



ELSEVIER

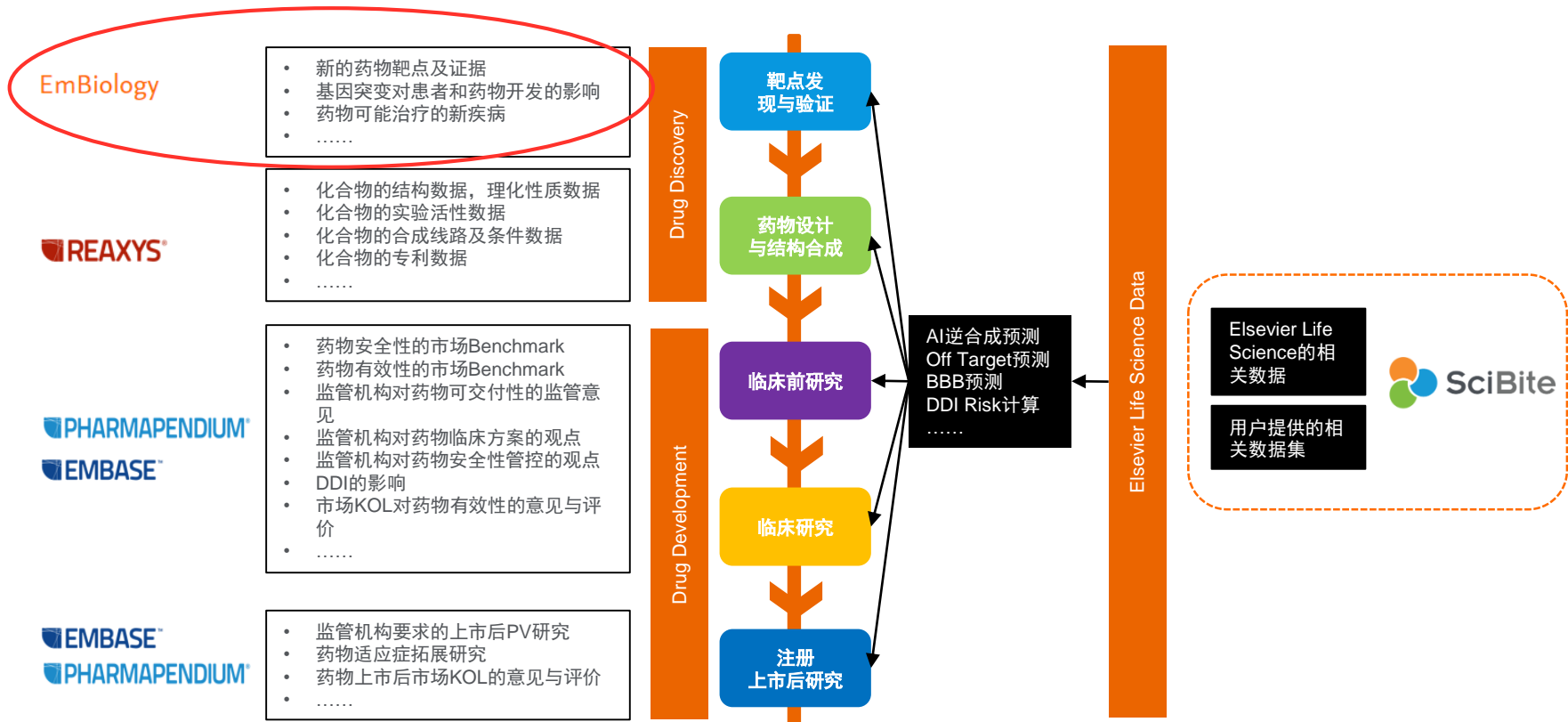
# EmBiology

AI驱动，快速发现生物信号通路，构建生物知识图谱

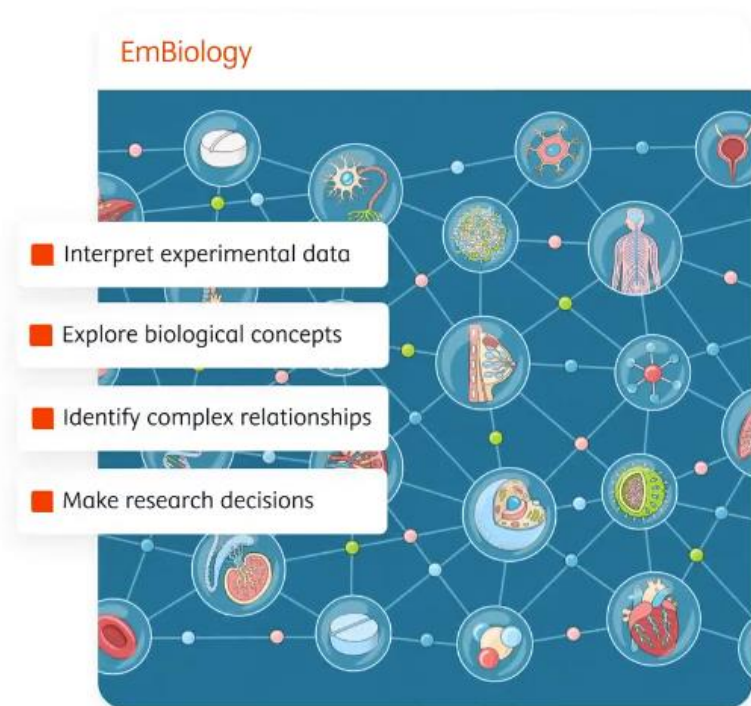
William 李韦良  
Elsevier Life Science Solutions



# Elsevier Life Science的平台数据和技术的全流程提供服务—A&G



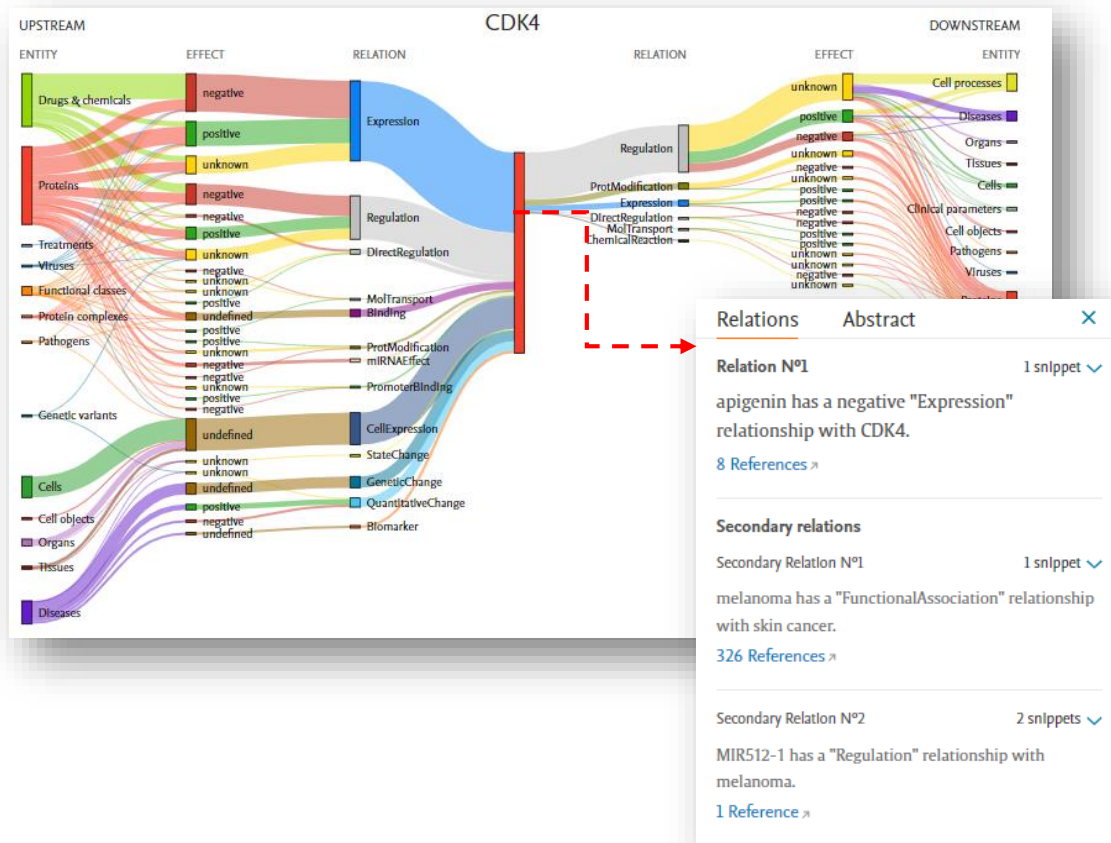
# EmBiology –揭示深层次的生物学证据



- 150万 生物学 名称
- 1900万 生物学 关系
- 来自近2000本生物、医学类期刊 (Elsevier + 第三方出版商)的760万全文文章
- 超过 3600万 Pubmed文摘
- 来自 [clinicaltrials.gov](http://clinicaltrials.gov)超过15万条临床试验数据

# EmBiology – 更多答案，更少搜索

- 使用人工智能驱动的知识图谱来映射和可视化数百万种生物关系，**发现通常可能被忽视的机会**
- 使研究人员能够探索与生物过程相关的因果关系，**从而更快、更自信地解释实验结果**
- 识别先前未知的关系可以**降低研究偏见的风险**



# 深入了解您自己的基因和蛋白质列表

EmBiology

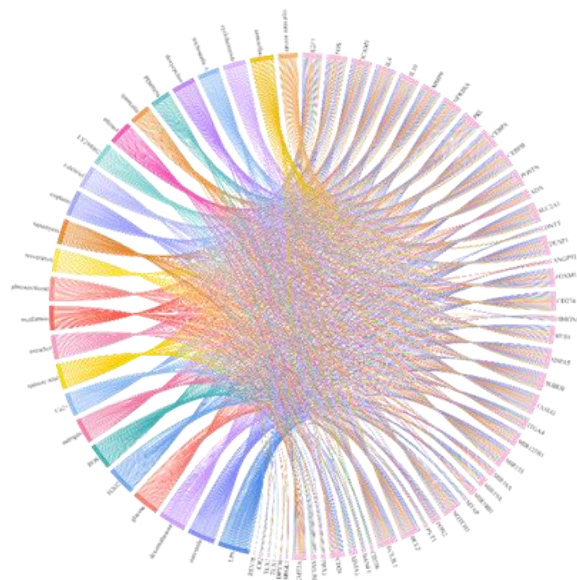
Upload > Concepts mapping > Find connections

Burkitt's positive regulation.xlsx

Select a question

I'm looking for...

- Diseases associated with proteins in my list
- Diseases caused by proteins in my list
- Diseases that have known biomarkers in my list
- Diseases that have (potential) novel biomarkers in my list
- Cell processes regulated by proteins in my list
- Expression targets (proteins) regulated by proteins in my list
- Common regulators (proteins) of proteins in my list
- Drugs that directly interact with proteins in my list
- Drugs that regulate proteins in my list



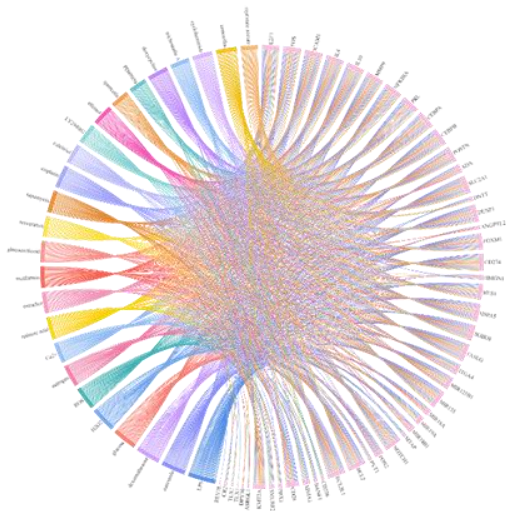
8,268 resultss found:

[Export \(First 1000\)](#) |  [Save to list](#) | [Clear selection](#)

- 1. **Metformin Directly Binds to MMP-9 to Improve Plaque Stability.**  
Journal of Cardiovascular Development and Disease, volume 10, 1 February 2023  
X. Chen, S. Wang, W. Xu, M. Zhao, Y. Zhang, H. Xiao  
[Relations: 1](#) [Abstract](#) [Full text](#)
- 2. **Rab711 plays a role in regulating surface expression of toll like receptors and downstream :**  
Biochemical and Biophysical Research Communications, volume 640, Pages 125-133, 15 January 2023  
R. Shrivastava, S. Pavuluri, S. Ghosh, S. Mukhopadhyay  
[Relations: 1](#) [Abstract](#) [Full text](#)

一次搜索多个基因/蛋白质的关系，以了解它们如何相互连接、如何相互作用以及可以找到哪些模式

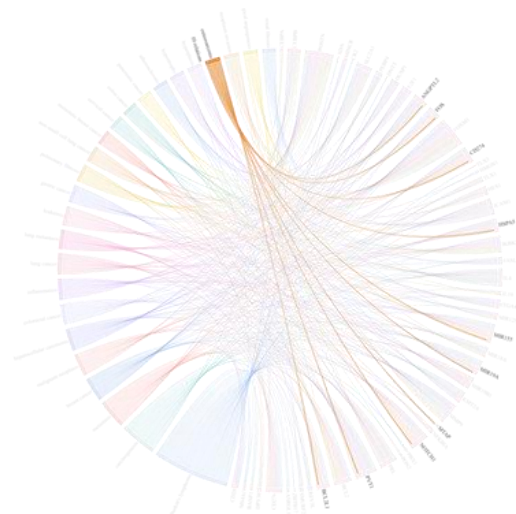
# 选择特定疾病查看文献结果列表



8,268 resultss found:

[Export \(First 1000\)](#)  [Save to list](#) [Clear selection](#)

- 1. **Metformin Directly Binds to MMP-9 to Improve Plaque Stability.**  
Journal of Cardiovascular Development and Disease, volume 10, 1 February 2023  
X. Chen, S. Wang, W. Xu, M. Zhao, Y. Zhang, H. Xiao  
[Relations: 1](#) [Abstract](#) [Full text](#) ↗
- 2. **Rab711 plays a role in regulating surface expression of toll like receptors and downstream :**  
Biochemical and Biophysical Research Communications, volume 640, Pages 125-133, 15 January 2023  
R. Shrivastava, S. Pavuluri, S. Ghosh, S. Mukhopadhyay  
[Relations: 1](#) [Abstract](#) [Full text](#) ↗



139 results found:

[Export \(First 1000\)](#)  [Save to list](#) [Clear selection](#)

- 1. **N6 methyladenosine induced long non coding RNA PVT1 regulates the miR 27f**  
International Journal of Oncology, volume 62, 1 January 2023  
B. Chen, C. Liu, H. Long, G. Bai, Y. Zhu, H. Xu  
[Relations: 1](#) [Abstract](#) [Full text](#) ↗
- 2. **LncRNA XIST from the bone marrow mesenchymal stem cell derived exosome**  
Cancer Cell International, volume 22, 1 December 2022  
G. Zhu, Y. Xia, Z. Zhao, A. Li, H. Li, T. Xiao  
[Relations: 1](#) [Abstract](#) [Full text](#) ↗

# 进一步探究各种生物学主体之间关联结果，助力深度科研

Upload > [Concepts mapping](#) > Generate network

蛋白-细胞-疾病.xlsx

示例：

恶性肿瘤 – 靶点 – T细胞  
直接的关系









# 统一检索平台，简单、直接、高效



EmBiology

Network

EmBio Insights

Search

Saved lists



Find biology related articles and networks

Type in a single search term e.g. disease, protein, drug, cell process, etc.



只需要属于**单一**名称，比如蛋白，基因，疾病等

无需学习复杂的检索式

# 示例1 – 检索基因蛋白APP



EmBio Insights Search Saved lists

Find biology related articles and networks

提示：输入关键词时如果系统出现提示，优先选择系统提示关键词输入

Type in a single search term e.g. disease, protein, drug, cell process, etc.

app



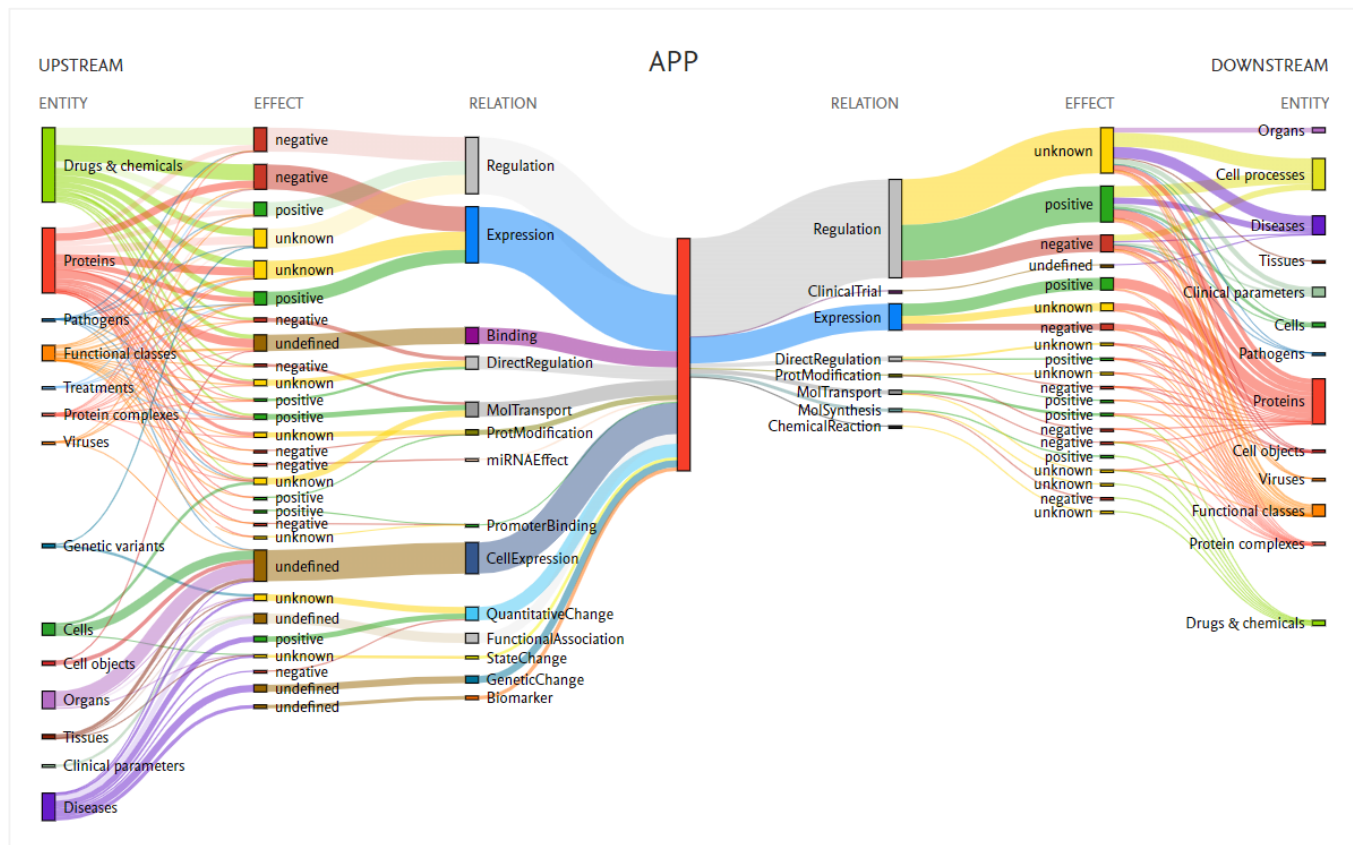
APP	33779
App use: XPNPEP1	36
APP-MP	1
APPP	0
APPNA	1
ApppU	0
APPL2	2
APPL1	546
AppppC	0
APPBP2	33



Cookie 设置 Terms and conditions Privacy

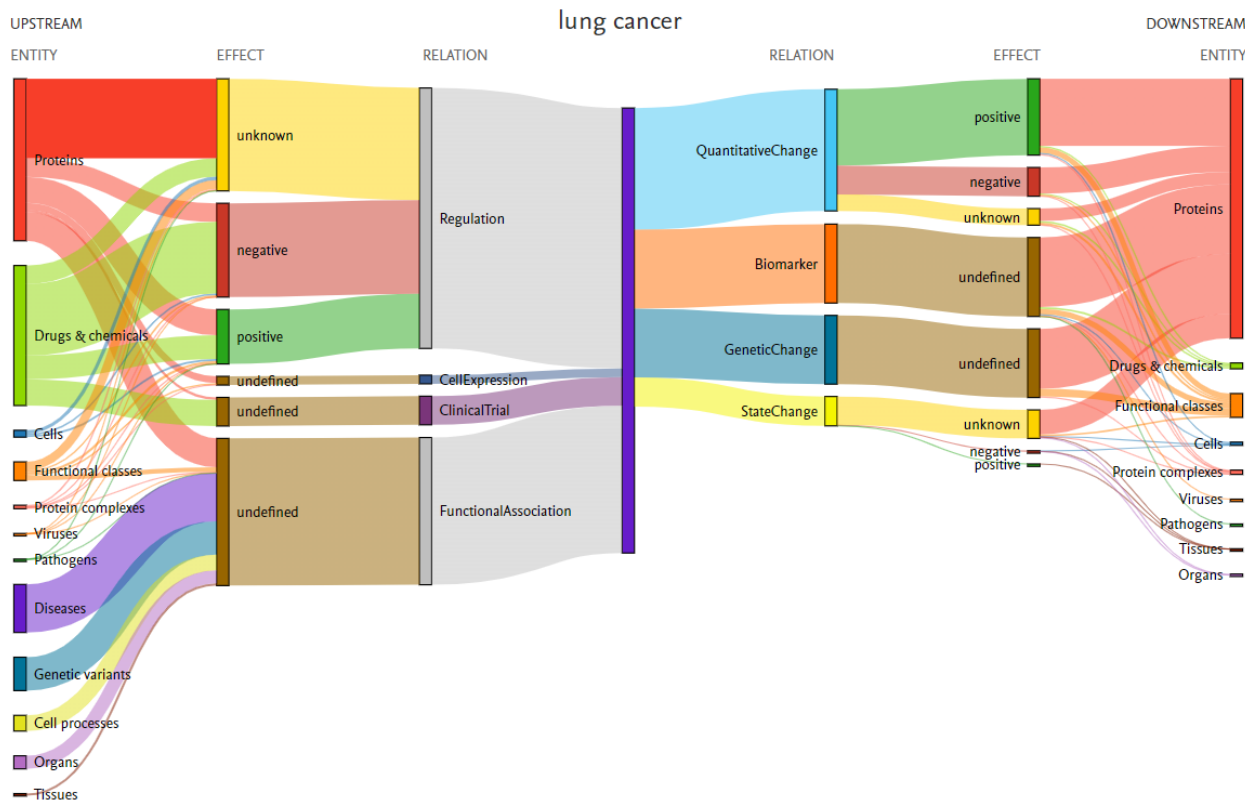
We use cookies to help provide and enhance our service. Copyright © 2024 Elsevier B.V., its licensors, and contributors.

# 结果 – 直接呈现可视化结果



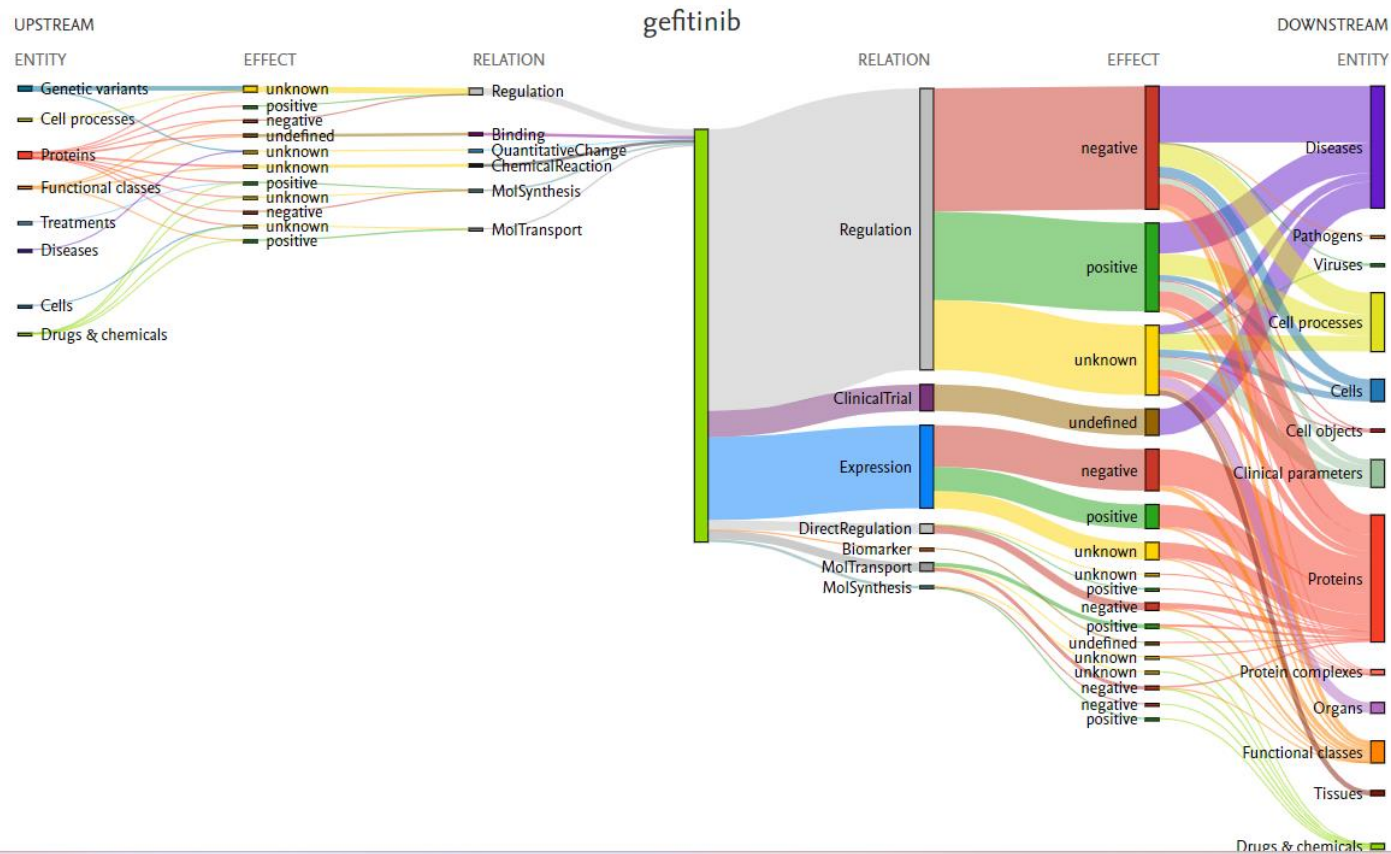
可以点击可视化图表上任意生物学名称，进行筛选

## 示例2 – 搜索某种疾病，比如肺癌

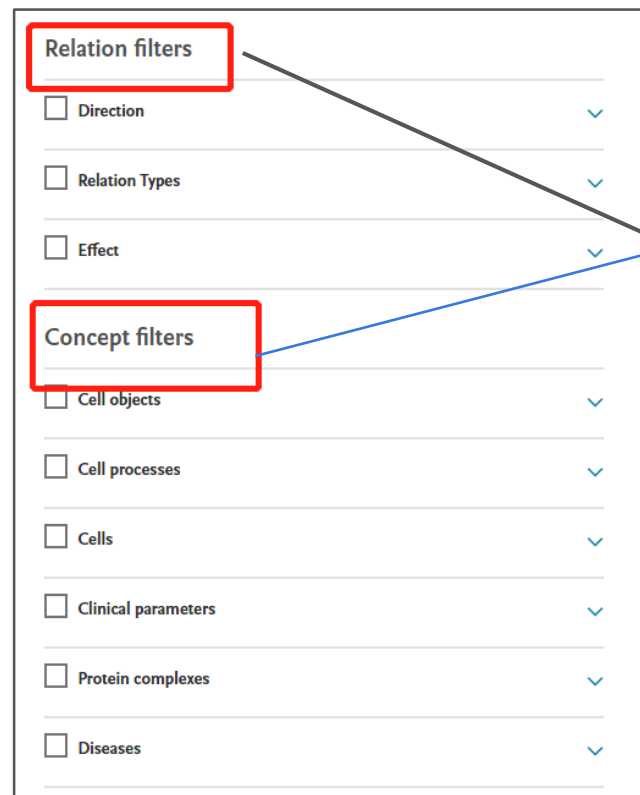
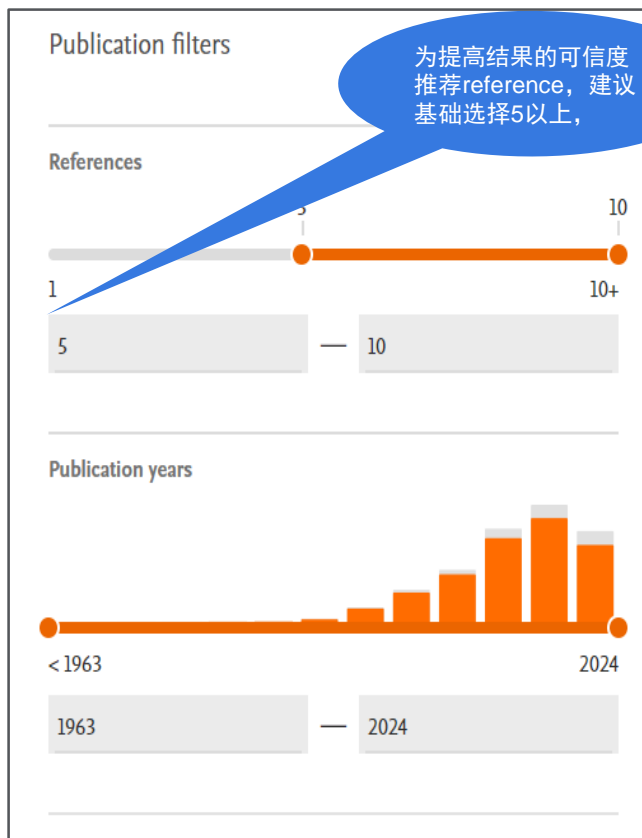


同样呈现针对疾病的上下游信号通路

# 举例3 – 检索某种药物



# 精准搜索示例



根据生物学关系,  
生物学概念等, 可  
进一步加权检索

# 聚焦所有对APP有负面影响 (negative effect) 结果



5,776 results

Clear Filters X

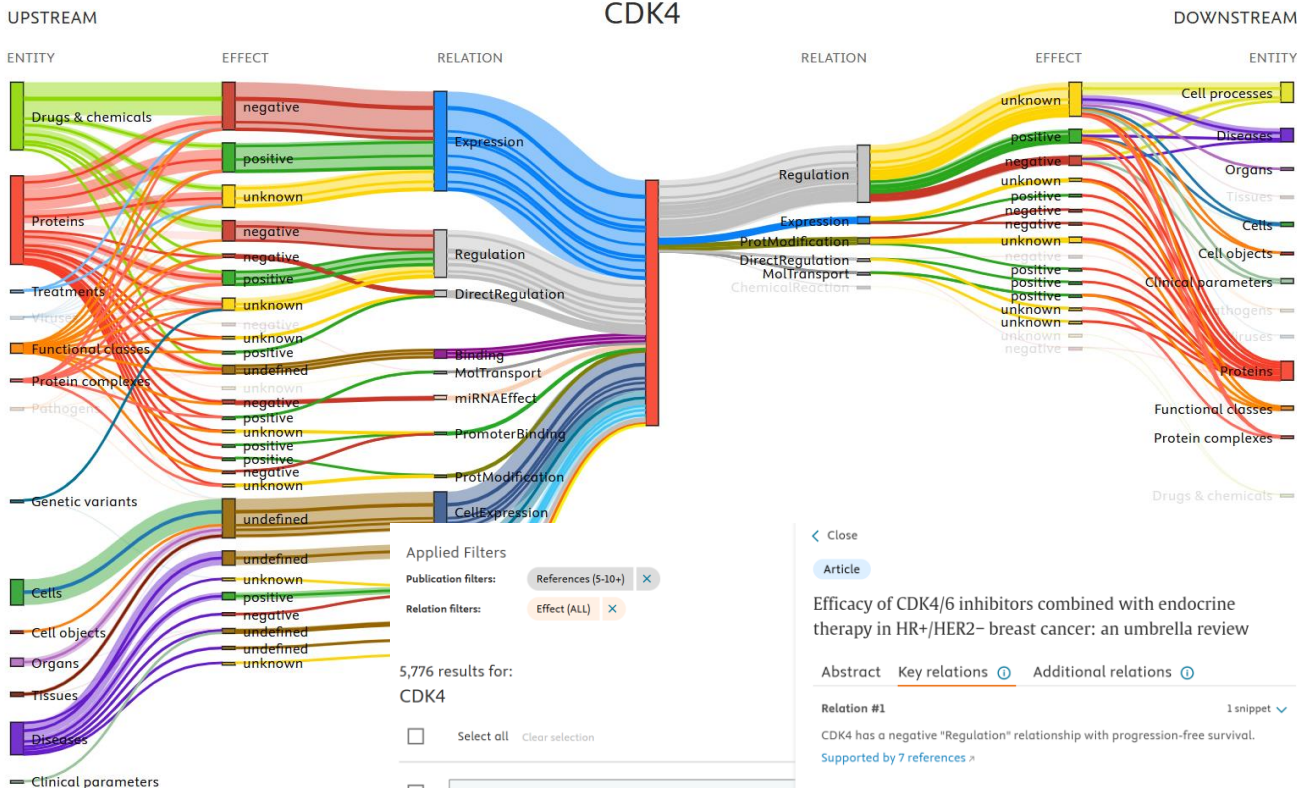
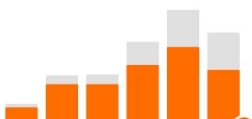
Apply

Publication filters

References



Publication years



Applied Filters  
 Publication filters: References (5-10+) X  
 Relation filters: Effect (ALL) X

5,776 results for:  
 CDK4

Select all Clear selection

1

**Article**  
 Efficacy of CDK4/6 inhibitors combined with endocrine  
*Journal of Cancer Research and Clinical Oncology*, volume 150, 1 January  
 D. Pu, D. Xu, Y. Wu, H. Chen, G. Shi, D. Feng, M. Zhang, Z. Liu, J. Li  
[Abstract](#) > [Relations: 1](#) > [Full text](#) >

< Close

Article

Efficacy of CDK4/6 inhibitors combined with endocrine therapy in HR+/HER2- breast cancer: an umbrella review

Abstract [Key relations](#) [Additional relations](#)

Relation #1

1 snippet

CDK4 has a negative "Regulation" relationship with progression-free survival.  
[Supported by 7 references](#)



# 搜索结果的解读



5,776 results for:

CDK4

Select all [Clear selection](#)

1 **Article**  
Efficacy of CDK4/6 inhibitors combined with endocrine therapy in HR+/HER2- breast cancer: an umbrella review  
*Journal of Cancer Research and Clinical Oncology*, volume 150, 1 January 2024  
D. Pu, D. Xu, Y. Wu, H. Chen, G. Shi, D. Feng, M. Zhang, Z. Liu, J. Li  
[Abstract](#) > [Relations: 1](#) > [Full text](#) >

2 **Article**  
Recommendations for cyclin-dependent kinase 4/6 inhibitors in the context of co-morbidity and drug interactions (Review)  
*Oncology Letters*, volume 27, 1 April 2024  
M. Teomete, D. Cabuk, T. Korkmaz, S. Seber, O.F. Ozturk, B. Aver, A. Ka  
[Abstract](#) > [Relations: 1](#) > [Full text](#) >

3 **Article**  
A network meta-analysis of efficacy and safety for first-line postmenopausal women with hormone receptor-positive breast cancer  
*BMC Medicine*, volume 22, 1 December 2024  
H. Shao, M. Zhao, A.-J. Guan, T. Shao, D. Zhou, G. Yu, W. Tang  
[Abstract](#) > [Relations: 1](#) > [Full text](#) >

**Article**

< Close

Article

Efficacy of CDK4/6 inhibitors combined with endocrine therapy in HR+/HER2- breast cancer: an umbrella review

[Abstract](#) [Key relations](#) ⓘ [Additional relations](#) ⓘ

**Relation #1** 1 snippet ^

CDK4 has a negative "Regulation" relationship with progression-free survival.

[Supported by 7 references](#) >

Based on current evidence, Cyclin-Dependent kinase 4 and 6 inhibitors combined with endocrine therapy have great confidence in improving progression-free survival, overall survival, ORR, and clinical benefit response outcomes in patients with advanced breast cancer, which provides more rational and valid evidence-based medicine for Cyclin-Dependent kinase 4 and 6 inhibitor promotion and clinical decision support.

## 结果分析如下:

- **一级 (首要) 关系描述性语句:** 例如., CDK4 has a negative "Regulation" relationship with progression-free survival. (有7篇文献支持) **这句话是由AI自动总结出来**
- **更多文献论证片段:** Based on current evidence, Cyclin-Dependent kinase 4 and 6 inhibitors combined with endocrine therapy have great confidence in improving progression-free survival, overall survival, ORR, and clinical benefit response outcomes in patients with advanced breast cancer, which provides more rational and valid evidence-based medicine for Cyclin-Dependent kinase 4 and 6 inhibitor promotion and clinical decision support. **AI推荐这篇文章原因的原文依据**  
(备注Clinical trials 没有文本片段)
- **链接到提及该关系的参考文献:** 在新的浏览器窗口打开参考文章或者试验数据
- **二级 (次要) 关系:** 记录中发现与您的搜索/过滤器不直接相关的其他关系, 或许可以引起您其他方向的思考

# EmBio Insights 3步走助力你分析关注的蛋白/基因

G14

	A	B	C	D
1	IFNG			
2	IL2RA			
3	FOXP3			
4	BCL2			
5	IL5			
6	BCL6			
7	IL17A			
8	IL4			
9	PRDM1			
10	PRF1			
11	CD86			
12	EOMES			
13	IFNAR1			
14	IL10			
15	OPRK1			
16	TNFRSF4			
17	C3			
18	CCND2			
19	CCR5			
20	CD274			
21	CD40LG			
22	CD69			
23	CDK1			
24	CDK2			
25	CLDN5			
26	CYP3A4			
27	DICER1			

embio-protein-entities (100)

EmBio Insights

Upload

Drag and drop your document here or

**Browse files**

(accepted formats: .xlsx, .xls - Max rows allowed: 200)

Not sure about which file to upload? [Download the template](#)

Uploads

List name	Status	Date
1. Proteins upstream eAZ regulate.xlsx	Completed	06/03/2024

**Open analysis**

EmBiology

New project

Saved experiments

EmBio Insights Search Saved lists

Upload > Concepts mapping

Alopecia short list\_200.xlsx

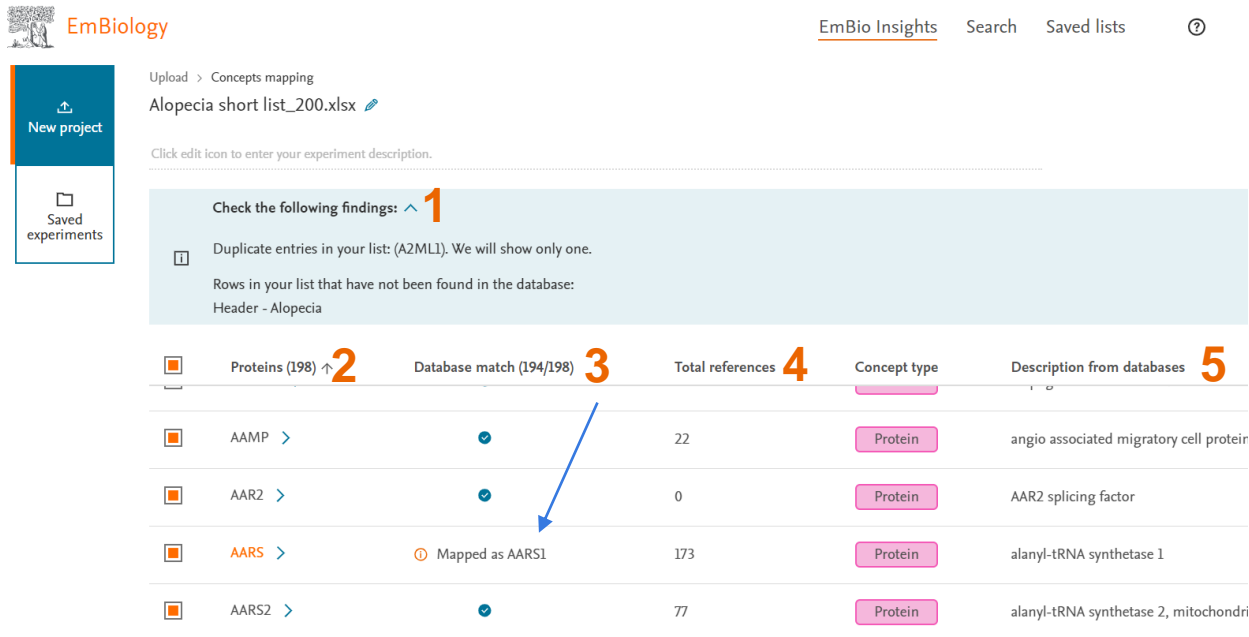
Click edit icon to enter your experiment description.

Check the following findings:

- Duplicate entries in your list: (A2ML1). We will show only one.
- Rows in your list that have not been found in the database: Header - Alopecia

	Proteins (198) ↑	Database match (194/198)	Total references	Concept type	Description from databases
AAMP >	●	22	Protein	angio associated migratory cell protein	
AAR2 >	●	0	Protein	AAR2 splicing factor	
AARS >	⊕ Mapped as AARS1	173	Protein	alanyl-tRNA synthetase 1	
AARS2 >	●	77	Protein	alanyl-tRNA synthetase 2, mitochondri	

# EmBiology 数据库将自动匹配用户上传的基因/蛋白质信息



EmBiology

EmBio Insights Search Saved lists ?

Upload > Concepts mapping  
Alopecia short\_list\_200.xlsx

Click edit icon to enter your experiment description.

Check the following findings: **1**

- Duplicate entries in your list: (A2ML1). We will show only one.
- Rows in your list that have not been found in the database: Header - Alopecia

Proteins (198) <b>2</b>	Database match (194/198) <b>3</b>	Total references <b>4</b>	Concept type	Description from databases <b>5</b>
AAMP >	✓	22	Protein	angio associated migratory cell proteir
AAR2 >	✓	0	Protein	AAR2 splicing factor
AARS >	○ Mapped as AARS1	173	Protein	alanyl-tRNA synthetase 1
AARS2 >	✓	77	Protein	alanyl-tRNA synthetase 2, mitochondri

1. 标题中显示了无法在 embiology 数据库中匹配到的蛋白质或者重复蛋白质的名称
2. 成功匹配到数据库里的蛋白质数量
3. 在某些情况下，上传列表中的蛋白质名称与 embiology 数据里的名字不匹配，系统建议出推荐的蛋白质同义词。
4. 参考文献数量是指提及该蛋白质的文章/临床试验的总数量
5. 蛋白质简单描述

# EmBiology 全方位识别蛋白信息



更多细节信息，比如功能，细胞定位，蛋白受体等。

☐ Duplicate entries in your list: (A2ML1). We will show only one.

Rows in your list that have not been found in the database:  
Header - Alopecia

☐	Proteins (198)	Disease match (194/198)	Total references	Concept type	Description
☐	A2ML1 →	✔	42	Protein	alpha-2
☐	A4GALT >	✔	82	Protein	alpha 1,
☐	AAAS >	✔	107	Protein	aladin \
☐	AACS >	✔	114	Protein	acetoac
☐	AADACL3 >	✔	0	Protein	arylac
☐	AADAT >	✔	232	Protein	amino
☐	AAED1 >	✔	4	Protein	peroxin
☐	...	...	...	...	...



Name:

[A2ML1](#) ↗

Description:

This gene encodes a member of the alpha-macroglobulin superfamily. The encoded protein is thought to be an N-glycosylated monomeric protein that acts as an inhibitor of several proteases. It has been shown to form covalent interactions with proteases, and has been reported as the p170 antigen recognized by autoantibodies in the autoimmune disease paraneoplastic pemphigus (PNP; PMID:20805888). Mutations in these gene have also been associated with some cases of Noonan syndrome (NS; PMID:24939586) as well as some cases of otitis media (PMID:26121085). Alternative splicing results in multiple transcript variants encoding different isoforms. [provided by RefSeq, Aug 2015]

Primary Cell Localization:

Extracellular

Organism:

Homo sapiens (human)

Type:

Protein

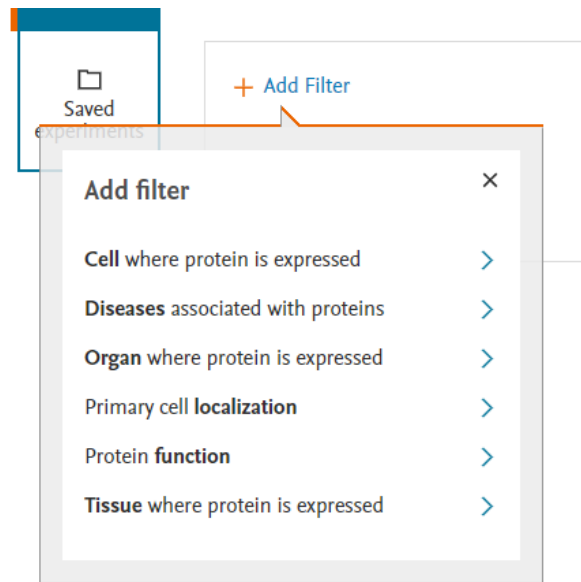
Total references: 42

点击蛋白名称，可以在新的窗口进行检索

# 点击Apply Filter可进一步筛选基因/蛋白

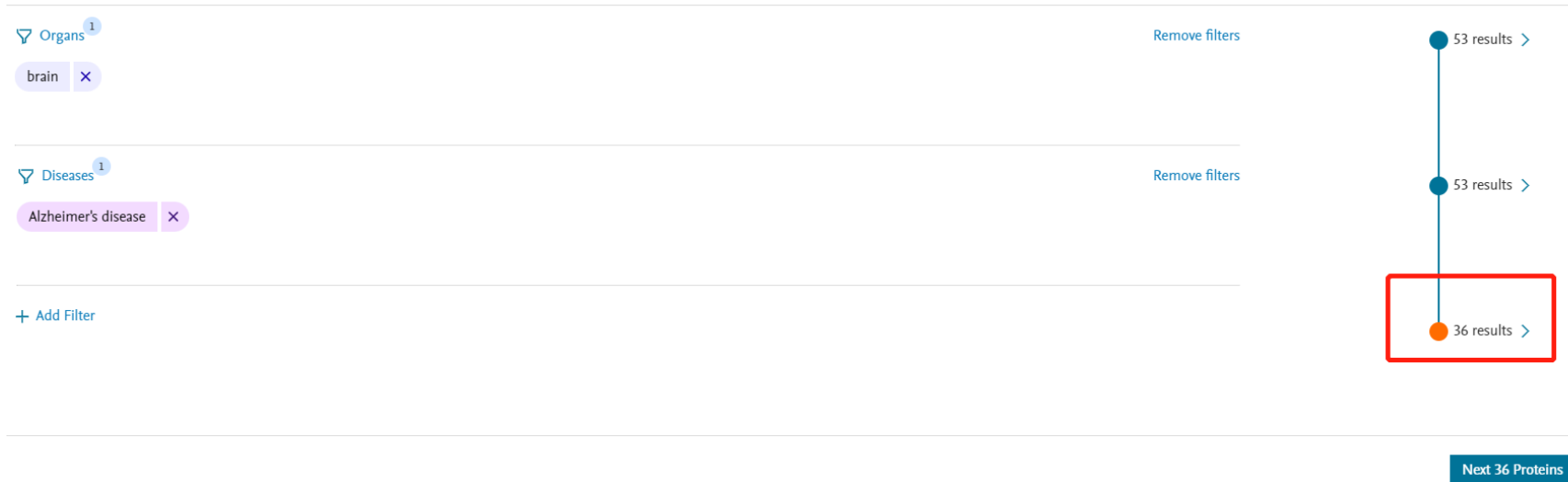
Total references	Concept type	Description from databases
71,224	Protein	Interferon Gamma
7,908	Protein	Interleukin 2 Receptor Subunit Alpha
10,167	Protein	Forkhead Box P3
45,444	Protein	BCL2 Apoptosis Regulator
13,290	Protein	Interleukin 5
3,436	Protein	BCL6 Transcription Repressor
24,988	Protein	Interleukin 17A

Find connections **Apply filters**



可以根据需求进行加权筛选

## 点击Apply Filter可进一步筛选基因/蛋白



The screenshot shows a filter interface with the following elements:

- Organs Filter:** A dropdown menu labeled 'Organs' with a '1' next to it, containing a 'brain' tag with an 'X' to remove it. A 'Remove filters' link is to the right.
- Diseases Filter:** A dropdown menu labeled 'Diseases' with a '1' next to it, containing an 'Alzheimer's disease' tag with an 'X' to remove it. A 'Remove filters' link is to the right.
- Results Summary:** A vertical list on the right side showing the number of results for each filter and the combined filters:
  - 53 results >
  - 53 results >
  - 36 results > (highlighted with a red box)
- Next 36 Proteins:** A blue button at the bottom right.

比如加入了器官：脑部；疾病：阿尔兹海默症，最后系统显示提供的53个基因/蛋白里，只有36个和这类有关，点击Next，更详细查看

# 构建选择蛋白与基因/药物之间的关系



Upload > Concepts mapping > Find connections

Burkitt's positive regulation.xlsx

Select a question

I'm looking for...

- Diseases associated with proteins in my list
- Diseases caused by proteins in my list
- Diseases that have known biomarkers in my list
- Diseases that have (potential) novel biomarkers in my list
- Cell processes regulated by proteins in my list
- Expression targets (proteins) regulated by proteins in my list
- Common regulators (proteins) of proteins in my list
- Drugs that directly interact with proteins in my list
- Drugs that regulate proteins in my list

Find Q

Filters applied: downstream direction, positive effect, Regulation relationship

单击 “i” 查看每个问题的关系解读

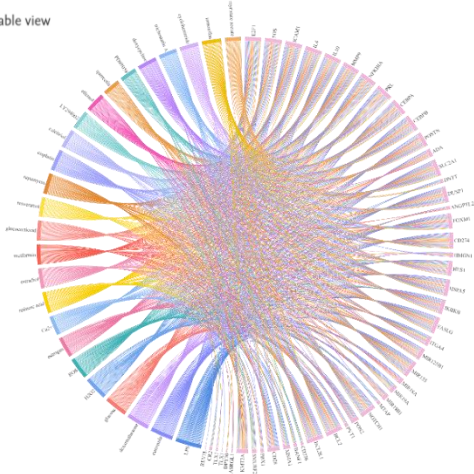
点击Find Connections之后，在选项卡里选择和基因列表相关的问题，比如疾病，细胞表达调控，药物等



# EmBiology Insights – 同时发现多种与基因/蛋白列表相关术语

The chart shows the first 25 results connected with the highest number of proteins from the list. Switch to table view and select different items to adjust the results. Close x

Chart view Table view



- 默认情况下显示前25个关联(基于蛋白质连接的数量)以及相关文献
- 您可以通过单击Table View来调整关联，其中将包括前500个关联，并做出不同的选择
- 图表下部的文献列表包括支持图表中关系的所有文献

Export chart Update results

8,268 results found:

Export (First 2000) Save to list Clear selection

1. Metformin Directly Binds to MMP-9 to Improve Plaque Stability.  
*Journal of Cardiovascular Development and Disease*, volume 10, 1 February 2023  
X. Chen, S. Wang, W. Xu, M. Zhao, Y. Zhang, H. Xiao  
[Relations](#) | [Abstract](#) | [Full text](#)
2. Rab711 plays a role in regulating surface expression of toll like receptors and downstream signaling in activated macrophages.  
*Biochemical and Biophysical Research Communications*, volume 640, Pages 125-131, 15 January 2023  
R. Shrivastava, S. Prasad, S. Ghosh, S. Mukhopadhyay  
[Relations](#) | [Abstract](#) | [Full text](#)
3. Efficacy of Intolelin on the human gastric cancer cell line MDN45 and underlying mechanism  
*Journal of Traditional Chinese Medicine*, volume 43, Pages 34-41, 1 February 2023  
Y. Ding, F. Liu, Z. Li, Y. Xu, N. Cai, G. Zhang, K. Wang, A. Zhao  
[Relations](#) | [Abstract](#) | [Full text](#)
4. Receptor protein tyrosine phosphatase  $\beta$ C regulates loss of neurogenesis in the mouse hippocampus following adolescent acute ether  
*Neuroscience*, volume 344, Pages 188-202, 1 January 2023  
M. Galán-Curiel, M. Rodríguez-Sagales, E. González, M. Vicente-Badajoz, T. Fontán-Badajoz, M.C. Ojeda-Bertho, C. Pérez-García, J. Carrasco, M. Moreno-Hernández, J. B. de Pascual-Torres, A. Ramos, G. Horta-Rico  
[Relations](#) | [Abstract](#) | [Full text](#)

Reset Chart

Relations Abstract x

Relation N°1 2 snippets

metformin has a negative "Expression" relationship with MMP9.  
26 References

Snippet 1 of 2  
Immunofluorescence staining of the right cerebral cortex area and serum MMP activity assay results showed that metformin treatment decreased local plaque MMP-9 protein level and circulating MMP-9 activity, respectively.

Snippet 2 of 2  
Moreover, metformin treatment drives MMP-9 degradation.

Secondary relations 1 snippet

Secondary Relation N°1  
metformin has a negative "Regulation" relationship with type 2 diabetes.  
287 References

Secondary Relation N°2 1 snippet

metformin has a negative "Regulation" relationship with atherosclerosis plaque.  
13 References

# Table View视角下，显示更多内容

Chart view

Table view

Export results (500)

1/500 diseases

Clear selection

Update chart (1/25)

Sorted by Connections ↑↓ | Alphabetical order ↑↓

1.  carcinogenesis 36 protein connection

2.  neoplasm 35 protein connection

Proteins	Description	Localization	Protein class	References	Literature
<a href="#">CD274 &gt;</a>	Cd274 molecule	Plasma membrane	Receptor	188	<a href="#">Articles</a>
<a href="#">IFNG &gt;</a>	Interferon gamma	Extracellular	Ligand	120	<a href="#">Articles</a>
<a href="#">SIRT1 &gt;</a>	Sirtuin 1	Nucleus	Protein	92	<a href="#">Articles</a>
<a href="#">BCL2 &gt;</a>	Bcl2 apoptosis regulator	Mitochondria	Protein	87	<a href="#">Articles</a>
<a href="#">IL10 &gt;</a>	Interleukin 10	Extracellular	Ligand	80	<a href="#">Articles</a>

例如此次检索，搜索的是和基因列表匹配的疾病，Tableview里可以选择500种疾病，每种疾病下查看与之关联的基因有哪些，具体描述是什么

# Embiology Network功能，检索基因/蛋白，疾病，药物，病原，器官等之间的关系



Check the following findings: ^



Rows in your list that have not been found in the database:  
macrophagy

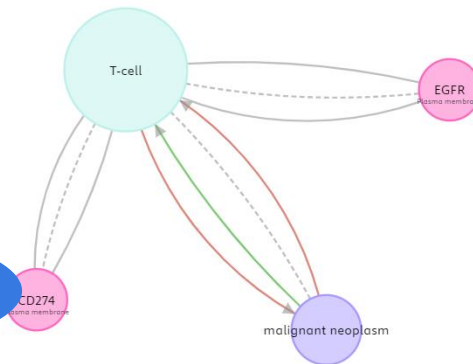
Biological concepts (4/4)	Database match (2/4)	Total references	Concept type	Description from databases
1. EGFR >		41,248	Receptor	Epidermal Growth Factor Receptor
2. PDL1 >	Mapped as CD274	16,342	Receptor	CD274 Molecule
3. T-cell >		98,239	Cell	
4. cancer >	Mapped as malignant	230,201	Disease	

Generate network

# 示例：多维度展示深度研究之间关系



直接展示各种生物体的不同关系  
如：绿色代表 正向调控



进一步展示T细胞与相关靶点、疾病关系

1,614 results

Select all [Clear selection](#)

Article  
1 Patient-derived cell-based pharmacogenomic assessment to unveil underlying resistance mechanisms .  
*Journal of Experimental and Clinical Cancer Research*, volume 42, 1 December 2023  
N. Yu, M. Hwang, Y. Lee, B.R. Song, E.H. Kang, H. Sim, B.-C. Ahn, K.H. Hwang, J. Kim, S. Hong, S. Kim, C. Park, J.-Y. Han  
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Article  
2 Clinical Applications of Flow Cytometry in Cancer Immunotherapies: From Diagnosis to Treatments  
*Methods in Molecular Biology*, volume 2593, Pages 93-112, 2023  
H.K. Mishra  
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