

Electronic Supplementary information

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

Danqi Li,^a Da Liu,^{a,b} Dandan Yue,^{a,c} Pinyi Gao,^{a,b} Cheng Du,^{*d} Xuegui Liu,^{*a,b} Lixin
Zhang^{*a}

^a Institute of Functional Molecules, Liaoning Province Key Laboratory of Green Functional Molecular Design and Development, Shenyang key Laboratory of targeted pesticides, Shenyang University of Chemical Technology, Shenyang 110142, Liaoning, PR China

^b College of Pharmaceutical and Biological Engineering, Shenyang University of Chemical Technology, Shenyang 110142, Liaoning, PR China

^c College of Applied Chemistry, Shenyang university of chemical technology, Shenyang 110142, Liaoning, PR China

^d Department of Oncology, General Hospital of Northern Theater Command, Shenyang 110840, Liaoning, PR China

*Correspondence to: Cheng Du, Xuegui Liu, and Lixin Zhang, College of Pharmaceutical and Biological Engineering, Shenyang University of Chemical Technology, Shenyang 110142, Liaoning, PR China. Institute of Functional Molecules, Shenyang University of Chemical Technology, Shenyang 110142, Liaoning, PR China.

E-mail: dc1115010@sina.com; liuxuegui@syuct.edu.cn; zhanglixin@syuct.edu.cn. Tel: +86-24-89385213, Fax: +86-24-89385213

List of supplementary content

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

Figure S2 HR-ESI-MS spectrum of saikosaponin-d

Table S1 The structures of compounds in the article

Table S2 Relevant information of target proteins and network features in the C-T network

Table S3 targets proteins and related signaling pathways

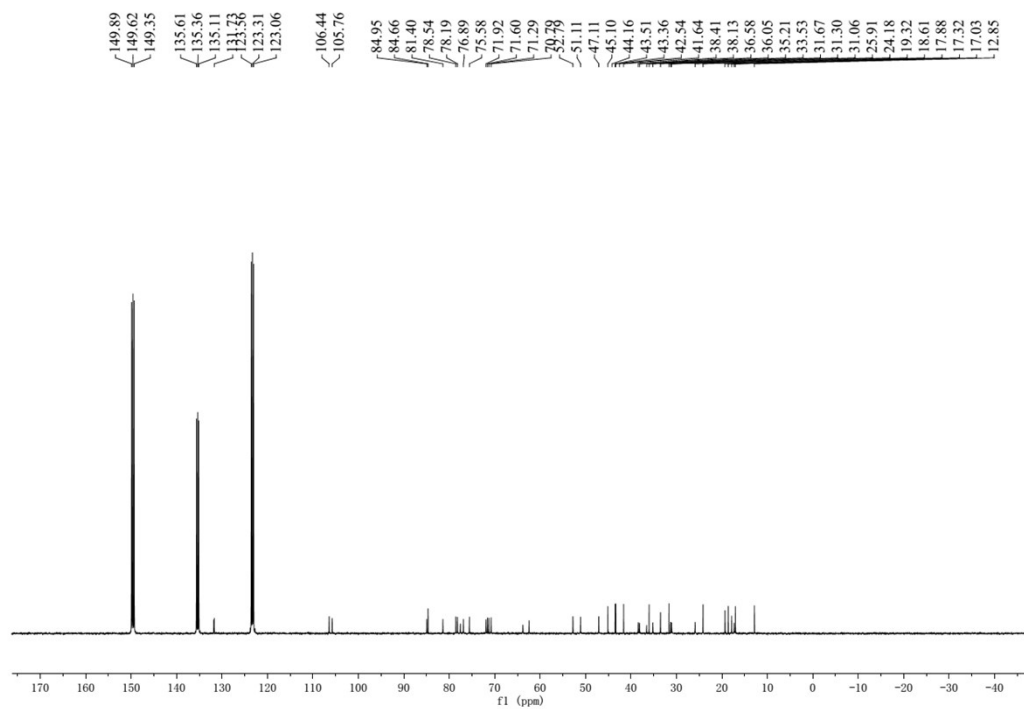


Figure S1 ¹³C-NMR spectrum (100 MHz, pyridine-*d*₅) of saikosaponin-d

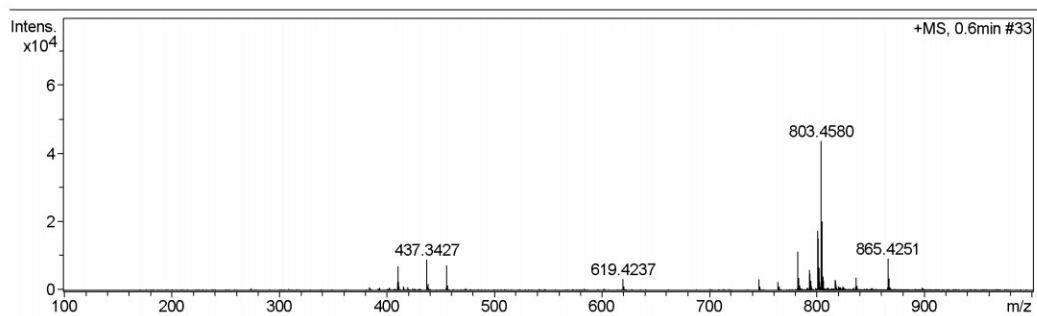
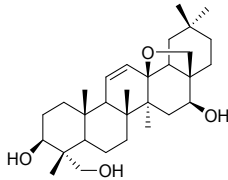
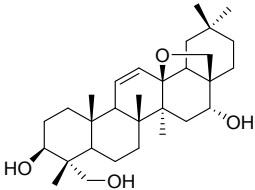
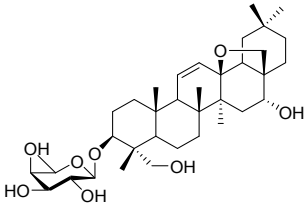
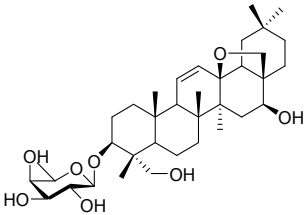
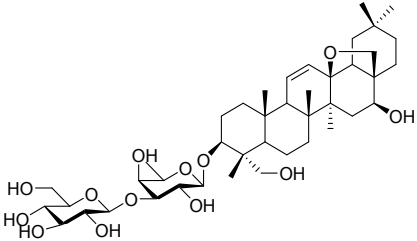
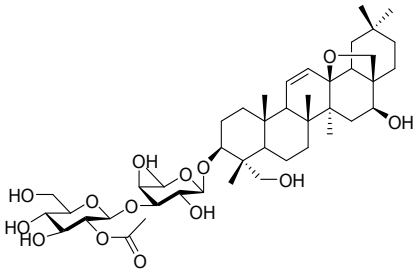
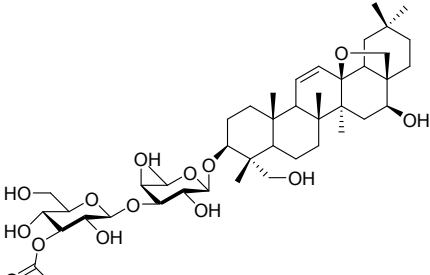
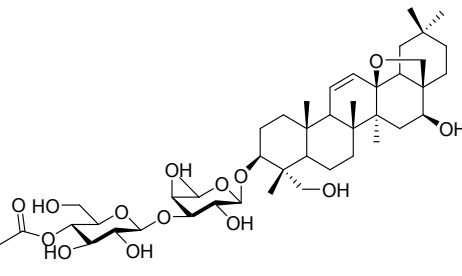
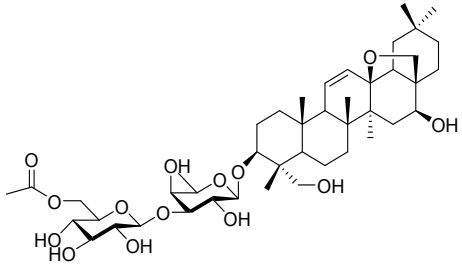
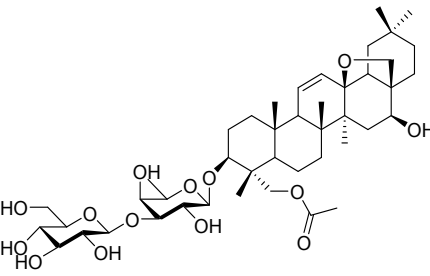
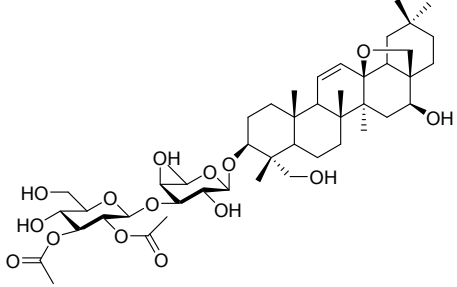
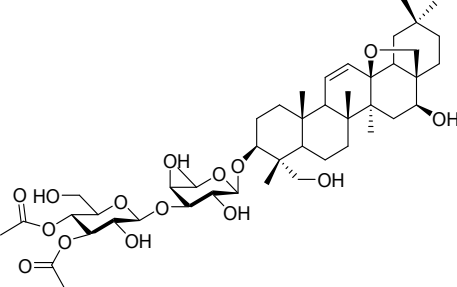
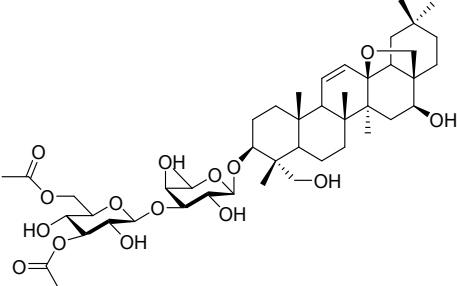
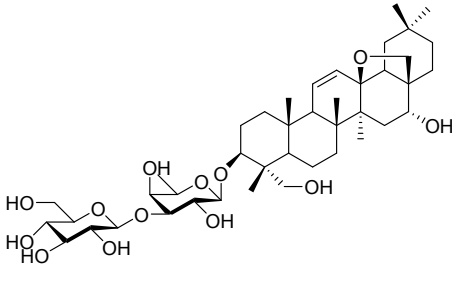


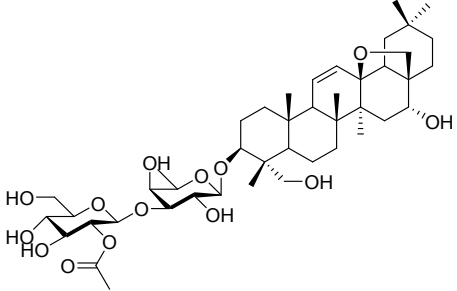
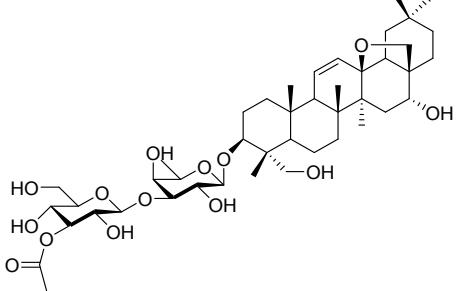
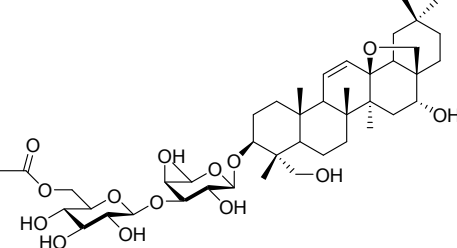
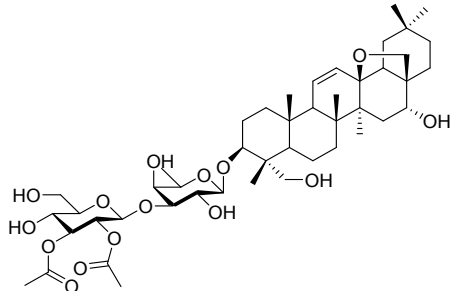
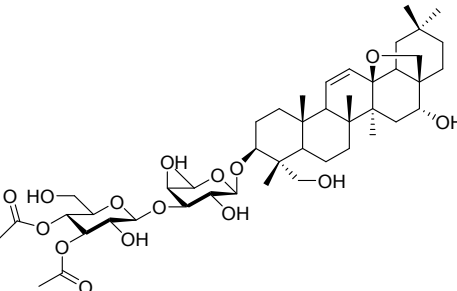
Figure S2 HR-ESI-MS spectrum of saikosaponin-d

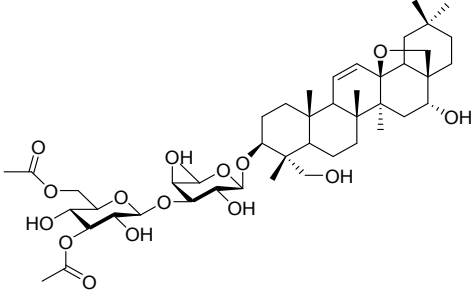
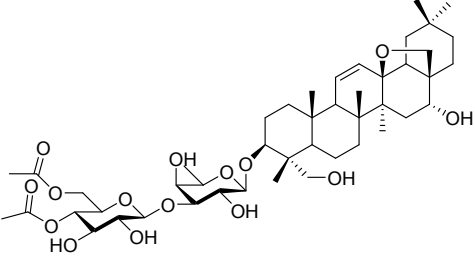
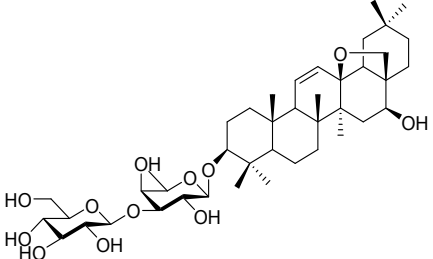
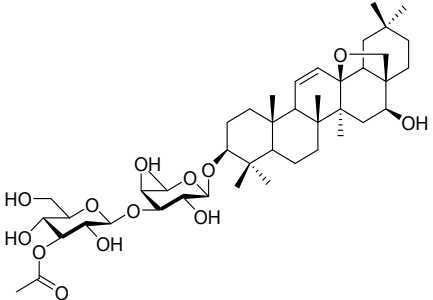
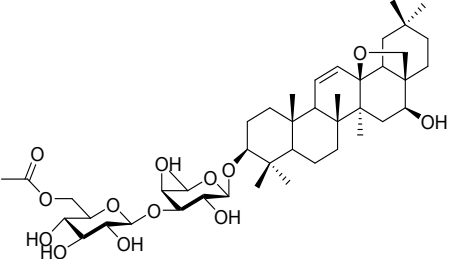
Table S1 The structures of compounds in the article

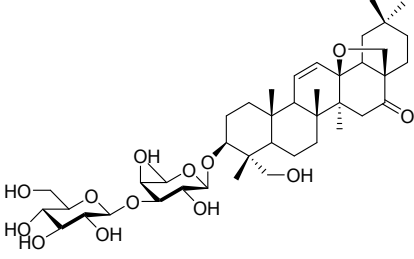
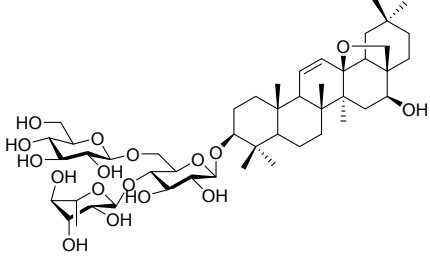
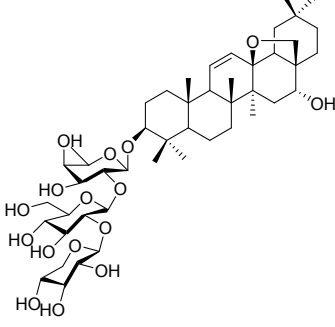
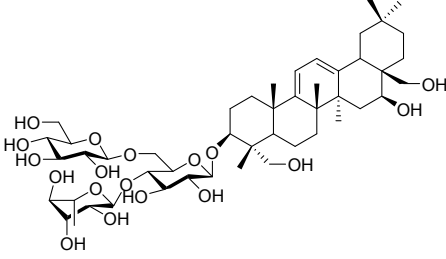
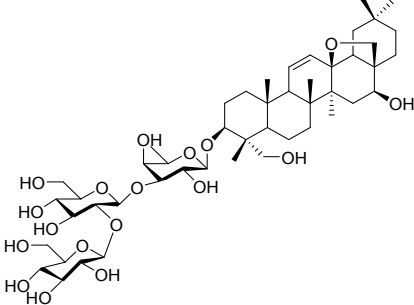
Number	Name	Structure
1	saikogenin F	
2	saikogenin G	
3	prosaikogenin G	
4	prosaikogenin F	
5	saikosaponin-a	

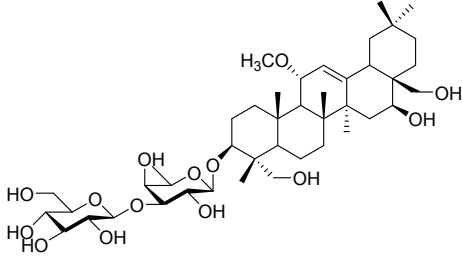
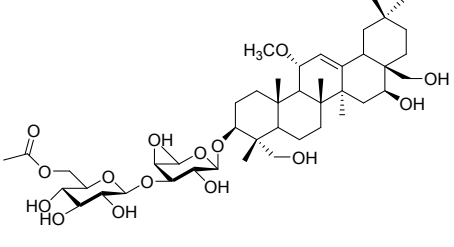
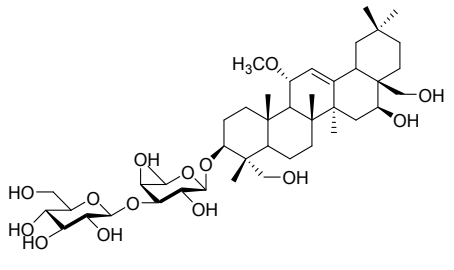
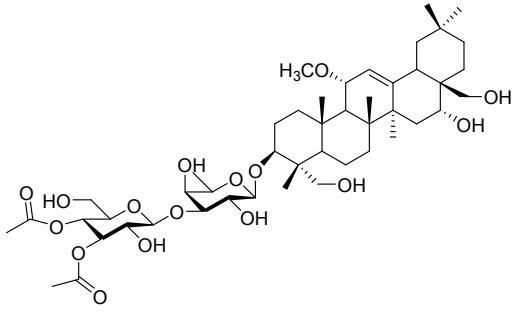
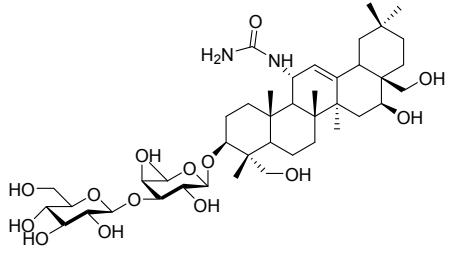
6	2''-O-acetylsaikosaponin-a	 <p>The structure shows a saikoside aglycone (saikosaponin-a) with a disaccharide chain attached to the C-3 position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the C-2'' position of the galactose unit.</p>
7	3''-O-acetylsaikosaponin-a	 <p>The structure shows a saikoside aglycone with a disaccharide chain attached to the C-3 position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the C-3'' position of the galactose unit.</p>
8	4''-O-acetylsaikosaponin-a	 <p>The structure shows a saikoside aglycone with a disaccharide chain attached to the C-3 position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the C-4'' position of the galactose unit.</p>
9	6''-O-acetylsaikosaponin-a	 <p>The structure shows a saikoside aglycone with a disaccharide chain attached to the C-3 position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the C-6'' position of the galactose unit.</p>
10	23-O-acetylsaikosaponin-a	 <p>The structure shows a saikoside aglycone with a disaccharide chain attached to the C-3 position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the C-23 position of the saikoside aglycone.</p>

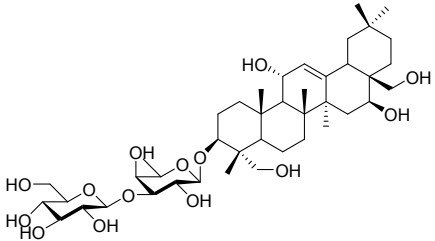
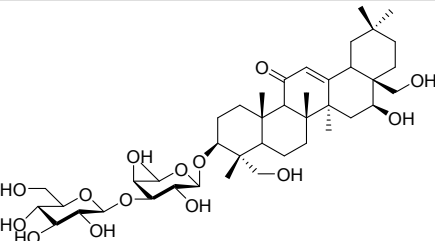
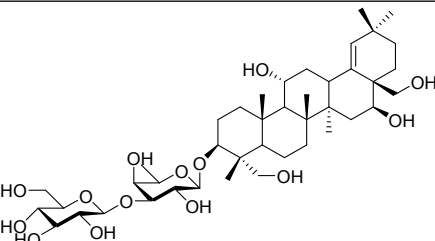
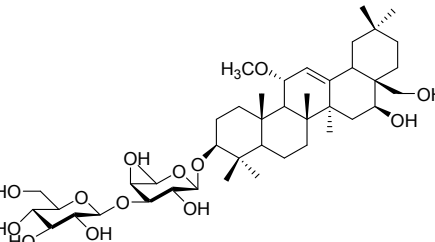
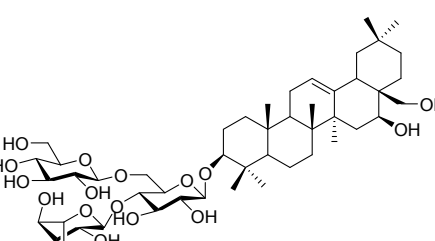
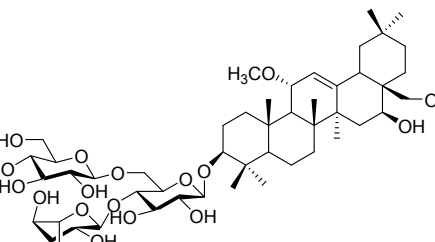
11	2'', 3''- <i>O</i> -diacetylsaikosaponin-a	 <p>The structure shows a complex steroid nucleus with a pentacyclic core. It features a diacetyl sugar chain attached to the C-3'' position. The sugar chain consists of a glucose unit linked to a galactose unit, which is further linked to a rhamnose unit. The 2'' and 3'' positions of the rhamnose unit are acetylated. The steroid nucleus has several methyl groups and hydroxyl groups, including a double bond in the B-ring and a hydroxyl group at C-14.</p>
12	3'', 4''- <i>O</i> -diacetylsaikosaponin-a	 <p>The structure is similar to the previous one, but the acetyl groups are attached to the 3'' and 4'' positions of the rhamnose unit. The rest of the steroid nucleus and sugar chain are identical.</p>
13	3'', 6''- <i>O</i> -diacetylsaikosaponin-a	 <p>The structure is similar to the previous ones, but the acetyl groups are attached to the 3'' and 6'' positions of the rhamnose unit. The rest of the steroid nucleus and sugar chain are identical.</p>
14	saikosaponin-d	 <p>The structure shows the steroid nucleus and sugar chain of saikosaponin-d. It features a diacetyl sugar chain attached to the C-3'' position, consisting of a glucose unit linked to a galactose unit, which is further linked to a rhamnose unit. The 2'' and 3'' positions of the rhamnose unit are acetylated. The steroid nucleus has several methyl groups and hydroxyl groups, including a double bond in the B-ring and a hydroxyl group at C-14.</p>

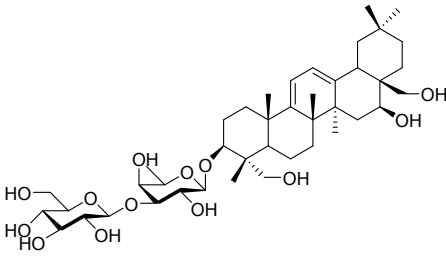
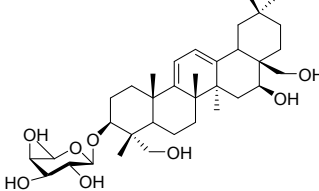
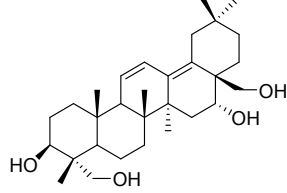
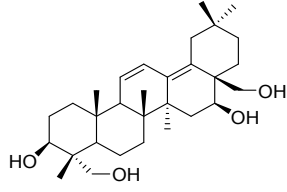
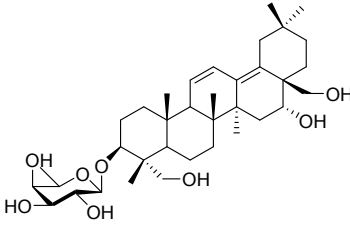
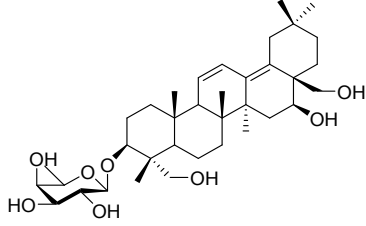
15	2''-O-acetylsaikosaponin-d	 <p>The structure shows a saikosaponin-d aglycone with a disaccharide chain at the 2'' position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the 2'' carbon of the galactose unit.</p>
16	3''-O-acetylsaikosaponin-d	 <p>The structure shows a saikosaponin-d aglycone with a disaccharide chain at the 3'' position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the 3'' carbon of the galactose unit.</p>
17	6''-O-acetylsaikosaponin-d	 <p>The structure shows a saikosaponin-d aglycone with a disaccharide chain at the 6'' position. The disaccharide consists of a glucose unit linked to a galactose unit. An acetyl group is attached to the 6'' carbon of the galactose unit.</p>
18	2'',3''-O-diacetylsaikosaponin-d	 <p>The structure shows a saikosaponin-d aglycone with a disaccharide chain at the 2'' position. The disaccharide consists of a glucose unit linked to a galactose unit. Acetyl groups are attached to the 2'' and 3'' carbons of the galactose unit.</p>
19	3'',4''-O-diacetylsaikosaponin-d	 <p>The structure shows a saikosaponin-d aglycone with a disaccharide chain at the 3'' position. The disaccharide consists of a glucose unit linked to a galactose unit. Acetyl groups are attached to the 3'' and 4'' carbons of the galactose unit.</p>

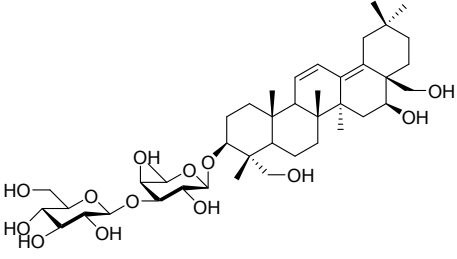
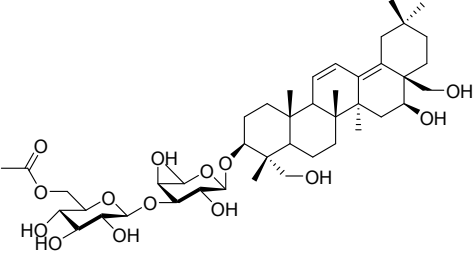
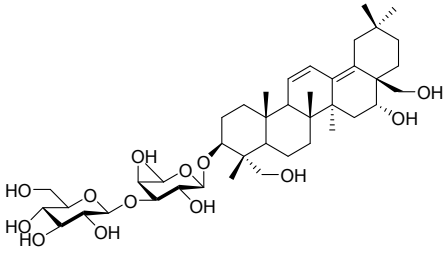
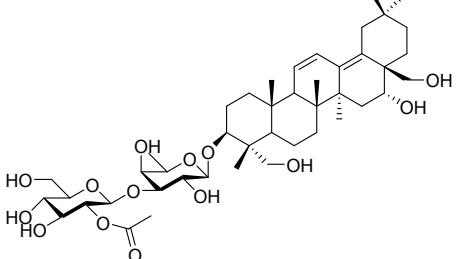
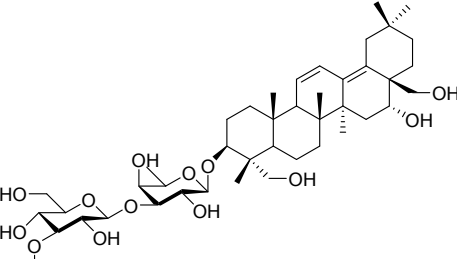
20	3",6"- <i>O</i> -diacetylsaikosaponin-d	
21	4",6"- <i>O</i> -diacetylsaikosaponin-d	
22	saikosaponins-e	
23	3"- <i>O</i> -acetylsaikosaponin-e	
24	6"- <i>O</i> -acetylsaikosaponin-e	

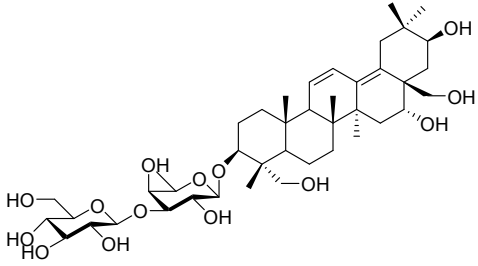
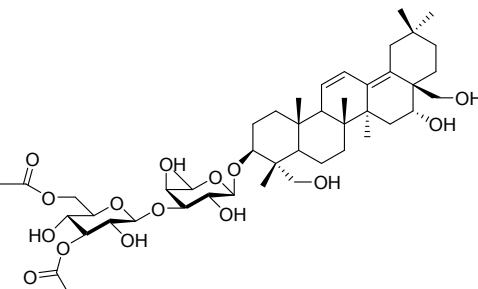
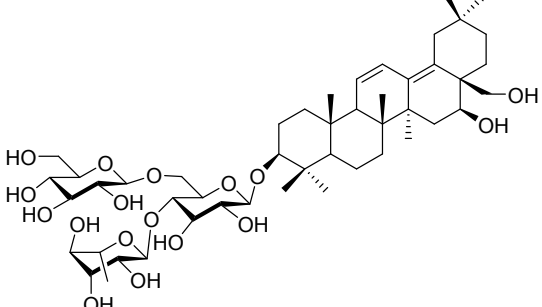
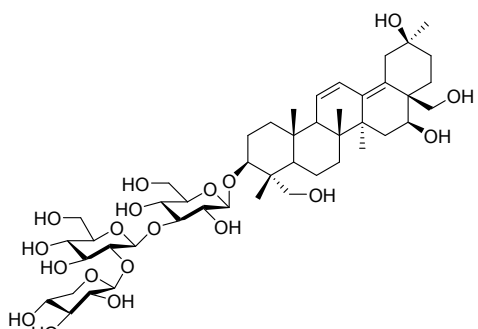
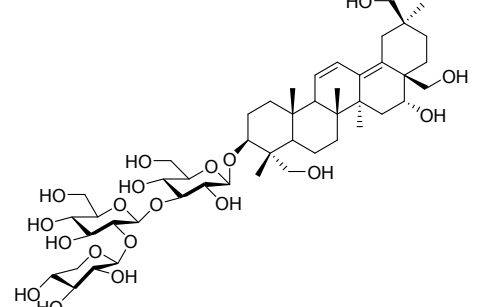
25	23-hydroxy-13 β , 28 β -epoxy-olean-11-ene-16-one 3-O- β -D-glucopyranosyl-(1 \rightarrow 3)- β -D-fucopyranoside	
26	saikosaponin-c	
27	rotundioside F	
28	saikosaponin-i	
29	bupleuroside I	

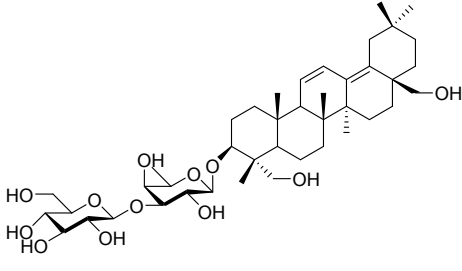
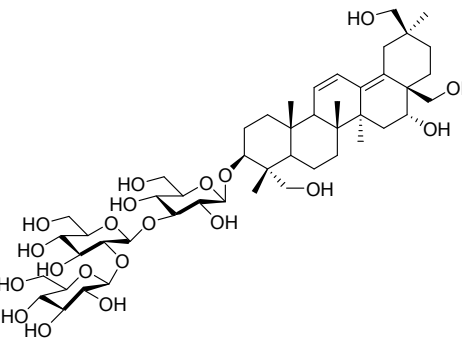
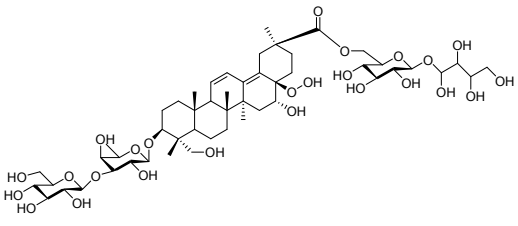
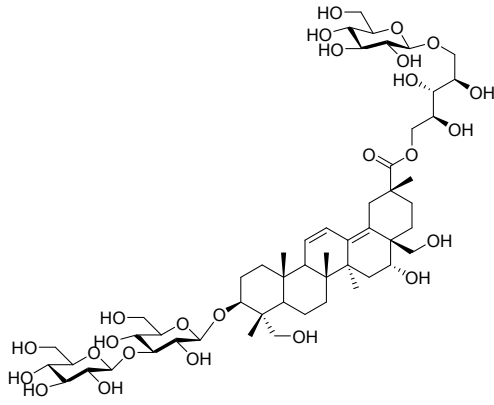
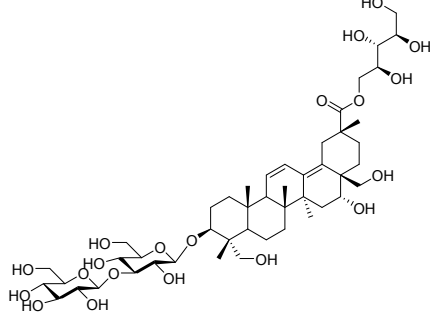
30	saikosaponin-b ₃	 <p>The structure shows a complex steroid nucleus with a methoxy group (H₃CO) at C-13, a double bond at C-14, and hydroxyl groups at C-3, C-14, C-15, and C-20. It is linked via a glycosidic bond to a disaccharide chain consisting of a glucose unit at the C-3 position and a galactose unit at the C-14 position.</p>
31	6''-O-acetylsaikosaponin-b ₃	 <p>This structure is identical to saikosaponin-b₃ but features an acetyl group (CH₃CO) attached to the 6''-OH position of the galactose unit in the disaccharide chain.</p>
32	saikosaponin-b ₄	 <p>The structure is identical to saikosaponin-b₃, showing the same steroid nucleus and disaccharide chain (glucose at C-3, galactose at C-14).</p>
33	3'', 4''-diacetylsaikosaponin-b ₄	 <p>This structure is identical to saikosaponin-b₄ but has acetyl groups (CH₃CO) attached to the 3''-OH and 4''-OH positions of the galactose unit in the disaccharide chain.</p>
34	saikosaponin-w	 <p>The structure is identical to saikosaponin-b₃ but features a hydrazide group (H₂N-CO-NH) at the C-13 position instead of a methoxy group.</p>

35	bupleuroside III	
36	bupleuroside VI	
37	bupleuroside XIII	
38	saikosaponin-t	
39	saikosaponin-f	
40	11 α -methoxysaikosaponin-f	

41	saikosaponin-g	
42	prosaikogenin H	
43	saikogenin D	
44	saikogenin A	
45	prosaikogenin D	
46	prosaikogenin A	

47	saikosaponin-b ₁	 <p>The structure shows a complex steroid nucleus with multiple hydroxyl groups and methyl substituents. It is linked via a glycosidic bond to a disaccharide chain consisting of a glucose unit and a galactose unit.</p>
48	6''-O-acetylsaikosaponin-b ₁	 <p>This structure is identical to saikosaponin-b₁ but features an acetyl group (-COCH₃) attached to the 6'' position of the galactose unit in the disaccharide chain.</p>
49	saikosaponin-b ₂	 <p>The structure shows a complex steroid nucleus with multiple hydroxyl groups and methyl substituents. It is linked via a glycosidic bond to a disaccharide chain consisting of a glucose unit and a galactose unit.</p>
50	2''-O-acetylsaikosaponin-b ₂	 <p>This structure is identical to saikosaponin-b₂ but features an acetyl group (-COCH₃) attached to the 2'' position of the galactose unit in the disaccharide chain.</p>
51	3''-O-acetylsaikosaponin-b ₂	 <p>This structure is identical to saikosaponin-b₂ but features an acetyl group (-COCH₃) attached to the 3'' position of the galactose unit in the disaccharide chain.</p>

52	21 β -hydroxysaikosaponin-b ₂	 <p>The structure shows a complex steroid nucleus with a hydroxyl group at C-21. It is linked via a glycosidic bond to a disaccharide chain consisting of a glucose unit and a galactose unit.</p>
53	3'',6''-O-acetylsaikosaponin-b ₂	 <p>The structure is similar to 21β-hydroxysaikosaponin-b₂ but features two acetyl groups attached to the 3'' and 6'' positions of the galactose unit in the disaccharide chain.</p>
54	saikosaponin-h	 <p>The structure features a steroid nucleus with a complex branched sugar chain attached at C-3. The sugar chain includes multiple glucose and galactose units.</p>
55	saikosaponin-k	 <p>The structure shows a steroid nucleus with a complex branched sugar chain. It includes a galactose unit at the top of the chain and several glucose units below it.</p>
56	saikosaponin-l	 <p>The structure is similar to saikosaponin-k, featuring a steroid nucleus with a complex branched sugar chain composed of galactose and glucose units.</p>

57	saikosaponin-m	 <p>The structure of saikosaponin-m consists of a steroid nucleus with a double bond at C5, a hydroxyl group at C3, and a methyl group at C10. It is linked via an ether bond at C13 to a branched chain of three pyranose rings. The terminal ring is a galactose unit with hydroxyl groups at C2, C3, and C6.</p>
58	saikosaponin-s	 <p>The structure of saikosaponin-s features a steroid nucleus with a double bond at C5, hydroxyl groups at C3 and C14, and a methyl group at C10. It is linked via an ether bond at C13 to a branched chain of three pyranose rings. The terminal ring is a galactose unit with hydroxyl groups at C2, C3, and C6.</p>
59	saikosaponin-v	 <p>The structure of saikosaponin-v has a steroid nucleus with a double bond at C5, hydroxyl groups at C3 and C14, and a methyl group at C10. It is linked via an ether bond at C13 to a branched chain of three pyranose rings. The terminal ring is a galactose unit with hydroxyl groups at C2, C3, and C6. Additionally, there is a side chain at C17 consisting of a propanoic acid moiety linked to a dihydroxyethyl group.</p>
60	scorzoneraside A	 <p>The structure of scorzoneraside A features a steroid nucleus with a double bond at C5, hydroxyl groups at C3 and C14, and a methyl group at C10. It is linked via an ether bond at C13 to a branched chain of three pyranose rings. The terminal ring is a galactose unit with hydroxyl groups at C2, C3, and C6. A side chain at C17 consists of a propanoic acid moiety linked to a dihydroxyethyl group.</p>
61	scorzonerosides B	 <p>The structure of scorzonerosides B is similar to scorzoneraside A, featuring a steroid nucleus with a double bond at C5, hydroxyl groups at C3 and C14, and a methyl group at C10. It is linked via an ether bond at C13 to a branched chain of three pyranose rings. The terminal ring is a galactose unit with hydroxyl groups at C2, C3, and C6. A side chain at C17 consists of a propanoic acid moiety linked to a dihydroxyethyl group.</p>

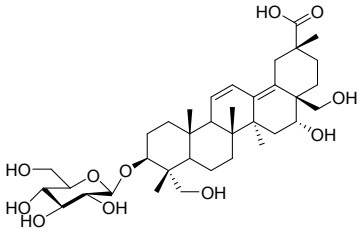
62	scorzonerosides C	 <p>The chemical structure of scorzonerosides C is a complex polycyclic molecule. It features a pentacyclic core consisting of a decalin system fused to a six-membered ring with a double bond, which is further fused to a six-membered ring containing a carboxylic acid group (-COOH). A side chain is attached to the decalin system, ending in a glucose moiety. The glucose is shown in its cyclic pyranose form with multiple hydroxyl groups (-OH) at various positions. Stereochemistry is indicated with wedged and dashed bonds throughout the structure.</p>
----	-------------------	---

Table S2 Relevant information of target proteins in the article and network features in the C-T network

NO.	Protein names	Gene names	Protein codes	Resolution	Degrees of target proteins	Betweenness of target proteins
1	Insulin-like growth factor 1 receptor	IGF1R	3NW7	2.11 Å	1	0
2	Heat shock protein HSP 90-alpha	HSP90AA1	4YKZ	1.85 Å	2	9.39E-04
3	Phosphatidylinositol 4,5-	PIK3CA	4JPS	2.2 Å	1	0

	bisphosphate 3-kinase catalytic subunit alpha					
4	Proto-oncogene tyrosine- protein kinase Src	SRC	4MXO	2.105 Å	10	0.08361207
5	Probable ATP-dependent RNA helicase DDX5	DDX5	3FE2	2.6 Å	14	0.09386843
6	Hepatocyte growth factor receptor	c-Met	5EYD	1.85 Å	0	0
7	Prostaglandin G/H synthase 2	COX2	5KIR	2.697 Å	2	4.25E-04
8	Neutrophil gelatinase- associated lipocalin	LCN2	3DSZ	2 Å	3	0.00454735
9	Protein-glutamine gamma- glutamyltransferase 2	TGM2	4PYG	2.8 Å	0	0
10	Protein kinase C alpha	PRKCA	4RA4	2.63 Å	12	0.07004885
11	Serine/threonine-protein kinase mTOR	mTOR	4JT5	3.45 Å	3	0.00282128
12	Estrogen receptor	ESR1	5FQV	1.74 Å	0	0
13	Disintegrin and metalloproteinase domain-containing protein 17	ADAM17	3LEA	2 Å	8	0.01679009
14	Receptor tyrosine-protein kinase erbB-2	ERBB2	3PP0	2.25 Å	0	0
15	Tumor Protein P53	TP53	5G4O	1.48 Å	0	0
16	Epidermal Growth Factor Receptor	EGFR	5JEB	3.298 Å	3	0.00394928
17	Cadherin 1	CDH1	4ZTE	2.13 Å	5	0.02783261

18	Catenin Beta 1	CTNNB1	3TX7	2.76 Å	0	0
19	Fibroblast Growth Factor Receptor 2	FGFR2	5EG3	2.606 Å	6	0.01547412
20	Progesterone Receptor	PGR	1SR7	1.46 Å	0	0
21	Prostaglandin-Endoperoxide Synthase 2	PTGS2	5IKT	2.451 Å	3	0.00170749
22	Erb-B2 Receptor Tyrosine Kinase 3	ERBB3	6OP9	2.501 Å	10	0.05911205
23	Apoptosis regulator Bcl-2	BCL2	4LXD	1.9 Å	26	0.2472
24	Aromatase	CYP19A1	3EQM	2.9 Å	0	0
25	Proto-oncogene c-Abl	ABL1	4ZOG	2.3 Å	3	0.00661283
26	Estrogen receptor beta	ESR2	4ZI1	2.1 Å	0	0
27	Vascular endothelial growth factor receptor 2	KDR	3EWH	1.6 Å	0	0
28	Cytochrome P450 11B1	CYP11B1	6M7X	2.095 Å	0	0
29	PI3K delta	PIK3CD	5T8F	2.91 Å	8	0.02876791
30	Carbonic anhydrase IV	CA4	3F7B	2.05 Å	4	0.00616844
31	Carbonic anhydrase II	CA2	4PZH	1.06 Å	1	0
32	Urokinase-type plasminogen activator	PLAU	1SQT	1.9 Å	9	0.03517613
33	DNA topoisomerase I	TOP1MT	1T8I	3 Å	6	0.01743362
34	Insulin receptor	INSR	5HHW	1.79 Å	4	0.00569398
35	FL cytokine receptor	FLT3	4XUF	3.2 Å		
36	Protein kinase C gamma type	PRKCG	2UZP	2 Å	1	0

37	Androgen receptor	AR	5V8Q	1.44 Å	0	0
38	Mast/stem cell growth factor receptor	KIT	3G0E	1.6 Å	0	0
39	Tyrosine-protein kinase JAK2	JAK2	5UT6	1.645 Å	2	0.00165432
40	FL cytokine receptor	FLT3	4RT7	3.1 Å	0	0
41	Cyclin-dependent kinase 6	CDK6	5L2T	2.37 Å	3	0.00186753
42	Dihydrofolate reductase	DHFR	4QJC	1.62 Å	9	0.02963539
43	Urokinase plasminogen activator surface receptor	PLAUR	3U74	2.39 Å	0	0
44	Ephrin type-A receptor 2	EPHA2	5IA5	1.776 Å	0	0
45	Dual specificity mitogen-activated protein kinase kinase 1	MAP2K1	5EYM	2.7 Å	0	0
46	C-X-C chemokine receptor type 4	CXCR4	3OE9	3.1 Å	18	0.11203831
47	Cathepsin D	CTSD	4OD9	1.9 Å	9	0.03673176
48	Ubiquitin-protein ligase E3 Mdm2	MDM2	5LAW	1.64 Å	4	0.00974686
49	Stromal cell-derived factor 1	CXCL12	4UAI	1.9 Å	2	0.00127425
50	Steryl-sulfatase	STS	1P49	2.6 Å	0	0
51	Cytochrome P450 2C19	CYP2C19	4GQS	2.87 Å	0	0
52	Thymidine phosphorylase	TYMP	1UOU	2.11 Å	0	0
53	Steroid hormone receptor ERR1	ESRRA	3K6P	1.996 Å	0	0

	RAC-alpha					
54	serine/threonine-protein kinase	AKT1	4GV1	1.49 Å	6	0.01464801

Table S3 targets proteins and related signaling pathways

Protein names	Gene names	Protein codes	Related pathways
			hsa01521 EGFR tyrosine kinase inhibitor resistance
			hsa01522 Endocrine resistance
			hsa04010 MAPK signaling pathway
			hsa04014 Ras signaling pathway
			hsa04015 Rap1 signaling pathway
			hsa04066 HIF-1 signaling pathway
Insulin-like growth factor 1 receptor	IGF1R	3NW7	hsa04068 FoxO signaling pathway
			hsa04114 Oocyte meiosis
			hsa04140 Autophagy - animal
			hsa04144 Endocytosis
			hsa04150 mTOR signaling pathway
			hsa04151 PI3K-Akt signaling pathway
			hsa04152 AMPK signaling pathway
			hsa04211 Longevity regulating pathway

		hsa04213 Longevity regulating pathway - multiple species
		hsa04510 Focal adhesion
		hsa04520 Adherens junction
		hsa04550 Signaling pathways regulating pluripotency of stem cells
		hsa04730 Long-term depression
		hsa04913 Ovarian steroidogenesis
		hsa04914 Progesterone-mediated oocyte maturation
		hsa05200 Pathways in cancer
		hsa05202 Transcriptional misregulation in cancer
		hsa05205 Proteoglycans in cancer
		hsa05214 Glioma
		hsa05215 Prostate cancer
		hsa05218 Melanoma
		hsa05224 Breast cancer
		hsa05225 Hepatocellular carcinoma
		hsa04141 Protein processing in endoplasmic reticulum
		hsa04151 PI3K-Akt signaling pathway
		hsa04217 Necroptosis
Heat shock protein	HSP90	hsa04612 Antigen processing and presentation
HSP 90-alpha	AA1	4YKZ hsa04621 NOD-like receptor signaling pathway
		hsa04657 IL-17 signaling pathway
		hsa04659 Th17 cell differentiation
		hsa04914 Progesterone-mediated oocyte maturation

	hsa04915 Estrogen signaling pathway
	hsa05200 Pathways in cancer
	hsa05215 Prostate cancer
	hsa05418 Fluid shear stress and atherosclerosis
	hsa00562 Inositol phosphate metabolism
	hsa01100 Metabolic pathways
	hsa01521 EGFR tyrosine kinase inhibitor resistance
	hsa01522 Endocrine resistance
	hsa01524 Platinum drug resistance
	hsa04012 ErbB signaling pathway
	hsa04014 Ras signaling pathway
	hsa04015 Rap1 signaling pathway
	hsa04024 cAMP signaling pathway
Phosphatidylinosit	hsa04062 Chemokine signaling pathway
ol 4,5-	hsa04066 HIF-1 signaling pathway
bisphosphate 3- PIK3CA 4JPS	hsa04068 FoxO signaling pathway
kinase catalytic	hsa04070 Phosphatidylinositol signaling system
subunit alpha	hsa04071 Sphingolipid signaling pathway
	hsa04072 Phospholipase D signaling pathway
	hsa04140 Autophagy - animal
	hsa04150 mTOR signaling pathway
	hsa04151 PI3K-Akt signaling pathway
	hsa04152 AMPK signaling pathway
	hsa04210 Apoptosis

hsa04211 Longevity regulating pathway

hsa04213 Longevity regulating pathway - multiple species

hsa04218 Cellular senescence

hsa04360 Axon guidance

hsa04370 VEGF signaling pathway

hsa04380 Osteoclast differentiation

hsa04510 Focal adhesion

hsa04550 Signaling pathways regulating pluripotency of stem cells

hsa04611 Platelet activation

hsa04620 Toll-like receptor signaling pathway

hsa04625 C-type lectin receptor signaling pathway

hsa04630 Jak-STAT signaling pathway

hsa04650 Natural killer cell mediated cytotoxicity

hsa04660 T cell receptor signaling pathway

hsa04662 B cell receptor signaling pathway

hsa04664 Fc epsilon RI signaling pathway

hsa04666 Fc gamma R-mediated phagocytosis

hsa04668 TNF signaling pathway

hsa04670 Leukocyte transendothelial migration

hsa04722 Neurotrophin signaling pathway

hsa04725 Cholinergic synapse

hsa04750 Inflammatory mediator regulation of TRP channels

hsa04810 Regulation of actin cytoskeleton

hsa04910 Insulin signaling pathway

hsa04914 Progesterone-mediated oocyte maturation

hsa04915 Estrogen signaling pathway

hsa04917 Prolactin signaling pathway

hsa04919 Thyroid hormone signaling pathway

hsa04923 Regulation of lipolysis in adipocytes

hsa04926 Relaxin signaling pathway

hsa04929 GnRH secretion

hsa04930 Type II diabetes mellitus

hsa04931 Insulin resistance

hsa04932 Non-alcoholic fatty liver disease (NAFLD)

hsa04933 AGE-RAGE signaling pathway in diabetic complications

hsa04960 Aldosterone-regulated sodium reabsorption

hsa04973 Carbohydrate digestion and absorption

hsa05100 Bacterial invasion of epithelial cells

hsa05135 Yersinia infection

hsa05142 Chagas disease (American trypanosomiasis)

hsa05146 Amoebiasis

hsa05160 Hepatitis C

hsa05161 Hepatitis B

hsa05162 Measles

hsa05164 Influenza A

hsa05165 Human papillomavirus infection

hsa05166 Human T-cell leukemia virus 1 infection

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05168 Herpes simplex virus 1 infection

hsa05169 Epstein-Barr virus infection

hsa05170 Human immunodeficiency virus 1 infection

hsa05200 Pathways in cancer

hsa05203 Viral carcinogenesis

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05210 Colorectal cancer

hsa05211 Renal cell carcinoma

hsa05212 Pancreatic cancer

hsa05213 Endometrial cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05220 Chronic myeloid leukemia

hsa05221 Acute myeloid leukemia

hsa05222 Small cell lung cancer

hsa05223 Non-small cell lung cancer

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

hsa05231 Choline metabolism in cancer

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

hsa05418 Fluid shear stress and atherosclerosis

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa01522 Endocrine resistance

hsa04012 ErbB signaling pathway

hsa04015 Rap1 signaling pathway

hsa04062 Chemokine signaling pathway

hsa04137 Mitophagy - animal

hsa04144 Endocytosis

hsa04360 Axon guidance

hsa04370 VEGF signaling pathway

hsa04510 Focal adhesion

hsa04520 Adherens junction

Proto-oncogene
tyrosine-protein
kinase Src SRC 4MXO hsa04530 Tight junction

hsa04540 Gap junction

hsa04611 Platelet activation

hsa04625 C-type lectin receptor signaling pathway

hsa04727 GABAergic synapse

hsa04750 Inflammatory mediator regulation of TRP channels

hsa04810 Regulation of actin cytoskeleton

hsa04912 GnRH signaling pathway

hsa04915 Estrogen signaling pathway

hsa04917 Prolactin signaling pathway

hsa04919 Thyroid hormone signaling pathway

hsa04921 Oxytocin signaling pathway

			hsa04926 Relaxin signaling pathway
			hsa05100 Bacterial invasion of epithelial cells
			hsa05120 Epithelial cell signaling in Helicobacter pylori infection
			hsa05131 Shigellosis
			hsa05135 Yersinia infection
			hsa05152 Tuberculosis
			hsa05161 Hepatitis B
			hsa05167 Kaposi sarcoma-associated herpesvirus infection
			hsa05168 Herpes simplex virus 1 infection
			hsa05203 Viral carcinogenesis
			hsa05205 Proteoglycans in cancer
			hsa05219 Bladder cancer
			hsa05418 Fluid shear stress and atherosclerosis
Probable ATP-dependent RNA helicase DDX5	DDX5	3FE2	hsa03040 Spliceosome
			hsa05205 Proteoglycans in cancer
			hsa00590 Arachidonic acid metabolism
			hsa01100 Metabolic pathways
			hsa04064 NF-kappa B signaling pathway
Prostaglandin G/H synthase 2	COX2	5KIR	hsa04370 VEGF signaling pathway
			hsa04625 C-type lectin receptor signaling pathway
			hsa04657 IL-17 signaling pathway
			hsa04668 TNF signaling pathway
			hsa04723 Retrograde endocannabinoid signaling

		hsa04726 Serotonergic synapse
		hsa04913 Ovarian steroidogenesis
		hsa04921 Oxytocin signaling pathway
		hsa04923 Regulation of lipolysis in adipocytes
		hsa05140 Leishmaniasis
		hsa05163 Human cytomegalovirus infection
		hsa05165 Human papillomavirus infection
		hsa05167 Kaposi sarcoma-associated herpesvirus infection
		hsa05200 Pathways in cancer
		hsa05204 Chemical carcinogenesis
		hsa05206 MicroRNAs in cancer
		hsa05222 Small cell lung cancer
Neutrophil gelatinase- associated lipocalin	LCN2 3DSZ	hsa04657 IL-17 signaling pathway
		hsa04621 NOD-like receptor signaling pathway
		hsa01521 EGFR tyrosine kinase inhibitor resistance
		hsa04010 MAPK signaling pathway
		hsa04012 ErbB signaling pathway
		hsa04014 Ras signaling pathway
Protein kinase C alpha type	4RA4	hsa04015 Rap1 signaling pathway
		hsa04020 Calcium signaling pathway
		hsa04066 HIF-1 signaling pathway
		hsa04070 Phosphatidylinositol signaling system
	PRKCA	hsa04071 Sphingolipid signaling pathway

hsa04072 Phospholipase D signaling pathway

hsa04150 mTOR signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa04261 Adrenergic signaling in cardiomyocytes

hsa04270 Vascular smooth muscle contraction

hsa04310 Wnt signaling pathway

hsa04360 Axon guidance

hsa04370 VEGF signaling pathway

hsa04510 Focal adhesion

hsa04540 Gap junction

hsa04650 Natural killer cell mediated cytotoxicity

hsa04664 Fc epsilon RI signaling pathway

hsa04666 Fc gamma R-mediated phagocytosis

hsa04670 Leukocyte transendothelial migration

hsa04713 Circadian entrainment

hsa04720 Long-term potentiation

hsa04723 Retrograde endocannabinoid signaling

hsa04724 Glutamatergic synapse

hsa04725 Cholinergic synapse

hsa04726 Serotonergic synapse

hsa04727 GABAergic synapse

hsa04728 Dopaminergic synapse

hsa04730 Long-term depression

hsa04750 Inflammatory mediator regulation of TRP channels

hsa04911 Insulin secretion

hsa04912 GnRH signaling pathway

hsa04916 Melanogenesis

hsa04918 Thyroid hormone synthesis

hsa04919 Thyroid hormone signaling pathway

hsa04921 Oxytocin signaling pathway

hsa04925 Aldosterone synthesis and secretion

hsa04926 Relaxin signaling pathway

hsa04928 Parathyroid hormone synthesis, secretion and action

hsa04929 GnRH secretion

hsa04933 AGE-RAGE signaling pathway in diabetic complications

hsa04960 Aldosterone-regulated sodium reabsorption

hsa04961 Endocrine and other factor-regulated calcium reabsorption

hsa04970 Salivary secretion

hsa04971 Gastric acid secretion

hsa04972 Pancreatic secretion

hsa05031 Amphetamine addiction

hsa05032 Morphine addiction

hsa05110 Vibrio cholerae infection

hsa05143 African trypanosomiasis

hsa05146 Amoebiasis

hsa05161 Hepatitis B

hsa05164 Influenza A

		hsa05170 Human immunodeficiency virus 1 infection
		hsa05200 Pathways in cancer
		hsa05205 Proteoglycans in cancer
		hsa05206 MicroRNAs in cancer
		hsa05214 Glioma
		hsa05223 Non-small cell lung cancer
		hsa05225 Hepatocellular carcinoma
		hsa05231 Choline metabolism in cancer
		hsa01521 EGFR tyrosine kinase inhibitor resistance
		hsa01522 Endocrine resistance
		hsa04012 ErbB signaling pathway
		hsa04066 HIF-1 signaling pathway
		hsa04072 Phospholipase D signaling pathway
		hsa04136 Autophagy - other
		hsa04140 Autophagy - animal
Serine/threonine-		hsa04150 mTOR signaling pathway
protein kinase	mTOR	4JT5
mTOR		hsa04151 PI3K-Akt signaling pathway
		hsa04152 AMPK signaling pathway
		hsa04211 Longevity regulating pathway
		hsa04213 Longevity regulating pathway - multiple species
		hsa04218 Cellular senescence
		hsa04371 Apelin signaling pathway
		hsa04630 Jak-STAT signaling pathway
		hsa04659 Th17 cell differentiation

hsa04714 Thermogenesis

hsa04910 Insulin signaling pathway

hsa04919 Thyroid hormone signaling pathway

hsa04920 Adipocytokine signaling pathway

hsa04930 Type II diabetes mellitus

hsa04931 Insulin resistance

hsa05165 Human papillomavirus infection

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05168 Herpes simplex virus 1 infection

hsa05170 Human immunodeficiency virus 1 infection

hsa05200 Pathways in cancer

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05210 Colorectal cancer

hsa05212 Pancreatic cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05221 Acute myeloid leukemia

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

hsa05231 Choline metabolism in cancer

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

Disintegrin and metalloproteinase domain-containing protein 17	ADAM 17	3LEA	hsa04330 Notch signaling pathway
			hsa05010 Alzheimer disease
			hsa05120 Epithelial cell signaling in Helicobacter pylori infection
			hsa01521 EGFR tyrosine kinase inhibitor resistance
			hsa01522 Endocrine resistance
			hsa04010 MAPK signaling pathway
			hsa04012 ErbB signaling pathway
			hsa04014 Ras signaling pathway
			hsa04015 Rap1 signaling pathway
			hsa04020 Calcium signaling pathway
			hsa04066 HIF-1 signaling pathway
			hsa04068 FoxO signaling pathway
			hsa04072 Phospholipase D signaling pathway
			Epidermal Growth Factor Receptor
hsa04151 PI3K-Akt signaling pathway			
hsa04510 Focal adhesion			
hsa04520 Adherens junction			
hsa04540 Gap junction			
hsa04630 Jak-STAT signaling pathway			
hsa04810 Regulation of actin cytoskeleton			
hsa04912 GnRH signaling pathway			
hsa04915 Estrogen signaling pathway			
hsa04921 Oxytocin signaling pathway			
hsa04926 Relaxin signaling pathway			

hsa04928 Parathyroid hormone synthesis, secretion and action

hsa04934 Cushing syndrome

hsa05120 Epithelial cell signaling in Helicobacter pylori infection

hsa05160 Hepatitis C

hsa05165 Human papillomavirus infection

hsa05200 Pathways in cancer

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05210 Colorectal cancer

hsa05212 Pancreatic cancer

hsa05213 Endometrial cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05219 Bladder cancer

hsa05223 Non-small cell lung cancer

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

hsa05231 Choline metabolism in cancer

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

Cadherin 1 CDH1 4ZTE hsa04015 Rap1 signaling pathway

hsa04371 Apelin signaling pathway

hsa04390 Hippo signaling pathway

hsa04514 Cell adhesion molecules (CAMs)

hsa04520 Adherens junction

hsa05100 Bacterial invasion of epithelial cells

hsa05200 Pathways in cancer

hsa05213 Endometrial cancer

hsa05216 Thyroid cancer

hsa05218 Melanoma

hsa05219 Bladder cancer

hsa05226 Gastric cancer

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa04010 MAPK signaling pathway

hsa04014 Ras signaling pathway

hsa04015 Rap1 signaling pathway

hsa04144 Endocytosis

hsa04151 PI3K-Akt signaling pathway

Fibroblast Growth Factor Receptor 2 FGFR2 5EG3 hsa04550 Signaling pathways regulating pluripotency of stem cells

hsa04810 Regulation of actin cytoskeleton

hsa05200 Pathways in cancer

hsa05215 Prostate cancer

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

Prostaglandin- PTGS2 5IKT hsa00590 Arachidonic acid metabolism

Endoperoxide
Synthase 2

hsa01100 Metabolic pathways
hsa04064 NF-kappa B signaling pathway
hsa04370 VEGF signaling pathway
hsa04625 C-type lectin receptor signaling pathway
hsa04657 IL-17 signaling pathway
hsa04668 TNF signaling pathway
hsa04723 Retrograde endocannabinoid signaling
hsa04726 Serotonergic synapse
hsa04913 Ovarian steroidogenesis
hsa04921 Oxytocin signaling pathway
hsa04923 Regulation of lipolysis in adipocytes
hsa05140 Leishmaniasis
hsa05165 Human papillomavirus infection
hsa05167 Kaposi sarcoma-associated herpesvirus infection
hsa05200 Pathways in cancer
hsa05204 Chemical carcinogenesis
hsa05206 MicroRNAs in cancer
hsa05222 Small cell lung cancer
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa04010 MAPK signaling pathway
hsa04012 ErbB signaling pathway
hsa04020 Calcium signaling pathway
hsa04151 PI3K-Akt signaling pathway
hsa05205 Proteoglycans in cancer

Erb-B2 Receptor
Tyrosine Kinase 3

ERBB3 6OP9

hsa05206 MicroRNAs in cancer

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa01522 Endocrine resistance

hsa01524 Platinum drug resistance

hsa04064 NF-kappa B signaling pathway

hsa04066 HIF-1 signaling pathway

hsa04071 Sphingolipid signaling pathway

hsa04115 p53 signaling pathway

hsa04140 Autophagy - animal

hsa04141 Protein processing in endoplasmic reticulum

hsa04151 PI3K-Akt signaling pathway

hsa04210 Apoptosis

Apoptosis
regulator Bcl-2

BCL2 4LXD

hsa04215 Apoptosis - multiple species

hsa04217 Necroptosis

hsa04261 Adrenergic signaling in cardiomyocytes

hsa04340 Hedgehog signaling pathway

hsa04510 Focal adhesion

hsa04621 NOD-like receptor signaling pathway

hsa04630 Jak-STAT signaling pathway

hsa04722 Neurotrophin signaling pathway

hsa04725 Cholinergic synapse

hsa04915 Estrogen signaling pathway

hsa04928 Parathyroid hormone synthesis, secretion and action

hsa04933 AGE-RAGE signaling pathway in diabetic complications

hsa05014 Amyotrophic lateral sclerosis (ALS)

hsa05145 Toxoplasmosis

hsa05152 Tuberculosis

hsa05161 Hepatitis B

hsa05162 Measles

hsa05168 Herpes simplex virus 1 infection

hsa05169 Epstein-Barr virus infection

hsa05170 Human immunodeficiency virus 1 infection

hsa05200 Pathways in cancer

hsa05206 MicroRNAs in cancer

hsa05210 Colorectal cancer

hsa05215 Prostate cancer

hsa05222 Small cell lung cancer

hsa05226 Gastric cancer

hsa05418 Fluid shear stress and atherosclerosis

hsa04012 ErbB signaling pathway

hsa04014 Ras signaling pathway

hsa04110 Cell cycle

hsa04360 Axon guidance

Proto-oncogene c-ABL1 4ZOG hsa04722 Neurotrophin signaling pathway

Abl

hsa05130 Pathogenic Escherichia coli infection

hsa05131 Shigellosis

hsa05200 Pathways in cancer

hsa05206 MicroRNAs in cancer

hsa05220 Chronic myeloid leukemia

hsa05416 Viral myocarditis

hsa00562 Inositol phosphate metabolism

hsa01100 Metabolic pathways

hsa01521 EGFR tyrosine kinase inhibitor resistance

hsa01522 Endocrine resistance

hsa01524 Platinum drug resistance

hsa04012 ErbB signaling pathway

hsa04014 Ras signaling pathway

hsa04015 Rap1 signaling pathway

hsa04024 cAMP signaling pathway

hsa04062 Chemokine signaling pathway

hsa04066 HIF-1 signaling pathway

PI3K delta PIK3CD 5T8F hsa04068 FoxO signaling pathway

hsa04070 Phosphatidylinositol signaling system

hsa04071 Sphingolipid signaling pathway

hsa04072 Phospholipase D signaling pathway

hsa04140 Autophagy - animal

hsa04150 mTOR signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa04152 AMPK signaling pathway

hsa04210 Apoptosis

hsa04211 Longevity regulating pathway

hsa04213 Longevity regulating pathway - multiple species

hsa04218 Cellular senescence

hsa04360 Axon guidance

hsa04370 VEGF signaling pathway

hsa04380 Osteoclast differentiation

hsa04510 Focal adhesion

hsa04550 Signaling pathways regulating pluripotency of stem cells

hsa04611 Platelet activation

hsa04620 Toll-like receptor signaling pathway

hsa04625 C-type lectin receptor signaling pathway

hsa04630 Jak-STAT signaling pathway

hsa04650 Natural killer cell mediated cytotoxicity

hsa04660 T cell receptor signaling pathway

hsa04662 B cell receptor signaling pathway

hsa04664 Fc epsilon RI signaling pathway

hsa04666 Fc gamma R-mediated phagocytosis

hsa04668 TNF signaling pathway

hsa04670 Leukocyte transendothelial migration

hsa04722 Neurotrophin signaling pathway

hsa04725 Cholinergic synapse

hsa04750 Inflammatory mediator regulation of TRP channels

hsa04810 Regulation of actin cytoskeleton

hsa04910 Insulin signaling pathway

hsa04914 Progesterone-mediated oocyte maturation

hsa04915 Estrogen signaling pathway

hsa04917 Prolactin signaling pathway

hsa04919 Thyroid hormone signaling pathway

hsa04923 Regulation of lipolysis in adipocytes

hsa04926 Relaxin signaling pathway

hsa04929 GnRH secretion

hsa04930 Type II diabetes mellitus

hsa04931 Insulin resistance

hsa04932 Non-alcoholic fatty liver disease (NAFLD)

hsa04933 AGE-RAGE signaling pathway in diabetic complications

hsa04960 Aldosterone-regulated sodium reabsorption

hsa04973 Carbohydrate digestion and absorption

hsa05100 Bacterial invasion of epithelial cells

hsa05135 Yersinia infection

hsa05142 Chagas disease (American trypanosomiasis)

hsa05146 Amoebiasis

hsa05160 Hepatitis C

hsa05161 Hepatitis B

hsa05162 Measles

hsa05164 Influenza A

hsa05165 Human papillomavirus infection

hsa05166 Human T-cell leukemia virus 1 infection

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05168 Herpes simplex virus 1 infection

hsa05169 Epstein-Barr virus infection

hsa05170 Human immunodeficiency virus 1 infection

hsa05200 Pathways in cancer

hsa05203 Viral carcinogenesis

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05210 Colorectal cancer

hsa05211 Renal cell carcinoma

hsa05212 Pancreatic cancer

hsa05213 Endometrial cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05220 Chronic myeloid leukemia

hsa05221 Acute myeloid leukemia

hsa05222 Small cell lung cancer

hsa05223 Non-small cell lung cancer

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

hsa05231 Choline metabolism in cancer

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

hsa05418 Fluid shear stress and atherosclerosis

Phosphatidylinosit PIK3CG 4WWO hsa00562 Inositol phosphate metabolism

ol 4,5-bisphosphate 3-kinase catalytic subunit gamma isoform			hsa01100 Metabolic pathways
			hsa04022 cGMP-PKG signaling pathway
			hsa04062 Chemokine signaling pathway
			hsa04072 Phospholipase D signaling pathway
			hsa04151 PI3K-Akt signaling pathway
			hsa04261 Adrenergic signaling in cardiomyocytes
			hsa04371 Apelin signaling pathway
			hsa04611 Platelet activation
			hsa04725 Cholinergic synapse
			hsa04921 Oxytocin signaling pathway
			hsa05145 Toxoplasmosis
			hsa05167 Kaposi sarcoma-associated herpesvirus infection
			hsa00910 Nitrogen metabolism
Carbonic anhydrase IV	CA4	3F7B	hsa01100 Metabolic pathways
			hsa04964 Proximal tubule bicarbonate reclamation
			hsa00910 Nitrogen metabolism
			hsa01100 Metabolic pathways
			hsa04964 Proximal tubule bicarbonate reclamation
Carbonic anhydrase II	CA2	4PZH	hsa04966 Collecting duct acid secretion
			hsa04971 Gastric acid secretion
			hsa04972 Pancreatic secretion
			hsa04976 Bile secretion
Urokinase-type plasminogen activator	PLAU	1SQT	hsa04064 NF-kappa B signaling pathway
			hsa04610 Complement and coagulation cascades

			hsa05202	Transcriptional misregulation in cancer
			hsa05205	Proteoglycans in cancer
			hsa05206	MicroRNAs in cancer
			hsa05215	Prostate cancer
			hsa03440	Homologous recombination
DNA	TOP1M		hsa03460	Fanconi anemia pathway
topoisomerase I	T	1T8I		
			hsa01524	Platinum drug resistance
			hsa04010	MAPK signaling pathway
			hsa04014	Ras signaling pathway
			hsa04015	Rap1 signaling pathway
			hsa04022	cGMP-PKG signaling pathway
			hsa04066	HIF-1 signaling pathway
			hsa04068	FoxO signaling pathway
			hsa04072	Phospholipase D signaling pathway
			hsa04150	mTOR signaling pathway
Insulin receptor	INSR	5HHW	hsa04151	PI3K-Akt signaling pathway
			hsa04152	AMPK signaling pathway
			hsa04211	Longevity regulating pathway
			hsa04213	Longevity regulating pathway - multiple species
			hsa04520	Adherens junction
			hsa04910	Insulin signaling pathway
			hsa04913	Ovarian steroidogenesis
			hsa04923	Regulation of lipolysis in adipocytes
			hsa04930	Type II diabetes mellitus

hsa04931 Insulin resistance
hsa04932 Non-alcoholic fatty liver disease (NAFLD)
hsa04960 Aldosterone-regulated sodium reabsorption
hsa01521 EGFR tyrosine kinase inhibitor resistance
hsa04010 MAPK signaling pathway
hsa04012 ErbB signaling pathway
hsa04014 Ras signaling pathway
hsa04015 Rap1 signaling pathway
hsa04020 Calcium signaling pathway
hsa04066 HIF-1 signaling pathway
hsa04070 Phosphatidylinositol signaling system
hsa04071 Sphingolipid signaling pathway
hsa04150 mTOR signaling pathway
hsa04270 Vascular smooth muscle contraction
hsa04310 Wnt signaling pathway
hsa04370 VEGF signaling pathway
hsa04510 Focal adhesion
hsa04540 Gap junction
hsa04650 Natural killer cell mediated cytotoxicity
hsa04666 Fc gamma R-mediated phagocytosis
hsa04670 Leukocyte transendothelial migration
hsa04713 Circadian entrainment
hsa04720 Long-term potentiation
hsa04723 Retrograde endocannabinoid signaling

Protein kinase C
gamma type

PRKCG 2UZP

hsa04724 Glutamatergic synapse

hsa04725 Cholinergic synapse

hsa04726 Serotonergic synapse

hsa04727 GABAergic synapse

hsa04728 Dopaminergic synapse

hsa04730 Long-term depression

hsa04750 Inflammatory mediator regulation of TRP channels

hsa04911 Insulin secretion

hsa04916 Melanogenesis

hsa04918 Thyroid hormone synthesis

hsa04919 Thyroid hormone signaling pathway

hsa04921 Oxytocin signaling pathway

hsa04925 Aldosterone synthesis and secretion

hsa04928 Parathyroid hormone synthesis, secretion and action

hsa04929 GnRH secretion

hsa04960 Aldosterone-regulated sodium reabsorption

hsa04961 Endocrine and other factor-regulated calcium reabsorption

hsa04970 Salivary secretion

hsa04971 Gastric acid secretion

hsa04972 Pancreatic secretion

hsa05031 Amphetamine addiction

hsa05032 Morphine addiction

hsa05143 African trypanosomiasis

hsa05146 Amoebiasis

		hsa05161 Hepatitis B
		hsa05170 Human immunodeficiency virus 1 infection
		hsa05200 Pathways in cancer
		hsa05205 Proteoglycans in cancer
		hsa05206 MicroRNAs in cancer
		hsa05214 Glioma
		hsa05223 Non-small cell lung cancer
		hsa05225 Hepatocellular carcinoma
		hsa05231 Choline metabolism in cancer
		hsa01521 EGFR tyrosine kinase inhibitor resistance
		hsa04062 Chemokine signaling pathway
		hsa04151 PI3K-Akt signaling pathway
		hsa04217 Necroptosis
		hsa04550 Signaling pathways regulating pluripotency of stem cells
		hsa04630 Jak-STAT signaling pathway
Tyrosine-protein		hsa04658 Th1 and Th2 cell differentiation
kinase JAK2	JAK2	5UT6
		hsa04659 Th17 cell differentiation
		hsa04725 Cholinergic synapse
		hsa04917 Prolactin signaling pathway
		hsa04920 Adipocytokine signaling pathway
		hsa04933 AGE-RAGE signaling pathway in diabetic complications
		hsa05140 Leishmaniasis
		hsa05145 Toxoplasmosis

hsa05152 Tuberculosis

hsa05161 Hepatitis B

hsa05164 Influenza A

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05168 Herpes simplex virus 1 infection

hsa05200 Pathways in cancer

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

hsa04110 Cell cycle

hsa04115 p53 signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa04218 Cellular senescence

hsa04934 Cushing syndrome

hsa05160 Hepatitis C

hsa05162 Measles

hsa05164 Influenza A

Cyclin-dependent
kinase 6

CDK6

5L2T

hsa05165 Human papillomavirus infection

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05169 Epstein-Barr virus infection

hsa05200 Pathways in cancer

hsa05203 Viral carcinogenesis

hsa05206 MicroRNAs in cancer

hsa05212 Pancreatic cancer

hsa05214 Glioma

hsa05218 Melanoma

hsa04915 Estrogen signaling pathway

hsa05152 Tuberculosis

hsa01522 Endocrine resistance

hsa01524 Platinum drug resistance

hsa04068 FoxO signaling pathway

hsa04110 Cell cycle

hsa04115 p53 signaling pathway

hsa04120 Ubiquitin mediated proteolysis

hsa04144 Endocytosis

hsa04151 PI3K-Akt signaling pathway

hsa04218 Cellular senescence

hsa04625 C-type lectin receptor signaling pathway

Ubiquitin-protein
ligase E3 Mdm2 MDM2 5LAW

hsa04919 Thyroid hormone signaling pathway

hsa05165 Human papillomavirus infection

hsa05169 Epstein-Barr virus infection

hsa05200 Pathways in cancer

hsa05202 Transcriptional misregulation in cancer

hsa05203 Viral carcinogenesis

hsa05205 Proteoglycans in cancer

hsa05206 MicroRNAs in cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05219 Bladder cancer

			hsa05220 Chronic myeloid leukemia
			hsa04060 Cytokine-cytokine receptor interaction
			hsa04061 Viral protein interaction with cytokine and cytokine receptor
			hsa04062 Chemokine signaling pathway
			hsa04064 NF-kappa B signaling pathway
Stromal cell-derived factor 1	CXCL1 2	4UAI	hsa04360 Axon guidance
			hsa04670 Leukocyte transendothelial migration
			hsa04672 Intestinal immune network for IgA production
			hsa04810 Regulation of actin cytoskeleton
			hsa05200 Pathways in cancer
			hsa05323 Rheumatoid arthritis
			hsa01521 EGFR tyrosine kinase inhibitor resistance
			hsa01522 Endocrine resistance
			hsa01524 Platinum drug resistance
			hsa04010 MAPK signaling pathway
			hsa04012 ErbB signaling pathway
			hsa04014 Ras signaling pathway
RAC-alpha serine/threonine-protein kinase	AKT1	4GV1	hsa04015 Rap1 signaling pathway
			hsa04022 cGMP-PKG signaling pathway
			hsa04024 cAMP signaling pathway
			hsa04062 Chemokine signaling pathway
			hsa04066 HIF-1 signaling pathway
			hsa04068 FoxO signaling pathway
			hsa04071 Sphingolipid signaling pathway

hsa04072 Phospholipase D signaling pathway

hsa04140 Autophagy - animal

hsa04150 mTOR signaling pathway

hsa04151 PI3K-Akt signaling pathway

hsa04152 AMPK signaling pathway

hsa04210 Apoptosis

hsa04211 Longevity regulating pathway

hsa04213 Longevity regulating pathway - multiple species

hsa04218 Cellular senescence

hsa04261 Adrenergic signaling in cardiomyocytes

hsa04370 VEGF signaling pathway

hsa04371 Apelin signaling pathway

hsa04380 Osteoclast differentiation

hsa04510 Focal adhesion

hsa04550 Signaling pathways regulating pluripotency of stem cells

hsa04611 Platelet activation

hsa04620 Toll-like receptor signaling pathway

hsa04625 C-type lectin receptor signaling pathway

hsa04630 Jak-STAT signaling pathway

hsa04660 T cell receptor signaling pathway

hsa04662 B cell receptor signaling pathway

hsa04664 Fc epsilon RI signaling pathway

hsa04666 Fc gamma R-mediated phagocytosis

hsa04668 TNF signaling pathway

hsa04722 Neurotrophin signaling pathway

hsa04725 Cholinergic synapse

hsa04728 Dopaminergic synapse

hsa04910 Insulin signaling pathway

hsa04914 Progesterone-mediated oocyte maturation

hsa04915 Estrogen signaling pathway

hsa04917 Prolactin signaling pathway

hsa04919 Thyroid hormone signaling pathway

hsa04920 Adipocytokine signaling pathway

hsa04922 Glucagon signaling pathway

hsa04923 Regulation of lipolysis in adipocytes

hsa04926 Relaxin signaling pathway

hsa04929 GnRH secretion

hsa04931 Insulin resistance

hsa04932 Non-alcoholic fatty liver disease (NAFLD)

hsa04933 AGE-RAGE signaling pathway in diabetic complications

hsa04973 Carbohydrate digestion and absorption

hsa05135 Yersinia infection

hsa05142 Chagas disease (American trypanosomiasis)

hsa05145 Toxoplasmosis

hsa05152 Tuberculosis

hsa05160 Hepatitis C

hsa05161 Hepatitis B

hsa05162 Measles

hsa05164 Influenza A

hsa05165 Human papillomavirus infection

hsa05166 Human T-cell leukemia virus 1 infection

hsa05167 Kaposi sarcoma-associated herpesvirus infection

hsa05168 Herpes simplex virus 1 infection

hsa05169 Epstein-Barr virus infection

hsa05170 Human immunodeficiency virus 1 infection

hsa05200 Pathways in cancer

hsa05205 Proteoglycans in cancer

hsa05210 Colorectal cancer

hsa05211 Renal cell carcinoma

hsa05212 Pancreatic cancer

hsa05213 Endometrial cancer

hsa05214 Glioma

hsa05215 Prostate cancer

hsa05218 Melanoma

hsa05220 Chronic myeloid leukemia

hsa05221 Acute myeloid leukemia

hsa05222 Small cell lung cancer

hsa05223 Non-small cell lung cancer

hsa05224 Breast cancer

hsa05225 Hepatocellular carcinoma

hsa05226 Gastric cancer

hsa05230 Central carbon metabolism in cancer

hsa05231 Choline metabolism in cancer

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

hsa05418 Fluid shear stress and atherosclerosis
