641000 |
| Allograft rejection | -0.1701000 |
| alpha-Linolenic acid metabolism | 0.0641200 |
| Alzheimer's disease | 0.3064000 |
| Amino sugar and nucleotide sugar metabolism | 0.4703000 |
| Aminoacyl-tRNA biosynthesis | 0.2770000 |
| Amoebiasis | -0.0805500 |
| Amphetamine addiction | -0.1326000 |
| AMPK signaling pathway | 0.4772000 |
| Amyotrophic lateral sclerosis (ALS) | 0.1777000 |
| Antigen processing and presentation | -0.0551200 |
| Apoptosis | 0.3377000 |
| Arachidonic acid metabolism | -0.7553000 |
| Arginine and proline metabolism | -0.0096470 |
| Arginine biosynthesis | 0.2695000 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.3359000 |
| Ascorbate and aldarate metabolism | -0.5951000 |
| Asthma | -0.4268000 |
| Autoimmune thyroid disease | -0.4063000 |

| | |
|---|---|
| B cell receptor signaling pathway | 0.1282000 |
| Bacterial invasion of epithelial cells | 0.4651000 |
| Basal cell carcinoma | 0.1815000 |
| beta-Alanine metabolism | -0.1935000 |
| Bile secretion | -0.0284000 |
| Biosynthesis of unsaturated fatty acids | 0.1667000 |
| Biotin metabolism | 0.2629000 |
| Bladder cancer | 0.4681000 |
| Butanoate metabolism | 0.2048000 |
| Caffeine metabolism | -0.4444000 |
| Carbohydrate digestion and absorption | 0.1503000 |
| Cardiac muscle contraction | -0.1902000 |
| Cell adhesion molecules (CAMs) | -0.2174000 |
| Cell cycle | 0.8318000 |
| Central carbon metabolism in cancer | 0.5544000 |
| Chagas disease (American trypanosomiasis) | 0.3088000 |
| Chemical carcinogenesis | -0.8674000 |
| Choline metabolism in cancer | 0.3345000 |
| Cholinergic synapse | 0.1629000 |
| Chronic myeloid leukemia | 0.5717000 |
| Circadian entrainment | -0.0231600 |
| Circadian rhythm | 0.4546000 |
| Citrate cycle (TCA cycle) | 0.9218000 |
| Cocaine addiction | 0.0135000 |
| Colorectal cancer | 0.4009000 |
| Complement and coagulation cascades | -0.2083000 |
| Cysteine and methionine metabolism | 0.4961000 |
| Cytosolic DNA-sensing pathway | 0.2345000 |
| D-Glutamine and D-glutamate metabolism | 0.3140000 |
| Dilated cardiomyopathy | 0.2262000 |
| Dopaminergic synapse | 0.0263500 |
| Dorso-ventral axis formation | 0.2663000 |
| Drug metabolism - cytochrome P450 | -0.5033000 |
| Drug metabolism - other enzymes | 0.0946300 |
| ECM-receptor interaction | 0.4528000 |
| Endocrine and other factor-regulated calcium reabsorption | -0.1277000 |
| Endocytosis | 0.6755000 |
| Endometrial cancer | 0.5097000 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.1394000 |
| Epstein-Barr virus infection | 0.3545000 |
| ErbB signaling pathway | 0.3667000 |
| Estrogen signaling pathway | 0.2256000 |
| Ether lipid metabolism | 0.0519700 |
| Fanconi anemia pathway | 0.5514000 |
| Fat digestion and absorption | 0.3645000 |
| Fatty acid biosynthesis | 0.3498000 |

| | |
|---|---|
| Fatty acid degradation | 0.6478000 |
| Fatty acid elongation | 0.2624000 |
| Fc epsilon RI signaling pathway | 0.2357000 |
| Fc gamma R-mediated phagocytosis | 0.3788000 |
| Folate biosynthesis | 0.2839000 |
| FoxO signaling pathway | 0.3138000 |
| Fructose and mannose metabolism | 0.4775000 |
| GABAergic synapse | -0.4524000 |
| Galactose metabolism | 0.4215000 |
| Gap junction | 0.1119000 |
| Gastric acid secretion | 0.1578000 |
| Glioma | 0.4437000 |
| Glucagon signaling pathway | 0.4168000 |
| Glutamatergic synapse | -0.1439000 |
| Glutathione metabolism | 0.2661000 |
| Glycerolipid metabolism | 0.7392000 |
| Glycerophospholipid metabolism | 0.7863000 |
| Glycine, serine and threonine metabolism | -0.0128100 |
| Glycolysis / Gluconeogenesis | 0.5276000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.4300000 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.4026000 |
| Glycosaminoglycan degradation | 0.4015000 |
| Glycosphingolipid biosynthesis - ganglio series | 0.2583000 |
| Glycosphingolipid biosynthesis - globo series | -0.0856000 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.2647000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.4371000 |
| Glyoxylate and dicarboxylate metabolism | 0.2864000 |
| GnRH signaling pathway | 0.2512000 |
| Graft-versus-host disease | -0.2912000 |
| Hepatitis B | 0.3107000 |
| Hepatitis C | 0.4129000 |
| Herpes simplex infection | 0.3018000 |
| HIF-1 signaling pathway | 0.5354000 |
| Histidine metabolism | -0.3225000 |
| Huntington's disease | 0.7866000 |
| Hypertrophic cardiomyopathy (HCM) | 0.2384000 |
| Inflammatory bowel disease (IBD) | -0.1901000 |
| Inflammatory mediator regulation of TRP channels | 0.1258000 |
| Influenza A | 0.2893000 |
| Inositol phosphate metabolism | 1.0320000 |
| Insulin resistance | 0.3911000 |
| Insulin secretion | -0.1234000 |
| Insulin signaling pathway | 0.4754000 |
| Intestinal immune network for IgA production | -0.1935000 |
| Legionellosis | -0.0985200 |
| Leishmaniasis | -0.0338200 |

| | |
|---|---|
| Leukocyte transendothelial migration | 0.0693600 |
| Linoleic acid metabolism | -1.3140000 |
| Lipoic acid metabolism | -0.1734000 |
| Long-term depression | 0.2355000 |
| Long-term potentiation | 0.1790000 |
| Longevity regulating pathway | 0.6330000 |
| Longevity regulating pathway - multiple species | 0.5785000 |
| Lysine biosynthesis | -0.1246000 |
| Lysine degradation | 0.6082000 |
| Malaria | -0.2542000 |
| Maturity onset diabetes of the young | -0.1635000 |
| Measles | 0.1890000 |
| Melanogenesis | 0.1795000 |
| Melanoma | 0.2872000 |
| Metabolism of xenobiotics by cytochrome P450 | -1.1420000 |
| Mineral absorption | -0.0202200 |
| Morphine addiction | -0.2829000 |
| mRNA surveillance pathway | 0.5742000 |
| mTOR signaling pathway | 0.3221000 |
| Mucin type O-Glycan biosynthesis | -0.3286000 |
| N-Glycan biosynthesis | 0.6238000 |
| Natural killer cell mediated cytotoxicity | 0.0910200 |
| Neuroactive ligand-receptor interaction | -0.4221000 |
| Neurotrophin signaling pathway | 0.3389000 |
| NF-kappa B signaling pathway | 0.1670000 |
| Nicotinate and nicotinamide metabolism | -0.0778000 |
| Nitrogen metabolism | 0.5889000 |
| NOD-like receptor signaling pathway | 0.2165000 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.2175000 |
| Non-small cell lung cancer | 0.4914000 |
| Notch signaling pathway | 0.4249000 |
| One carbon pool by folate | 0.8291000 |
| Oocyte meiosis | 0.5494000 |
| Osteoclast differentiation | 0.1077000 |
| Ovarian steroidogenesis | 0.0242100 |
| Oxidative phosphorylation | 0.5034000 |
| p53 signaling pathway | 0.2989000 |
| Pancreatic cancer | 0.4644000 |
| Pancreatic secretion | 0.0961200 |
| Pantothenate and CoA biosynthesis | 0.1395000 |
| Parkinson's disease | 0.1674000 |
| Pathogenic Escherichia coli infection | 0.2793000 |
| Pentose and glucuronate interconversions | -0.2093000 |
| Pentose phosphate pathway | 0.3394000 |
| Peroxisome | 0.1327000 |
| Pertussis | 0.1016000 |

| | |
|---|---|
| Phagosome | 1.0730000 |
| Phenylalanine metabolism | -0.1297000 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.3136000 |
| Phosphatidylinositol signaling system | 1.2740000 |
| Phospholipase D signaling pathway | 0.3400000 |
| Phototransduction | -0.4083000 |
| Platelet activation | 0.2605000 |
| Porphyrin and chlorophyll metabolism | -0.0163000 |
| Primary bile acid biosynthesis | -0.2752000 |
| Prion diseases | 0.3208000 |
| Progesterone-mediated oocyte maturation | 0.2225000 |
| Prolactin signaling pathway | 0.3414000 |
| Propanoate metabolism | 0.3348000 |
| Prostate cancer | 0.4738000 |
| Protein processing in endoplasmic reticulum | 0.4201000 |
| Proximal tubule bicarbonate reclamation | 0.1627000 |
| Pyrimidine metabolism | 0.9902000 |
| Pyruvate metabolism | 0.5065000 |
| Regulation of autophagy | 0.2549000 |
| Regulation of lipolysis in adipocytes | 0.2080000 |
| Renal cell carcinoma | 0.4360000 |
| Renin secretion | 0.2150000 |
| Renin-angiotensin system | 0.0005793 |
| Retinol metabolism | -1.7240000 |
| Retrograde endocannabinoid signaling | -0.0269400 |
| Rheumatoid arthritis | -0.1968000 |
| Riboflavin metabolism | 0.3818000 |
| Ribosome biogenesis in eukaryotes | 0.3049000 |
| RIG-I-like receptor signaling pathway | 0.2748000 |
| RNA degradation | 0.6902000 |
| RNA transport | 0.3885000 |
| Salivary secretion | 0.0567400 |
| Salmonella infection | 0.3875000 |
| Selenocompound metabolism | 0.3578000 |
| Serotonergic synapse | -0.0762200 |
| Shigellosis | 0.3455000 |
| Signaling pathways regulating pluripotency of stem cells | 0.3754000 |
| Small cell lung cancer | 0.5976000 |
| SNARE interactions in vesicular transport | 0.4079000 |
| Sphingolipid metabolism | 0.7296000 |
| Sphingolipid signaling pathway | 0.4447000 |
| Staphylococcus aureus infection | -0.1491000 |
| Starch and sucrose metabolism | 0.2445000 |
| Steroid biosynthesis | 0.4066000 |
| Steroid hormone biosynthesis | -1.0100000 |
| Sulfur metabolism | 0.5077000 |

| | |
|---|---|
| Sulfur relay system | 0.2898000 |
| Synaptic vesicle cycle | 0.5894000 |
| Synthesis and degradation of ketone bodies | 0.1865000 |
| Systemic lupus erythematosus | -0.2741000 |
| T cell receptor signaling pathway | 0.1920000 |
| Taste transduction | -0.3617000 |
| Taurine and hypotaurine metabolism | -0.2734000 |
| Terpenoid backbone biosynthesis | 0.3613000 |
| TGF-beta signaling pathway | 0.2352000 |
| Thiamine metabolism | 0.1550000 |
| Thyroid cancer | 0.3736000 |
| Thyroid hormone signaling pathway | 0.6185000 |
| Thyroid hormone synthesis | -0.0145500 |
| Tight junction | 0.3380000 |
| TNF signaling pathway | 0.3000000 |
| Toll-like receptor signaling pathway | 0.0864900 |
| Toxoplasmosis | 0.2953000 |
| Transcriptional misregulation in cancer | 0.0904200 |
| Tryptophan metabolism | -0.2737000 |
| Type I diabetes mellitus | -0.4157000 |
| Type II diabetes mellitus | 0.1799000 |
| Tyrosine metabolism | -0.3835000 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.2858000 |
| Valine, leucine and isoleucine degradation | 0.5630000 |
| Vascular smooth muscle contraction | 0.1913000 |
| Vasopressin-regulated water reabsorption | 0.0436700 |
| VEGF signaling pathway | 0.3138000 |
| Vibrio cholerae infection | 0.4023000 |
| Viral carcinogenesis | 0.3304000 |
| Viral myocarditis | 0.1488000 |
| Vitamin B6 metabolism | 0.1492000 |
| Vitamin digestion and absorption | -0.4696000 |
| Wnt signaling pathway | 0.2125000 |

| | control.Mean |
|---|---|
| Acute myeloid leukemia | 0.438100 |
| Adherens junction | 0.549600 |
| Adipocytokine signaling pathway | 0.264200 |
| Adrenergic signaling in cardiomyocytes | -0.279400 |
| African trypanosomiasis | -0.229100 |
| AGE-RAGE signaling pathway in diabetic complications | 0.255500 |
| Alanine, aspartate and glutamate metabolism | 0.546300 |
| Aldosterone synthesis and secretion | 0.095020 |
| Aldosterone-regulated sodium reabsorption | 0.163200 |
| Allograft rejection | -0.170700 |
| alpha-Linolenic acid metabolism | 0.068670 |
| Alzheimer's disease | 0.298600 |

| | |
|---|---|
| Amino sugar and nucleotide sugar metabolism | 0.468300 |
| Aminoacyl-tRNA biosynthesis | 0.278400 |
| Amoebiasis | -0.077170 |
| Amphetamine addiction | -0.133700 |
| AMPK signaling pathway | 0.479600 |
| Amyotrophic lateral sclerosis (ALS) | 0.177200 |
| Antigen processing and presentation | -0.054660 |
| Apoptosis | 0.337100 |
| Arachidonic acid metabolism | -0.754500 |
| Arginine and proline metabolism | -0.004254 |
| Arginine biosynthesis | 0.272500 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.336500 |
| Ascorbate and aldarate metabolism | -0.597600 |
| Asthma | -0.425200 |
| Autoimmune thyroid disease | -0.408800 |
| B cell receptor signaling pathway | 0.127500 |
| Bacterial invasion of epithelial cells | 0.463600 |
| Basal cell carcinoma | 0.181300 |
| beta-Alanine metabolism | -0.213400 |
| Bile secretion | -0.030380 |
| Biosynthesis of unsaturated fatty acids | 0.166900 |
| Biotin metabolism | 0.262700 |
| Bladder cancer | 0.467700 |
| Butanoate metabolism | 0.189600 |
| Caffeine metabolism | -0.451400 |
| Carbohydrate digestion and absorption | 0.148400 |
| Cardiac muscle contraction | -0.189100 |
| Cell adhesion molecules (CAMs) | -0.216900 |
| Cell cycle | 0.831700 |
| Central carbon metabolism in cancer | 0.551600 |
| Chagas disease (American trypanosomiasis) | 0.307200 |
| Chemical carcinogenesis | -0.879900 |
| Choline metabolism in cancer | 0.335700 |
| Cholinergic synapse | 0.159200 |
| Chronic myeloid leukemia | 0.574800 |
| Circadian entrainment | -0.040230 |
| Circadian rhythm | 0.455000 |
| Citrate cycle (TCA cycle) | 0.949300 |
| Cocaine addiction | 0.004420 |
| Colorectal cancer | 0.402100 |
| Complement and coagulation cascades | -0.202100 |
| Cysteine and methionine metabolism | 0.494500 |
| Cytosolic DNA-sensing pathway | 0.237200 |
| D-Glutamine and D-glutamate metabolism | 0.314300 |
| Dilated cardiomyopathy | 0.229800 |
| Dopaminergic synapse | 0.026380 |

| | |
|---|---|
| Dorso-ventral axis formation | 0.266900 |
| Drug metabolism - cytochrome P450 | -0.497100 |
| Drug metabolism - other enzymes | 0.082990 |
| ECM-receptor interaction | 0.474700 |
| Endocrine and other factor-regulated calcium reabsorption | -0.123300 |
| Endocytosis | 0.672300 |
| Endometrial cancer | 0.511100 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.137600 |
| Epstein-Barr virus infection | 0.352100 |
| ErbB signaling pathway | 0.368200 |
| Estrogen signaling pathway | 0.223400 |
| Ether lipid metabolism | 0.087480 |
| Fanconi anemia pathway | 0.546500 |
| Fat digestion and absorption | 0.362200 |
| Fatty acid biosynthesis | 0.349500 |
| Fatty acid degradation | 0.629300 |
| Fatty acid elongation | 0.265800 |
| Fc epsilon RI signaling pathway | 0.239600 |
| Fc gamma R-mediated phagocytosis | 0.369900 |
| Folate biosynthesis | 0.283800 |
| FoxO signaling pathway | 0.315100 |
| Fructose and mannose metabolism | 0.447100 |
| GABAergic synapse | -0.454000 |
| Galactose metabolism | 0.420100 |
| Gap junction | 0.103400 |
| Gastric acid secretion | 0.149300 |
| Glioma | 0.439300 |
| Glucagon signaling pathway | 0.429200 |
| Glutamatergic synapse | -0.144400 |
| Glutathione metabolism | 0.272500 |
| Glycerolipid metabolism | 0.736000 |
| Glycerophospholipid metabolism | 0.790900 |
| Glycine, serine and threonine metabolism | 0.014660 |
| Glycolysis / Gluconeogenesis | 0.531300 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.430400 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.403400 |
| Glycosaminoglycan degradation | 0.400900 |
| Glycosphingolipid biosynthesis - ganglio series | 0.260300 |
| Glycosphingolipid biosynthesis - globo series | -0.080300 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.266700 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.433300 |
| Glyoxylate and dicarboxylate metabolism | 0.288700 |
| GnRH signaling pathway | 0.249700 |
| Graft-versus-host disease | -0.275500 |
| Hepatitis B | 0.312400 |
| Hepatitis C | 0.414300 |

| | |
|---|---|
| Herpes simplex infection | 0.302500 |
| HIF-1 signaling pathway | 0.532300 |
| Histidine metabolism | -0.322500 |
| Huntington's disease | 0.781700 |
| Hypertrophic cardiomyopathy (HCM) | 0.238500 |
| Inflammatory bowel disease (IBD) | -0.190400 |
| Inflammatory mediator regulation of TRP channels | 0.121400 |
| Influenza A | 0.285900 |
| Inositol phosphate metabolism | 1.045000 |
| Insulin resistance | 0.387400 |
| Insulin secretion | -0.127200 |
| Insulin signaling pathway | 0.477300 |
| Intestinal immune network for IgA production | -0.193600 |
| Legionellosis | -0.089410 |
| Leishmaniasis | -0.032410 |
| Leukocyte transendothelial migration | 0.068220 |
| Linoleic acid metabolism | -1.297000 |
| Lipoic acid metabolism | -0.178700 |
| Long-term depression | 0.235000 |
| Long-term potentiation | 0.172700 |
| Longevity regulating pathway | 0.634200 |
| Longevity regulating pathway - multiple species | 0.583200 |
| Lysine biosynthesis | -0.126400 |
| Lysine degradation | 0.613400 |
| Malaria | -0.223800 |
| Maturity onset diabetes of the young | -0.166900 |
| Measles | 0.186800 |
| Melanogenesis | 0.167800 |
| Melanoma | 0.272900 |
| Metabolism of xenobiotics by cytochrome P450 | -1.132000 |
| Mineral absorption | -0.020440 |
| Morphine addiction | -0.291100 |
| mRNA surveillance pathway | 0.577200 |
| mTOR signaling pathway | 0.316900 |
| Mucin type O-Glycan biosynthesis | -0.324000 |
| N-Glycan biosynthesis | 0.623100 |
| Natural killer cell mediated cytotoxicity | 0.087400 |
| Neuroactive ligand-receptor interaction | -0.421700 |
| Neurotrophin signaling pathway | 0.337900 |
| NF-kappa B signaling pathway | 0.171200 |
| Nicotinate and nicotinamide metabolism | -0.097000 |
| Nitrogen metabolism | 0.588700 |
| NOD-like receptor signaling pathway | 0.218100 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.216300 |
| Non-small cell lung cancer | 0.490200 |
| Notch signaling pathway | 0.421000 |

| | |
|---|---|
| One carbon pool by folate | 0.814100 |
| Oocyte meiosis | 0.552800 |
| Osteoclast differentiation | 0.107800 |
| Ovarian steroidogenesis | 0.038170 |
| Oxidative phosphorylation | 0.500000 |
| p53 signaling pathway | 0.307000 |
| Pancreatic cancer | 0.463700 |
| Pancreatic secretion | 0.103600 |
| Pantothenate and CoA biosynthesis | 0.135100 |
| Parkinson's disease | 0.160400 |
| Pathogenic Escherichia coli infection | 0.278100 |
| Pentose and glucuronate interconversions | -0.224000 |
| Pentose phosphate pathway | 0.297500 |
| Peroxisome | 0.132800 |
| Pertussis | 0.107200 |
| Phagosome | 1.079000 |
| Phenylalanine metabolism | -0.120300 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.313500 |
| Phosphatidylinositol signaling system | 1.305000 |
| Phospholipase D signaling pathway | 0.344700 |
| Phototransduction | -0.420600 |
| Platelet activation | 0.267200 |
| Porphyrin and chlorophyll metabolism | -0.018500 |
| Primary bile acid biosynthesis | -0.274700 |
| Prion diseases | 0.320200 |
| Progesterone-mediated oocyte maturation | 0.222100 |
| Prolactin signaling pathway | 0.339500 |
| Propanoate metabolism | 0.332900 |
| Prostate cancer | 0.483500 |
| Protein processing in endoplasmic reticulum | 0.412600 |
| Proximal tubule bicarbonate reclamation | 0.186600 |
| Pyrimidine metabolism | 1.003000 |
| Pyruvate metabolism | 0.517300 |
| Regulation of autophagy | 0.254800 |
| Regulation of lipolysis in adipocytes | 0.214400 |
| Renal cell carcinoma | 0.433200 |
| Renin secretion | 0.216700 |
| Renin-angiotensin system | 0.001284 |
| Retinol metabolism | -1.732000 |
| Retrograde endocannabinoid signaling | -0.018580 |
| Rheumatoid arthritis | -0.184900 |
| Riboflavin metabolism | 0.381300 |
| Ribosome biogenesis in eukaryotes | 0.305200 |
| RIG-I-like receptor signaling pathway | 0.272600 |
| RNA degradation | 0.690900 |
| RNA transport | 0.390600 |

| | |
|---|---|
| Salivary secretion | 0.052540 |
| Salmonella infection | 0.392100 |
| Selenocompound metabolism | 0.372700 |
| Serotonergic synapse | -0.079570 |
| Shigellosis | 0.345800 |
| Signaling pathways regulating pluripotency of stem cells | 0.375200 |
| Small cell lung cancer | 0.597200 |
| SNARE interactions in vesicular transport | 0.409300 |
| Sphingolipid metabolism | 0.755700 |
| Sphingolipid signaling pathway | 0.442400 |
| Staphylococcus aureus infection | -0.139800 |
| Starch and sucrose metabolism | 0.235400 |
| Steroid biosynthesis | 0.401200 |
| Steroid hormone biosynthesis | -1.007000 |
| Sulfur metabolism | 0.506800 |
| Sulfur relay system | 0.288500 |
| Synaptic vesicle cycle | 0.589100 |
| Synthesis and degradation of ketone bodies | 0.168200 |
| Systemic lupus erythematosus | -0.270900 |
| T cell receptor signaling pathway | 0.193700 |
| Taste transduction | -0.361600 |
| Taurine and hypotaurine metabolism | -0.272100 |
| Terpenoid backbone biosynthesis | 0.363200 |
| TGF-beta signaling pathway | 0.232900 |
| Thiamine metabolism | 0.156600 |
| Thyroid cancer | 0.368100 |
| Thyroid hormone signaling pathway | 0.620100 |
| Thyroid hormone synthesis | -0.023980 |
| Tight junction | 0.326300 |
| TNF signaling pathway | 0.298500 |
| Toll-like receptor signaling pathway | 0.086110 |
| Toxoplasmosis | 0.295300 |
| Transcriptional misregulation in cancer | 0.089800 |
| Tryptophan metabolism | -0.275400 |
| Type I diabetes mellitus | -0.414200 |
| Type II diabetes mellitus | 0.185200 |
| Tyrosine metabolism | -0.370900 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.285900 |
| Valine, leucine and isoleucine degradation | 0.550700 |
| Vascular smooth muscle contraction | 0.190000 |
| Vasopressin-regulated water reabsorption | 0.029110 |
| VEGF signaling pathway | 0.311600 |
| Vibrio cholerae infection | 0.402000 |
| Viral carcinogenesis | 0.329400 |
| Viral myocarditis | 0.143000 |
| Vitamin B6 metabolism | 0.145700 |

| | |
|---|---|
| Vitamin digestion and absorption | -0.473300 |
| Wnt signaling pathway | 0.219700 |
| | control.3rd.Qu. |
| Acute myeloid leukemia | 0.441400 |
| Adherens junction | 0.555300 |
| Adipocytokine signaling pathway | 0.275700 |
| Adrenergic signaling in cardiomyocytes | -0.269500 |
| African trypanosomiasis | -0.221400 |
| AGE-RAGE signaling pathway in diabetic complications | 0.272800 |
| Alanine, aspartate and glutamate metabolism | 0.552900 |
| Aldosterone synthesis and secretion | 0.150400 |
| Aldosterone-regulated sodium reabsorption | 0.174900 |
| Allograft rejection | -0.168200 |
| alpha-Linolenic acid metabolism | 0.078400 |
| Alzheimer's disease | 0.307900 |
| Amino sugar and nucleotide sugar metabolism | 0.472900 |
| Aminoacyl-tRNA biosynthesis | 0.290800 |
| Amoebiasis | -0.049270 |
| Amphetamine addiction | -0.123300 |
| AMPK signaling pathway | 0.483400 |
| Amyotrophic lateral sclerosis (ALS) | 0.180600 |
| Antigen processing and presentation | -0.037930 |
| Apoptosis | 0.343900 |
| Arachidonic acid metabolism | -0.742200 |
| Arginine and proline metabolism | 0.001743 |
| Arginine biosynthesis | 0.277900 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.340800 |
| Ascorbate and aldarate metabolism | -0.584700 |
| Asthma | -0.417100 |
| Autoimmune thyroid disease | -0.395100 |
| B cell receptor signaling pathway | 0.135700 |
| Bacterial invasion of epithelial cells | 0.476600 |
| Basal cell carcinoma | 0.199900 |
| beta-Alanine metabolism | -0.182300 |
| Bile secretion | -0.015750 |
| Biosynthesis of unsaturated fatty acids | 0.169900 |
| Biotin metabolism | 0.263400 |
| Bladder cancer | 0.478000 |
| Butanoate metabolism | 0.207900 |
| Caffeine metabolism | -0.435000 |
| Carbohydrate digestion and absorption | 0.166200 |
| Cardiac muscle contraction | -0.184600 |
| Cell adhesion molecules (CAMs) | -0.209800 |
| Cell cycle | 0.852600 |
| Central carbon metabolism in cancer | 0.559400 |
| Chagas disease (American trypanosomiasis) | 0.320800 |

| | |
|---|---|
| Chemical carcinogenesis | -0.858800 |
| Choline metabolism in cancer | 0.337600 |
| Cholinergic synapse | 0.174500 |
| Chronic myeloid leukemia | 0.577700 |
| Circadian entrainment | 0.002766 |
| Circadian rhythm | 0.458600 |
| Citrate cycle (TCA cycle) | 0.951700 |
| Cocaine addiction | 0.016440 |
| Colorectal cancer | 0.409000 |
| Complement and coagulation cascades | -0.199600 |
| Cysteine and methionine metabolism | 0.498100 |
| Cytosolic DNA-sensing pathway | 0.238900 |
| D-Glutamine and D-glutamate metabolism | 0.314600 |
| Dilated cardiomyopathy | 0.239300 |
| Dopaminergic synapse | 0.056320 |
| Dorso-ventral axis formation | 0.267100 |
| Drug metabolism - cytochrome P450 | -0.492900 |
| Drug metabolism - other enzymes | 0.095170 |
| ECM-receptor interaction | 0.511100 |
| Endocrine and other factor-regulated calcium reabsorption | -0.116600 |
| Endocytosis | 0.681100 |
| Endometrial cancer | 0.525200 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.140600 |
| Epstein-Barr virus infection | 0.356900 |
| ErbB signaling pathway | 0.377400 |
| Estrogen signaling pathway | 0.240800 |
| Ether lipid metabolism | 0.094920 |
| Fanconi anemia pathway | 0.558500 |
| Fat digestion and absorption | 0.368300 |
| Fatty acid biosynthesis | 0.350400 |
| Fatty acid degradation | 0.662700 |
| Fatty acid elongation | 0.267600 |
| Fc epsilon RI signaling pathway | 0.241300 |
| Fc gamma R-mediated phagocytosis | 0.383300 |
| Folate biosynthesis | 0.292400 |
| FoxO signaling pathway | 0.319200 |
| Fructose and mannose metabolism | 0.482100 |
| GABAergic synapse | -0.444700 |
| Galactose metabolism | 0.423500 |
| Gap junction | 0.116900 |
| Gastric acid secretion | 0.171600 |
| Glioma | 0.444700 |
| Glucagon signaling pathway | 0.460700 |
| Glutamatergic synapse | -0.114500 |
| Glutathione metabolism | 0.282300 |
| Glycerolipid metabolism | 0.760900 |

| | |
|---|---|
| Glycerophospholipid metabolism | 0.835600 |
| Glycine, serine and threonine metabolism | 0.018130 |
| Glycolysis / Gluconeogenesis | 0.546200 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.431200 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.404100 |
| Glycosaminoglycan degradation | 0.424000 |
| Glycosphingolipid biosynthesis - ganglio series | 0.267000 |
| Glycosphingolipid biosynthesis - globo series | -0.079240 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.259700 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.445800 |
| Glyoxylate and dicarboxylate metabolism | 0.310800 |
| GnRH signaling pathway | 0.265900 |
| Graft-versus-host disease | -0.270200 |
| Hepatitis B | 0.324300 |
| Hepatitis C | 0.419600 |
| Herpes simplex infection | 0.305600 |
| HIF-1 signaling pathway | 0.551100 |
| Histidine metabolism | -0.313700 |
| Huntington's disease | 0.788600 |
| Hypertrophic cardiomyopathy (HCM) | 0.239100 |
| Inflammatory bowel disease (IBD) | -0.187800 |
| Inflammatory mediator regulation of TRP channels | 0.134400 |
| Influenza A | 0.298700 |
| Inositol phosphate metabolism | 1.071000 |
| Insulin resistance | 0.393400 |
| Insulin secretion | -0.112000 |
| Insulin signaling pathway | 0.480900 |
| Intestinal immune network for IgA production | -0.190900 |
| Legionellosis | -0.088660 |
| Leishmaniasis | -0.029940 |
| Leukocyte transendothelial migration | 0.080250 |
| Linoleic acid metabolism | -1.287000 |
| Lipoic acid metabolism | -0.172000 |
| Long-term depression | 0.277100 |
| Long-term potentiation | 0.206600 |
| Longevity regulating pathway | 0.642700 |
| Longevity regulating pathway - multiple species | 0.589900 |
| Lysine biosynthesis | -0.113900 |
| Lysine degradation | 0.613900 |
| Malaria | -0.220400 |
| Maturity onset diabetes of the young | -0.160500 |
| Measles | 0.197400 |
| Melanogenesis | 0.185200 |
| Melanoma | 0.306300 |
| Metabolism of xenobiotics by cytochrome P450 | -1.120000 |
| Mineral absorption | -0.011000 |

| | |
|---|---|
| Morphine addiction | -0.262000 |
| mRNA surveillance pathway | 0.579400 |
| mTOR signaling pathway | 0.326700 |
| Mucin type O-Glycan biosynthesis | -0.242800 |
| N-Glycan biosynthesis | 0.625800 |
| Natural killer cell mediated cytotoxicity | 0.101700 |
| Neuroactive ligand-receptor interaction | -0.414300 |
| Neurotrophin signaling pathway | 0.349700 |
| NF-kappa B signaling pathway | 0.173300 |
| Nicotinate and nicotinamide metabolism | -0.061660 |
| Nitrogen metabolism | 0.589300 |
| NOD-like receptor signaling pathway | 0.221800 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.222700 |
| Non-small cell lung cancer | 0.496900 |
| Notch signaling pathway | 0.431700 |
| One carbon pool by folate | 0.872900 |
| Oocyte meiosis | 0.554600 |
| Osteoclast differentiation | 0.113900 |
| Ovarian steroidogenesis | 0.083820 |
| Oxidative phosphorylation | 0.511500 |
| p53 signaling pathway | 0.311000 |
| Pancreatic cancer | 0.469700 |
| Pancreatic secretion | 0.147600 |
| Pantothenate and CoA biosynthesis | 0.143100 |
| Parkinson's disease | 0.181600 |
| Pathogenic Escherichia coli infection | 0.299500 |
| Pentose and glucuronate interconversions | -0.198500 |
| Pentose phosphate pathway | 0.367900 |
| Peroxisome | 0.133100 |
| Pertussis | 0.114600 |
| Phagosome | 1.100000 |
| Phenylalanine metabolism | -0.116800 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.315100 |
| Phosphatidylinositol signaling system | 1.317000 |
| Phospholipase D signaling pathway | 0.345200 |
| Phototransduction | -0.392000 |
| Platelet activation | 0.277500 |
| Porphyrin and chlorophyll metabolism | -0.004352 |
| Primary bile acid biosynthesis | -0.269700 |
| Prion diseases | 0.322100 |
| Progesterone-mediated oocyte maturation | 0.225900 |
| Prolactin signaling pathway | 0.354700 |
| Propanoate metabolism | 0.339000 |
| Prostate cancer | 0.487300 |
| Protein processing in endoplasmic reticulum | 0.427300 |
| Proximal tubule bicarbonate reclamation | 0.186900 |

| | |
|---|---|
| Pyrimidine metabolism | 1.034000 |
| Pyruvate metabolism | 0.533400 |
| Regulation of autophagy | 0.259300 |
| Regulation of lipolysis in adipocytes | 0.225200 |
| Renal cell carcinoma | 0.437100 |
| Renin secretion | 0.228600 |
| Renin-angiotensin system | 0.131500 |
| Retinol metabolism | -1.720000 |
| Retrograde endocannabinoid signaling | -0.003103 |
| Rheumatoid arthritis | -0.182500 |
| Riboflavin metabolism | 0.384700 |
| Ribosome biogenesis in eukaryotes | 0.309300 |
| RIG-I-like receptor signaling pathway | 0.278900 |
| RNA degradation | 0.692700 |
| RNA transport | 0.397400 |
| Salivary secretion | 0.068720 |
| Salmonella infection | 0.397400 |
| Selenocompound metabolism | 0.375400 |
| Serotonergic synapse | -0.023680 |
| Shigellosis | 0.359900 |
| Signaling pathways regulating pluripotency of stem cells | 0.384000 |
| Small cell lung cancer | 0.599600 |
| SNARE interactions in vesicular transport | 0.414400 |
| Sphingolipid metabolism | 0.781700 |
| Sphingolipid signaling pathway | 0.452000 |
| Staphylococcus aureus infection | -0.134000 |
| Starch and sucrose metabolism | 0.247600 |
| Steroid biosynthesis | 0.411300 |
| Steroid hormone biosynthesis | -0.960900 |
| Sulfur metabolism | 0.509300 |
| Sulfur relay system | 0.290400 |
| Synaptic vesicle cycle | 0.591600 |
| Synthesis and degradation of ketone bodies | 0.192000 |
| Systemic lupus erythematosus | -0.252400 |
| T cell receptor signaling pathway | 0.195000 |
| Taste transduction | -0.359100 |
| Taurine and hypotaurine metabolism | -0.260300 |
| Terpenoid backbone biosynthesis | 0.370800 |
| TGF-beta signaling pathway | 0.238700 |
| Thiamine metabolism | 0.159900 |
| Thyroid cancer | 0.377600 |
| Thyroid hormone signaling pathway | 0.634700 |
| Thyroid hormone synthesis | -0.001132 |
| Tight junction | 0.339900 |
| TNF signaling pathway | 0.303200 |
| Toll-like receptor signaling pathway | 0.088490 |

| | |
|---|---|
| Toxoplasmosis | 0.297500 |
| Transcriptional misregulation in cancer | 0.093550 |
| Tryptophan metabolism | -0.262100 |
| Type I diabetes mellitus | -0.401600 |
| Type II diabetes mellitus | 0.192500 |
| Tyrosine metabolism | -0.364400 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.287700 |
| Valine, leucine and isoleucine degradation | 0.566500 |
| Vascular smooth muscle contraction | 0.204600 |
| Vasopressin-regulated water reabsorption | 0.045730 |
| VEGF signaling pathway | 0.321500 |
| Vibrio cholerae infection | 0.402800 |
| Viral carcinogenesis | 0.331100 |
| Viral myocarditis | 0.157500 |
| Vitamin B6 metabolism | 0.160500 |
| Vitamin digestion and absorption | -0.443900 |
| Wnt signaling pathway | 0.243200 |

| | control.Max. |
|---|---|
| Acute myeloid leukemia | 0.442500 |
| Adherens junction | 0.557300 |
| Adipocytokine signaling pathway | 0.290600 |
| Adrenergic signaling in cardiomyocytes | -0.253100 |
| African trypanosomiasis | -0.205800 |
| AGE-RAGE signaling pathway in diabetic complications | 0.273400 |
| Alanine, aspartate and glutamate metabolism | 0.563900 |
| Aldosterone synthesis and secretion | 0.161200 |
| Aldosterone-regulated sodium reabsorption | 0.177300 |
| Allograft rejection | -0.165300 |
| alpha-Linolenic acid metabolism | 0.120200 |
| Alzheimer's disease | 0.308400 |
| Amino sugar and nucleotide sugar metabolism | 0.473600 |
| Aminoacyl-tRNA biosynthesis | 0.295900 |
| Amoebiasis | -0.029320 |
| Amphetamine addiction | -0.118000 |
| AMPK signaling pathway | 0.492500 |
| Amyotrophic lateral sclerosis (ALS) | 0.181400 |
| Antigen processing and presentation | -0.016660 |
| Apoptosis | 0.346700 |
| Arachidonic acid metabolism | -0.719300 |
| Arginine and proline metabolism | 0.019040 |
| Arginine biosynthesis | 0.288800 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.343100 |
| Ascorbate and aldarate metabolism | -0.568300 |
| Asthma | -0.399900 |
| Autoimmune thyroid disease | -0.393800 |
| B cell receptor signaling pathway | 0.144600 |

| | |
|---|---|
| Bacterial invasion of epithelial cells | 0.483400 |
| Basal cell carcinoma | 0.221000 |
| beta-Alanine metabolism | -0.172000 |
| Bile secretion | -0.008094 |
| Biosynthesis of unsaturated fatty acids | 0.173300 |
| Biotin metabolism | 0.264100 |
| Bladder cancer | 0.479600 |
| Butanoate metabolism | 0.211800 |
| Caffeine metabolism | -0.416500 |
| Carbohydrate digestion and absorption | 0.173200 |
| Cardiac muscle contraction | -0.181100 |
| Cell adhesion molecules (CAMs) | -0.205000 |
| Cell cycle | 0.855300 |
| Central carbon metabolism in cancer | 0.560000 |
| Chagas disease (American trypanosomiasis) | 0.326600 |
| Chemical carcinogenesis | -0.856600 |
| Choline metabolism in cancer | 0.342000 |
| Cholinergic synapse | 0.201200 |
| Chronic myeloid leukemia | 0.587700 |
| Circadian entrainment | 0.012730 |
| Circadian rhythm | 0.462400 |
| Citrate cycle (TCA cycle) | 1.035000 |
| Cocaine addiction | 0.019430 |
| Colorectal cancer | 0.419400 |
| Complement and coagulation cascades | -0.179000 |
| Cysteine and methionine metabolism | 0.499900 |
| Cytosolic DNA-sensing pathway | 0.247900 |
| D-Glutamine and D-glutamate metabolism | 0.315700 |
| Dilated cardiomyopathy | 0.250900 |
| Dopaminergic synapse | 0.100100 |
| Dorso-ventral axis formation | 0.269200 |
| Drug metabolism - cytochrome P450 | -0.466700 |
| Drug metabolism - other enzymes | 0.096180 |
| ECM-receptor interaction | 0.600200 |
| Endocrine and other factor-regulated calcium reabsorption | -0.090800 |
| Endocytosis | 0.687800 |
| Endometrial cancer | 0.535500 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.141300 |
| Epstein-Barr virus infection | 0.361700 |
| ErbB signaling pathway | 0.384700 |
| Estrogen signaling pathway | 0.251900 |
| Ether lipid metabolism | 0.207500 |
| Fanconi anemia pathway | 0.567200 |
| Fat digestion and absorption | 0.369200 |
| Fatty acid biosynthesis | 0.350500 |
| Fatty acid degradation | 0.679900 |

| | |
|---|---|
| Fatty acid elongation | 0.281600 |
| Fc epsilon RI signaling pathway | 0.253200 |
| Fc gamma R-mediated phagocytosis | 0.384400 |
| Folate biosynthesis | 0.292800 |
| FoxO signaling pathway | 0.323300 |
| Fructose and mannose metabolism | 0.482800 |
| GABAergic synapse | -0.444400 |
| Galactose metabolism | 0.427200 |
| Gap junction | 0.118600 |
| Gastric acid secretion | 0.187200 |
| Glioma | 0.446500 |
| Glucagon signaling pathway | 0.509900 |
| Glutamatergic synapse | -0.103600 |
| Glutathione metabolism | 0.308200 |
| Glycerolipid metabolism | 0.780000 |
| Glycerophospholipid metabolism | 0.884300 |
| Glycine, serine and threonine metabolism | 0.104600 |
| Glycolysis / Gluconeogenesis | 0.566200 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.433000 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.406800 |
| Glycosaminoglycan degradation | 0.426800 |
| Glycosphingolipid biosynthesis - ganglio series | 0.277900 |
| Glycosphingolipid biosynthesis - globo series | -0.060910 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.252700 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.445900 |
| Glyoxylate and dicarboxylate metabolism | 0.319200 |
| GnRH signaling pathway | 0.273600 |
| Graft-versus-host disease | -0.219400 |
| Hepatitis B | 0.333600 |
| Hepatitis C | 0.426300 |
| Herpes simplex infection | 0.311800 |
| HIF-1 signaling pathway | 0.557400 |
| Histidine metabolism | -0.313300 |
| Huntington's disease | 0.791100 |
| Hypertrophic cardiomyopathy (HCM) | 0.240800 |
| Inflammatory bowel disease (IBD) | -0.185100 |
| Inflammatory mediator regulation of TRP channels | 0.135300 |
| Influenza A | 0.307800 |
| Inositol phosphate metabolism | 1.118000 |
| Insulin resistance | 0.400100 |
| Insulin secretion | -0.100600 |
| Insulin signaling pathway | 0.487500 |
| Intestinal immune network for IgA production | -0.187600 |
| Legionellosis | -0.059190 |
| Leishmaniasis | -0.022220 |
| Leukocyte transendothelial migration | 0.084170 |

| | |
|---|---|
| Linoleic acid metabolism | -1.230000 |
| Lipoic acid metabolism | -0.169300 |
| Long-term depression | 0.309800 |
| Long-term potentiation | 0.233500 |
| Longevity regulating pathway | 0.654600 |
| Longevity regulating pathway - multiple species | 0.610100 |
| Lysine biosynthesis | -0.103500 |
| Lysine degradation | 0.630400 |
| Malaria | -0.121500 |
| Maturity onset diabetes of the young | -0.159500 |
| Measles | 0.199300 |
| Melanogenesis | 0.193300 |
| Melanoma | 0.348900 |
| Metabolism of xenobiotics by cytochrome P450 | -1.075000 |
| Mineral absorption | -0.004526 |
| Morphine addiction | -0.255400 |
| mRNA surveillance pathway | 0.591900 |
| mTOR signaling pathway | 0.328900 |
| Mucin type O-Glycan biosynthesis | -0.227200 |
| N-Glycan biosynthesis | 0.626700 |
| Natural killer cell mediated cytotoxicity | 0.111000 |
| Neuroactive ligand-receptor interaction | -0.409300 |
| Neurotrophin signaling pathway | 0.352900 |
| NF-kappa B signaling pathway | 0.188000 |
| Nicotinate and nicotinamide metabolism | -0.040950 |
| Nitrogen metabolism | 0.590100 |
| NOD-like receptor signaling pathway | 0.236000 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.223000 |
| Non-small cell lung cancer | 0.500300 |
| Notch signaling pathway | 0.441700 |
| One carbon pool by folate | 0.886100 |
| Oocyte meiosis | 0.565400 |
| Osteoclast differentiation | 0.116200 |
| Ovarian steroidogenesis | 0.135300 |
| Oxidative phosphorylation | 0.518100 |
| p53 signaling pathway | 0.338100 |
| Pancreatic cancer | 0.471300 |
| Pancreatic secretion | 0.177400 |
| Pantothenate and CoA biosynthesis | 0.145200 |
| Parkinson's disease | 0.185800 |
| Pathogenic Escherichia coli infection | 0.303000 |
| Pentose and glucuronate interconversions | -0.171400 |
| Pentose phosphate pathway | 0.375900 |
| Peroxisome | 0.134100 |
| Pertussis | 0.145700 |
| Phagosome | 1.123000 |

| | |
|---|---|
| Phenylalanine metabolism | -0.082140 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.318700 |
| Phosphatidylinositol signaling system | 1.428000 |
| Phospholipase D signaling pathway | 0.360500 |
| Phototransduction | -0.348200 |
| Platelet activation | 0.300500 |
| Porphyrin and chlorophyll metabolism | 0.010770 |
| Primary bile acid biosynthesis | -0.254500 |
| Prion diseases | 0.323600 |
| Progesterone-mediated oocyte maturation | 0.236000 |
| Prolactin signaling pathway | 0.358000 |
| Propanoate metabolism | 0.348300 |
| Prostate cancer | 0.516700 |
| Protein processing in endoplasmic reticulum | 0.430000 |
| Proximal tubule bicarbonate reclamation | 0.258700 |
| Pyrimidine metabolism | 1.092000 |
| Pyruvate metabolism | 0.586400 |
| Regulation of autophagy | 0.261200 |
| Regulation of lipolysis in adipocytes | 0.264100 |
| Renal cell carcinoma | 0.437900 |
| Renin secretion | 0.245100 |
| Renin-angiotensin system | 0.136500 |
| Retinol metabolism | -1.720000 |
| Retrograde endocannabinoid signaling | 0.054580 |
| Rheumatoid arthritis | -0.144400 |
| Riboflavin metabolism | 0.385500 |
| Ribosome biogenesis in eukaryotes | 0.311700 |
| RIG-I-like receptor signaling pathway | 0.281000 |
| RNA degradation | 0.698700 |
| RNA transport | 0.405800 |
| Salivary secretion | 0.081660 |
| Salmonella infection | 0.418300 |
| Selenocompound metabolism | 0.421800 |
| Serotonergic synapse | 0.004668 |
| Shigellosis | 0.367200 |
| Signaling pathways regulating pluripotency of stem cells | 0.388700 |
| Small cell lung cancer | 0.601000 |
| SNARE interactions in vesicular transport | 0.418900 |
| Sphingolipid metabolism | 0.889400 |
| Sphingolipid signaling pathway | 0.463700 |
| Staphylococcus aureus infection | -0.104200 |
| Starch and sucrose metabolism | 0.255900 |
| Steroid biosynthesis | 0.416900 |
| Steroid hormone biosynthesis | -0.918000 |
| Sulfur metabolism | 0.510300 |
| Sulfur relay system | 0.291500 |

| | |
|---|---|
| Synaptic vesicle cycle | 0.593300 |
| Synthesis and degradation of ketone bodies | 0.196400 |
| Systemic lupus erythematosus | -0.240800 |
| T cell receptor signaling pathway | 0.200800 |
| Taste transduction | -0.354100 |
| Taurine and hypotaurine metabolism | -0.256300 |
| Terpenoid backbone biosynthesis | 0.377600 |
| TGF-beta signaling pathway | 0.246700 |
| Thiamine metabolism | 0.166500 |
| Thyroid cancer | 0.379700 |
| Thyroid hormone signaling pathway | 0.645000 |
| Thyroid hormone synthesis | 0.016000 |
| Tight junction | 0.343900 |
| TNF signaling pathway | 0.309400 |
| Toll-like receptor signaling pathway | 0.092430 |
| Toxoplasmosis | 0.298200 |
| Transcriptional misregulation in cancer | 0.094880 |
| Tryptophan metabolism | -0.261600 |
| Type I diabetes mellitus | -0.394400 |
| Type II diabetes mellitus | 0.214700 |
| Tyrosine metabolism | -0.308600 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.290200 |
| Valine, leucine and isoleucine degradation | 0.570100 |
| Vascular smooth muscle contraction | 0.207600 |
| Vasopressin-regulated water reabsorption | 0.050240 |
| VEGF signaling pathway | 0.322100 |
| Vibrio cholerae infection | 0.403200 |
| Viral carcinogenesis | 0.332200 |
| Viral myocarditis | 0.162200 |
| Vitamin B6 metabolism | 0.166100 |
| Vitamin digestion and absorption | -0.443300 |
| Wnt signaling pathway | 0.274700 |

| | sample.N |
|---|---|
| Acute myeloid leukemia | 4 |
| Adherens junction | 4 |
| Adipocytokine signaling pathway | 4 |
| Adrenergic signaling in cardiomyocytes | 4 |
| African trypanosomiasis | 4 |
| AGE-RAGE signaling pathway in diabetic complications | 4 |
| Alanine, aspartate and glutamate metabolism | 4 |
| Aldosterone synthesis and secretion | 4 |
| Aldosterone-regulated sodium reabsorption | 4 |
| Allograft rejection | 4 |
| alpha-Linolenic acid metabolism | 4 |
| Alzheimer's disease | 4 |
| Amino sugar and nucleotide sugar metabolism | 4 |

| | |
|---|---|
| Aminoacyl-tRNA biosynthesis | 4 |
| Amoebiasis | 4 |
| Amphetamine addiction | 4 |
| AMPK signaling pathway | 4 |
| Amyotrophic lateral sclerosis (ALS) | 4 |
| Antigen processing and presentation | 4 |
| Apoptosis | 4 |
| Arachidonic acid metabolism | 4 |
| Arginine and proline metabolism | 4 |
| Arginine biosynthesis | 4 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 4 |
| Ascorbate and aldarate metabolism | 4 |
| Asthma | 4 |
| Autoimmune thyroid disease | 4 |
| B cell receptor signaling pathway | 4 |
| Bacterial invasion of epithelial cells | 4 |
| Basal cell carcinoma | 4 |
| beta-Alanine metabolism | 4 |
| Bile secretion | 4 |
| Biosynthesis of unsaturated fatty acids | 4 |
| Biotin metabolism | 4 |
| Bladder cancer | 4 |
| Butanoate metabolism | 4 |
| Caffeine metabolism | 4 |
| Carbohydrate digestion and absorption | 4 |
| Cardiac muscle contraction | 4 |
| Cell adhesion molecules (CAMs) | 4 |
| Cell cycle | 4 |
| Central carbon metabolism in cancer | 4 |
| Chagas disease (American trypanosomiasis) | 4 |
| Chemical carcinogenesis | 4 |
| Choline metabolism in cancer | 4 |
| Cholinergic synapse | 4 |
| Chronic myeloid leukemia | 4 |
| Circadian entrainment | 4 |
| Circadian rhythm | 4 |
| Citrate cycle (TCA cycle) | 4 |
| Cocaine addiction | 4 |
| Colorectal cancer | 4 |
| Complement and coagulation cascades | 4 |
| Cysteine and methionine metabolism | 4 |
| Cytosolic DNA-sensing pathway | 4 |
| D-Glutamine and D-glutamate metabolism | 4 |
| Dilated cardiomyopathy | 4 |
| Dopaminergic synapse | 4 |
| Dorso-ventral axis formation | 4 |

| | |
|---|---|
| Drug metabolism - cytochrome P450 | 4 |
| Drug metabolism - other enzymes | 4 |
| ECM-receptor interaction | 4 |
| Endocrine and other factor-regulated calcium reabsorption | 4 |
| Endocytosis | 4 |
| Endometrial cancer | 4 |
| Epithelial cell signaling in Helicobacter pylori infection | 4 |
| Epstein-Barr virus infection | 4 |
| ErbB signaling pathway | 4 |
| Estrogen signaling pathway | 4 |
| Ether lipid metabolism | 4 |
| Fanconi anemia pathway | 4 |
| Fat digestion and absorption | 4 |
| Fatty acid biosynthesis | 4 |
| Fatty acid degradation | 4 |
| Fatty acid elongation | 4 |
| Fc epsilon RI signaling pathway | 4 |
| Fc gamma R-mediated phagocytosis | 4 |
| Folate biosynthesis | 4 |
| FoxO signaling pathway | 4 |
| Fructose and mannose metabolism | 4 |
| GABAergic synapse | 4 |
| Galactose metabolism | 4 |
| Gap junction | 4 |
| Gastric acid secretion | 4 |
| Glioma | 4 |
| Glucagon signaling pathway | 4 |
| Glutamatergic synapse | 4 |
| Glutathione metabolism | 4 |
| Glycerolipid metabolism | 4 |
| Glycerophospholipid metabolism | 4 |
| Glycine, serine and threonine metabolism | 4 |
| Glycolysis / Gluconeogenesis | 4 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 4 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 4 |
| Glycosaminoglycan degradation | 4 |
| Glycosphingolipid biosynthesis - ganglio series | 4 |
| Glycosphingolipid biosynthesis - globo series | 4 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 4 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 4 |
| Glyoxylate and dicarboxylate metabolism | 4 |
| GnRH signaling pathway | 4 |
| Graft-versus-host disease | 4 |
| Hepatitis B | 4 |
| Hepatitis C | 4 |
| Herpes simplex infection | 4 |

| | |
|---|---|
| HIF-1 signaling pathway | 4 |
| Histidine metabolism | 4 |
| Huntington's disease | 4 |
| Hypertrophic cardiomyopathy (HCM) | 4 |
| Inflammatory bowel disease (IBD) | 4 |
| Inflammatory mediator regulation of TRP channels | 4 |
| Influenza A | 4 |
| Inositol phosphate metabolism | 4 |
| Insulin resistance | 4 |
| Insulin secretion | 4 |
| Insulin signaling pathway | 4 |
| Intestinal immune network for IgA production | 4 |
| Legionellosis | 4 |
| Leishmaniasis | 4 |
| Leukocyte transendothelial migration | 4 |
| Linoleic acid metabolism | 4 |
| Lipoic acid metabolism | 4 |
| Long-term depression | 4 |
| Long-term potentiation | 4 |
| Longevity regulating pathway | 4 |
| Longevity regulating pathway - multiple species | 4 |
| Lysine biosynthesis | 4 |
| Lysine degradation | 4 |
| Malaria | 4 |
| Maturity onset diabetes of the young | 4 |
| Measles | 4 |
| Melanogenesis | 4 |
| Melanoma | 4 |
| Metabolism of xenobiotics by cytochrome P450 | 4 |
| Mineral absorption | 4 |
| Morphine addiction | 4 |
| mRNA surveillance pathway | 4 |
| mTOR signaling pathway | 4 |
| Mucin type O-Glycan biosynthesis | 4 |
| N-Glycan biosynthesis | 4 |
| Natural killer cell mediated cytotoxicity | 4 |
| Neuroactive ligand-receptor interaction | 4 |
| Neurotrophin signaling pathway | 4 |
| NF-kappa B signaling pathway | 4 |
| Nicotinate and nicotinamide metabolism | 4 |
| Nitrogen metabolism | 4 |
| NOD-like receptor signaling pathway | 4 |
| Non-alcoholic fatty liver disease (NAFLD) | 4 |
| Non-small cell lung cancer | 4 |
| Notch signaling pathway | 4 |
| One carbon pool by folate | 4 |

| | |
|---|---|
| Oocyte meiosis | 4 |
| Osteoclast differentiation | 4 |
| Ovarian steroidogenesis | 4 |
| Oxidative phosphorylation | 4 |
| p53 signaling pathway | 4 |
| Pancreatic cancer | 4 |
| Pancreatic secretion | 4 |
| Pantothenate and CoA biosynthesis | 4 |
| Parkinson's disease | 4 |
| Pathogenic Escherichia coli infection | 4 |
| Pentose and glucuronate interconversions | 4 |
| Pentose phosphate pathway | 4 |
| Peroxisome | 4 |
| Pertussis | 4 |
| Phagosome | 4 |
| Phenylalanine metabolism | 4 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 4 |
| Phosphatidylinositol signaling system | 4 |
| Phospholipase D signaling pathway | 4 |
| Phototransduction | 4 |
| Platelet activation | 4 |
| Porphyrin and chlorophyll metabolism | 4 |
| Primary bile acid biosynthesis | 4 |
| Prion diseases | 4 |
| Progesterone-mediated oocyte maturation | 4 |
| Prolactin signaling pathway | 4 |
| Propanoate metabolism | 4 |
| Prostate cancer | 4 |
| Protein processing in endoplasmic reticulum | 4 |
| Proximal tubule bicarbonate reclamation | 4 |
| Pyrimidine metabolism | 4 |
| Pyruvate metabolism | 4 |
| Regulation of autophagy | 4 |
| Regulation of lipolysis in adipocytes | 4 |
| Renal cell carcinoma | 4 |
| Renin secretion | 4 |
| Renin-angiotensin system | 4 |
| Retinol metabolism | 4 |
| Retrograde endocannabinoid signaling | 4 |
| Rheumatoid arthritis | 4 |
| Riboflavin metabolism | 4 |
| Ribosome biogenesis in eukaryotes | 4 |
| RIG-I-like receptor signaling pathway | 4 |
| RNA degradation | 4 |
| RNA transport | 4 |
| Salivary secretion | 4 |

| | |
|---|---|
| Salmonella infection | 4 |
| Selenocompound metabolism | 4 |
| Serotonergic synapse | 4 |
| Shigellosis | 4 |
| Signaling pathways regulating pluripotency of stem cells | 4 |
| Small cell lung cancer | 4 |
| SNARE interactions in vesicular transport | 4 |
| Sphingolipid metabolism | 4 |
| Sphingolipid signaling pathway | 4 |
| Staphylococcus aureus infection | 4 |
| Starch and sucrose metabolism | 4 |
| Steroid biosynthesis | 4 |
| Steroid hormone biosynthesis | 4 |
| Sulfur metabolism | 4 |
| Sulfur relay system | 4 |
| Synaptic vesicle cycle | 4 |
| Synthesis and degradation of ketone bodies | 4 |
| Systemic lupus erythematosus | 4 |
| T cell receptor signaling pathway | 4 |
| Taste transduction | 4 |
| Taurine and hypotaurine metabolism | 4 |
| Terpenoid backbone biosynthesis | 4 |
| TGF-beta signaling pathway | 4 |
| Thiamine metabolism | 4 |
| Thyroid cancer | 4 |
| Thyroid hormone signaling pathway | 4 |
| Thyroid hormone synthesis | 4 |
| Tight junction | 4 |
| TNF signaling pathway | 4 |
| Toll-like receptor signaling pathway | 4 |
| Toxoplasmosis | 4 |
| Transcriptional misregulation in cancer | 4 |
| Tryptophan metabolism | 4 |
| Type I diabetes mellitus | 4 |
| Type II diabetes mellitus | 4 |
| Tyrosine metabolism | 4 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 4 |
| Valine, leucine and isoleucine degradation | 4 |
| Vascular smooth muscle contraction | 4 |
| Vasopressin-regulated water reabsorption | 4 |
| VEGF signaling pathway | 4 |
| Vibrio cholerae infection | 4 |
| Viral carcinogenesis | 4 |
| Viral myocarditis | 4 |
| Vitamin B6 metabolism | 4 |
| Vitamin digestion and absorption | 4 |

| | |
|---|---|
| Wnt signaling pathway | 4 |
| | sample.Min. |
| Acute myeloid leukemia | 0.418200 |
| Adherens junction | 0.543000 |
| Adipocytokine signaling pathway | 0.225300 |
| Adrenergic signaling in cardiomyocytes | -0.382400 |
| African trypanosomiasis | -0.254100 |
| AGE-RAGE signaling pathway in diabetic complications | 0.248200 |
| Alanine, aspartate and glutamate metabolism | 0.546200 |
| Aldosterone synthesis and secretion | 0.148300 |
| Aldosterone-regulated sodium reabsorption | 0.120100 |
| Allograft rejection | -0.184100 |
| alpha-Linolenic acid metabolism | 0.011020 |
| Alzheimer's disease | 0.300100 |
| Amino sugar and nucleotide sugar metabolism | 0.373800 |
| Aminoacyl-tRNA biosynthesis | 0.226800 |
| Amoebiasis | -0.078140 |
| Amphetamine addiction | -0.081780 |
| AMPK signaling pathway | 0.468000 |
| Amyotrophic lateral sclerosis (ALS) | 0.172700 |
| Antigen processing and presentation | -0.166600 |
| Apoptosis | 0.315900 |
| Arachidonic acid metabolism | -0.911800 |
| Arginine and proline metabolism | -0.093050 |
| Arginine biosynthesis | 0.189600 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.248700 |
| Ascorbate and aldarate metabolism | -0.616100 |
| Asthma | -0.381900 |
| Autoimmune thyroid disease | -0.411500 |
| B cell receptor signaling pathway | 0.116700 |
| Bacterial invasion of epithelial cells | 0.458000 |
| Basal cell carcinoma | 0.035240 |
| beta-Alanine metabolism | -0.262100 |
| Bile secretion | -0.055040 |
| Biosynthesis of unsaturated fatty acids | 0.089280 |
| Biotin metabolism | 0.246400 |
| Bladder cancer | 0.423000 |
| Butanoate metabolism | 0.139800 |
| Caffeine metabolism | -0.420200 |
| Carbohydrate digestion and absorption | 0.011090 |
| Cardiac muscle contraction | -0.222000 |
| Cell adhesion molecules (CAMs) | -0.240600 |
| Cell cycle | 0.916300 |
| Central carbon metabolism in cancer | 0.515200 |
| Chagas disease (American trypanosomiasis) | 0.288900 |
| Chemical carcinogenesis | -0.885100 |

| | |
|---|---|
| Choline metabolism in cancer | 0.309000 |
| Cholinergic synapse | 0.113800 |
| Chronic myeloid leukemia | 0.550000 |
| Circadian entrainment | -0.057760 |
| Circadian rhythm | 0.512700 |
| Citrate cycle (TCA cycle) | 0.913600 |
| Cocaine addiction | -0.051550 |
| Colorectal cancer | 0.383600 |
| Complement and coagulation cascades | -0.263000 |
| Cysteine and methionine metabolism | 0.459500 |
| Cytosolic DNA-sensing pathway | 0.208800 |
| D-Glutamine and D-glutamate metabolism | 0.326200 |
| Dilated cardiomyopathy | 0.067050 |
| Dopaminergic synapse | -0.003907 |
| Dorso-ventral axis formation | 0.268900 |
| Drug metabolism - cytochrome P450 | -0.478700 |
| Drug metabolism - other enzymes | 0.030640 |
| ECM-receptor interaction | 0.205800 |
| Endocrine and other factor-regulated calcium reabsorption | -0.175200 |
| Endocytosis | 0.599000 |
| Endometrial cancer | 0.484000 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.163400 |
| Epstein-Barr virus infection | 0.357500 |
| ErbB signaling pathway | 0.323700 |
| Estrogen signaling pathway | 0.127600 |
| Ether lipid metabolism | 0.039850 |
| Fanconi anemia pathway | 0.554800 |
| Fat digestion and absorption | 0.292400 |
| Fatty acid biosynthesis | 0.350700 |
| Fatty acid degradation | 0.538700 |
| Fatty acid elongation | 0.275900 |
| Fc epsilon RI signaling pathway | 0.207400 |
| Fc gamma R-mediated phagocytosis | 0.341800 |
| Folate biosynthesis | 0.265500 |
| FoxO signaling pathway | 0.308700 |
| Fructose and mannose metabolism | 0.376700 |
| GABAergic synapse | -0.539200 |
| Galactose metabolism | 0.361900 |
| Gap junction | 0.118500 |
| Gastric acid secretion | 0.155400 |
| Glioma | 0.378300 |
| Glucagon signaling pathway | 0.326400 |
| Glutamatergic synapse | -0.233600 |
| Glutathione metabolism | 0.268200 |
| Glycerolipid metabolism | 0.559500 |
| Glycerophospholipid metabolism | 0.654700 |

| | |
|---|---|
| Glycine, serine and threonine metabolism | -0.149900 |
| Glycolysis / Gluconeogenesis | 0.472400 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.397500 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.301900 |
| Glycosaminoglycan degradation | 0.344100 |
| Glycosphingolipid biosynthesis - ganglio series | 0.243000 |
| Glycosphingolipid biosynthesis - globo series | -0.094750 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.382000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.404600 |
| Glyoxylate and dicarboxylate metabolism | 0.201900 |
| GnRH signaling pathway | 0.266300 |
| Graft-versus-host disease | -0.327500 |
| Hepatitis B | 0.304000 |
| Hepatitis C | 0.397800 |
| Herpes simplex infection | 0.307600 |
| HIF-1 signaling pathway | 0.505800 |
| Histidine metabolism | -0.353100 |
| Huntington's disease | 0.779900 |
| Hypertrophic cardiomyopathy (HCM) | 0.194100 |
| Inflammatory bowel disease (IBD) | -0.182600 |
| Inflammatory mediator regulation of TRP channels | 0.097080 |
| Influenza A | 0.290000 |
| Inositol phosphate metabolism | 0.949800 |
| Insulin resistance | 0.337800 |
| Insulin secretion | -0.153300 |
| Insulin signaling pathway | 0.431000 |
| Intestinal immune network for IgA production | -0.215700 |
| Legionellosis | -0.090740 |
| Leishmaniasis | -0.070420 |
| Leukocyte transendothelial migration | 0.099990 |
| Linoleic acid metabolism | -1.231000 |
| Lipoic acid metabolism | -0.202000 |
| Long-term depression | 0.146400 |
| Long-term potentiation | 0.176700 |
| Longevity regulating pathway | 0.607500 |
| Longevity regulating pathway - multiple species | 0.530500 |
| Lysine biosynthesis | -0.103400 |
| Lysine degradation | 0.622100 |
| Malaria | -0.285600 |
| Maturity onset diabetes of the young | -0.206800 |
| Measles | 0.178700 |
| Melanogenesis | 0.104500 |
| Melanoma | 0.243300 |
| Metabolism of xenobiotics by cytochrome P450 | -1.255000 |
| Mineral absorption | -0.057190 |
| Morphine addiction | -0.442100 |

| | |
|---|---|
| mRNA surveillance pathway | 0.613400 |
| mTOR signaling pathway | 0.272300 |
| Mucin type O-Glycan biosynthesis | -0.530900 |
| N-Glycan biosynthesis | 0.570700 |
| Natural killer cell mediated cytotoxicity | 0.013510 |
| Neuroactive ligand-receptor interaction | -0.447500 |
| Neurotrophin signaling pathway | 0.296000 |
| NF-kappa B signaling pathway | 0.158200 |
| Nicotinate and nicotinamide metabolism | -0.159900 |
| Nitrogen metabolism | 0.601700 |
| NOD-like receptor signaling pathway | 0.201400 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.184800 |
| Non-small cell lung cancer | 0.465700 |
| Notch signaling pathway | 0.203900 |
| One carbon pool by folate | 0.877700 |
| Oocyte meiosis | 0.618000 |
| Osteoclast differentiation | 0.104700 |
| Ovarian steroidogenesis | -0.028140 |
| Oxidative phosphorylation | 0.465600 |
| p53 signaling pathway | 0.315700 |
| Pancreatic cancer | 0.455200 |
| Pancreatic secretion | 0.021750 |
| Pantothenate and CoA biosynthesis | 0.103200 |
| Parkinson's disease | 0.143600 |
| Pathogenic Escherichia coli infection | 0.256600 |
| Pentose and glucuronate interconversions | -0.326600 |
| Pentose phosphate pathway | 0.069200 |
| Peroxisome | 0.110400 |
| Pertussis | 0.047410 |
| Phagosome | 0.935300 |
| Phenylalanine metabolism | -0.120500 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.331800 |
| Phosphatidylinositol signaling system | 1.082000 |
| Phospholipase D signaling pathway | 0.245000 |
| Phototransduction | -0.522500 |
| Platelet activation | 0.271300 |
| Porphyrin and chlorophyll metabolism | -0.038650 |
| Primary bile acid biosynthesis | -0.306600 |
| Prion diseases | 0.301700 |
| Progesterone-mediated oocyte maturation | 0.201400 |
| Prolactin signaling pathway | 0.325700 |
| Propanoate metabolism | 0.318600 |
| Prostate cancer | 0.434400 |
| Protein processing in endoplasmic reticulum | 0.403200 |
| Proximal tubule bicarbonate reclamation | 0.166500 |
| Pyrimidine metabolism | 1.004000 |

| | |
|---|---|
| Pyruvate metabolism | 0.421600 |
| Regulation of autophagy | 0.231300 |
| Regulation of lipolysis in adipocytes | 0.196200 |
| Renal cell carcinoma | 0.372200 |
| Renin secretion | 0.168700 |
| Renin-angiotensin system | -0.205500 |
| Retinol metabolism | -1.871000 |
| Retrograde endocannabinoid signaling | -0.130200 |
| Rheumatoid arthritis | -0.207000 |
| Riboflavin metabolism | 0.326500 |
| Ribosome biogenesis in eukaryotes | 0.306600 |
| RIG-I-like receptor signaling pathway | 0.252100 |
| RNA degradation | 0.732900 |
| RNA transport | 0.434800 |
| Salivary secretion | 0.034640 |
| Salmonella infection | 0.387500 |
| Selenocompound metabolism | 0.325900 |
| Serotonergic synapse | -0.147400 |
| Shigellosis | 0.338400 |
| Signaling pathways regulating pluripotency of stem cells | 0.276600 |
| Small cell lung cancer | 0.549100 |
| SNARE interactions in vesicular transport | 0.362700 |
| Sphingolipid metabolism | 0.634100 |
| Sphingolipid signaling pathway | 0.363700 |
| Staphylococcus aureus infection | -0.241700 |
| Starch and sucrose metabolism | 0.086230 |
| Steroid biosynthesis | 0.351000 |
| Steroid hormone biosynthesis | -1.285000 |
| Sulfur metabolism | 0.506400 |
| Sulfur relay system | 0.232600 |
| Synaptic vesicle cycle | 0.558000 |
| Synthesis and degradation of ketone bodies | 0.062040 |
| Systemic lupus erythematosus | -0.334000 |
| T cell receptor signaling pathway | 0.171500 |
| Taste transduction | -0.333800 |
| Taurine and hypotaurine metabolism | -0.358000 |
| Terpenoid backbone biosynthesis | 0.353500 |
| TGF-beta signaling pathway | 0.192100 |
| Thiamine metabolism | 0.078490 |
| Thyroid cancer | 0.319900 |
| Thyroid hormone signaling pathway | 0.575200 |
| Thyroid hormone synthesis | -0.067000 |
| Tight junction | 0.295600 |
| TNF signaling pathway | 0.282400 |
| Toll-like receptor signaling pathway | 0.087530 |
| Toxoplasmosis | 0.284300 |

| | |
|---|---|
| Transcriptional misregulation in cancer | 0.086470 |
| Tryptophan metabolism | -0.298700 |
| Type I diabetes mellitus | -0.421500 |
| Type II diabetes mellitus | 0.142100 |
| Tyrosine metabolism | -0.386100 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.271800 |
| Valine, leucine and isoleucine degradation | 0.466300 |
| Vascular smooth muscle contraction | 0.129600 |
| Vasopressin-regulated water reabsorption | -0.064550 |
| VEGF signaling pathway | 0.246100 |
| Vibrio cholerae infection | 0.366500 |
| Viral carcinogenesis | 0.337500 |
| Viral myocarditis | 0.132000 |
| Vitamin B6 metabolism | 0.002633 |
| Vitamin digestion and absorption | -0.449500 |
| Wnt signaling pathway | 0.121500 |

| | sample.1st.Qu. |
|---|---|
| Acute myeloid leukemia | 0.43100 |
| Adherens junction | 0.56390 |
| Adipocytokine signaling pathway | 0.23600 |
| Adrenergic signaling in cardiomyocytes | -0.30470 |
| African trypanosomiasis | -0.24640 |
| AGE-RAGE signaling pathway in diabetic complications | 0.26410 |
| Alanine, aspartate and glutamate metabolism | 0.56160 |
| Aldosterone synthesis and secretion | 0.16900 |
| Aldosterone-regulated sodium reabsorption | 0.12540 |
| Allograft rejection | -0.17060 |
| alpha-Linolenic acid metabolism | 0.01279 |
| Alzheimer's disease | 0.30210 |
| Amino sugar and nucleotide sugar metabolism | 0.41310 |
| Aminoacyl-tRNA biosynthesis | 0.26900 |
| Amoebiasis | -0.07763 |
| Amphetamine addiction | -0.07970 |
| AMPK signaling pathway | 0.46830 |
| Amyotrophic lateral sclerosis (ALS) | 0.18190 |
| Antigen processing and presentation | -0.14900 |
| Apoptosis | 0.32480 |
| Arachidonic acid metabolism | -0.89600 |
| Arginine and proline metabolism | -0.05943 |
| Arginine biosynthesis | 0.24160 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.31130 |
| Ascorbate and aldarate metabolism | -0.56960 |
| Asthma | -0.37410 |
| Autoimmune thyroid disease | -0.40630 |
| B cell receptor signaling pathway | 0.13520 |
| Bacterial invasion of epithelial cells | 0.46310 |

| | |
|---|---|
| Basal cell carcinoma | 0.04187 |
| beta-Alanine metabolism | -0.24960 |
| Bile secretion | -0.04929 |
| Biosynthesis of unsaturated fatty acids | 0.10630 |
| Biotin metabolism | 0.25070 |
| Bladder cancer | 0.43560 |
| Butanoate metabolism | 0.16200 |
| Caffeine metabolism | -0.40070 |
| Carbohydrate digestion and absorption | 0.03826 |
| Cardiac muscle contraction | -0.20160 |
| Cell adhesion molecules (CAMs) | -0.24060 |
| Cell cycle | 0.92890 |
| Central carbon metabolism in cancer | 0.52100 |
| Chagas disease (American trypanosomiasis) | 0.29020 |
| Chemical carcinogenesis | -0.87820 |
| Choline metabolism in cancer | 0.31070 |
| Cholinergic synapse | 0.13870 |
| Chronic myeloid leukemia | 0.55100 |
| Circadian entrainment | -0.04835 |
| Circadian rhythm | 0.51530 |
| Citrate cycle (TCA cycle) | 0.91690 |
| Cocaine addiction | -0.00367 |
| Colorectal cancer | 0.39540 |
| Complement and coagulation cascades | -0.25640 |
| Cysteine and methionine metabolism | 0.49920 |
| Cytosolic DNA-sensing pathway | 0.22010 |
| D-Glutamine and D-glutamate metabolism | 0.33290 |
| Dilated cardiomyopathy | 0.08611 |
| Dopaminergic synapse | 0.03035 |
| Dorso-ventral axis formation | 0.27560 |
| Drug metabolism - cytochrome P450 | -0.47600 |
| Drug metabolism - other enzymes | 0.06798 |
| ECM-receptor interaction | 0.21840 |
| Endocrine and other factor-regulated calcium reabsorption | -0.11960 |
| Endocytosis | 0.61580 |
| Endometrial cancer | 0.49440 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.16560 |
| Epstein-Barr virus infection | 0.36610 |
| ErbB signaling pathway | 0.32790 |
| Estrogen signaling pathway | 0.16380 |
| Ether lipid metabolism | 0.05559 |
| Fanconi anemia pathway | 0.63880 |
| Fat digestion and absorption | 0.31150 |
| Fatty acid biosynthesis | 0.35280 |
| Fatty acid degradation | 0.55090 |
| Fatty acid elongation | 0.27940 |

| | |
|---|---|
| Fc epsilon RI signaling pathway | 0.21440 |
| Fc gamma R-mediated phagocytosis | 0.34870 |
| Folate biosynthesis | 0.26590 |
| FoxO signaling pathway | 0.30950 |
| Fructose and mannose metabolism | 0.42540 |
| GABAergic synapse | -0.48340 |
| Galactose metabolism | 0.36290 |
| Gap junction | 0.12260 |
| Gastric acid secretion | 0.17020 |
| Glioma | 0.38280 |
| Glucagon signaling pathway | 0.36500 |
| Glutamatergic synapse | -0.17640 |
| Glutathione metabolism | 0.27440 |
| Glycerolipid metabolism | 0.59440 |
| Glycerophospholipid metabolism | 0.69320 |
| Glycine, serine and threonine metabolism | -0.08987 |
| Glycolysis / Gluconeogenesis | 0.50870 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.40830 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.35750 |
| Glycosaminoglycan degradation | 0.34870 |
| Glycosphingolipid biosynthesis - ganglio series | 0.25230 |
| Glycosphingolipid biosynthesis - globo series | -0.08943 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.30970 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.40940 |
| Glyoxylate and dicarboxylate metabolism | 0.23160 |
| GnRH signaling pathway | 0.28360 |
| Graft-versus-host disease | -0.32370 |
| Hepatitis B | 0.31000 |
| Hepatitis C | 0.40270 |
| Herpes simplex infection | 0.30800 |
| HIF-1 signaling pathway | 0.51050 |
| Histidine metabolism | -0.34440 |
| Huntington's disease | 0.78770 |
| Hypertrophic cardiomyopathy (HCM) | 0.20120 |
| Inflammatory bowel disease (IBD) | -0.17620 |
| Inflammatory mediator regulation of TRP channels | 0.12410 |
| Influenza A | 0.29370 |
| Inositol phosphate metabolism | 1.01100 |
| Insulin resistance | 0.34300 |
| Insulin secretion | -0.12750 |
| Insulin signaling pathway | 0.43800 |
| Intestinal immune network for IgA production | -0.20220 |
| Legionellosis | -0.08680 |
| Leishmaniasis | -0.06280 |
| Leukocyte transendothelial migration | 0.11320 |
| Linoleic acid metabolism | -1.23000 |

| | |
|---|---|
| Lipoic acid metabolism | -0.15080 |
| Long-term depression | 0.16540 |
| Long-term potentiation | 0.21370 |
| Longevity regulating pathway | 0.64040 |
| Longevity regulating pathway - multiple species | 0.57910 |
| Lysine biosynthesis | -0.10250 |
| Lysine degradation | 0.63120 |
| Malaria | -0.19790 |
| Maturity onset diabetes of the young | -0.19560 |
| Measles | 0.18060 |
| Melanogenesis | 0.11340 |
| Melanoma | 0.28380 |
| Metabolism of xenobiotics by cytochrome P450 | -1.19100 |
| Mineral absorption | -0.04913 |
| Morphine addiction | -0.34110 |
| mRNA surveillance pathway | 0.61490 |
| mTOR signaling pathway | 0.27980 |
| Mucin type O-Glycan biosynthesis | -0.50470 |
| N-Glycan biosynthesis | 0.57790 |
| Natural killer cell mediated cytotoxicity | 0.01817 |
| Neuroactive ligand-receptor interaction | -0.44540 |
| Neurotrophin signaling pathway | 0.30600 |
| NF-kappa B signaling pathway | 0.16760 |
| Nicotinate and nicotinamide metabolism | -0.10680 |
| Nitrogen metabolism | 0.60640 |
| NOD-like receptor signaling pathway | 0.21970 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.20290 |
| Non-small cell lung cancer | 0.48030 |
| Notch signaling pathway | 0.35610 |
| One carbon pool by folate | 0.95700 |
| Oocyte meiosis | 0.62270 |
| Osteoclast differentiation | 0.11050 |
| Ovarian steroidogenesis | -0.01285 |
| Oxidative phosphorylation | 0.47590 |
| p53 signaling pathway | 0.33140 |
| Pancreatic cancer | 0.47640 |
| Pancreatic secretion | 0.02996 |
| Pantothenate and CoA biosynthesis | 0.10880 |
| Parkinson's disease | 0.19580 |
| Pathogenic Escherichia coli infection | 0.26820 |
| Pentose and glucuronate interconversions | -0.30350 |
| Pentose phosphate pathway | 0.10060 |
| Peroxisome | 0.12260 |
| Pertussis | 0.07829 |
| Phagosome | 1.08200 |
| Phenylalanine metabolism | -0.11860 |

| | |
|---|---|
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.33790 |
| Phosphatidylinositol signaling system | 1.25900 |
| Phospholipase D signaling pathway | 0.26780 |
| Phototransduction | -0.46600 |
| Platelet activation | 0.27970 |
| Porphyrin and chlorophyll metabolism | -0.01967 |
| Primary bile acid biosynthesis | -0.28410 |
| Prion diseases | 0.30240 |
| Progesterone-mediated oocyte maturation | 0.23320 |
| Prolactin signaling pathway | 0.33360 |
| Propanoate metabolism | 0.33850 |
| Prostate cancer | 0.46610 |
| Protein processing in endoplasmic reticulum | 0.40560 |
| Proximal tubule bicarbonate reclamation | 0.16930 |
| Pyrimidine metabolism | 1.04000 |
| Pyruvate metabolism | 0.43480 |
| Regulation of autophagy | 0.24320 |
| Regulation of lipolysis in adipocytes | 0.20310 |
| Renal cell carcinoma | 0.39370 |
| Renin secretion | 0.20630 |
| Renin-angiotensin system | -0.16310 |
| Retinol metabolism | -1.83400 |
| Retrograde endocannabinoid signaling | -0.08789 |
| Rheumatoid arthritis | -0.17130 |
| Riboflavin metabolism | 0.33030 |
| Ribosome biogenesis in eukaryotes | 0.31680 |
| RIG-I-like receptor signaling pathway | 0.26140 |
| RNA degradation | 0.73440 |
| RNA transport | 0.43770 |
| Salivary secretion | 0.05459 |
| Salmonella infection | 0.39200 |
| Selenocompound metabolism | 0.32840 |
| Serotonergic synapse | -0.13090 |
| Shigellosis | 0.34220 |
| Signaling pathways regulating pluripotency of stem cells | 0.29210 |
| Small cell lung cancer | 0.57190 |
| SNARE interactions in vesicular transport | 0.36610 |
| Sphingolipid metabolism | 0.64570 |
| Sphingolipid signaling pathway | 0.39090 |
| Staphylococcus aureus infection | -0.19150 |
| Starch and sucrose metabolism | 0.14050 |
| Steroid biosynthesis | 0.35630 |
| Steroid hormone biosynthesis | -1.26800 |
| Sulfur metabolism | 0.50690 |
| Sulfur relay system | 0.25350 |
| Synaptic vesicle cycle | 0.56580 |

| | |
|---|---|
| Synthesis and degradation of ketone bodies | 0.09597 |
| Systemic lupus erythematosus | -0.32660 |
| T cell receptor signaling pathway | 0.17360 |
| Taste transduction | -0.30940 |
| Taurine and hypotaurine metabolism | -0.33640 |
| Terpenoid backbone biosynthesis | 0.37180 |
| TGF-beta signaling pathway | 0.20540 |
| Thiamine metabolism | 0.10780 |
| Thyroid cancer | 0.32530 |
| Thyroid hormone signaling pathway | 0.58610 |
| Thyroid hormone synthesis | -0.01800 |
| Tight junction | 0.30890 |
| TNF signaling pathway | 0.28960 |
| Toll-like receptor signaling pathway | 0.09749 |
| Toxoplasmosis | 0.28780 |
| Transcriptional misregulation in cancer | 0.10220 |
| Tryptophan metabolism | -0.28520 |
| Type I diabetes mellitus | -0.41840 |
| Type II diabetes mellitus | 0.16230 |
| Tyrosine metabolism | -0.37910 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.27830 |
| Valine, leucine and isoleucine degradation | 0.52010 |
| Vascular smooth muscle contraction | 0.14900 |
| Vasopressin-regulated water reabsorption | -0.06379 |
| VEGF signaling pathway | 0.25030 |
| Vibrio cholerae infection | 0.38300 |
| Viral carcinogenesis | 0.34490 |
| Viral myocarditis | 0.13200 |
| Vitamin B6 metabolism | 0.03600 |
| Vitamin digestion and absorption | -0.43710 |
| Wnt signaling pathway | 0.13120 |

| | sample.Median |
|---|---|
| Acute myeloid leukemia | 0.437200 |
| Adherens junction | 0.572300 |
| Adipocytokine signaling pathway | 0.247100 |
| Adrenergic signaling in cardiomyocytes | -0.248900 |
| African trypanosomiasis | -0.211100 |
| AGE-RAGE signaling pathway in diabetic complications | 0.277400 |
| Alanine, aspartate and glutamate metabolism | 0.584800 |
| Aldosterone synthesis and secretion | 0.176400 |
| Aldosterone-regulated sodium reabsorption | 0.152700 |
| Allograft rejection | -0.163900 |
| alpha-Linolenic acid metabolism | 0.023350 |
| Alzheimer's disease | 0.304500 |
| Amino sugar and nucleotide sugar metabolism | 0.431700 |
| Aminoacyl-tRNA biosynthesis | 0.294200 |

| | |
|---|---|
| Amoebiasis | -0.069690 |
| Amphetamine addiction | -0.056590 |
| AMPK signaling pathway | 0.474300 |
| Amyotrophic lateral sclerosis (ALS) | 0.185800 |
| Antigen processing and presentation | -0.127200 |
| Apoptosis | 0.333200 |
| Arachidonic acid metabolism | -0.853100 |
| Arginine and proline metabolism | -0.039160 |
| Arginine biosynthesis | 0.268400 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.337600 |
| Ascorbate and aldarate metabolism | -0.541800 |
| Asthma | -0.371300 |
| Autoimmune thyroid disease | -0.403500 |
| B cell receptor signaling pathway | 0.146100 |
| Bacterial invasion of epithelial cells | 0.480400 |
| Basal cell carcinoma | 0.046180 |
| beta-Alanine metabolism | -0.223800 |
| Bile secretion | -0.037730 |
| Biosynthesis of unsaturated fatty acids | 0.122600 |
| Biotin metabolism | 0.257300 |
| Bladder cancer | 0.443900 |
| Butanoate metabolism | 0.170200 |
| Caffeine metabolism | -0.393800 |
| Carbohydrate digestion and absorption | 0.065030 |
| Cardiac muscle contraction | -0.185600 |
| Cell adhesion molecules (CAMs) | -0.224800 |
| Cell cycle | 0.949900 |
| Central carbon metabolism in cancer | 0.523500 |
| Chagas disease (American trypanosomiasis) | 0.297400 |
| Chemical carcinogenesis | -0.856700 |
| Choline metabolism in cancer | 0.316400 |
| Cholinergic synapse | 0.179300 |
| Chronic myeloid leukemia | 0.563000 |
| Circadian entrainment | -0.040960 |
| Circadian rhythm | 0.517300 |
| Citrate cycle (TCA cycle) | 0.920700 |
| Cocaine addiction | 0.020780 |
| Colorectal cancer | 0.404800 |
| Complement and coagulation cascades | -0.241800 |
| Cysteine and methionine metabolism | 0.521900 |
| Cytosolic DNA-sensing pathway | 0.236200 |
| D-Glutamine and D-glutamate metabolism | 0.343500 |
| Dilated cardiomyopathy | 0.111000 |
| Dopaminergic synapse | 0.046550 |
| Dorso-ventral axis formation | 0.292400 |
| Drug metabolism - cytochrome P450 | -0.473500 |

| | |
|---|---|
| Drug metabolism - other enzymes | 0.081360 |
| ECM-receptor interaction | 0.258700 |
| Endocrine and other factor-regulated calcium reabsorption | -0.098620 |
| Endocytosis | 0.631300 |
| Endometrial cancer | 0.511700 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.173500 |
| Epstein-Barr virus infection | 0.369700 |
| ErbB signaling pathway | 0.354000 |
| Estrogen signaling pathway | 0.187100 |
| Ether lipid metabolism | 0.094050 |
| Fanconi anemia pathway | 0.681600 |
| Fat digestion and absorption | 0.318400 |
| Fatty acid biosynthesis | 0.363700 |
| Fatty acid degradation | 0.571600 |
| Fatty acid elongation | 0.292900 |
| Fc epsilon RI signaling pathway | 0.224800 |
| Fc gamma R-mediated phagocytosis | 0.351800 |
| Folate biosynthesis | 0.275700 |
| FoxO signaling pathway | 0.310300 |
| Fructose and mannose metabolism | 0.465500 |
| GABAergic synapse | -0.418000 |
| Galactose metabolism | 0.367000 |
| Gap junction | 0.129700 |
| Gastric acid secretion | 0.191300 |
| Glioma | 0.409100 |
| Glucagon signaling pathway | 0.392000 |
| Glutamatergic synapse | -0.132700 |
| Glutathione metabolism | 0.282100 |
| Glycerolipid metabolism | 0.608500 |
| Glycerophospholipid metabolism | 0.727800 |
| Glycine, serine and threonine metabolism | -0.039600 |
| Glycolysis / Gluconeogenesis | 0.533000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.421600 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.402500 |
| Glycosaminoglycan degradation | 0.370700 |
| Glycosphingolipid biosynthesis - ganglio series | 0.256700 |
| Glycosphingolipid biosynthesis - globo series | -0.085470 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.262900 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.433100 |
| Glyoxylate and dicarboxylate metabolism | 0.246500 |
| GnRH signaling pathway | 0.291700 |
| Graft-versus-host disease | -0.311200 |
| Hepatitis B | 0.318300 |
| Hepatitis C | 0.404500 |
| Herpes simplex infection | 0.320500 |
| HIF-1 signaling pathway | 0.517200 |

| | |
|---|---|
| Histidine metabolism | -0.339600 |
| Huntington's disease | 0.800600 |
| Hypertrophic cardiomyopathy (HCM) | 0.204400 |
| Inflammatory bowel disease (IBD) | -0.169500 |
| Inflammatory mediator regulation of TRP channels | 0.136800 |
| Influenza A | 0.309900 |
| Inositol phosphate metabolism | 1.048000 |
| Insulin resistance | 0.346700 |
| Insulin secretion | -0.112200 |
| Insulin signaling pathway | 0.450600 |
| Intestinal immune network for IgA production | -0.197100 |
| Legionellosis | -0.083030 |
| Leishmaniasis | -0.051560 |
| Leukocyte transendothelial migration | 0.120400 |
| Linoleic acid metabolism | -1.229000 |
| Lipoic acid metabolism | -0.110600 |
| Long-term depression | 0.200000 |
| Long-term potentiation | 0.242300 |
| Longevity regulating pathway | 0.651800 |
| Longevity regulating pathway - multiple species | 0.602200 |
| Lysine biosynthesis | -0.093210 |
| Lysine degradation | 0.635600 |
| Malaria | -0.163800 |
| Maturity onset diabetes of the young | -0.172400 |
| Measles | 0.184000 |
| Melanogenesis | 0.126000 |
| Melanoma | 0.302300 |
| Metabolism of xenobiotics by cytochrome P450 | -1.133000 |
| Mineral absorption | -0.032990 |
| Morphine addiction | -0.277000 |
| mRNA surveillance pathway | 0.615500 |
| mTOR signaling pathway | 0.288900 |
| Mucin type O-Glycan biosynthesis | -0.455400 |
| N-Glycan biosynthesis | 0.644500 |
| Natural killer cell mediated cytotoxicity | 0.024950 |
| Neuroactive ligand-receptor interaction | -0.406900 |
| Neurotrophin signaling pathway | 0.321200 |
| NF-kappa B signaling pathway | 0.177000 |
| Nicotinate and nicotinamide metabolism | -0.077320 |
| Nitrogen metabolism | 0.613500 |
| NOD-like receptor signaling pathway | 0.228700 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.213200 |
| Non-small cell lung cancer | 0.495100 |
| Notch signaling pathway | 0.418400 |
| One carbon pool by folate | 0.990700 |
| Oocyte meiosis | 0.637800 |

| | |
|---|---|
| Osteoclast differentiation | 0.113400 |
| Ovarian steroidogenesis | 0.020730 |
| Oxidative phosphorylation | 0.480800 |
| p53 signaling pathway | 0.337300 |
| Pancreatic cancer | 0.484000 |
| Pancreatic secretion | 0.060700 |
| Pantothenate and CoA biosynthesis | 0.111600 |
| Parkinson's disease | 0.215100 |
| Pathogenic Escherichia coli infection | 0.301000 |
| Pentose and glucuronate interconversions | -0.285100 |
| Pentose phosphate pathway | 0.198600 |
| Peroxisome | 0.128800 |
| Pertussis | 0.089160 |
| Phagosome | 1.158000 |
| Phenylalanine metabolism | -0.106300 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.341600 |
| Phosphatidylinositol signaling system | 1.326000 |
| Phospholipase D signaling pathway | 0.301500 |
| Phototransduction | -0.408700 |
| Platelet activation | 0.293200 |
| Porphyrin and chlorophyll metabolism | -0.009479 |
| Primary bile acid biosynthesis | -0.272500 |
| Prion diseases | 0.310700 |
| Progesterone-mediated oocyte maturation | 0.244200 |
| Prolactin signaling pathway | 0.336700 |
| Propanoate metabolism | 0.350100 |
| Prostate cancer | 0.477600 |
| Protein processing in endoplasmic reticulum | 0.421800 |
| Proximal tubule bicarbonate reclamation | 0.176800 |
| Pyrimidine metabolism | 1.055000 |
| Pyruvate metabolism | 0.473500 |
| Regulation of autophagy | 0.247800 |
| Regulation of lipolysis in adipocytes | 0.208400 |
| Renal cell carcinoma | 0.414600 |
| Renin secretion | 0.219500 |
| Renin-angiotensin system | -0.136600 |
| Retinol metabolism | -1.814000 |
| Retrograde endocannabinoid signaling | -0.042330 |
| Rheumatoid arthritis | -0.151100 |
| Riboflavin metabolism | 0.355800 |
| Ribosome biogenesis in eukaryotes | 0.326500 |
| RIG-I-like receptor signaling pathway | 0.275000 |
| RNA degradation | 0.735000 |
| RNA transport | 0.441000 |
| Salivary secretion | 0.061390 |
| Salmonella infection | 0.416100 |

| | |
|---|---|
| Selenocompound metabolism | 0.344100 |
| Serotonergic synapse | -0.117300 |
| Shigellosis | 0.372500 |
| Signaling pathways regulating pluripotency of stem cells | 0.322400 |
| Small cell lung cancer | 0.604100 |
| SNARE interactions in vesicular transport | 0.400800 |
| Sphingolipid metabolism | 0.750000 |
| Sphingolipid signaling pathway | 0.407900 |
| Staphylococcus aureus infection | -0.172800 |
| Starch and sucrose metabolism | 0.167000 |
| Steroid biosynthesis | 0.382500 |
| Steroid hormone biosynthesis | -1.183000 |
| Sulfur metabolism | 0.523300 |
| Sulfur relay system | 0.278100 |
| Synaptic vesicle cycle | 0.580600 |
| Synthesis and degradation of ketone bodies | 0.111800 |
| Systemic lupus erythematosus | -0.309700 |
| T cell receptor signaling pathway | 0.180800 |
| Taste transduction | -0.299100 |
| Taurine and hypotaurine metabolism | -0.314800 |
| Terpenoid backbone biosynthesis | 0.385800 |
| TGF-beta signaling pathway | 0.222700 |
| Thiamine metabolism | 0.125000 |
| Thyroid cancer | 0.338300 |
| Thyroid hormone signaling pathway | 0.606700 |
| Thyroid hormone synthesis | 0.003465 |
| Tight junction | 0.316300 |
| TNF signaling pathway | 0.294100 |
| Toll-like receptor signaling pathway | 0.103400 |
| Toxoplasmosis | 0.292400 |
| Transcriptional misregulation in cancer | 0.113200 |
| Tryptophan metabolism | -0.278900 |
| Type I diabetes mellitus | -0.405300 |
| Type II diabetes mellitus | 0.173300 |
| Tyrosine metabolism | -0.352400 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.292800 |
| Valine, leucine and isoleucine degradation | 0.547200 |
| Vascular smooth muscle contraction | 0.166900 |
| Vasopressin-regulated water reabsorption | -0.043810 |
| VEGF signaling pathway | 0.267600 |
| Vibrio cholerae infection | 0.389100 |
| Viral carcinogenesis | 0.349000 |
| Viral myocarditis | 0.147400 |
| Vitamin B6 metabolism | 0.053650 |
| Vitamin digestion and absorption | -0.425600 |
| Wnt signaling pathway | 0.144700 |

| | sample.Mean |
|---|---|
| Acute myeloid leukemia | 0.433400 |
| Adherens junction | 0.566600 |
| Adipocytokine signaling pathway | 0.244500 |
| Adrenergic signaling in cardiomyocytes | -0.267400 |
| African trypanosomiasis | -0.208600 |
| AGE-RAGE signaling pathway in diabetic complications | 0.275400 |
| Alanine, aspartate and glutamate metabolism | 0.580500 |
| Aldosterone synthesis and secretion | 0.170600 |
| Aldosterone-regulated sodium reabsorption | 0.152200 |
| Allograft rejection | -0.165000 |
| alpha-Linolenic acid metabolism | 0.030850 |
| Alzheimer's disease | 0.306100 |
| Amino sugar and nucleotide sugar metabolism | 0.424300 |
| Aminoacyl-tRNA biosynthesis | 0.283200 |
| Amoebiasis | -0.067970 |
| Amphetamine addiction | -0.057190 |
| AMPK signaling pathway | 0.476900 |
| Amyotrophic lateral sclerosis (ALS) | 0.188000 |
| Antigen processing and presentation | -0.131700 |
| Apoptosis | 0.336100 |
| Arachidonic acid metabolism | -0.855000 |
| Arginine and proline metabolism | -0.046430 |
| Arginine biosynthesis | 0.260200 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.317000 |
| Ascorbate and aldarate metabolism | -0.557300 |
| Asthma | -0.373100 |
| Autoimmune thyroid disease | -0.393300 |
| B cell receptor signaling pathway | 0.140900 |
| Bacterial invasion of epithelial cells | 0.479000 |
| Basal cell carcinoma | 0.058910 |
| beta-Alanine metabolism | -0.210000 |
| Bile secretion | -0.028470 |
| Biosynthesis of unsaturated fatty acids | 0.150100 |
| Biotin metabolism | 0.259000 |
| Bladder cancer | 0.447200 |
| Butanoate metabolism | 0.166100 |
| Caffeine metabolism | -0.390400 |
| Carbohydrate digestion and absorption | 0.070840 |
| Cardiac muscle contraction | -0.192300 |
| Cell adhesion molecules (CAMs) | -0.222600 |
| Cell cycle | 0.952600 |
| Central carbon metabolism in cancer | 0.523400 |
| Chagas disease (American trypanosomiasis) | 0.297900 |
| Chemical carcinogenesis | -0.851700 |
| Choline metabolism in cancer | 0.316500 |

| | |
|---|---|
| Cholinergic synapse | 0.173600 |
| Chronic myeloid leukemia | 0.565400 |
| Circadian entrainment | -0.032680 |
| Circadian rhythm | 0.519500 |
| Citrate cycle (TCA cycle) | 0.921000 |
| Cocaine addiction | 0.007941 |
| Colorectal cancer | 0.403100 |
| Complement and coagulation cascades | -0.237500 |
| Cysteine and methionine metabolism | 0.514100 |
| Cytosolic DNA-sensing pathway | 0.234300 |
| D-Glutamine and D-glutamate metabolism | 0.343600 |
| Dilated cardiomyopathy | 0.120000 |
| Dopaminergic synapse | 0.040610 |
| Dorso-ventral axis formation | 0.290400 |
| Drug metabolism - cytochrome P450 | -0.471000 |
| Drug metabolism - other enzymes | 0.069820 |
| ECM-receptor interaction | 0.291800 |
| Endocrine and other factor-regulated calcium reabsorption | -0.112500 |
| Endocytosis | 0.625900 |
| Endometrial cancer | 0.512100 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.175500 |
| Epstein-Barr virus infection | 0.368400 |
| ErbB signaling pathway | 0.354500 |
| Estrogen signaling pathway | 0.178300 |
| Ether lipid metabolism | 0.128800 |
| Fanconi anemia pathway | 0.655000 |
| Fat digestion and absorption | 0.316700 |
| Fatty acid biosynthesis | 0.364600 |
| Fatty acid degradation | 0.569100 |
| Fatty acid elongation | 0.295100 |
| Fc epsilon RI signaling pathway | 0.228900 |
| Fc gamma R-mediated phagocytosis | 0.353900 |
| Folate biosynthesis | 0.277000 |
| FoxO signaling pathway | 0.312300 |
| Fructose and mannose metabolism | 0.460900 |
| GABAergic synapse | -0.429500 |
| Galactose metabolism | 0.405400 |
| Gap junction | 0.129100 |
| Gastric acid secretion | 0.190500 |
| Glioma | 0.408800 |
| Glucagon signaling pathway | 0.385800 |
| Glutamatergic synapse | -0.150700 |
| Glutathione metabolism | 0.290300 |
| Glycerolipid metabolism | 0.620200 |
| Glycerophospholipid metabolism | 0.755300 |
| Glycine, serine and threonine metabolism | -0.047450 |

| | |
|---|---|
| Glycolysis / Gluconeogenesis | 0.535000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.423200 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.385700 |
| Glycosaminoglycan degradation | 0.370500 |
| Glycosphingolipid biosynthesis - ganglio series | 0.255100 |
| Glycosphingolipid biosynthesis - globo series | -0.085650 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.258400 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.437100 |
| Glyoxylate and dicarboxylate metabolism | 0.236700 |
| GnRH signaling pathway | 0.286200 |
| Graft-versus-host disease | -0.309500 |
| Hepatitis B | 0.319300 |
| Hepatitis C | 0.407600 |
| Herpes simplex infection | 0.323700 |
| HIF-1 signaling pathway | 0.523800 |
| Histidine metabolism | -0.339100 |
| Huntington's disease | 0.802800 |
| Hypertrophic cardiomyopathy (HCM) | 0.205600 |
| Inflammatory bowel disease (IBD) | -0.170700 |
| Inflammatory mediator regulation of TRP channels | 0.131100 |
| Influenza A | 0.310800 |
| Inositol phosphate metabolism | 1.031000 |
| Insulin resistance | 0.351100 |
| Insulin secretion | -0.112800 |
| Insulin signaling pathway | 0.448300 |
| Intestinal immune network for IgA production | -0.200200 |
| Legionellosis | -0.082330 |
| Leishmaniasis | -0.052330 |
| Leukocyte transendothelial migration | 0.125100 |
| Linoleic acid metabolism | -1.218000 |
| Lipoic acid metabolism | -0.123900 |
| Long-term depression | 0.195000 |
| Long-term potentiation | 0.230700 |
| Longevity regulating pathway | 0.641500 |
| Longevity regulating pathway - multiple species | 0.590600 |
| Lysine biosynthesis | -0.053640 |
| Lysine degradation | 0.635000 |
| Malaria | -0.177200 |
| Maturity onset diabetes of the young | -0.175900 |
| Measles | 0.185300 |
| Melanogenesis | 0.129200 |
| Melanoma | 0.334300 |
| Metabolism of xenobiotics by cytochrome P450 | -1.154000 |
| Mineral absorption | -0.034030 |
| Morphine addiction | -0.288000 |
| mRNA surveillance pathway | 0.616700 |

| | |
|---|---|
| mTOR signaling pathway | 0.288400 |
| Mucin type O-Glycan biosynthesis | -0.440200 |
| N-Glycan biosynthesis | 0.645400 |
| Natural killer cell mediated cytotoxicity | 0.029310 |
| Neuroactive ligand-receptor interaction | -0.407300 |
| Neurotrophin signaling pathway | 0.320900 |
| NF-kappa B signaling pathway | 0.178800 |
| Nicotinate and nicotinamide metabolism | -0.091340 |
| Nitrogen metabolism | 0.612100 |
| NOD-like receptor signaling pathway | 0.226900 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.214500 |
| Non-small cell lung cancer | 0.492400 |
| Notch signaling pathway | 0.374100 |
| One carbon pool by folate | 0.971600 |
| Oocyte meiosis | 0.645900 |
| Osteoclast differentiation | 0.115900 |
| Ovarian steroidogenesis | 0.025790 |
| Oxidative phosphorylation | 0.478900 |
| p53 signaling pathway | 0.335900 |
| Pancreatic cancer | 0.480500 |
| Pancreatic secretion | 0.073910 |
| Pantothenate and CoA biosynthesis | 0.111500 |
| Parkinson's disease | 0.202300 |
| Pathogenic Escherichia coli infection | 0.297200 |
| Pentose and glucuronate interconversions | -0.285400 |
| Pentose phosphate pathway | 0.228500 |
| Peroxisome | 0.127200 |
| Pertussis | 0.086340 |
| Phagosome | 1.126000 |
| Phenylalanine metabolism | -0.104500 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.340300 |
| Phosphatidylinositol signaling system | 1.276000 |
| Phospholipase D signaling pathway | 0.295700 |
| Phototransduction | -0.421000 |
| Platelet activation | 0.293100 |
| Porphyrin and chlorophyll metabolism | -0.010990 |
| Primary bile acid biosynthesis | -0.275700 |
| Prion diseases | 0.319500 |
| Progesterone-mediated oocyte maturation | 0.234400 |
| Prolactin signaling pathway | 0.336700 |
| Propanoate metabolism | 0.349100 |
| Prostate cancer | 0.467100 |
| Protein processing in endoplasmic reticulum | 0.422200 |
| Proximal tubule bicarbonate reclamation | 0.176100 |
| Pyrimidine metabolism | 1.080000 |
| Pyruvate metabolism | 0.474900 |

| | |
|---|---|
| Regulation of autophagy | 0.244200 |
| Regulation of lipolysis in adipocytes | 0.212400 |
| Renal cell carcinoma | 0.413900 |
| Renin secretion | 0.209900 |
| Renin-angiotensin system | -0.083320 |
| Retinol metabolism | -1.799000 |
| Retrograde endocannabinoid signaling | -0.034470 |
| Rheumatoid arthritis | -0.159200 |
| Riboflavin metabolism | 0.355400 |
| Ribosome biogenesis in eukaryotes | 0.326900 |
| RIG-I-like receptor signaling pathway | 0.274600 |
| RNA degradation | 0.738000 |
| RNA transport | 0.445900 |
| Salivary secretion | 0.057850 |
| Salmonella infection | 0.418400 |
| Selenocompound metabolism | 0.349800 |
| Serotonergic synapse | -0.110300 |
| Shigellosis | 0.379600 |
| Signaling pathways regulating pluripotency of stem cells | 0.320600 |
| Small cell lung cancer | 0.600600 |
| SNARE interactions in vesicular transport | 0.400000 |
| Sphingolipid metabolism | 0.771700 |
| Sphingolipid signaling pathway | 0.404600 |
| Staphylococcus aureus infection | -0.178000 |
| Starch and sucrose metabolism | 0.150600 |
| Steroid biosynthesis | 0.392800 |
| Steroid hormone biosynthesis | -1.165000 |
| Sulfur metabolism | 0.524300 |
| Sulfur relay system | 0.277200 |
| Synaptic vesicle cycle | 0.580600 |
| Synthesis and degradation of ketone bodies | 0.109400 |
| Systemic lupus erythematosus | -0.302800 |
| T cell receptor signaling pathway | 0.180500 |
| Taste transduction | -0.298100 |
| Taurine and hypotaurine metabolism | -0.320000 |
| Terpenoid backbone biosynthesis | 0.381200 |
| TGF-beta signaling pathway | 0.220700 |
| Thiamine metabolism | 0.119500 |
| Thyroid cancer | 0.339200 |
| Thyroid hormone signaling pathway | 0.605300 |
| Thyroid hormone synthesis | -0.011980 |
| Tight junction | 0.314000 |
| TNF signaling pathway | 0.293200 |
| Toll-like receptor signaling pathway | 0.103100 |
| Toxoplasmosis | 0.293300 |
| Transcriptional misregulation in cancer | 0.108300 |

| | |
|---|---|
| Tryptophan metabolism | -0.277500 |
| Type I diabetes mellitus | -0.394300 |
| Type II diabetes mellitus | 0.169200 |
| Tyrosine metabolism | -0.344000 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.293500 |
| Valine, leucine and isoleucine degradation | 0.533000 |
| Vascular smooth muscle contraction | 0.161200 |
| Vasopressin-regulated water reabsorption | -0.017300 |
| VEGF signaling pathway | 0.267000 |
| Vibrio cholerae infection | 0.390800 |
| Viral carcinogenesis | 0.350200 |
| Viral myocarditis | 0.149900 |
| Vitamin B6 metabolism | 0.062810 |
| Vitamin digestion and absorption | -0.426900 |
| Wnt signaling pathway | 0.147600 |

| | sample.3rd.Qu. |
|---|---|
| Acute myeloid leukemia | 0.4397000 |
| Adherens junction | 0.5751000 |
| Adipocytokine signaling pathway | 0.2555000 |
| Adrenergic signaling in cardiomyocytes | -0.2115000 |
| African trypanosomiasis | -0.1732000 |
| AGE-RAGE signaling pathway in diabetic complications | 0.2887000 |
| Alanine, aspartate and glutamate metabolism | 0.6036000 |
| Aldosterone synthesis and secretion | 0.1780000 |
| Aldosterone-regulated sodium reabsorption | 0.1796000 |
| Allograft rejection | -0.1583000 |
| alpha-Linolenic acid metabolism | 0.0414100 |
| Alzheimer's disease | 0.3086000 |
| Amino sugar and nucleotide sugar metabolism | 0.4429000 |
| Aminoacyl-tRNA biosynthesis | 0.3084000 |
| Amoebiasis | -0.0600300 |
| Amphetamine addiction | -0.0340700 |
| AMPK signaling pathway | 0.4828000 |
| Amyotrophic lateral sclerosis (ALS) | 0.1919000 |
| Antigen processing and presentation | -0.1099000 |
| Apoptosis | 0.3445000 |
| Arachidonic acid metabolism | -0.8122000 |
| Arginine and proline metabolism | -0.0261600 |
| Arginine biosynthesis | 0.2869000 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.3433000 |
| Ascorbate and aldarate metabolism | -0.5295000 |
| Asthma | -0.3703000 |
| Autoimmune thyroid disease | -0.3905000 |
| B cell receptor signaling pathway | 0.1518000 |
| Bacterial invasion of epithelial cells | 0.4963000 |
| Basal cell carcinoma | 0.0632100 |

| | |
|---|---|
| beta-Alanine metabolism | -0.1841000 |
| Bile secretion | -0.0169100 |
| Biosynthesis of unsaturated fatty acids | 0.1664000 |
| Biotin metabolism | 0.2656000 |
| Bladder cancer | 0.4555000 |
| Butanoate metabolism | 0.1744000 |
| Caffeine metabolism | -0.3834000 |
| Carbohydrate digestion and absorption | 0.0976200 |
| Cardiac muscle contraction | -0.1764000 |
| Cell adhesion molecules (CAMs) | -0.2068000 |
| Cell cycle | 0.9737000 |
| Central carbon metabolism in cancer | 0.5259000 |
| Chagas disease (American trypanosomiasis) | 0.3052000 |
| Chemical carcinogenesis | -0.8302000 |
| Choline metabolism in cancer | 0.3223000 |
| Cholinergic synapse | 0.2141000 |
| Chronic myeloid leukemia | 0.5773000 |
| Circadian entrainment | -0.0252900 |
| Circadian rhythm | 0.5216000 |
| Citrate cycle (TCA cycle) | 0.9248000 |
| Cocaine addiction | 0.0323900 |
| Colorectal cancer | 0.4126000 |
| Complement and coagulation cascades | -0.2230000 |
| Cysteine and methionine metabolism | 0.5368000 |
| Cytosolic DNA-sensing pathway | 0.2504000 |
| D-Glutamine and D-glutamate metabolism | 0.3542000 |
| Dilated cardiomyopathy | 0.1449000 |
| Dopaminergic synapse | 0.0568000 |
| Dorso-ventral axis formation | 0.3072000 |
| Drug metabolism - cytochrome P450 | -0.4684000 |
| Drug metabolism - other enzymes | 0.0832000 |
| ECM-receptor interaction | 0.3322000 |
| Endocrine and other factor-regulated calcium reabsorption | -0.0915500 |
| Endocytosis | 0.6413000 |
| Endometrial cancer | 0.5294000 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.1835000 |
| Epstein-Barr virus infection | 0.3721000 |
| ErbB signaling pathway | 0.3806000 |
| Estrogen signaling pathway | 0.2016000 |
| Ether lipid metabolism | 0.1673000 |
| Fanconi anemia pathway | 0.6977000 |
| Fat digestion and absorption | 0.3235000 |
| Fatty acid biosynthesis | 0.3755000 |
| Fatty acid degradation | 0.5897000 |
| Fatty acid elongation | 0.3086000 |
| Fc epsilon RI signaling pathway | 0.2392000 |

| | |
|---|---|
| Fc gamma R-mediated phagocytosis | 0.3570000 |
| Folate biosynthesis | 0.2868000 |
| FoxO signaling pathway | 0.3132000 |
| Fructose and mannose metabolism | 0.5011000 |
| GABAergic synapse | -0.3642000 |
| Galactose metabolism | 0.4094000 |
| Gap junction | 0.1363000 |
| Gastric acid secretion | 0.2116000 |
| Glioma | 0.4351000 |
| Glucagon signaling pathway | 0.4129000 |
| Glutamatergic synapse | -0.1070000 |
| Glutathione metabolism | 0.2980000 |
| Glycerolipid metabolism | 0.6344000 |
| Glycerophospholipid metabolism | 0.7899000 |
| Glycine, serine and threonine metabolism | 0.0028230 |
| Glycolysis / Gluconeogenesis | 0.5593000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.4365000 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.4307000 |
| Glycosaminoglycan degradation | 0.3925000 |
| Glycosphingolipid biosynthesis - ganglio series | 0.2595000 |
| Glycosphingolipid biosynthesis - globo series | -0.0817000 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.2116000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.4608000 |
| Glyoxylate and dicarboxylate metabolism | 0.2517000 |
| GnRH signaling pathway | 0.2943000 |
| Graft-versus-host disease | -0.2969000 |
| Hepatitis B | 0.3277000 |
| Hepatitis C | 0.4095000 |
| Herpes simplex infection | 0.3363000 |
| HIF-1 signaling pathway | 0.5305000 |
| Histidine metabolism | -0.3343000 |
| Huntington's disease | 0.8157000 |
| Hypertrophic cardiomyopathy (HCM) | 0.2088000 |
| Inflammatory bowel disease (IBD) | -0.1640000 |
| Inflammatory mediator regulation of TRP channels | 0.1437000 |
| Influenza A | 0.3270000 |
| Inositol phosphate metabolism | 1.0670000 |
| Insulin resistance | 0.3548000 |
| Insulin secretion | -0.0975500 |
| Insulin signaling pathway | 0.4609000 |
| Intestinal immune network for IgA production | -0.1951000 |
| Legionellosis | -0.0785600 |
| Leishmaniasis | -0.0410900 |
| Leukocyte transendothelial migration | 0.1323000 |
| Linoleic acid metabolism | -1.2170000 |
| Lipoic acid metabolism | -0.0836300 |

| | |
|---|---|
| Long-term depression | 0.2296000 |
| Long-term potentiation | 0.2592000 |
| Longevity regulating pathway | 0.6530000 |
| Longevity regulating pathway - multiple species | 0.6138000 |
| Lysine biosynthesis | -0.0443700 |
| Lysine degradation | 0.6393000 |
| Malaria | -0.1431000 |
| Maturity onset diabetes of the young | -0.1527000 |
| Measles | 0.1887000 |
| Melanogenesis | 0.1418000 |
| Melanoma | 0.3528000 |
| Metabolism of xenobiotics by cytochrome P450 | -1.0970000 |
| Mineral absorption | -0.0178900 |
| Morphine addiction | -0.2239000 |
| mRNA surveillance pathway | 0.6174000 |
| mTOR signaling pathway | 0.2976000 |
| Mucin type O-Glycan biosynthesis | -0.3909000 |
| N-Glycan biosynthesis | 0.7120000 |
| Natural killer cell mediated cytotoxicity | 0.0361000 |
| Neuroactive ligand-receptor interaction | -0.3689000 |
| Neurotrophin signaling pathway | 0.3362000 |
| NF-kappa B signaling pathway | 0.1882000 |
| Nicotinate and nicotinamide metabolism | -0.0618900 |
| Nitrogen metabolism | 0.6193000 |
| NOD-like receptor signaling pathway | 0.2359000 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.2247000 |
| Non-small cell lung cancer | 0.5072000 |
| Notch signaling pathway | 0.4364000 |
| One carbon pool by folate | 1.0050000 |
| Oocyte meiosis | 0.6610000 |
| Osteoclast differentiation | 0.1189000 |
| Ovarian steroidogenesis | 0.0593700 |
| Oxidative phosphorylation | 0.4838000 |
| p53 signaling pathway | 0.3418000 |
| Pancreatic cancer | 0.4881000 |
| Pancreatic secretion | 0.1046000 |
| Pantothenate and CoA biosynthesis | 0.1143000 |
| Parkinson's disease | 0.2216000 |
| Pathogenic Escherichia coli infection | 0.3300000 |
| Pentose and glucuronate interconversions | -0.2671000 |
| Pentose phosphate pathway | 0.3265000 |
| Peroxisome | 0.1334000 |
| Pertussis | 0.0972000 |
| Phagosome | 1.2020000 |
| Phenylalanine metabolism | -0.0923000 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.3440000 |

| | |
|---|---|
| Phosphatidylinositol signaling system | 1.3430000 |
| Phospholipase D signaling pathway | 0.3294000 |
| Phototransduction | -0.3637000 |
| Platelet activation | 0.3066000 |
| Porphyrin and chlorophyll metabolism | -0.0007985 |
| Primary bile acid biosynthesis | -0.2642000 |
| Prion diseases | 0.3279000 |
| Progesterone-mediated oocyte maturation | 0.2454000 |
| Prolactin signaling pathway | 0.3397000 |
| Propanoate metabolism | 0.3607000 |
| Prostate cancer | 0.4786000 |
| Protein processing in endoplasmic reticulum | 0.4385000 |
| Proximal tubule bicarbonate reclamation | 0.1836000 |
| Pyrimidine metabolism | 1.0950000 |
| Pyruvate metabolism | 0.5136000 |
| Regulation of autophagy | 0.2487000 |
| Regulation of lipolysis in adipocytes | 0.2177000 |
| Renal cell carcinoma | 0.4347000 |
| Renin secretion | 0.2231000 |
| Renin-angiotensin system | -0.0568100 |
| Retinol metabolism | -1.7800000 |
| Retrograde endocannabinoid signaling | 0.0110800 |
| Rheumatoid arthritis | -0.1390000 |
| Riboflavin metabolism | 0.3809000 |
| Ribosome biogenesis in eukaryotes | 0.3366000 |
| RIG-I-like receptor signaling pathway | 0.2882000 |
| RNA degradation | 0.7386000 |
| RNA transport | 0.4491000 |
| Salivary secretion | 0.0646600 |
| Salmonella infection | 0.4425000 |
| Selenocompound metabolism | 0.3655000 |
| Serotonergic synapse | -0.0967100 |
| Shigellosis | 0.4099000 |
| Signaling pathways regulating pluripotency of stem cells | 0.3509000 |
| Small cell lung cancer | 0.6328000 |
| SNARE interactions in vesicular transport | 0.4348000 |
| Sphingolipid metabolism | 0.8760000 |
| Sphingolipid signaling pathway | 0.4216000 |
| Staphylococcus aureus infection | -0.1593000 |
| Starch and sucrose metabolism | 0.1771000 |
| Steroid biosynthesis | 0.4189000 |
| Steroid hormone biosynthesis | -1.0800000 |
| Sulfur metabolism | 0.5407000 |
| Sulfur relay system | 0.3017000 |
| Synaptic vesicle cycle | 0.5954000 |
| Synthesis and degradation of ketone bodies | 0.1253000 |

| | |
|---|---|
| Systemic lupus erythematosus | -0.2859000 |
| T cell receptor signaling pathway | 0.1877000 |
| Taste transduction | -0.2879000 |
| Taurine and hypotaurine metabolism | -0.2984000 |
| Terpenoid backbone biosynthesis | 0.3952000 |
| TGF-beta signaling pathway | 0.2381000 |
| Thiamine metabolism | 0.1367000 |
| Thyroid cancer | 0.3523000 |
| Thyroid hormone signaling pathway | 0.6260000 |
| Thyroid hormone synthesis | 0.0094840 |
| Tight junction | 0.3214000 |
| TNF signaling pathway | 0.2977000 |
| Toll-like receptor signaling pathway | 0.1090000 |
| Toxoplasmosis | 0.2979000 |
| Transcriptional misregulation in cancer | 0.1193000 |
| Tryptophan metabolism | -0.2712000 |
| Type I diabetes mellitus | -0.3812000 |
| Type II diabetes mellitus | 0.1802000 |
| Tyrosine metabolism | -0.3173000 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.3080000 |
| Valine, leucine and isoleucine degradation | 0.5601000 |
| Vascular smooth muscle contraction | 0.1791000 |
| Vasopressin-regulated water reabsorption | 0.0026760 |
| VEGF signaling pathway | 0.2843000 |
| Vibrio cholerae infection | 0.3969000 |
| Viral carcinogenesis | 0.3543000 |
| Viral myocarditis | 0.1653000 |
| Vitamin B6 metabolism | 0.0804600 |
| Vitamin digestion and absorption | -0.4154000 |
| Wnt signaling pathway | 0.1611000 |

| | sample.Max. |
|---|---|
| Acute myeloid leukemia | 0.441000 |
| Adherens junction | 0.578600 |
| Adipocytokine signaling pathway | 0.258400 |
| Adrenergic signaling in cardiomyocytes | -0.189300 |
| African trypanosomiasis | -0.157900 |
| AGE-RAGE signaling pathway in diabetic complications | 0.298400 |
| Alanine, aspartate and glutamate metabolism | 0.606000 |
| Aldosterone synthesis and secretion | 0.181400 |
| Aldosterone-regulated sodium reabsorption | 0.183400 |
| Allograft rejection | -0.148100 |
| alpha-Linolenic acid metabolism | 0.065700 |
| Alzheimer's disease | 0.315300 |
| Amino sugar and nucleotide sugar metabolism | 0.459900 |
| Aminoacyl-tRNA biosynthesis | 0.317800 |
| Amoebiasis | -0.054380 |

| | |
|---|---|
| Amphetamine addiction | -0.033780 |
| AMPK signaling pathway | 0.490900 |
| Amyotrophic lateral sclerosis (ALS) | 0.207500 |
| Antigen processing and presentation | -0.106000 |
| Apoptosis | 0.361800 |
| Arachidonic acid metabolism | -0.802100 |
| Arginine and proline metabolism | -0.014370 |
| Arginine biosynthesis | 0.314500 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.343900 |
| Ascorbate and aldarate metabolism | -0.529500 |
| Asthma | -0.367800 |
| Autoimmune thyroid disease | -0.354900 |
| B cell receptor signaling pathway | 0.154800 |
| Bacterial invasion of epithelial cells | 0.497100 |
| Basal cell carcinoma | 0.108000 |
| beta-Alanine metabolism | -0.130200 |
| Bile secretion | 0.016630 |
| Biosynthesis of unsaturated fatty acids | 0.266000 |
| Biotin metabolism | 0.274800 |
| Bladder cancer | 0.478000 |
| Butanoate metabolism | 0.184200 |
| Caffeine metabolism | -0.353800 |
| Carbohydrate digestion and absorption | 0.142200 |
| Cardiac muscle contraction | -0.176300 |
| Cell adhesion molecules (CAMs) | -0.200100 |
| Cell cycle | 0.994400 |
| Central carbon metabolism in cancer | 0.531300 |
| Chagas disease (American trypanosomiasis) | 0.307900 |
| Chemical carcinogenesis | -0.808400 |
| Choline metabolism in cancer | 0.324100 |
| Cholinergic synapse | 0.222100 |
| Chronic myeloid leukemia | 0.585500 |
| Circadian entrainment | 0.008948 |
| Circadian rhythm | 0.530800 |
| Citrate cycle (TCA cycle) | 0.928800 |
| Cocaine addiction | 0.041760 |
| Colorectal cancer | 0.419300 |
| Complement and coagulation cascades | -0.203500 |
| Cysteine and methionine metabolism | 0.553000 |
| Cytosolic DNA-sensing pathway | 0.256100 |
| D-Glutamine and D-glutamate metabolism | 0.361400 |
| Dilated cardiomyopathy | 0.190800 |
| Dopaminergic synapse | 0.073230 |
| Dorso-ventral axis formation | 0.307900 |
| Drug metabolism - cytochrome P450 | -0.458100 |
| Drug metabolism - other enzymes | 0.085890 |

| | |
|---|---|
| ECM-receptor interaction | 0.444100 |
| Endocrine and other factor-regulated calcium reabsorption | -0.077590 |
| Endocytosis | 0.641900 |
| Endometrial cancer | 0.540900 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.191500 |
| Epstein-Barr virus infection | 0.376800 |
| ErbB signaling pathway | 0.386200 |
| Estrogen signaling pathway | 0.211400 |
| Ether lipid metabolism | 0.287200 |
| Fanconi anemia pathway | 0.701900 |
| Fat digestion and absorption | 0.337500 |
| Fatty acid biosynthesis | 0.380200 |
| Fatty acid degradation | 0.594500 |
| Fatty acid elongation | 0.318800 |
| Fc epsilon RI signaling pathway | 0.258500 |
| Fc gamma R-mediated phagocytosis | 0.370200 |
| Folate biosynthesis | 0.290900 |
| FoxO signaling pathway | 0.320000 |
| Fructose and mannose metabolism | 0.535700 |
| GABAergic synapse | -0.342800 |
| Galactose metabolism | 0.525700 |
| Gap junction | 0.138400 |
| Gastric acid secretion | 0.223900 |
| Glioma | 0.438900 |
| Glucagon signaling pathway | 0.432900 |
| Glutamatergic synapse | -0.103900 |
| Glutathione metabolism | 0.329000 |
| Glycerolipid metabolism | 0.704300 |
| Glycerophospholipid metabolism | 0.911100 |
| Glycine, serine and threonine metabolism | 0.039310 |
| Glycolysis / Gluconeogenesis | 0.601500 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.451900 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.435900 |
| Glycosaminoglycan degradation | 0.396600 |
| Glycosphingolipid biosynthesis - ganglio series | 0.264000 |
| Glycosphingolipid biosynthesis - globo series | -0.076920 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | -0.125500 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.477700 |
| Glyoxylate and dicarboxylate metabolism | 0.252000 |
| GnRH signaling pathway | 0.295000 |
| Graft-versus-host disease | -0.287900 |
| Hepatitis B | 0.336500 |
| Hepatitis C | 0.423700 |
| Herpes simplex infection | 0.346100 |
| HIF-1 signaling pathway | 0.555100 |
| Histidine metabolism | -0.324100 |

| | |
|---|---|
| Huntington's disease | 0.830300 |
| Hypertrophic cardiomyopathy (HCM) | 0.219500 |
| Inflammatory bowel disease (IBD) | -0.161100 |
| Inflammatory mediator regulation of TRP channels | 0.153600 |
| Influenza A | 0.333400 |
| Inositol phosphate metabolism | 1.079000 |
| Insulin resistance | 0.373200 |
| Insulin secretion | -0.073550 |
| Insulin signaling pathway | 0.461000 |
| Intestinal immune network for IgA production | -0.191100 |
| Legionellosis | -0.072510 |
| Leishmaniasis | -0.035780 |
| Leukocyte transendothelial migration | 0.159700 |
| Linoleic acid metabolism | -1.183000 |
| Lipoic acid metabolism | -0.072570 |
| Long-term depression | 0.233900 |
| Long-term potentiation | 0.261400 |
| Longevity regulating pathway | 0.655100 |
| Longevity regulating pathway - multiple species | 0.627400 |
| Lysine biosynthesis | 0.075300 |
| Lysine degradation | 0.646700 |
| Malaria | -0.095390 |
| Maturity onset diabetes of the young | -0.152000 |
| Measles | 0.194400 |
| Melanogenesis | 0.160300 |
| Melanoma | 0.489200 |
| Metabolism of xenobiotics by cytochrome P450 | -1.095000 |
| Mineral absorption | -0.012960 |
| Morphine addiction | -0.156100 |
| mRNA surveillance pathway | 0.622600 |
| mTOR signaling pathway | 0.303600 |
| Mucin type O-Glycan biosynthesis | -0.319200 |
| N-Glycan biosynthesis | 0.722000 |
| Natural killer cell mediated cytotoxicity | 0.053840 |
| Neuroactive ligand-receptor interaction | -0.368000 |
| Neurotrophin signaling pathway | 0.345200 |
| NF-kappa B signaling pathway | 0.202900 |
| Nicotinate and nicotinamide metabolism | -0.050840 |
| Nitrogen metabolism | 0.619700 |
| NOD-like receptor signaling pathway | 0.248800 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.246800 |
| Non-small cell lung cancer | 0.513500 |
| Notch signaling pathway | 0.455800 |
| One carbon pool by folate | 1.027000 |
| Oocyte meiosis | 0.689800 |
| Osteoclast differentiation | 0.132300 |

| | |
|---|---|
| Ovarian steroidogenesis | 0.089870 |
| Oxidative phosphorylation | 0.488200 |
| p53 signaling pathway | 0.353400 |
| Pancreatic cancer | 0.499000 |
| Pancreatic secretion | 0.152500 |
| Pantothenate and CoA biosynthesis | 0.119500 |
| Parkinson's disease | 0.235400 |
| Pathogenic Escherichia coli infection | 0.330400 |
| Pentose and glucuronate interconversions | -0.244800 |
| Pentose phosphate pathway | 0.447700 |
| Peroxisome | 0.140700 |
| Pertussis | 0.119600 |
| Phagosome | 1.252000 |
| Phenylalanine metabolism | -0.084930 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.346000 |
| Phosphatidylinositol signaling system | 1.369000 |
| Phospholipase D signaling pathway | 0.335000 |
| Phototransduction | -0.344300 |
| Platelet activation | 0.314700 |
| Porphyrin and chlorophyll metabolism | 0.013640 |
| Primary bile acid biosynthesis | -0.251400 |
| Prion diseases | 0.355200 |
| Progesterone-mediated oocyte maturation | 0.247900 |
| Prolactin signaling pathway | 0.347500 |
| Propanoate metabolism | 0.377500 |
| Prostate cancer | 0.478900 |
| Protein processing in endoplasmic reticulum | 0.442000 |
| Proximal tubule bicarbonate reclamation | 0.184400 |
| Pyrimidine metabolism | 1.206000 |
| Pyruvate metabolism | 0.531200 |
| Regulation of autophagy | 0.249700 |
| Regulation of lipolysis in adipocytes | 0.236600 |
| Renal cell carcinoma | 0.454200 |
| Renin secretion | 0.231700 |
| Renin-angiotensin system | 0.145400 |
| Retinol metabolism | -1.696000 |
| Retrograde endocannabinoid signaling | 0.076980 |
| Rheumatoid arthritis | -0.127500 |
| Riboflavin metabolism | 0.383500 |
| Ribosome biogenesis in eukaryotes | 0.347800 |
| RIG-I-like receptor signaling pathway | 0.296300 |
| RNA degradation | 0.749300 |
| RNA transport | 0.466800 |
| Salivary secretion | 0.073990 |
| Salmonella infection | 0.454100 |
| Selenocompound metabolism | 0.385000 |

| | |
|---|---|
| Serotonergic synapse | -0.058990 |
| Shigellosis | 0.435000 |
| Signaling pathways regulating pluripotency of stem cells | 0.360700 |
| Small cell lung cancer | 0.645300 |
| SNARE interactions in vesicular transport | 0.435800 |
| Sphingolipid metabolism | 0.952600 |
| Sphingolipid signaling pathway | 0.438900 |
| Staphylococcus aureus infection | -0.124600 |
| Starch and sucrose metabolism | 0.182400 |
| Steroid biosynthesis | 0.455100 |
| Steroid hormone biosynthesis | -1.009000 |
| Sulfur metabolism | 0.544400 |
| Sulfur relay system | 0.319900 |
| Synaptic vesicle cycle | 0.603200 |
| Synthesis and degradation of ketone bodies | 0.152000 |
| Systemic lupus erythematosus | -0.257900 |
| T cell receptor signaling pathway | 0.188800 |
| Taste transduction | -0.260400 |
| Taurine and hypotaurine metabolism | -0.292500 |
| Terpenoid backbone biosynthesis | 0.399900 |
| TGF-beta signaling pathway | 0.245200 |
| Thiamine metabolism | 0.149300 |
| Thyroid cancer | 0.360300 |
| Thyroid hormone signaling pathway | 0.632800 |
| Thyroid hormone synthesis | 0.012130 |
| Tight junction | 0.327800 |
| TNF signaling pathway | 0.301900 |
| Toll-like receptor signaling pathway | 0.118200 |
| Toxoplasmosis | 0.304200 |
| Transcriptional misregulation in cancer | 0.120200 |
| Tryptophan metabolism | -0.253200 |
| Type I diabetes mellitus | -0.345200 |
| Type II diabetes mellitus | 0.187900 |
| Tyrosine metabolism | -0.285300 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.316700 |
| Valine, leucine and isoleucine degradation | 0.571300 |
| Vascular smooth muscle contraction | 0.181400 |
| Vasopressin-regulated water reabsorption | 0.082960 |
| VEGF signaling pathway | 0.286600 |
| Vibrio cholerae infection | 0.418500 |
| Viral carcinogenesis | 0.365200 |
| Viral myocarditis | 0.172700 |
| Vitamin B6 metabolism | 0.141300 |
| Vitamin digestion and absorption | -0.407000 |
| Wnt signaling pathway | 0.179700 |
| | p.value |

| | |
|---|---|
| Acute myeloid leukemia | 4.679187e-01 |
| Adherens junction | 1.226839e-01 |
| Adipocytokine signaling pathway | 1.952346e-01 |
| Adrenergic signaling in cardiomyocytes | 7.996300e-01 |
| African trypanosomiasis | 4.682416e-01 |
| AGE-RAGE signaling pathway in diabetic complications | 3.012445e-01 |
| Alanine, aspartate and glutamate metabolism | 9.493295e-02 |
| Aldosterone synthesis and secretion | 1.202823e-01 |
| Aldosterone-regulated sodium reabsorption | 5.774420e-01 |
| Allograft rejection | 5.133788e-01 |
| alpha-Linolenic acid metabolism | 1.608778e-01 |
| Alzheimer's disease | 4.586410e-01 |
| Amino sugar and nucleotide sugar metabolism | 9.246784e-02 |
| Aminoacyl-tRNA biosynthesis | 8.342750e-01 |
| Amoebiasis | 6.960623e-01 |
| Amphetamine addiction | 4.914580e-03 |
| AMPK signaling pathway | 7.178370e-01 |
| Amyotrophic lateral sclerosis (ALS) | 2.354015e-01 |
| Antigen processing and presentation | 1.139761e-02 |
| Apoptosis | 9.293740e-01 |
| Arachidonic acid metabolism | 2.546850e-02 |
| Arginine and proline metabolism | 8.425275e-02 |
| Arginine biosynthesis | 6.769146e-01 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 4.576018e-01 |
| Ascorbate and aldarate metabolism | 1.569735e-01 |
| Asthma | 9.807357e-03 |
| Autoimmune thyroid disease | 3.620127e-01 |
| B cell receptor signaling pathway | 2.844850e-01 |
| Bacterial invasion of epithelial cells | 3.133533e-01 |
| Basal cell carcinoma | 2.101500e-03 |
| beta-Alanine metabolism | 9.344103e-01 |
| Bile secretion | 9.248535e-01 |
| Biosynthesis of unsaturated fatty acids | 7.007793e-01 |
| Biotin metabolism | 5.909040e-01 |
| Bladder cancer | 1.837957e-01 |
| Butanoate metabolism | 2.993934e-01 |
| Caffeine metabolism | 3.638314e-02 |
| Carbohydrate digestion and absorption | 6.212188e-02 |
| Cardiac muscle contraction | 7.878523e-01 |
| Cell adhesion molecules (CAMs) | 6.529462e-01 |
| Cell cycle | 1.846657e-03 |
| Central carbon metabolism in cancer | 5.817186e-03 |
| Chagas disease (American trypanosomiasis) | 4.339063e-01 |
| Chemical carcinogenesis | 2.907213e-01 |
| Choline metabolism in cancer | 7.379284e-03 |
| Cholinergic synapse | 6.706821e-01 |

| | |
|---|---|
| Chronic myeloid leukemia | 3.874615e-01 |
| Circadian entrainment | 8.383082e-01 |
| Circadian rhythm | 2.025562e-05 |
| Citrate cycle (TCA cycle) | 3.967858e-01 |
| Cocaine addiction | 8.874662e-01 |
| Colorectal cancer | 9.205659e-01 |
| Complement and coagulation cascades | 7.306283e-02 |
| Cysteine and methionine metabolism | 4.010081e-01 |
| Cytosolic DNA-sensing pathway | 8.123825e-01 |
| D-Glutamine and D-glutamate metabolism | 3.422198e-02 |
| Dilated cardiomyopathy | 2.163240e-02 |
| Dopaminergic synapse | 7.009532e-01 |
| Dorso-ventral axis formation | 9.939906e-02 |
| Drug metabolism - cytochrome P450 | 8.345425e-02 |
| Drug metabolism - other enzymes | 4.890267e-01 |
| ECM-receptor interaction | 4.307883e-02 |
| Endocrine and other factor-regulated calcium reabsorption | 6.800278e-01 |
| Endocytosis | 1.258608e-02 |
| Endometrial cancer | 9.539643e-01 |
| Epithelial cell signaling in Helicobacter pylori infection | 6.307648e-03 |
| Epstein-Barr virus infection | 4.731113e-02 |
| ErbB signaling pathway | 4.800363e-01 |
| Estrogen signaling pathway | 9.952757e-02 |
| Ether lipid metabolism | 5.729844e-01 |
| Fanconi anemia pathway | 4.506133e-02 |
| Fat digestion and absorption | 9.823653e-03 |
| Fatty acid biosynthesis | 1.323411e-01 |
| Fatty acid degradation | 1.408528e-01 |
| Fatty acid elongation | 5.623178e-02 |
| Fc epsilon RI signaling pathway | 4.241433e-01 |
| Fc gamma R-mediated phagocytosis | 2.615663e-01 |
| Folate biosynthesis | 4.454349e-01 |
| FoxO signaling pathway | 5.366351e-01 |
| Fructose and mannose metabolism | 7.790316e-01 |
| GABAergic synapse | 6.242181e-01 |
| Galactose metabolism | 7.394396e-01 |
| Gap junction | 9.655488e-02 |
| Gastric acid secretion | 1.564822e-01 |
| Glioma | 1.511666e-01 |
| Glucagon signaling pathway | 3.046274e-01 |
| Glutamatergic synapse | 8.664972e-01 |
| Glutathione metabolism | 3.771793e-01 |
| Glycerolipid metabolism | 2.321556e-02 |
| Glycerophospholipid metabolism | 6.202848e-01 |
| Glycine, serine and threonine metabolism | 2.701033e-01 |
| Glycolysis / Gluconeogenesis | 9.089287e-01 |

| | |
|---|---|
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 5.834182e-01 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 6.083384e-01 |
| Glycosaminoglycan degradation | 1.698663e-01 |
| Glycosphingolipid biosynthesis - ganglio series | 5.480292e-01 |
| Glycosphingolipid biosynthesis - globo series | 5.091735e-01 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 8.861219e-01 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 8.525705e-01 |
| Glyoxylate and dicarboxylate metabolism | 3.411235e-02 |
| GnRH signaling pathway | 4.250220e-02 |
| Graft-versus-host disease | 1.754120e-01 |
| Hepatitis B | 5.722936e-01 |
| Hepatitis C | 3.957628e-01 |
| Herpes simplex infection | 1.086049e-01 |
| HIF-1 signaling pathway | 6.362035e-01 |
| Histidine metabolism | 8.095896e-02 |
| Huntington's disease | 1.654663e-01 |
| Hypertrophic cardiomyopathy (HCM) | 7.195646e-03 |
| Inflammatory bowel disease (IBD) | 1.827232e-02 |
| Inflammatory mediator regulation of TRP channels | 5.418516e-01 |
| Influenza A | 1.549479e-01 |
| Inositol phosphate metabolism | 7.361464e-01 |
| Insulin resistance | 1.335977e-02 |
| Insulin secretion | 5.217811e-01 |
| Insulin signaling pathway | 2.261515e-02 |
| Intestinal immune network for IgA production | 3.193241e-01 |
| Legionellosis | 5.494098e-01 |
| Leishmaniasis | 8.114609e-02 |
| Leukocyte transendothelial migration | 1.189518e-02 |
| Linoleic acid metabolism | 3.211003e-02 |
| Lipoic acid metabolism | 1.551629e-01 |
| Long-term depression | 3.576669e-01 |
| Long-term potentiation | 1.530562e-01 |
| Longevity regulating pathway | 6.205017e-01 |
| Longevity regulating pathway - multiple species | 7.662647e-01 |
| Lysine biosynthesis | 1.904448e-01 |
| Lysine degradation | 3.002316e-02 |
| Malaria | 4.080270e-01 |
| Maturity onset diabetes of the young | 5.769450e-01 |
| Measles | 8.548674e-01 |
| Melanogenesis | 1.154453e-01 |
| Melanoma | 3.889056e-01 |
| Metabolism of xenobiotics by cytochrome P450 | 6.339641e-01 |
| Mineral absorption | 3.341493e-01 |
| Morphine addiction | 9.645343e-01 |
| mRNA surveillance pathway | 2.120504e-03 |
| mTOR signaling pathway | 3.479779e-02 |

| | |
|---|---|
| Mucin type O-Glycan biosynthesis | 1.419736e-01 |
| N-Glycan biosynthesis | 6.200608e-01 |
| Natural killer cell mediated cytotoxicity | 8.703946e-03 |
| Neuroactive ligand-receptor interaction | 5.721175e-01 |
| Neurotrophin signaling pathway | 2.617666e-01 |
| NF-kappa B signaling pathway | 5.278251e-01 |
| Nicotinate and nicotinamide metabolism | 8.947444e-01 |
| Nitrogen metabolism | 1.198404e-02 |
| NOD-like receptor signaling pathway | 4.910424e-01 |
| Non-alcoholic fatty liver disease (NAFLD) | 9.007188e-01 |
| Non-small cell lung cancer | 8.601840e-01 |
| Notch signaling pathway | 4.779441e-01 |
| One carbon pool by folate | 2.349021e-02 |
| Oocyte meiosis | 8.275539e-03 |
| Osteoclast differentiation | 3.008375e-01 |
| Ovarian steroidogenesis | 8.036325e-01 |
| Oxidative phosphorylation | 1.070940e-01 |
| p53 signaling pathway | 7.371133e-02 |
| Pancreatic cancer | 1.658437e-01 |
| Pancreatic secretion | 5.256014e-01 |
| Pantothenate and CoA biosynthesis | 2.736899e-02 |
| Parkinson's disease | 1.491651e-01 |
| Pathogenic Escherichia coli infection | 4.480331e-01 |
| Pentose and glucuronate interconversions | 1.283518e-01 |
| Pentose phosphate pathway | 5.329301e-01 |
| Peroxisome | 4.364265e-01 |
| Pertussis | 3.423775e-01 |
| Phagosome | 5.492808e-01 |
| Phenylalanine metabolism | 3.569737e-01 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 6.245936e-04 |
| Phosphatidylinositol signaling system | 7.232668e-01 |
| Phospholipase D signaling pathway | 1.040732e-01 |
| Phototransduction | 9.942426e-01 |
| Platelet activation | 1.511475e-01 |
| Porphyrin and chlorophyll metabolism | 6.763440e-01 |
| Primary bile acid biosynthesis | 9.450461e-01 |
| Prion diseases | 9.646282e-01 |
| Progesterone-mediated oocyte maturation | 3.721440e-01 |
| Prolactin signaling pathway | 8.024226e-01 |
| Propanoate metabolism | 3.063600e-01 |
| Prostate cancer | 3.351046e-01 |
| Protein processing in endoplasmic reticulum | 5.522655e-01 |
| Proximal tubule bicarbonate reclamation | 6.942137e-01 |
| Pyrimidine metabolism | 2.150347e-01 |
| Pyruvate metabolism | 2.865093e-01 |
| Regulation of autophagy | 9.559723e-02 |

| | |
|---|---|
| Regulation of lipolysis in adipocytes | 9.251571e-01 |
| Renal cell carcinoma | 3.570001e-01 |
| Renin secretion | 7.198162e-01 |
| Renin-angiotensin system | 4.675981e-01 |
| Retinol metabolism | 1.682504e-01 |
| Retrograde endocannabinoid signaling | 7.722285e-01 |
| Rheumatoid arthritis | 2.880170e-01 |
| Riboflavin metabolism | 1.889055e-01 |
| Ribosome biogenesis in eukaryotes | 8.636707e-02 |
| RIG-I-like receptor signaling pathway | 8.665204e-01 |
| RNA degradation | 9.176075e-05 |
| RNA transport | 1.165443e-03 |
| Salivary secretion | 7.598067e-01 |
| Salmonella infection | 2.262457e-01 |
| Selenocompound metabolism | 3.287668e-01 |
| Serotonergic synapse | 5.225172e-01 |
| Shigellosis | 2.532261e-01 |
| Signaling pathways regulating pluripotency of stem cells | 6.684990e-02 |
| Small cell lung cancer | 8.860703e-01 |
| SNARE interactions in vesicular transport | 6.812914e-01 |
| Sphingolipid metabolism | 8.673091e-01 |
| Sphingolipid signaling pathway | 9.823105e-02 |
| Staphylococcus aureus infection | 2.228559e-01 |
| Starch and sucrose metabolism | 2.209481e-02 |
| Steroid biosynthesis | 7.601862e-01 |
| Steroid hormone biosynthesis | 9.406965e-02 |
| Sulfur metabolism | 1.841501e-01 |
| Sulfur relay system | 5.988330e-01 |
| Synaptic vesicle cycle | 4.780804e-01 |
| Synthesis and degradation of ketone bodies | 8.645675e-02 |
| Systemic lupus erythematosus | 1.943895e-01 |
| T cell receptor signaling pathway | 5.052094e-02 |
| Taste transduction | 2.196767e-02 |
| Taurine and hypotaurine metabolism | 4.036299e-02 |
| Terpenoid backbone biosynthesis | 1.941051e-01 |
| TGF-beta signaling pathway | 4.213100e-01 |
| Thiamine metabolism | 8.784280e-02 |
| Thyroid cancer | 5.796910e-02 |
| Thyroid hormone signaling pathway | 4.341664e-01 |
| Thyroid hormone synthesis | 6.848458e-01 |
| Tight junction | 4.670031e-01 |
| TNF signaling pathway | 4.547101e-01 |
| Toll-like receptor signaling pathway | 6.850776e-02 |
| Toxoplasmosis | 6.927603e-01 |
| Transcriptional misregulation in cancer | 9.484421e-02 |
| Tryptophan metabolism | 8.721772e-01 |

| | |
|---|---|
| Type I diabetes mellitus | 3.637074e-01 |
| Type II diabetes mellitus | 3.081460e-01 |
| Tyrosine metabolism | 4.305364e-01 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 5.242640e-01 |
| Valine, leucine and isoleucine degradation | 5.477987e-01 |
| Vascular smooth muscle contraction | 1.088051e-01 |
| Vasopressin-regulated water reabsorption | 2.905184e-01 |
| VEGF signaling pathway | 1.547803e-02 |
| Vibrio cholerae infection | 3.723576e-01 |
| Viral carcinogenesis | 3.151456e-02 |
| Viral myocarditis | 6.685908e-01 |
| Vitamin B6 metabolism | 5.767118e-02 |
| Vitamin digestion and absorption | 6.983628e-02 |
| Wnt signaling pathway | 3.579422e-02 |

| | q.value |
|---|---|
| Acute myeloid leukemia | 0.732377935 |
| Adherens junction | 0.388764477 |
| Adipocytokine signaling pathway | 0.467031716 |
| Adrenergic signaling in cardiomyocytes | 0.899478632 |
| African trypanosomiasis | 0.732377935 |
| AGE-RAGE signaling pathway in diabetic complications | 0.621385385 |
| Alanine, aspartate and glutamate metabolism | 0.346924673 |
| Aldosterone synthesis and secretion | 0.386169372 |
| Aldosterone-regulated sodium reabsorption | 0.778430116 |
| Allograft rejection | 0.765640844 |
| alpha-Linolenic acid metabolism | 0.436157487 |
| Alzheimer's disease | 0.732377935 |
| Amino sugar and nucleotide sugar metabolism | 0.346924673 |
| Aminoacyl-tRNA biosynthesis | 0.925286827 |
| Amoebiasis | 0.838395017 |
| Amphetamine addiction | 0.149810712 |
| AMPK signaling pathway | 0.852546387 |
| Amyotrophic lateral sclerosis (ALS) | 0.541867704 |
| Antigen processing and presentation | 0.153550234 |
| Apoptosis | 0.952803580 |
| Arachidonic acid metabolism | 0.207143810 |
| Arginine and proline metabolism | 0.346924673 |
| Arginine biosynthesis | 0.838395017 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.732377935 |
| Ascorbate and aldarate metabolism | 0.430354199 |
| Asthma | 0.149810712 |
| Autoimmune thyroid disease | 0.672307677 |
| B cell receptor signaling pathway | 0.616834819 |
| Bacterial invasion of epithelial cells | 0.626706671 |
| Basal cell carcinoma | 0.073914715 |
| beta-Alanine metabolism | 0.953958595 |

| | |
|---|---|
| Bile secretion | 0.952482395 |
| Biosynthesis of unsaturated fatty acids | 0.838395017 |
| Biotin metabolism | 0.787871964 |
| Bladder cancer | 0.463223043 |
| Butanoate metabolism | 0.621385385 |
| Caffeine metabolism | 0.227627871 |
| Carbohydrate digestion and absorption | 0.309341616 |
| Cardiac muscle contraction | 0.894120754 |
| Cell adhesion molecules (CAMs) | 0.829785762 |
| Cell cycle | 0.073914715 |
| Central carbon metabolism in cancer | 0.149810712 |
| Chagas disease (American trypanosomiasis) | 0.724408590 |
| Chemical carcinogenesis | 0.616834819 |
| Choline metabolism in cancer | 0.149810712 |
| Cholinergic synapse | 0.838395017 |
| Chronic myeloid leukemia | 0.692649377 |
| Circadian entrainment | 0.925552942 |
| Circadian rhythm | 0.004942372 |
| Citrate cycle (TCA cycle) | 0.696516155 |
| Cocaine addiction | 0.937410197 |
| Colorectal cancer | 0.952482395 |
| Complement and coagulation cascades | 0.333066008 |
| Cysteine and methionine metabolism | 0.698899904 |
| Cytosolic DNA-sensing pathway | 0.905120234 |
| D-Glutamine and D-glutamate metabolism | 0.227627871 |
| Dilated cardiomyopathy | 0.197641796 |
| Dopaminergic synapse | 0.838395017 |
| Dorso-ventral axis formation | 0.346924673 |
| Drug metabolism - cytochrome P450 | 0.346924673 |
| Drug metabolism - other enzymes | 0.744188485 |
| ECM-receptor interaction | 0.250267469 |
| Endocrine and other factor-regulated calcium reabsorption | 0.838395017 |
| Endocytosis | 0.153550234 |
| Endometrial cancer | 0.965839342 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.149810712 |
| Epstein-Barr virus infection | 0.262361726 |
| ErbB signaling pathway | 0.736659528 |
| Estrogen signaling pathway | 0.346924673 |
| Ether lipid metabolism | 0.778430116 |
| Fanconi anemia pathway | 0.255696856 |
| Fat digestion and absorption | 0.149810712 |
| Fatty acid biosynthesis | 0.408749609 |
| Fatty acid degradation | 0.427673673 |
| Fatty acid elongation | 0.294676264 |
| Fc epsilon RI signaling pathway | 0.723713041 |
| Fc gamma R-mediated phagocytosis | 0.585973044 |

| | |
|---|---|
| Folate biosynthesis | 0.732377935 |
| FoxO signaling pathway | 0.765640844 |
| Fructose and mannose metabolism | 0.888241660 |
| GABAergic synapse | 0.805868895 |
| Galactose metabolism | 0.863269172 |
| Gap junction | 0.346924673 |
| Gastric acid secretion | 0.430354199 |
| Glioma | 0.430354199 |
| Glucagon signaling pathway | 0.621385385 |
| Glutamatergic synapse | 0.932261806 |
| Glutathione metabolism | 0.681716632 |
| Glycerolipid metabolism | 0.197641796 |
| Glycerophospholipid metabolism | 0.805331997 |
| Glycine, serine and threonine metabolism | 0.599138254 |
| Glycolysis / Gluconeogenesis | 0.947771848 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.782165077 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.802348972 |
| Glycosaminoglycan degradation | 0.440929592 |
| Glycosphingolipid biosynthesis - ganglio series | 0.765640844 |
| Glycosphingolipid biosynthesis - globo series | 0.765640844 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 0.937410197 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.932261806 |
| Glyoxylate and dicarboxylate metabolism | 0.227627871 |
| GnRH signaling pathway | 0.250267469 |
| Graft-versus-host disease | 0.450531978 |
| Hepatitis B | 0.778430116 |
| Hepatitis C | 0.696516155 |
| Herpes simplex infection | 0.358762802 |
| HIF-1 signaling pathway | 0.812741662 |
| Histidine metabolism | 0.346924673 |
| Huntington's disease | 0.439846423 |
| Hypertrophic cardiomyopathy (HCM) | 0.149810712 |
| Inflammatory bowel disease (IBD) | 0.193845492 |
| Inflammatory mediator regulation of TRP channels | 0.765640844 |
| Influenza A | 0.430354199 |
| Inositol phosphate metabolism | 0.863269172 |
| Insulin resistance | 0.155227767 |
| Insulin secretion | 0.765640844 |
| Insulin signaling pathway | 0.197641796 |
| Intestinal immune network for IgA production | 0.633455938 |
| Legionellosis | 0.765640844 |
| Leishmaniasis | 0.346924673 |
| Leukocyte transendothelial migration | 0.153550234 |
| Linoleic acid metabolism | 0.227627871 |
| Lipoic acid metabolism | 0.430354199 |
| Long-term depression | 0.671313312 |

| | |
|---|---|
| Long-term potentiation | 0.430354199 |
| Longevity regulating pathway | 0.805331997 |
| Longevity regulating pathway - multiple species | 0.881927301 |
| Lysine biosynthesis | 0.467031716 |
| Lysine degradation | 0.227627871 |
| Malaria | 0.706089301 |
| Maturity onset diabetes of the young | 0.778430116 |
| Measles | 0.932261806 |
| Melanogenesis | 0.375581985 |
| Melanoma | 0.692649377 |
| Metabolism of xenobiotics by cytochrome P450 | 0.812741662 |
| Mineral absorption | 0.648932753 |
| Morphine addiction | 0.968597852 |
| mRNA surveillance pathway | 0.073914715 |
| mTOR signaling pathway | 0.227627871 |
| Mucin type O-Glycan biosynthesis | 0.427673673 |
| N-Glycan biosynthesis | 0.805331997 |
| Natural killer cell mediated cytotoxicity | 0.149810712 |
| Neuroactive ligand-receptor interaction | 0.778430116 |
| Neurotrophin signaling pathway | 0.585973044 |
| NF-kappa B signaling pathway | 0.765640844 |
| Nicotinate and nicotinamide metabolism | 0.941024273 |
| Nitrogen metabolism | 0.153550234 |
| NOD-like receptor signaling pathway | 0.744188485 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.943241999 |
| Non-small cell lung cancer | 0.932261806 |
| Notch signaling pathway | 0.736659528 |
| One carbon pool by folate | 0.197641796 |
| Oocyte meiosis | 0.149810712 |
| Osteoclast differentiation | 0.621385385 |
| Ovarian steroidogenesis | 0.899478632 |
| Oxidative phosphorylation | 0.358762802 |
| p53 signaling pathway | 0.333066008 |
| Pancreatic cancer | 0.439846423 |
| Pancreatic secretion | 0.765640844 |
| Pantothenate and CoA biosynthesis | 0.215420416 |
| Parkinson's disease | 0.430354199 |
| Pathogenic Escherichia coli infection | 0.732377935 |
| Pentose and glucuronate interconversions | 0.401510883 |
| Pentose phosphate pathway | 0.765640844 |
| Peroxisome | 0.724408590 |
| Pertussis | 0.657796227 |
| Phagosome | 0.765640844 |
| Phenylalanine metabolism | 0.671313312 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.050800281 |
| Phosphatidylinositol signaling system | 0.852546387 |

| | |
|---|---|
| Phospholipase D signaling pathway | 0.357659999 |
| Phototransduction | 0.994242603 |
| Platelet activation | 0.430354199 |
| Porphyrin and chlorophyll metabolism | 0.838395017 |
| Primary bile acid biosynthesis | 0.960796874 |
| Prion diseases | 0.968597852 |
| Progesterone-mediated oocyte maturation | 0.678024365 |
| Prolactin signaling pathway | 0.899478632 |
| Propanoate metabolism | 0.621385385 |
| Prostate cancer | 0.648932753 |
| Protein processing in endoplasmic reticulum | 0.765640844 |
| Proximal tubule bicarbonate reclamation | 0.838395017 |
| Pyrimidine metabolism | 0.509402553 |
| Pyruvate metabolism | 0.616834819 |
| Regulation of autophagy | 0.346924673 |
| Regulation of lipolysis in adipocytes | 0.952482395 |
| Renal cell carcinoma | 0.671313312 |
| Renin secretion | 0.852546387 |
| Renin-angiotensin system | 0.732377935 |
| Retinol metabolism | 0.440929592 |
| Retrograde endocannabinoid signaling | 0.884618571 |
| Rheumatoid arthritis | 0.616834819 |
| Riboflavin metabolism | 0.467031716 |
| Ribosome biogenesis in eukaryotes | 0.346924673 |
| RIG-I-like receptor signaling pathway | 0.932261806 |
| RNA degradation | 0.011194812 |
| RNA transport | 0.071092044 |
| Salivary secretion | 0.879077846 |
| Salmonella infection | 0.525751931 |
| Selenocompound metabolism | 0.646928181 |
| Serotonergic synapse | 0.765640844 |
| Shigellosis | 0.577450264 |
| Signaling pathways regulating pluripotency of stem cells | 0.326227490 |
| Small cell lung cancer | 0.937410197 |
| SNARE interactions in vesicular transport | 0.838395017 |
| Sphingolipid metabolism | 0.932261806 |
| Sphingolipid signaling pathway | 0.346924673 |
| Staphylococcus aureus infection | 0.522854145 |
| Starch and sucrose metabolism | 0.197641796 |
| Steroid biosynthesis | 0.879077846 |
| Steroid hormone biosynthesis | 0.346924673 |
| Sulfur metabolism | 0.463223043 |
| Sulfur relay system | 0.794104689 |
| Synaptic vesicle cycle | 0.736659528 |
| Synthesis and degradation of ketone bodies | 0.346924673 |
| Systemic lupus erythematosus | 0.467031716 |

```
T cell receptor signaling pathway                                  0.273935753
Taste transduction                                                 0.197641796
Taurine and hypotaurine metabolism                                 0.246214209
Terpenoid backbone biosynthesis                                    0.467031716
TGF-beta signaling pathway                                         0.723713041
Thiamine metabolism                                                0.346924673
Thyroid cancer                                                     0.294676264
Thyroid hormone signaling pathway                                  0.724408590
Thyroid hormone synthesis                                          0.838395017
Tight junction                                                     0.732377935
TNF signaling pathway                                              0.732377935
Toll-like receptor signaling pathway                               0.327693329
Toxoplasmosis                                                      0.838395017
Transcriptional misregulation in cancer                            0.346924673
Tryptophan metabolism                                              0.933382647
Type I diabetes mellitus                                           0.672307677
Type II diabetes mellitus                                          0.621385385
Tyrosine metabolism                                                0.724408590
Ubiquinone and other terpenoid-quinone biosynthesis                0.765640844
Valine, leucine and isoleucine degradation                         0.765640844
Vascular smooth muscle contraction                                 0.358762802
Vasopressin-regulated water reabsorption                           0.616834819
VEGF signaling pathway                                             0.171665409
Vibrio cholerae infection                                          0.678024365
Viral carcinogenesis                                               0.227627871
Viral myocarditis                                                  0.838395017
Vitamin B6 metabolism                                              0.294676264
Vitamin digestion and absorption                                   0.327693329
Wnt signaling pathway                                              0.227627871

$errors
named list()
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The user can also specified whether the normalization step (standardization and sigma-transformation) should be perfomed (`normalize=TRUE`). If `verbose=TRUE`, function prints out the titles of pathways as their are analysed. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway.

## 3.6 PRS

PRS is another method that works with gene-level statistics and a list of differentially expresed genes. The pathway topology is incorporated as the number of downstream differentially expressed genes. The gene-level log fold-changes are weigted by this numeber and sumed up into a pathway-level score. A statistical significance is assessed by a permutations of genes.

```
> Prs<-PRS(hnrnp.cnts, group, pathways, type="RNASeq",  logFC.th=-1, nperm=100)

14329 node labels mapped to the expression data
Average coverage 84.40644 %
0 (out of 267) pathways without a mapped node

> res(Prs)

$results
                                                                        nPRS
Acute myeloid leukemia                                          -0.394516258
Adherens junction                                                0.004078021
Adipocytokine signaling pathway                                  0.024441545
Adrenergic signaling in cardiomyocytes                           0.461423354
African trypanosomiasis                                          0.225526344
AGE-RAGE signaling pathway in diabetic complications             0.100360280
Alanine, aspartate and glutamate metabolism                      0.297017179
Aldosterone synthesis and secretion                             -0.050936945
Aldosterone-regulated sodium reabsorption                        1.022140325
Allograft rejection                                             -0.489304165
alpha-Linolenic acid metabolism                                  0.089645251
Alzheimer's disease                                             -2.875302721
Amino sugar and nucleotide sugar metabolism                     -0.700216199
Aminoacyl-tRNA biosynthesis                                      0.647867945
Amoebiasis                                                       0.032298323
Amphetamine addiction                                            0.726679819
AMPK signaling pathway                                          -2.911967866
Amyotrophic lateral sclerosis (ALS)                              0.450808839
Antigen processing and presentation                             -5.785004724
Apoptosis                                                       -4.025979200
Arachidonic acid metabolism                                     -0.002378602
Arginine and proline metabolism                                  0.234138974
Arginine biosynthesis                                            0.413318782
Arrhythmogenic right ventricular cardiomyopathy (ARVC)           3.923921655
Ascorbate and aldarate metabolism                                0.080096200
Asthma                                                           0.049840690
Autoimmune thyroid disease                                       0.147482884
B cell receptor signaling pathway                               -0.071768254
Bacterial invasion of epithelial cells                           0.496823737
```

| | |
|---|---|
| Basal cell carcinoma | -0.037353575 |
| beta-Alanine metabolism | 0.037329161 |
| Bile secretion | 0.058521330 |
| Biosynthesis of unsaturated fatty acids | -1.607699625 |
| Biotin metabolism | 0.156102394 |
| Bladder cancer | -0.538417869 |
| Butanoate metabolism | 0.138826489 |
| Caffeine metabolism | -0.010321282 |
| Carbohydrate digestion and absorption | -0.008299633 |
| Cardiac muscle contraction | 0.079194665 |
| Cell adhesion molecules (CAMs) | -0.617057046 |
| Cell cycle | 4.700059537 |
| Central carbon metabolism in cancer | -0.011306457 |
| Chagas disease (American trypanosomiasis) | -0.546820220 |
| Chemical carcinogenesis | -1.391630739 |
| Choline metabolism in cancer | -0.486036274 |
| Cholinergic synapse | 0.368963673 |
| Chronic myeloid leukemia | 0.008877290 |
| Circadian entrainment | 0.109153054 |
| Circadian rhythm | 0.259149662 |
| Citrate cycle (TCA cycle) | -2.275015818 |
| Cocaine addiction | 0.290839954 |
| Colorectal cancer | 1.575823135 |
| Complement and coagulation cascades | -0.261776959 |
| Cysteine and methionine metabolism | 1.050658891 |
| Cytosolic DNA-sensing pathway | -0.141766937 |
| D-Glutamine and D-glutamate metabolism | 0.561991464 |
| Dilated cardiomyopathy | 0.083181923 |
| Dopaminergic synapse | 0.544122070 |
| Dorso-ventral axis formation | 1.494704858 |
| Drug metabolism - cytochrome P450 | -0.133100715 |
| Drug metabolism - other enzymes | 0.712815817 |
| ECM-receptor interaction | -9.723402155 |
| Endocrine and other factor-regulated calcium reabsorption | 0.254201259 |
| Endocytosis | 0.684483761 |
| Endometrial cancer | 2.971361315 |
| Epithelial cell signaling in Helicobacter pylori infection | 1.318262954 |
| Epstein-Barr virus infection | 0.314695539 |
| ErbB signaling pathway | -0.280645892 |
| Estrogen signaling pathway | -0.193428024 |
| Ether lipid metabolism | 0.018778369 |
| Fanconi anemia pathway | 0.407233383 |
| Fat digestion and absorption | -1.612183075 |
| Fatty acid biosynthesis | -31.725782797 |
| Fatty acid degradation | 0.062596186 |
| Fatty acid elongation | 0.294418371 |

| | |
|---|---|
| Fc epsilon RI signaling pathway | -0.464503231 |
| Fc gamma R-mediated phagocytosis | 0.115899598 |
| Folate biosynthesis | -9.774328411 |
| FoxO signaling pathway | 1.247574102 |
| Fructose and mannose metabolism | -7.508537102 |
| GABAergic synapse | 0.329337312 |
| Galactose metabolism | -5.558575508 |
| Gap junction | 0.317505171 |
| Gastric acid secretion | 0.035171925 |
| Glioma | 0.537812002 |
| Glucagon signaling pathway | 0.045470834 |
| Glutamatergic synapse | 0.149571068 |
| Glutathione metabolism | -3.297672467 |
| Glycerolipid metabolism | -1.302199780 |
| Glycerophospholipid metabolism | -0.512118413 |
| Glycine, serine and threonine metabolism | 1.999576821 |
| Glycolysis / Gluconeogenesis | -2.855089498 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | -7.001185391 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | -0.170184721 |
| Glycosaminoglycan degradation | -1.306246725 |
| Glycosphingolipid biosynthesis - ganglio series | -0.458533227 |
| Glycosphingolipid biosynthesis - globo series | 0.097604243 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 0.110495876 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | -0.713269436 |
| Glyoxylate and dicarboxylate metabolism | 1.951783215 |
| GnRH signaling pathway | -0.536541338 |
| Graft-versus-host disease | -0.696926865 |
| Hepatitis B | -0.188352318 |
| Hepatitis C | 0.726700054 |
| Herpes simplex infection | 0.797051137 |
| HIF-1 signaling pathway | -0.653272090 |
| Histidine metabolism | 0.032342146 |
| Huntington's disease | 1.155031575 |
| Hypertrophic cardiomyopathy (HCM) | 0.580522731 |
| Inflammatory bowel disease (IBD) | 0.128397700 |
| Inflammatory mediator regulation of TRP channels | -0.365205876 |
| Influenza A | 0.692594223 |
| Inositol phosphate metabolism | 0.146452717 |
| Insulin resistance | -1.659669922 |
| Insulin secretion | -0.067365682 |
| Insulin signaling pathway | -4.248163769 |
| Intestinal immune network for IgA production | 0.233721688 |
| Legionellosis | 0.555310853 |
| Leishmaniasis | -0.374686410 |
| Leukocyte transendothelial migration | 0.283051899 |
| Linoleic acid metabolism | 0.168194093 |

| | |
|---|---|
| Lipoic acid metabolism | 0.001397924 |
| Long-term depression | 0.259527042 |
| Long-term potentiation | 0.207933980 |
| Longevity regulating pathway | 0.425235489 |
| Longevity regulating pathway - multiple species | 0.713942425 |
| Lysine biosynthesis | 0.090745291 |
| Lysine degradation | 0.237804706 |
| Malaria | 0.197465322 |
| Maturity onset diabetes of the young | -0.061217446 |
| Measles | -0.065358538 |
| Melanogenesis | 0.088629234 |
| Melanoma | 0.611121638 |
| Metabolism of xenobiotics by cytochrome P450 | -0.503257910 |
| Mineral absorption | 0.181920239 |
| Morphine addiction | 0.464293482 |
| mRNA surveillance pathway | 1.197243841 |
| mTOR signaling pathway | -0.250286887 |
| Mucin type O-Glycan biosynthesis | 0.398464083 |
| N-Glycan biosynthesis | -0.196944291 |
| Natural killer cell mediated cytotoxicity | -0.335492629 |
| Neuroactive ligand-receptor interaction | 0.221095500 |
| Neurotrophin signaling pathway | -0.521090533 |
| NF-kappa B signaling pathway | -0.195015930 |
| Nicotinate and nicotinamide metabolism | -0.271400013 |
| Nitrogen metabolism | 0.341719143 |
| NOD-like receptor signaling pathway | 1.741894622 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.216902100 |
| Non-small cell lung cancer | -0.469013785 |
| Notch signaling pathway | 0.229239077 |
| One carbon pool by folate | 0.212099114 |
| Oocyte meiosis | -0.094722656 |
| Osteoclast differentiation | 0.087350188 |
| Ovarian steroidogenesis | 0.093925826 |
| Oxidative phosphorylation | 2.024092131 |
| p53 signaling pathway | 0.331459480 |
| Pancreatic cancer | -0.486421550 |
| Pancreatic secretion | -0.393919597 |
| Pantothenate and CoA biosynthesis | -0.991346461 |
| Parkinson's disease | -1.928528064 |
| Pathogenic Escherichia coli infection | 1.505883880 |
| Pentose and glucuronate interconversions | -0.059212059 |
| Pentose phosphate pathway | -15.681518529 |
| Peroxisome | 0.139614189 |
| Pertussis | 0.160203263 |
| Phagosome | 0.970138948 |
| Phenylalanine metabolism | 0.269393522 |

| | |
|---|---|
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.287869767 |
| Phosphatidylinositol signaling system | -0.328285253 |
| Phospholipase D signaling pathway | -0.010454039 |
| Phototransduction | 0.049278133 |
| Platelet activation | 0.183090455 |
| Porphyrin and chlorophyll metabolism | 0.118440111 |
| Primary bile acid biosynthesis | 0.065342199 |
| Prion diseases | -1.652420732 |
| Progesterone-mediated oocyte maturation | 2.081685641 |
| Prolactin signaling pathway | -0.427253533 |
| Propanoate metabolism | 0.431320525 |
| Prostate cancer | 1.712306007 |
| Protein processing in endoplasmic reticulum | 0.283788063 |
| Proximal tubule bicarbonate reclamation | -0.003916196 |
| Pyrimidine metabolism | 1.022465246 |
| Pyruvate metabolism | 0.190796939 |
| Regulation of autophagy | 0.484356275 |
| Regulation of lipolysis in adipocytes | 0.014922301 |
| Renal cell carcinoma | -1.392809993 |
| Renin secretion | 0.053235379 |
| Renin-angiotensin system | 0.017758207 |
| Retinol metabolism | 0.109441972 |
| Retrograde endocannabinoid signaling | 0.348888424 |
| Rheumatoid arthritis | 0.209947451 |
| Riboflavin metabolism | -0.232146126 |
| Ribosome biogenesis in eukaryotes | 0.029921737 |
| RIG-I-like receptor signaling pathway | 0.252191874 |
| RNA degradation | 1.059073874 |
| RNA transport | 4.404706629 |
| Salivary secretion | -0.103145378 |
| Salmonella infection | -1.936289450 |
| Selenocompound metabolism | -0.557618672 |
| Serotonergic synapse | 0.170411438 |
| Shigellosis | 0.109786096 |
| Signaling pathways regulating pluripotency of stem cells | 0.077381831 |
| Small cell lung cancer | -11.028059388 |
| SNARE interactions in vesicular transport | 0.104050862 |
| Sphingolipid metabolism | 0.132438896 |
| Sphingolipid signaling pathway | -0.295655705 |
| Staphylococcus aureus infection | -0.464231445 |
| Starch and sucrose metabolism | -2.945588520 |
| Steroid biosynthesis | 0.190919197 |
| Steroid hormone biosynthesis | 0.205683076 |
| Sulfur metabolism | 0.200582636 |
| Sulfur relay system | 0.174979827 |
| Synaptic vesicle cycle | 4.085816294 |

| | |
|---|---|
| Synthesis and degradation of ketone bodies | 0.309420227 |
| Systemic lupus erythematosus | -0.075547226 |
| T cell receptor signaling pathway | 0.179471619 |
| Taste transduction | -0.353333589 |
| Taurine and hypotaurine metabolism | 0.108134360 |
| Terpenoid backbone biosynthesis | 0.559109920 |
| TGF-beta signaling pathway | -0.425957475 |
| Thiamine metabolism | 0.105572074 |
| Thyroid cancer | 2.854341198 |
| Thyroid hormone signaling pathway | 0.179762673 |
| Thyroid hormone synthesis | 0.024179775 |
| Tight junction | 0.381520240 |
| TNF signaling pathway | -0.333747067 |
| Toll-like receptor signaling pathway | 0.074262980 |
| Toxoplasmosis | -3.438385705 |
| Transcriptional misregulation in cancer | 0.553496988 |
| Tryptophan metabolism | 0.004819804 |
| Type I diabetes mellitus | 0.154275281 |
| Type II diabetes mellitus | -0.603844632 |
| Tyrosine metabolism | 0.336140891 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.679636356 |
| Valine, leucine and isoleucine degradation | 0.247143038 |
| Vascular smooth muscle contraction | -0.070931264 |
| Vasopressin-regulated water reabsorption | -0.153847250 |
| VEGF signaling pathway | 0.041053003 |
| Vibrio cholerae infection | 0.205686494 |
| Viral carcinogenesis | -0.043433765 |
| Viral myocarditis | 0.580981563 |
| Vitamin B6 metabolism | -0.221685641 |
| Vitamin digestion and absorption | 0.121857634 |
| Wnt signaling pathway | 0.077443071 |

| | p.value |
|---|---|
| Acute myeloid leukemia | 0.88 |
| Adherens junction | 0.62 |
| Adipocytokine signaling pathway | 0.58 |
| Adrenergic signaling in cardiomyocytes | 0.24 |
| African trypanosomiasis | 0.47 |
| AGE-RAGE signaling pathway in diabetic complications | 0.57 |
| Alanine, aspartate and glutamate metabolism | 0.28 |
| Aldosterone synthesis and secretion | 0.58 |
| Aldosterone-regulated sodium reabsorption | 0.03 |
| Allograft rejection | 0.95 |
| alpha-Linolenic acid metabolism | 0.69 |
| Alzheimer's disease | 0.98 |
| Amino sugar and nucleotide sugar metabolism | 0.90 |
| Aminoacyl-tRNA biosynthesis | 0.11 |

| | |
|---|---|
| Amoebiasis | 0.70 |
| Amphetamine addiction | 0.07 |
| AMPK signaling pathway | 0.98 |
| Amyotrophic lateral sclerosis (ALS) | 0.11 |
| Antigen processing and presentation | 1.00 |
| Apoptosis | 0.99 |
| Arachidonic acid metabolism | 0.77 |
| Arginine and proline metabolism | 0.19 |
| Arginine biosynthesis | 0.25 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.00 |
| Ascorbate and aldarate metabolism | 0.53 |
| Asthma | 0.54 |
| Autoimmune thyroid disease | 0.39 |
| B cell receptor signaling pathway | 0.73 |
| Bacterial invasion of epithelial cells | 0.17 |
| Basal cell carcinoma | 0.70 |
| beta-Alanine metabolism | 0.79 |
| Bile secretion | 0.68 |
| Biosynthesis of unsaturated fatty acids | 0.94 |
| Biotin metabolism | 0.62 |
| Bladder cancer | 0.88 |
| Butanoate metabolism | 0.43 |
| Caffeine metabolism | 0.36 |
| Carbohydrate digestion and absorption | 0.79 |
| Cardiac muscle contraction | 0.59 |
| Cell adhesion molecules (CAMs) | 0.95 |
| Cell cycle | 0.00 |
| Central carbon metabolism in cancer | 0.83 |
| Chagas disease (American trypanosomiasis) | 0.88 |
| Chemical carcinogenesis | 0.89 |
| Choline metabolism in cancer | 0.84 |
| Cholinergic synapse | 0.38 |
| Chronic myeloid leukemia | 0.73 |
| Circadian entrainment | 0.65 |
| Circadian rhythm | 0.16 |
| Citrate cycle (TCA cycle) | 0.97 |
| Cocaine addiction | 0.52 |
| Colorectal cancer | 0.00 |
| Complement and coagulation cascades | 0.90 |
| Cysteine and methionine metabolism | 0.06 |
| Cytosolic DNA-sensing pathway | 0.88 |
| D-Glutamine and D-glutamate metabolism | 0.08 |
| Dilated cardiomyopathy | 0.60 |
| Dopaminergic synapse | 0.14 |
| Dorso-ventral axis formation | 0.04 |
| Drug metabolism - cytochrome P450 | 0.68 |

| | |
|---|---|
| Drug metabolism - other enzymes | 0.05 |
| ECM-receptor interaction | 1.00 |
| Endocrine and other factor-regulated calcium reabsorption | 0.26 |
| Endocytosis | 0.09 |
| Endometrial cancer | 0.01 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.06 |
| Epstein-Barr virus infection | 0.10 |
| ErbB signaling pathway | 0.71 |
| Estrogen signaling pathway | 0.72 |
| Ether lipid metabolism | 0.75 |
| Fanconi anemia pathway | 0.08 |
| Fat digestion and absorption | 0.96 |
| Fatty acid biosynthesis | 1.00 |
| Fatty acid degradation | 0.73 |
| Fatty acid elongation | 0.09 |
| Fc epsilon RI signaling pathway | 0.85 |
| Fc gamma R-mediated phagocytosis | 0.70 |
| Folate biosynthesis | 1.00 |
| FoxO signaling pathway | 0.04 |
| Fructose and mannose metabolism | 1.00 |
| GABAergic synapse | 0.29 |
| Galactose metabolism | 1.00 |
| Gap junction | 0.21 |
| Gastric acid secretion | 0.60 |
| Glioma | 0.12 |
| Glucagon signaling pathway | 0.63 |
| Glutamatergic synapse | 0.52 |
| Glutathione metabolism | 0.98 |
| Glycerolipid metabolism | 0.95 |
| Glycerophospholipid metabolism | 0.83 |
| Glycine, serine and threonine metabolism | 0.02 |
| Glycolysis / Gluconeogenesis | 0.97 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 0.99 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 0.75 |
| Glycosaminoglycan degradation | 0.95 |
| Glycosphingolipid biosynthesis - ganglio series | 0.90 |
| Glycosphingolipid biosynthesis - globo series | 0.35 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 0.72 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 0.96 |
| Glyoxylate and dicarboxylate metabolism | 0.00 |
| GnRH signaling pathway | 0.92 |
| Graft-versus-host disease | 0.95 |
| Hepatitis B | 0.81 |
| Hepatitis C | 0.09 |
| Herpes simplex infection | 0.00 |
| HIF-1 signaling pathway | 0.90 |

| | |
|---|---|
| Histidine metabolism | 0.67 |
| Huntington's disease | 0.01 |
| Hypertrophic cardiomyopathy (HCM) | 0.09 |
| Inflammatory bowel disease (IBD) | 0.41 |
| Inflammatory mediator regulation of TRP channels | 0.70 |
| Influenza A | 0.04 |
| Inositol phosphate metabolism | 0.60 |
| Insulin resistance | 0.94 |
| Insulin secretion | 0.75 |
| Insulin signaling pathway | 0.99 |
| Intestinal immune network for IgA production | 0.36 |
| Legionellosis | 0.15 |
| Leishmaniasis | 0.79 |
| Leukocyte transendothelial migration | 0.44 |
| Linoleic acid metabolism | 0.52 |
| Lipoic acid metabolism | 0.27 |
| Long-term depression | 0.34 |
| Long-term potentiation | 0.32 |
| Longevity regulating pathway | 0.33 |
| Longevity regulating pathway - multiple species | 0.10 |
| Lysine biosynthesis | 0.78 |
| Lysine degradation | 0.39 |
| Malaria | 0.39 |
| Maturity onset diabetes of the young | 0.55 |
| Measles | 0.80 |
| Melanogenesis | 0.61 |
| Melanoma | 0.13 |
| Metabolism of xenobiotics by cytochrome P450 | 0.80 |
| Mineral absorption | 0.71 |
| Morphine addiction | 0.24 |
| mRNA surveillance pathway | 0.03 |
| mTOR signaling pathway | 0.84 |
| Mucin type O-Glycan biosynthesis | 0.19 |
| N-Glycan biosynthesis | 0.79 |
| Natural killer cell mediated cytotoxicity | 0.86 |
| Neuroactive ligand-receptor interaction | 0.30 |
| Neurotrophin signaling pathway | 0.80 |
| NF-kappa B signaling pathway | 0.77 |
| Nicotinate and nicotinamide metabolism | 0.83 |
| Nitrogen metabolism | 0.13 |
| NOD-like receptor signaling pathway | 0.02 |
| Non-alcoholic fatty liver disease (NAFLD) | 0.35 |
| Non-small cell lung cancer | 0.86 |
| Notch signaling pathway | 0.40 |
| One carbon pool by folate | 0.29 |
| Oocyte meiosis | 0.75 |

| | |
|---|---|
| Osteoclast differentiation | 0.70 |
| Ovarian steroidogenesis | 0.71 |
| Oxidative phosphorylation | 0.03 |
| p53 signaling pathway | 0.33 |
| Pancreatic cancer | 0.87 |
| Pancreatic secretion | 0.82 |
| Pantothenate and CoA biosynthesis | 0.93 |
| Parkinson's disease | 0.96 |
| Pathogenic Escherichia coli infection | 0.00 |
| Pentose and glucuronate interconversions | 0.85 |
| Pentose phosphate pathway | 1.00 |
| Peroxisome | 0.17 |
| Pertussis | 0.55 |
| Phagosome | 0.07 |
| Phenylalanine metabolism | 0.29 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.10 |
| Phosphatidylinositol signaling system | 0.84 |
| Phospholipase D signaling pathway | 0.69 |
| Phototransduction | 0.39 |
| Platelet activation | 0.47 |
| Porphyrin and chlorophyll metabolism | 0.54 |
| Primary bile acid biosynthesis | 0.57 |
| Prion diseases | 0.94 |
| Progesterone-mediated oocyte maturation | 0.00 |
| Prolactin signaling pathway | 0.87 |
| Propanoate metabolism | 0.06 |
| Prostate cancer | 0.00 |
| Protein processing in endoplasmic reticulum | 0.25 |
| Proximal tubule bicarbonate reclamation | 0.65 |
| Pyrimidine metabolism | 0.02 |
| Pyruvate metabolism | 0.40 |
| Regulation of autophagy | 0.13 |
| Regulation of lipolysis in adipocytes | 0.65 |
| Renal cell carcinoma | 0.94 |
| Renin secretion | 0.63 |
| Renin-angiotensin system | 0.66 |
| Retinol metabolism | 0.65 |
| Retrograde endocannabinoid signaling | 0.32 |
| Rheumatoid arthritis | 0.45 |
| Riboflavin metabolism | 0.81 |
| Ribosome biogenesis in eukaryotes | 0.24 |
| RIG-I-like receptor signaling pathway | 0.18 |
| RNA degradation | 0.04 |
| RNA transport | 0.00 |
| Salivary secretion | 0.71 |
| Salmonella infection | 0.97 |

| | |
|---|---|
| Selenocompound metabolism | 0.80 |
| Serotonergic synapse | 0.49 |
| Shigellosis | 0.48 |
| Signaling pathways regulating pluripotency of stem cells | 0.52 |
| Small cell lung cancer | 1.00 |
| SNARE interactions in vesicular transport | 0.67 |
| Sphingolipid metabolism | 0.63 |
| Sphingolipid signaling pathway | 0.86 |
| Staphylococcus aureus infection | 0.89 |
| Starch and sucrose metabolism | 0.99 |
| Steroid biosynthesis | 0.46 |
| Steroid hormone biosynthesis | 0.48 |
| Sulfur metabolism | 0.21 |
| Sulfur relay system | 0.63 |
| Synaptic vesicle cycle | 0.00 |
| Synthesis and degradation of ketone bodies | 0.20 |
| Systemic lupus erythematosus | 0.88 |
| T cell receptor signaling pathway | 0.57 |
| Taste transduction | 0.79 |
| Taurine and hypotaurine metabolism | 0.69 |
| Terpenoid backbone biosynthesis | 0.12 |
| TGF-beta signaling pathway | 0.88 |
| Thiamine metabolism | 0.65 |
| Thyroid cancer | 0.00 |
| Thyroid hormone signaling pathway | 0.35 |
| Thyroid hormone synthesis | 0.69 |
| Tight junction | 0.21 |
| TNF signaling pathway | 0.71 |
| Toll-like receptor signaling pathway | 0.59 |
| Toxoplasmosis | 0.97 |
| Transcriptional misregulation in cancer | 0.16 |
| Tryptophan metabolism | 0.82 |
| Type I diabetes mellitus | 0.49 |
| Type II diabetes mellitus | 0.80 |
| Tyrosine metabolism | 0.43 |
| Ubiquinone and other terpenoid-quinone biosynthesis | 0.07 |
| Valine, leucine and isoleucine degradation | 0.37 |
| Vascular smooth muscle contraction | 0.64 |
| Vasopressin-regulated water reabsorption | 0.81 |
| VEGF signaling pathway | 0.68 |
| Vibrio cholerae infection | 0.57 |
| Viral carcinogenesis | 0.80 |
| Viral myocarditis | 0.05 |
| Vitamin B6 metabolism | 0.80 |
| Vitamin digestion and absorption | 0.71 |
| Wnt signaling pathway | 0.55 |

| | q.value |
|---|---|
| Acute myeloid leukemia | 1.0000000 |
| Adherens junction | 1.0000000 |
| Adipocytokine signaling pathway | 1.0000000 |
| Adrenergic signaling in cardiomyocytes | 0.9295238 |
| African trypanosomiasis | 1.0000000 |
| AGE-RAGE signaling pathway in diabetic complications | 1.0000000 |
| Alanine, aspartate and glutamate metabolism | 0.9966197 |
| Aldosterone synthesis and secretion | 1.0000000 |
| Aldosterone-regulated sodium reabsorption | 0.3852632 |
| Allograft rejection | 1.0000000 |
| alpha-Linolenic acid metabolism | 1.0000000 |
| Alzheimer's disease | 1.0000000 |
| Amino sugar and nucleotide sugar metabolism | 1.0000000 |
| Aminoacyl-tRNA biosynthesis | 0.6390476 |
| Amoebiasis | 1.0000000 |
| Amphetamine addiction | 0.5509677 |
| AMPK signaling pathway | 1.0000000 |
| Amyotrophic lateral sclerosis (ALS) | 0.6390476 |
| Antigen processing and presentation | 1.0000000 |
| Apoptosis | 1.0000000 |
| Arachidonic acid metabolism | 1.0000000 |
| Arginine and proline metabolism | 0.8278571 |
| Arginine biosynthesis | 0.9384615 |
| Arrhythmogenic right ventricular cardiomyopathy (ARVC) | 0.0000000 |
| Ascorbate and aldarate metabolism | 1.0000000 |
| Asthma | 1.0000000 |
| Autoimmune thyroid disease | 1.0000000 |
| B cell receptor signaling pathway | 1.0000000 |
| Bacterial invasion of epithelial cells | 0.7826415 |
| Basal cell carcinoma | 1.0000000 |
| beta-Alanine metabolism | 1.0000000 |
| Bile secretion | 1.0000000 |
| Biosynthesis of unsaturated fatty acids | 1.0000000 |
| Biotin metabolism | 1.0000000 |
| Bladder cancer | 1.0000000 |
| Butanoate metabolism | 1.0000000 |
| Caffeine metabolism | 1.0000000 |
| Carbohydrate digestion and absorption | 1.0000000 |
| Cardiac muscle contraction | 1.0000000 |
| Cell adhesion molecules (CAMs) | 1.0000000 |
| Cell cycle | 0.0000000 |
| Central carbon metabolism in cancer | 1.0000000 |
| Chagas disease (American trypanosomiasis) | 1.0000000 |
| Chemical carcinogenesis | 1.0000000 |
| Choline metabolism in cancer | 1.0000000 |

| | |
|---|---|
| Cholinergic synapse | 1.0000000 |
| Chronic myeloid leukemia | 1.0000000 |
| Circadian entrainment | 1.0000000 |
| Circadian rhythm | 0.7654902 |
| Citrate cycle (TCA cycle) | 1.0000000 |
| Cocaine addiction | 1.0000000 |
| Colorectal cancer | 0.0000000 |
| Complement and coagulation cascades | 1.0000000 |
| Cysteine and methionine metabolism | 0.5228571 |
| Cytosolic DNA-sensing pathway | 1.0000000 |
| D-Glutamine and D-glutamate metabolism | 0.5915152 |
| Dilated cardiomyopathy | 1.0000000 |
| Dopaminergic synapse | 0.7116667 |
| Dorso-ventral axis formation | 0.4243478 |
| Drug metabolism - cytochrome P450 | 1.0000000 |
| Drug metabolism - other enzymes | 0.4880000 |
| ECM-receptor interaction | 1.0000000 |
| Endocrine and other factor-regulated calcium reabsorption | 0.9612121 |
| Endocytosis | 0.5935135 |
| Endometrial cancer | 0.1876923 |
| Epithelial cell signaling in Helicobacter pylori infection | 0.5228571 |
| Epstein-Barr virus infection | 0.6100000 |
| ErbB signaling pathway | 1.0000000 |
| Estrogen signaling pathway | 1.0000000 |
| Ether lipid metabolism | 1.0000000 |
| Fanconi anemia pathway | 0.5915152 |
| Fat digestion and absorption | 1.0000000 |
| Fatty acid biosynthesis | 1.0000000 |
| Fatty acid degradation | 1.0000000 |
| Fatty acid elongation | 0.5935135 |
| Fc epsilon RI signaling pathway | 1.0000000 |
| Fc gamma R-mediated phagocytosis | 1.0000000 |
| Folate biosynthesis | 1.0000000 |
| FoxO signaling pathway | 0.4243478 |
| Fructose and mannose metabolism | 1.0000000 |
| GABAergic synapse | 0.9966197 |
| Galactose metabolism | 1.0000000 |
| Gap junction | 0.8540000 |
| Gastric acid secretion | 1.0000000 |
| Glioma | 0.6654545 |
| Glucagon signaling pathway | 1.0000000 |
| Glutamatergic synapse | 1.0000000 |
| Glutathione metabolism | 1.0000000 |
| Glycerolipid metabolism | 1.0000000 |
| Glycerophospholipid metabolism | 1.0000000 |
| Glycine, serine and threonine metabolism | 0.3050000 |

| | |
|---|---|
| Glycolysis / Gluconeogenesis | 1.0000000 |
| Glycosaminoglycan biosynthesis - chondroitin sulfate / dermatan sulfate | 1.0000000 |
| Glycosaminoglycan biosynthesis - heparan sulfate / heparin | 1.0000000 |
| Glycosaminoglycan degradation | 1.0000000 |
| Glycosphingolipid biosynthesis - ganglio series | 1.0000000 |
| Glycosphingolipid biosynthesis - globo series | 1.0000000 |
| Glycosphingolipid biosynthesis - lacto and neolacto series | 1.0000000 |
| Glycosylphosphatidylinositol(GPI)-anchor biosynthesis | 1.0000000 |
| Glyoxylate and dicarboxylate metabolism | 0.0000000 |
| GnRH signaling pathway | 1.0000000 |
| Graft-versus-host disease | 1.0000000 |
| Hepatitis B | 1.0000000 |
| Hepatitis C | 0.5935135 |
| Herpes simplex infection | 0.0000000 |
| HIF-1 signaling pathway | 1.0000000 |
| Histidine metabolism | 1.0000000 |
| Huntington's disease | 0.1876923 |
| Hypertrophic cardiomyopathy (HCM) | 0.5935135 |
| Inflammatory bowel disease (IBD) | 1.0000000 |
| Inflammatory mediator regulation of TRP channels | 1.0000000 |
| Influenza A | 0.4243478 |
| Inositol phosphate metabolism | 1.0000000 |
| Insulin resistance | 1.0000000 |
| Insulin secretion | 1.0000000 |
| Insulin signaling pathway | 1.0000000 |
| Intestinal immune network for IgA production | 1.0000000 |
| Legionellosis | 0.7469388 |
| Leishmaniasis | 1.0000000 |
| Leukocyte transendothelial migration | 1.0000000 |
| Linoleic acid metabolism | 1.0000000 |
| Lipoic acid metabolism | 0.9832836 |
| Long-term depression | 1.0000000 |
| Long-term potentiation | 1.0000000 |
| Longevity regulating pathway | 1.0000000 |
| Longevity regulating pathway - multiple species | 0.6100000 |
| Lysine biosynthesis | 1.0000000 |
| Lysine degradation | 1.0000000 |
| Malaria | 1.0000000 |
| Maturity onset diabetes of the young | 1.0000000 |
| Measles | 1.0000000 |
| Melanogenesis | 1.0000000 |
| Melanoma | 0.6748936 |
| Metabolism of xenobiotics by cytochrome P450 | 1.0000000 |
| Mineral absorption | 1.0000000 |
| Morphine addiction | 0.9295238 |
| mRNA surveillance pathway | 0.3852632 |

| | |
|---|---|
| mTOR signaling pathway | 1.0000000 |
| Mucin type O-Glycan biosynthesis | 0.8278571 |
| N-Glycan biosynthesis | 1.0000000 |
| Natural killer cell mediated cytotoxicity | 1.0000000 |
| Neuroactive ligand-receptor interaction | 1.0000000 |
| Neurotrophin signaling pathway | 1.0000000 |
| NF-kappa B signaling pathway | 1.0000000 |
| Nicotinate and nicotinamide metabolism | 1.0000000 |
| Nitrogen metabolism | 0.6748936 |
| NOD-like receptor signaling pathway | 0.3050000 |
| Non-alcoholic fatty liver disease (NAFLD) | 1.0000000 |
| Non-small cell lung cancer | 1.0000000 |
| Notch signaling pathway | 1.0000000 |
| One carbon pool by folate | 0.9966197 |
| Oocyte meiosis | 1.0000000 |
| Osteoclast differentiation | 1.0000000 |
| Ovarian steroidogenesis | 1.0000000 |
| Oxidative phosphorylation | 0.3852632 |
| p53 signaling pathway | 1.0000000 |
| Pancreatic cancer | 1.0000000 |
| Pancreatic secretion | 1.0000000 |
| Pantothenate and CoA biosynthesis | 1.0000000 |
| Parkinson's disease | 1.0000000 |
| Pathogenic Escherichia coli infection | 0.0000000 |
| Pentose and glucuronate interconversions | 1.0000000 |
| Pentose phosphate pathway | 1.0000000 |
| Peroxisome | 0.7826415 |
| Pertussis | 1.0000000 |
| Phagosome | 0.5509677 |
| Phenylalanine metabolism | 0.9966197 |
| Phenylalanine, tyrosine and tryptophan biosynthesis | 0.6100000 |
| Phosphatidylinositol signaling system | 1.0000000 |
| Phospholipase D signaling pathway | 1.0000000 |
| Phototransduction | 1.0000000 |
| Platelet activation | 1.0000000 |
| Porphyrin and chlorophyll metabolism | 1.0000000 |
| Primary bile acid biosynthesis | 1.0000000 |
| Prion diseases | 1.0000000 |
| Progesterone-mediated oocyte maturation | 0.0000000 |
| Prolactin signaling pathway | 1.0000000 |
| Propanoate metabolism | 0.5228571 |
| Prostate cancer | 0.0000000 |
| Protein processing in endoplasmic reticulum | 0.9384615 |
| Proximal tubule bicarbonate reclamation | 1.0000000 |
| Pyrimidine metabolism | 0.3050000 |
| Pyruvate metabolism | 1.0000000 |

| | |
|---|---|
| Regulation of autophagy | 0.6748936 |
| Regulation of lipolysis in adipocytes | 1.0000000 |
| Renal cell carcinoma | 1.0000000 |
| Renin secretion | 1.0000000 |
| Renin-angiotensin system | 1.0000000 |
| Retinol metabolism | 1.0000000 |
| Retrograde endocannabinoid signaling | 1.0000000 |
| Rheumatoid arthritis | 1.0000000 |
| Riboflavin metabolism | 1.0000000 |
| Ribosome biogenesis in eukaryotes | 0.9295238 |
| RIG-I-like receptor signaling pathway | 0.8133333 |
| RNA degradation | 0.4243478 |
| RNA transport | 0.0000000 |
| Salivary secretion | 1.0000000 |
| Salmonella infection | 1.0000000 |
| Selenocompound metabolism | 1.0000000 |
| Serotonergic synapse | 1.0000000 |
| Shigellosis | 1.0000000 |
| Signaling pathways regulating pluripotency of stem cells | 1.0000000 |
| Small cell lung cancer | 1.0000000 |
| SNARE interactions in vesicular transport | 1.0000000 |
| Sphingolipid metabolism | 1.0000000 |
| Sphingolipid signaling pathway | 1.0000000 |
| Staphylococcus aureus infection | 1.0000000 |
| Starch and sucrose metabolism | 1.0000000 |
| Steroid biosynthesis | 1.0000000 |
| Steroid hormone biosynthesis | 1.0000000 |
| Sulfur metabolism | 0.8540000 |
| Sulfur relay system | 1.0000000 |
| Synaptic vesicle cycle | 0.0000000 |
| Synthesis and degradation of ketone bodies | 0.8540000 |
| Systemic lupus erythematosus | 1.0000000 |
| T cell receptor signaling pathway | 1.0000000 |
| Taste transduction | 1.0000000 |
| Taurine and hypotaurine metabolism | 1.0000000 |
| Terpenoid backbone biosynthesis | 0.6654545 |
| TGF-beta signaling pathway | 1.0000000 |
| Thiamine metabolism | 1.0000000 |
| Thyroid cancer | 0.0000000 |
| Thyroid hormone signaling pathway | 1.0000000 |
| Thyroid hormone synthesis | 1.0000000 |
| Tight junction | 0.8540000 |
| TNF signaling pathway | 1.0000000 |
| Toll-like receptor signaling pathway | 1.0000000 |
| Toxoplasmosis | 1.0000000 |
| Transcriptional misregulation in cancer | 0.7654902 |

```
Tryptophan metabolism                                                  1.0000000
Type I diabetes mellitus                                               1.0000000
Type II diabetes mellitus                                              1.0000000
Tyrosine metabolism                                                    1.0000000
Ubiquinone and other terpenoid-quinone biosynthesis                    0.5509677
Valine, leucine and isoleucine degradation                             1.0000000
Vascular smooth muscle contraction                                     1.0000000
Vasopressin-regulated water reabsorption                               1.0000000
VEGF signaling pathway                                                 1.0000000
Vibrio cholerae infection                                              1.0000000
Viral carcinogenesis                                                   1.0000000
Viral myocarditis                                                      0.4880000
Vitamin B6 metabolism                                                  1.0000000
Vitamin digestion and absorption                                       1.0000000
Wnt signaling pathway                                                  1.0000000

$errors
named list()
```

Arguments of this functions are almost the same as in `SPIA`. Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). Alternatively, the user can supply the results of the differential expression analysis of genes in two forms:

1. a data.frame with columns: *ID* gene identifiers (they must match with the node labels), *logFC* log fold-changes, *t* - t-statistics, *pval* p-values, *padj* adjusted p-values. Then the user sets `type` to `DEtable`

2. a list with two slots: named vector of log fold-changes of differentially expressed genes and a vector of names of all genes analysed. Then the user sets `type` to `DElist`

The others arguments are optional. Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The default thresholds for the differential expression analysis of genes (the moderated t-test from `limma` is used) are set with arguments `logFC.th` and `p.val.th`. The user can omit one of these criteria by setting the agrument negative value, as is shown also in the example. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway. There is one extra argument `nperm` which controls the number of permutations.

## 3.7 PWEA

The last method available in this package is called PathWay Enrichment Analysis (PWEA). This is actually a weigthed form of common Gene Set Enrichment Analysis (GSEA). The weights are called Topological Influence Factor (TIF) and are defined as a geometic mean of ratios of Pearson's correlation coefficient and the distance of two genes in a pathway. The weights of genes outside a pathway are assigned randomly from normal distribution with parameters estimated from the weights of genes in all pathways. A statistical significance of a pathway is assessed via Kolmogorov-Simirnov-like test statistic comparing two cumulative distribution functions with class label permutations.

```
> pwe<-PWEA(hnrnp.cnts, group, pathways, type="RNASeq", nperm=100)
> #528 node labels mapped to the expression data
> #Average coverage 83.16538
> #0 (out of 10) pathways without a mapped node
> #Acute myeloid leukemia
> #Adherens junction
> #Adipocytokine signaling pathway
> #Adrenergic signaling in cardiomyocytes
> #African trypanosomiasis
> #Alanine, aspartate and glutamate metabolism
> #Alcoholism
> #Aldosterone-regulated sodium reabsorption
> #Allograft rejection
> #alpha-Linolenic acid metabolism
> res(pwe)
> #                                                ES    p     p.adj
> #Acute myeloid leukemia                     0.3526104 0.29 0.4142857
> #Adherens junction                          0.3829831 1.00 1.0000000
> #Adipocytokine signaling pathway            0.3102945 1.00 1.0000000
> #Adrenergic signaling in cardiomyocytes     0.3611207 0.20 0.3333333
> #African trypanosomiasis                    0.3272899 0.20 0.3333333
> #Alanine, aspartate and glutamate metabolism 0.2720946 0.20 0.3333333
> #Alcoholism                                 0.4708293 0.86 1.0000000
> #Aldosterone-regulated sodium reabsorption   0.3951037 0.20 0.3333333
> #Allograft rejection                        0.9421248 0.03 0.3000000
> #alpha-Linolenic acid metabolism            0.6587026 0.20 0.3333333
```

Apart from the expected arguments: a gene expression data matrix, a vector of class labels and a list of pathways, the user needs to specify the `type` argument which decides on the type of the data (`"MA"` is used for expression microarray and `"RNASeq"` for RNA-Seq data). The others arguments are optional.Arguments `convertTo` and `convertBy` control the conversion of the node labels in the pathways. The default setting is `convertTo="none"` which performs no conversion. Please note, that the node labels should be the same as the rownames of gene expression data matrix. The `alpha` parameter sets a threshold for gene weights.

The purpose of this filtering is to reduce the possiblity that a weight of a gene that is tighly correlated with a few genes are lowered by the weak correlation with other genes in a pathway. The implementation returns also a gene-level statistics of the differential expression of genes. These statistics are later used in the visualization of a selected pathway. The `nperm` argument controls the number of permutations.

# Chapter 4

# Outputs and visualization of the results for one pathway

All the functions mentioned in this vignette return an object of class `topResult`. It is a list with three slots. The first one is called `res` and contains a data frame of the results for all the pathways. The actual informations there differ among the methods and are described in the manual. The second slot is called `topo.sig` and it is a list of topological significances of genes in pathways. The term topologial significance means scores used to measure the importance of a gene in a pathway. The higher the score the more important gene. It is `NULL` for TAPPA and DEGraph method, because they do not provide any measure of this kind. The last slot contains the log fold-changes or test statistics of differential expression at gene level. They are necessary in the `plot` function for all the methods except TopologyGSA and clipper.

The `plot()` function has three necessarry arguments when it is to be applied on `topResult` object. The first one is an output from any of the methods. The second one is either a name of a pathway or its number in a list of pathways. And the last one is a list of pathways used in the analysis.

The final visualization of the results for one pathway is method specific. Three arguments that are common to all methods are:

- `IDs` - the type of gene labels in the original data, `"entrez"` by default
- `graphIDS` - the type of gene labels to be used in plot, `"symbol"` by default
- `layout` - the layout of the graph from `Rgraphviz` package, `"dot"` by default, other possibilities are e.g. `"neato"` or `"twopi"`

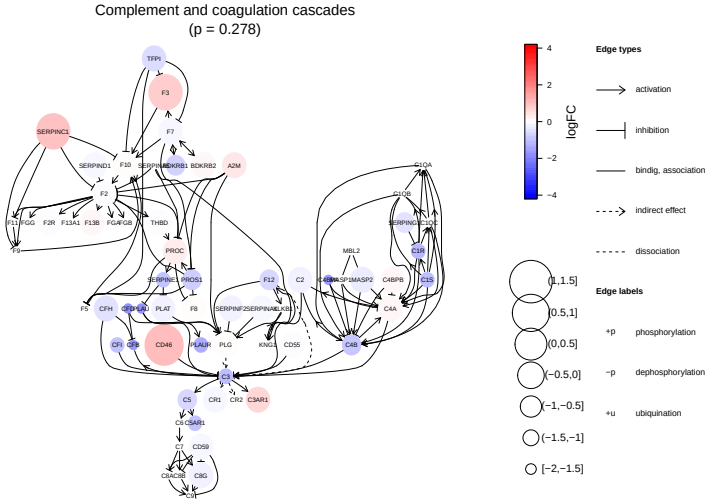
The significant cliques are enhanced in the results of TopologyGSA and clipper. Since the whole analysis with these method is done on transformed topology (moralized then triangulated graphs), the transformed topology is also drawn in the visualization. The user can specify the color which used for edges between nodes from a significant clique (default value is `cli.color="red"` and

can be either a character or a function that returns a color pallette) and the color of nodes (default value is `cli.node.color="white"`. The `alpha` controls the significance threshold for the cliques. If `add.legend=TRUE` then a legend is drawn containing the colors of edges of individual cliques, their genes and p-value. The `intersp` can be used to adjust the space between items of legened.

```
> #Fails during check
> library(gageData)
> data(hnrnp.cnts)
> group<-c(rep("sample",4), rep("control",4))
> hnrnp.cnts<-hnrnp.cnts[rowSums(hnrnp.cnts)>0,]
> res<-clipper(hnrnp.cnts, group, pathways[1:2], type="RNASeq", testCliques=TRUE)
> plot(res,1, pathways)
>
```

In the visualization of the results from PRS, PWEA or SPIA method, the nodes are colored accoring to the selected gene-level statistic and the size of node reflects the topological significance of a node. Because TAPPA and DEGraph do not provide any specific topological or statistical measure at gene-level, only the coloring of the nodes according to gene-level statistics is used. The user can specify the number of breaks for gene statistics and topological significance of genes (default values are 100 and 5, `breaks=c(100,5)`), colors in the pallete for the gene statistics (default is `pallete.colors=c("blue","white", "red")` and a color for missing nodes `na.col="grey"`. The `stats` argument controls the label of the gene statistics and `title` controls whether the name of a pathway and its p-value should be written as a title. The user can also adjust the size of the nodes (`nodesize`) and font (`fontsize`)

```
> library(gageData)
> data(hnrnp.cnts)
> group<-c(rep("sample",4), rep("control",4))
> hnrnp.cnts<-hnrnp.cnts[rowSums(hnrnp.cnts)>0,]
> pathways<-pathways("hsapiens", "kegg")[50:55]
> spi<-SPIA(hnrnp.cnts, group, pathways, type="RNASeq", logFC.th=-1)
> plot(spi,"Complement and coagulation cascades", pathways, fontsize=50)
>
```


Complement and coagulation cascades
(p = 0.278)
TFPI
F3
F7
SERPINC1
SERPIND1
F10
SERPINE1
BDKRB1
BDKRB2
A2M
F2
F12
F2G
F2R
F13A1
F13B
F2AR
GP1BB
THBD
F9
PROC
SERPINE1
PROS1
F5
CFH
CFB
CFD
PLAT
F8
SERPINF2
SERPINA5
F12
C2
CFI
CFB
CD46
PLAUR
PLG
KNG1
CD55
C3
C5
CR1
CR2
C3AR1
C5
C5AR1
C7
CD59
C8A
C8B
C8G
C9
C1QA
C1QB
SERPING1
C1QC
C1R
C1S
MBL2
MASP1
MASP2
C4BPB
C4A
C4B


4
2
0
−2
−4
logFC
Edge types
activation
inhibition
bindig, association
indirect effect
dissociation
(1,1.5]
(0.5,1]
(0,0.5]
(−0.5,0]
(−1,−0.5]
(−1.5,−1]
[−2,−1.5]
Edge labels
+p phosphorylation
−p dephosphorylation
+u ubiquination

Figure 4.1:

# Bibliography


[Al-Haj Ibrahim *et al.*(2012)] Al-Haj Ibrahim, M., Jassim, S., Cawthorne, M. A., and Langlands, K. (2012). A topology-based score for pathway enrichment. *J Comput Biol*.

[Anders and Huber(2010)] Anders, S. and Huber, W. (2010). Differential expression analysis for sequence count data. *Genome Biology*, **11**(10), R106.

[Dillies *et al.*(2013)] Dillies, M.-A., Rau, A., Aubert, J., Hennequet-Antier, C., Jeanmougin, M., Servant, N., Keime, C., Marot, G., Castel, D., Estelle, J., Guernec, G., Jagla, B., Jouneau, L., Laloe, D., Le Gall, C., Schaeffer, B., Le Crom, S., Guedj, M., and Jaffrezic, F. (2013). A comprehensive evaluation of normalization methods for illumina high-throughput rna sequencing data analysis. *Briefings in Bioinformatics*, **14**(6), 671–683.

[Draghici *et al.*(2007)] Draghici, S., Khatri, P., Tarca, A. L., Amin, K., Done, A., Voichita, C., Georgescu, C., and Romero, R. (2007). A systems biology approach for pathway level analysis. *Genome Research*, **17**(10), 000.

[Gao and Wang(2007)] Gao, S. and Wang, X. (2007). Tappa: topological analysis of pathway phenotype association. *Bioinformatics*, **23**(22), 3100–3102.

[Hung *et al.*(2010)] Hung, J.-H., Whitfield, T., Yang, T.-H., Hu, Z., Weng, Z., and DeLisi, C. (2010). Identification of functional modules that correlate with phenotypic difference: the influence of network topology. *Genome Biology*, **11**(2), R23.

[Jacob *et al.*(2010)] Jacob, L., Neuvial, P., and Dudoit, S. (2010). Gains in Power from Structured Two-Sample Tests of Means on Graphs. *ArXiv e-prints*.

[Martini *et al.*(2012)] Martini, P., Sales, G., Massa, M. S., Chiogna, M., and Romualdi, C. (2012). Along signal paths: an empirical gene set approach exploiting pathway topology. *Nucleic Acids Research*.

[Massa *et al.*(2010)] Massa, M., Chiogna, M., and Romualdi, C. (2010). Gene set analysis exploiting the topology of a pathway. *BMC Systems Biology*, **4**(1), 121.

[R Core Team(2014)] R Core Team (2014). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria.

[Robinson and Oshlack(2010] Robinson, M. and Oshlack, A. (2010). A scaling normalization method for differential expression analysis of rna-seq data. *Genome Biology*, **11**(3), R25.

[Sales *et al.*(2012)] Sales, G., Calura, E., Cavalieri, D., and Romualdi, C. (2012). graphite - a bioconductor package to convert pathway topology to gene network. *BMC Bioinformatics*, **13**(1), 20.

[Tarca *et al.*(2009)] Tarca, A. L., Draghici, S., Khatri, P., Hassan, S. S., Mittal, P., Kim, J.-s., Kim, C. J., Kusanovic, J. P., and Romero, R. (2009). A novel signaling pathway impact analysis. *Bioinformatics*, **25**(1), 75–82.