



ELSEVIER

EmBiology Quick User Guide



February 2023

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Starting a search

 EmBio Search Saved lists

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

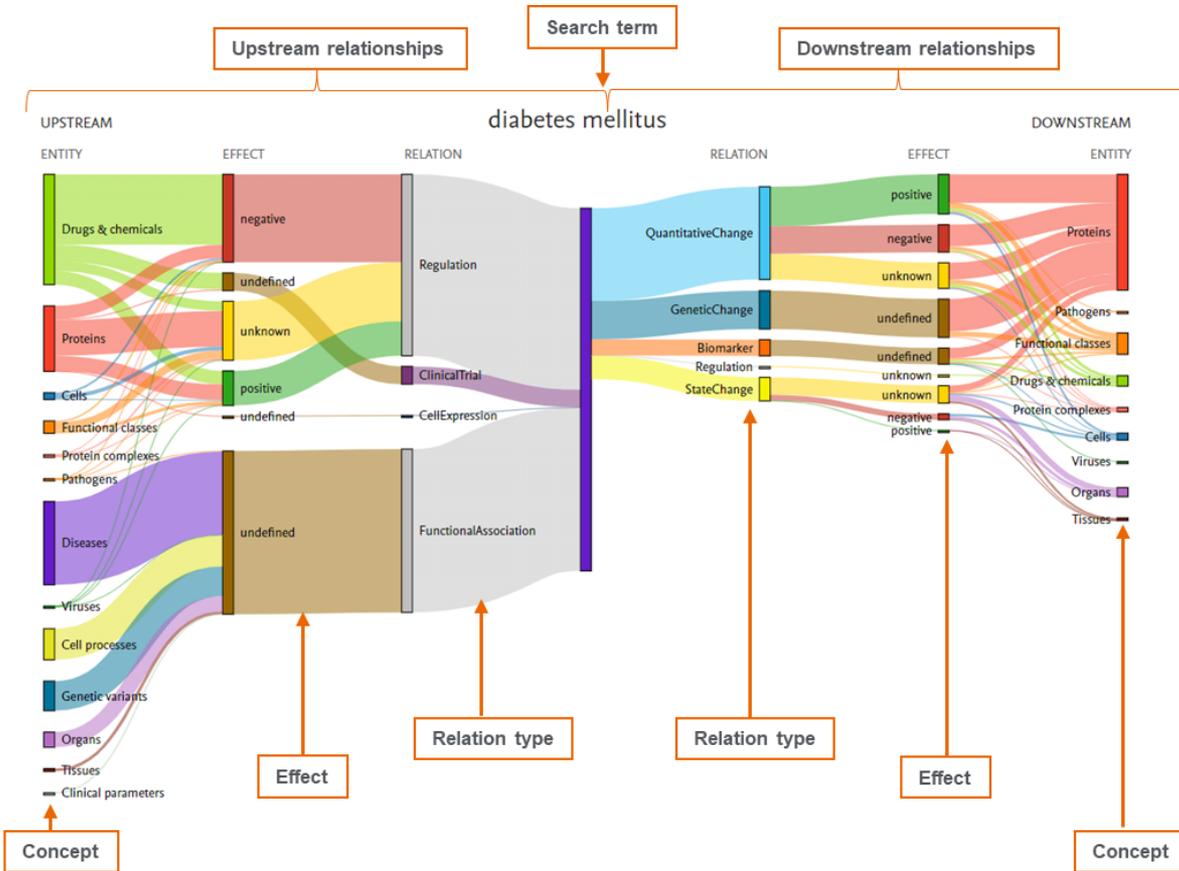
- Type a term into the search bar. After 3 letters are entered, suggestions will appear below the search bar. Either continue typing in the search term and press 'enter' or select from one of the suggested terms.
 - Search for any of the >1.2M concepts in EmBiology (drug, disease, protein, virus, cell process, etc.)
 - Note that several synonyms often refer to the same term and it is possible to type your preferred synonym for a concept. EmBiology will indicate what the preferred term for that concept is and results will include articles and clinical trials that mention both the preferred term and all synonyms.

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

diabet × Q

diabetic coma	54
diabetic foot	995
diabetes mellitus	136912
diabetic complication	5793
diabetic ulcer	239
diabetic wound	614
bullosis diabeticorum	13
diabetic nephropathy	12231
diabetic obesity	4556
gestational diabetes	5434

Interpreting the visual overview of results



Upstream/downstream

- Upstream relationships represent biological concepts that **act on** the search term (e.g., SIRT1 negatively regulates diabetes mellitus).
- Downstream relationships represent biological concepts that are **acted on by** the search term (IL6 has a positive quantitative change as a result of diabetes mellitus)

Concept

- Represent different biological entities (e.g., proteins, drugs, cell processes, etc) that have a relationship with the search term). For a description of all concept types, see page x.

Effect

- Can be positive, negative or unknown (in cases where the effect is not mentioned) or undefined (for relationship types that do not act positively or negatively)

Relation type

- Represent different types of relationships concepts have with the search term. For a description of relationships, see page x.

Understanding your results

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

<input type="checkbox"/> 1.	<p>Luminescence studies of binding affinity of vildagliptin with bovine serum Journal of Biomolecular Structure and Dynamics, 2022 P. Verma, L. Kaur, P. Aswal, A. Singh, H. Ojha, A.J. Rahman, R. Singhal, A.K. Tiwari, M. Pathak</p> <p>Relations: 1 Abstract Full text</p>
<input type="checkbox"/> 2.	<p>The impact of a novel Chinese yam-derived polysaccharide on blood glucose in diabetic C57BL/6 mice. Food & function, volume 13, Pages 2681-2692, 7 March 2022 X. Feng, Q. Zhang, J. Li, N. Ble, C. Li, R. Lian, L. Qin, Y. Feng, C. Wang</p> <p>Relations: 1 Abstract Full text</p>
<input type="checkbox"/> 3.	<p>Prevalence of SGLT2i and GLP1RA use among US adults with type 2 diabetes Journal of Diabetes and Its Complications, volume 36, 1 June 2022 C.P. Limonte, Y.N. Hall, S. Trilkudanathan, K.R. Tuttle, I.B. Hirsch, I.H. de Boer, L.R. Zelnick</p> <p>Relations: 2 Abstract Full text</p>
<input type="checkbox"/> 4.	<p>Economic analysis of glucagon like peptide-1 receptor agonists from the Saudi Pharmaceutical Journal, volume 30, Pages 433-439, 1 April 2022 N.S. Alkhatib, A.R. Almutairi, O.S. Alkhezi, O.M. Alfayez, M.S. Al Yami, O.A. Almohammed</p> <p>Relations: 1 Abstract Full text</p>
<input type="checkbox"/> 5.	<p>Type-2 diabetic rat heart: The effect of kolaviron on mTOR-1, P70S60K, PKCACE, and P38 MAPK gene expression profile.</p>

Relations Abstract ✕

Relation N°1 1 snippet

metformin has a negative "Regulation" relationship with diabetes mellitus.
[1,879 References](#)

Relation N°2 1 snippet

GLP-1 receptor agonist has a negative "Regulation" relationship with diabetes mellitus.
[248 References](#)

Secondary relations

Secondary Relation N°1 2 snippets

ALB has a "CellExpression" relationship with urine.
[1,987 References](#)

Secondary Relation N°2 1 snippet

GLP-1 receptor agonist has a negative "Regulation" relationship with disease exacerbation.
[14 References](#)

Secondary Relation N°3 1 snippet

GLP-1 receptor agonist has a negative "Regulation" relationship with cardiovascular disease.
[81 References](#)

- The results list includes all articles and clinical trials where a biological concept has a relationship with your search term
- Applying filters further narrows down the results list to those records with a specific type of relationship
- Each record includes information on the relations found in the record, a link to the abstract/clinical trial information and a link out to the full text/CT.gov

Understanding your results – Relations information

Export (First 1000) | Save to list | Clear selection

<input type="checkbox"/> 1.	Luminescence studies of binding affinity of vildagliptin with bovine serum Journal of Biomolecular Structure and Dynamics, 2022 P. Verma, L. Kaur, P. Aswal, A. Singh, H. Ojha, A.J. Rahman, R. Singhal, A.K. Tiwari, M. Pathak Relations: 1 Abstract Full text	Relation N°1 1 snippet metformin has a negative "Regulation" relationship with diabetes mellitus. 1,879 References Snippet 1 of 1 Use of glucose-lowering agents for conditions other than diabetes, e.g. metformin for polycystic ovarian syndrome and glucagon-like peptide-1 receptor agonists for weight loss, could have led to misclassification as a diabetes diagnosis, but this number is likely to be small.
<input type="checkbox"/> 2.	The impact of a novel Chinese yam-derived polysaccharide on blood glucose diabetic C57BL/6 mice. Food & function, volume 13, Pages 2681-2692, 7 March 2022 X. Feng, Q. Zhang, J. Li, N. Ble, C. Li, R. Lian, L. Qin, Y. Feng, C. Wang Relations: 1 Abstract Full text	Relation N°2 1 snippet GLP-1 receptor agonist has a negative "Regulation" relationship with diabetes mellitus. 248 References
<input type="checkbox"/> 3.	Prevalence of SGLT2i and GLP1RA use among US adults with type 2 diabetes Journal of Diabetes and Its Complications, volume 36, 1 June 2022 C.P. Limonte, Y.N. Hall, S. Trikudanathan, K.R. Tuttle, I.B. Hirsch, I.H. de Boer, L.R. Zelnick Relations: 2 Abstract Full text	Secondary relations Secondary Relation N°1 2 snippets ALB has a "CellExpression" relationship with urine. 1,987 References
<input type="checkbox"/> 4.	Economic analysis of glucagon like peptide-1 receptor agonists from the Saudi Saudi Pharmaceutical Journal, volume 30, Pages 433-439, 1 April 2022 N.S. Alkhatib, A.R. Almutairi, O.S. Alkhezi, O.M. Alfayez, M.S. Al Yami, O.A. Almomhammed Relations: 1 Abstract Full text	Secondary Relation N°2 1 snippet
<input type="checkbox"/> 5.	Type-2 diabetic rat heart: The effect of kolaviron on mTOR-1, P70S60K, PKC ACE and P38 MAPK gene expression profile.	

Relation information includes the following:

- **Sentence describing the relationship:**
e.g., *metformin has a negative regulation relationship with diabetes mellitus*
- **One or more text snippets:** text from the article that was interpreted by automatic indexing to include the relationship. Snippets can be useful to see the context of the relationship and determine it's relevance to your work. (Clinical trials do not have text snippets)
- **Link to additional references mentioning the relationship:** opens up a new window of articles/trials that include the specific relationship and can be a useful indicator of how well studied/known is a relationship
- **Secondary relationships:** additional relationships found in the record that are not directly related to your search/filters

Understanding your results – Clinical Trial information

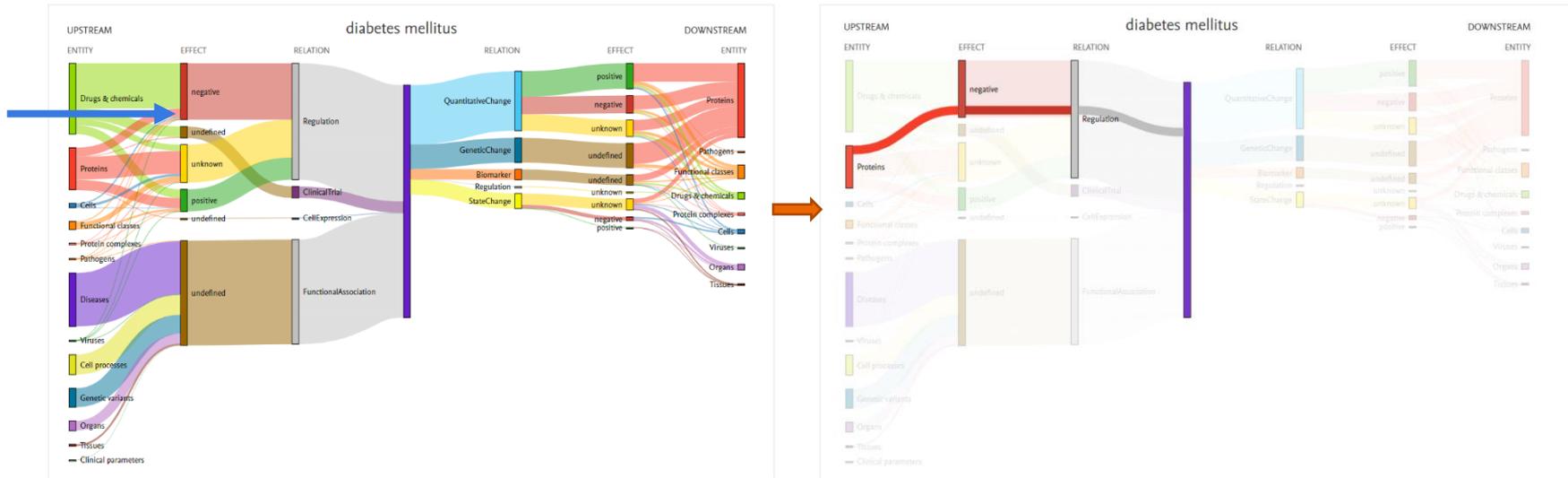
	Relations	Info
<p>inflammatory axis suppression. Bioactive Materials, volume 19, Pages 653-665, 1 January 2023 X. Zeng, B. Chen, L. Wang, Y. Sun, Z. Jin, X. Liu, L. Ouyang, Y. Liao Relations: 1 Abstract Full text ↗</p>		
<input type="checkbox"/> 2. isCGM With Education and Feedback for Non-Insulin Dependent Type 2 Di ClinicalTrial.gov Study Sponsor: University of Alberta Start date: 2022 Relations: 1 Info Record details ↗		
<input type="checkbox"/> 3. Placebo-controlled, Proof-of-concept Study to Evaluate the Safety and Effic Combination With SGLT2 Inhibitor EmpaGliflozin in patiEnts With NASH a ClinicalTrial.gov Study Sponsor: Inventiva Pharma Start date: 2022 Relations: 2 Info Record details ↗		<p>CONDITION(S):</p> <ul style="list-style-type: none">• NASH - Nonalcoholic Steatohepatitis• Diabetes Mellitus, Type 2 <p>INTERVENTION(S)/DRUG TYPE(S):</p> <ul style="list-style-type: none">• Empagliflozin• Placebo• IVA337 <p>TRIAL STATE:</p> <p>Not yet recruiting</p> <p>PHASES:</p> <ul style="list-style-type: none">• Phase 2 <p>STUDY TYPE:</p> <p>Interventional</p> <p>STUDY SPONSOR:</p> <p>Inventiva Pharma</p> <p>STUDY COLLABORATOR:</p> <p>Information not provided</p>
<input type="checkbox"/> 4. Gentamicin-loaded Calciumsulfate-hydroxyapatite Biocomposite to Treat D ClinicalTrial.gov Study Sponsor: University Medical Center Groningen Start date: 2022 Relations: 1 Info Record details ↗		
<input type="checkbox"/> 5. Immunonutrition for Diabetic Foot Ulcers ClinicalTrial.gov Study Sponsor: Prisma Health-Midlands Start date: 2022 Relations: 3 Info Record details ↗		

Clinical trials do not include Abstracts. Instead, they include:

- Condition(s)
- Interventions
- Trial State
- Phase(s)
- Study type
- Study sponsor
- Study collaborator

It is possible to filter for specific clinical trial information (e.g., trial phase) by exporting clinical trial results and applying filters in the exported file.

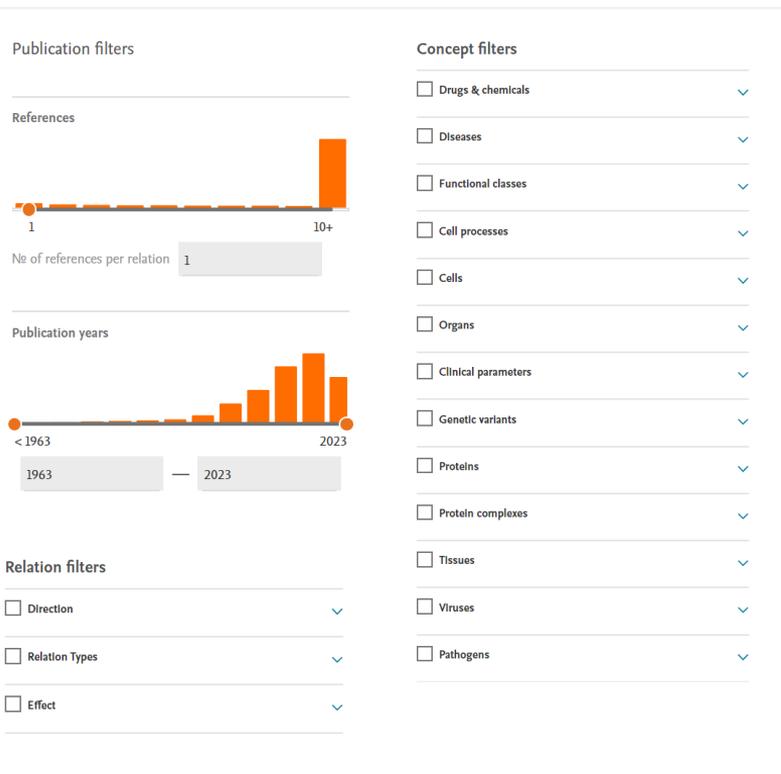
How to apply filters – single filter



It is possible to apply a single filter by clicking directly on the visual.

- For example, to filter by proteins that negatively regulate diabetes mellitus, click on the corresponding area on the graph. This will narrow down search results to those that include at least one **primary** relationship where a protein negatively regulates diabetes mellitus.

How to apply filters – multiple filters



Publication filters

- **References:** Allows filtering by a specific number of references per relation. For example, if the No. references per relation = 5, results will include articles/clinical trials where all primary relationships are supported by 5 or more references.
- **Publication years:** Allows filtering by specific years. For example, setting the lower limit to 1992 and upper limit to 2021 means results will include all articles/clinical trials published between the years 1992 and 2021.

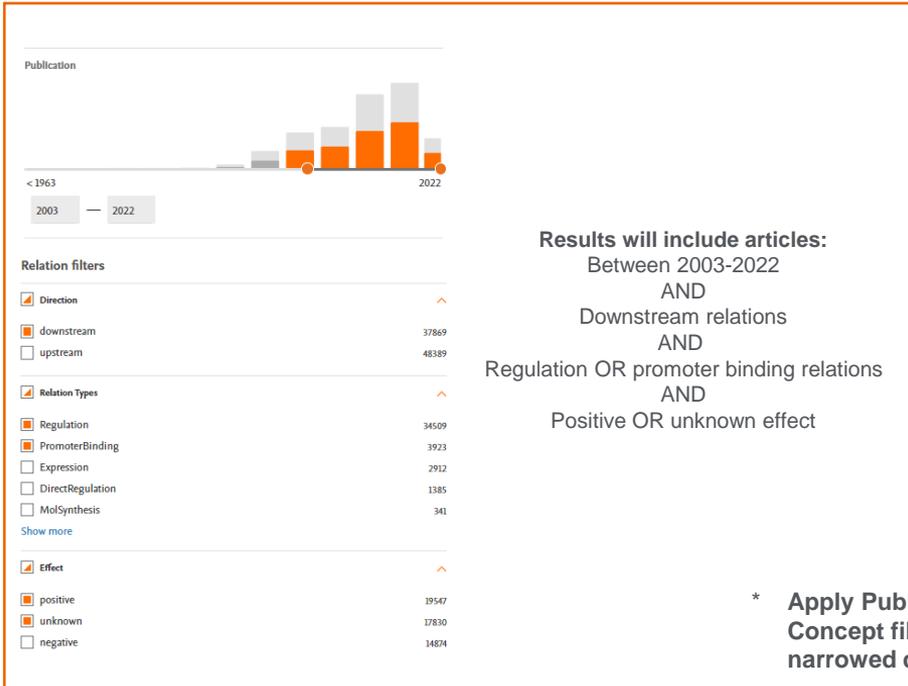
Relation filters

- **Direction:** results will include articles/clinical trials where all primary relationships are 1) upstream (meaning concepts **act on** the search term) or 2) downstream (concepts are **acted on by** the search term).
- **Relation:** results will include articles/clinical trials where all primary relationships are of the selected relation(s).
- **Effect:** results will include articles/clinical trials where all primary relationships are of the selected effect(s) – positive, negative, unknown (meaning the effect of the relationship has not been identified) and undefined (meaning the relationship type does not have a positive/negative effect)

Concept Filters: results will include articles/clinical trials where all primary relationships are of the selected concept(s). For example, selecting upstream, regulation, positive and protein means results will include articles/clinical trials where all primary relationships are proteins that have a positive regulation relationship with your search term.

Filter behaviour

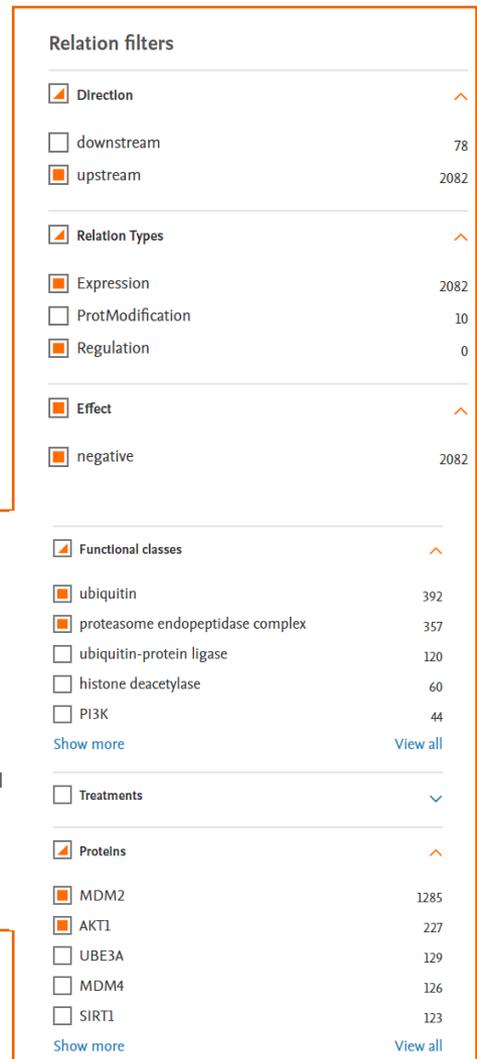
- Between different types of filters, selections are combined with AND
- Multiple selections within an individual filter category are combined with OR
 - All selections under Concept filters combined with OR



Results will include articles:
Between 2003-2022
AND
Downstream relations
AND
Regulation OR promoter binding relations
AND
Positive OR unknown effect

Results will include articles with:
Upstream relations
AND
Regulation OR Expression relations
AND
Negative effect
AND
Ubiquitin OR proteasome.... OR MDM2 OR AKT1

* Apply Publication and Relation filters first, then Concept filters (the list of concept filters will be narrowed down to relevant options)



Exporting relationships

Functional classes ▼

Treatments ▼

Proteins ▲

EGF 185

CBL 142

ERRFI1 131

LRIG1 130

DCN 104

[Show more](#) View all

- Perform search and apply all relevant publication/relationship filters
- Using the filter pop-up panel, you can export information about individual concepts or the entire set of information for a concept. For example:
 - Search by EGFR
 - Apply upstream/positive relationship filters
 - Expand the Concept filter – Protein and select View all.
 - A popup shows all proteins that are upstream of EGFR with a negative relationship. Select individual proteins or Select all entities – you can export this list or apply filters from this popup.

Filter: Protein Export entities (522) ✕

All # 0-9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

All filters Your selection

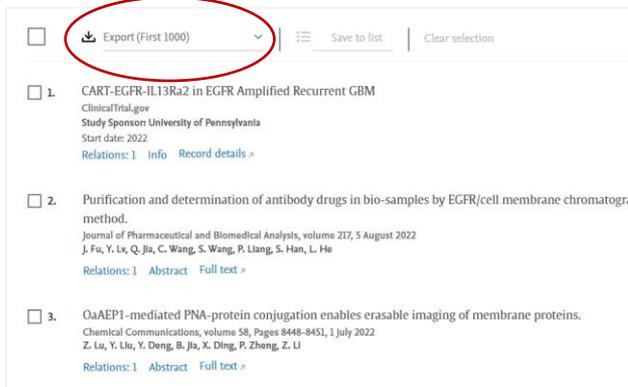
Select all entities @ ←

A	<input checked="" type="checkbox"/> ANKRD13A	1	<input checked="" type="checkbox"/> ARIH2	1	<input checked="" type="checkbox"/> BAP1	1
<input checked="" type="checkbox"/> ABL1	5 <input checked="" type="checkbox"/> ANXA6	17	<input checked="" type="checkbox"/> ARSB	1	<input checked="" type="checkbox"/> BCAR1	2
<input checked="" type="checkbox"/> ACSL4	1 <input checked="" type="checkbox"/> APIG1	2	<input checked="" type="checkbox"/> ATF2	1	<input checked="" type="checkbox"/> BIRC2	2
<input checked="" type="checkbox"/> ADAMTS8	1 <input checked="" type="checkbox"/> APC	2	<input checked="" type="checkbox"/> ATF4	1	<input checked="" type="checkbox"/> BIRC3	1
<input checked="" type="checkbox"/> ADIPOQ	2 <input checked="" type="checkbox"/> APLP2	1	<input checked="" type="checkbox"/> AURKB	1	<input checked="" type="checkbox"/> BLOC1S1	2
<input checked="" type="checkbox"/> AFAP1	1 <input checked="" type="checkbox"/> APMAP	1	B		<input checked="" type="checkbox"/> BMP4	8
<input checked="" type="checkbox"/> AICD	4 <input checked="" type="checkbox"/> APOBEC3B	1	<input checked="" type="checkbox"/> B4GALNT1	1	<input checked="" type="checkbox"/> BRAF	26
<input checked="" type="checkbox"/> ALDH3A1	1 <input checked="" type="checkbox"/> ARHGEF4	1	<input checked="" type="checkbox"/> B4GALT1	2	<input checked="" type="checkbox"/> BRCA1	6
<input checked="" type="checkbox"/> angiotensin (1-7)	6 <input checked="" type="checkbox"/> ARID1A	3	<input checked="" type="checkbox"/> BAG1	4	<input checked="" type="checkbox"/> BRCA2	1

Clear selection Apply filters (522)

Search Term	Acts on / is acted by	Concept	Relation	Object Type	Relation E	# of refere	Link
EGFR	is acted on by	EGF	Expression	negative	188	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	LRIG1	DirectRegulation	negative	121	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	LRIG1	Expression	negative	43	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	CBL	Expression	negative	147	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	ERRFI1	DirectRegulation	negative	129	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	ERRFI1	Expression	negative	14	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	DCN	DirectRegulation	negative	101	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	DCN	Expression	negative	10	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	MIR7-1	miRNAEffect	negative	99	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	SNX1	DirectRegulation	negative	33	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	SNX1	Expression	negative	33	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	MIR133A1	miRNAEffect	negative	54	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	HGS	DirectRegulation	negative	30	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	HGS	Expression	negative	22	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	MIR146A	miRNAEffect	negative	48	https://embio.elsevier.com/reference?query=EGFI	
EGFR	is acted on by	MIR145	miRNAEffect	negative	35	https://embio.elsevier.com/reference?query=EGFI	

Saving and exporting results

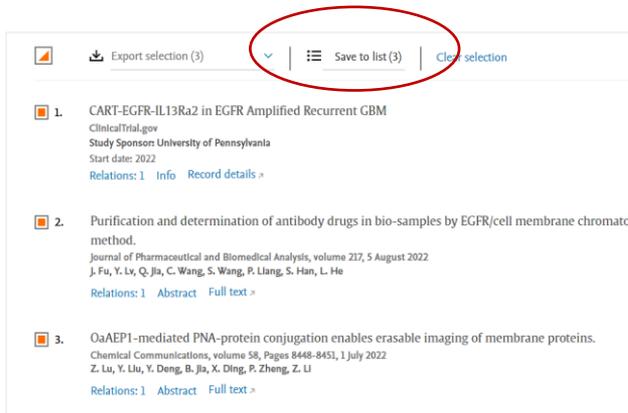


Export (First 1000) Save to list Clear selection

- CART-EGFR-IL13Ra2 in EGFR Amplified Recurrent GBM
 ClinicalTrial.gov
 Study Sponsors University of Pennsylvania
 Start date: 2022
 Relations: 1 Info Record details >
- Purification and determination of antibody drugs in bio-samples by EGFR/cell membrane chromatography method.
 Journal of Pharmaceutical and Biomedical Analysis, volume 217, 5 August 2022
 J. Fu, Y. Lv, Q. Jia, C. Wang, S. Wang, P. Llang, S. Han, L. He
 Relations: 1 Abstract Full text >
- OaAEP1-mediated PNA-protein conjugation enables erasable imaging of membrane proteins.
 Chemical Communications, volume 58, Pages 8448-8451, 1 July 2022
 Z. Lu, Y. Liu, Y. Deng, B. Jia, X. Ding, P. Zheng, Z. Li
 Relations: 1 Abstract Full text >

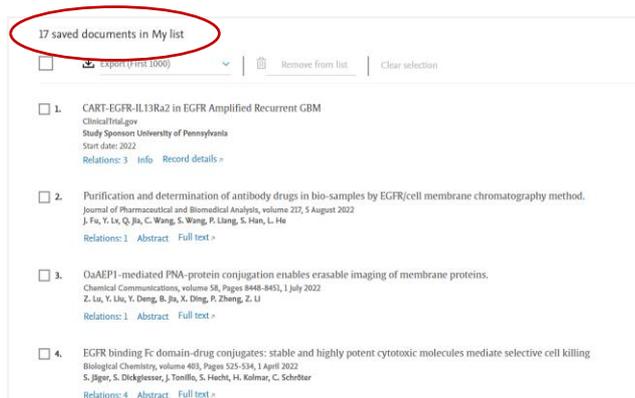
	A	B	C	D	E	F
1	Result	Title	Publication	Author	Nar	Source
2		1 CART-EGF	ClinicalTri	University	ClinicalTri	2022 https
3		1 CART-EGF	ClinicalTri	University	ClinicalTri	2022 https
4		1 CART-EGF	ClinicalTri	University	ClinicalTri	2022 https
5		2 Purification	Article	J. Fu, Y. L	Journal of	2022 https
6		3 OaAEP1-n	Article	Z. Lu, Y. L	Chemical C	2022 https
7		4 EGFR binc	Article	S. Jäger,	Biological	2022 https
8		4 EGFR binc	Article	S. Jäger,	Biological	2022 https
9		4 EGFR binc	Article	S. Jäger,	Biological	2022 https
10		4 EGFR binc	Article	S. Jäger,	Biological	2022 https
11		5 EGFR inhil	Article	X. He, Y. H	Scientific r	2022 https
12		5 EGFR inhil	Article	X. He, Y. H	Scientific r	2022 https
13		6 YAP deriv	Article	Y. An, B. D	Cancer Le	2022 https
14		6 YAP deriv	Article	Y. An, B. D	Cancer Le	2022 https
15		6 YAP deriv	Article	Y. An, B. D	Cancer Le	2022 https

- Export up to 1000 results or select individual results
- Export files include all bibliographic information, relationship information, text snippets and clinical trail information



Export selection (3) Save to list (3) Clear selection

- CART-EGFR-IL13Ra2 in EGFR Amplified Recurrent GBM
 ClinicalTrial.gov
 Study Sponsors University of Pennsylvania
 Start date: 2022
 Relations: 1 Info Record details >
- Purification and determination of antibody drugs in bio-samples by EGFR/cell membrane chromatography method.
 Journal of Pharmaceutical and Biomedical Analysis, volume 217, 5 August 2022
 J. Fu, Y. Lv, Q. Jia, C. Wang, S. Wang, P. Llang, S. Han, L. He
 Relations: 1 Abstract Full text >
- OaAEP1-mediated PNA-protein conjugation enables erasable imaging of membrane proteins.
 Chemical Communications, volume 58, Pages 8448-8451, 1 July 2022
 Z. Lu, Y. Liu, Y. Deng, B. Jia, X. Ding, P. Zheng, Z. Li
 Relations: 1 Abstract Full text >



17 saved documents in My list

Export (First 1000) Remove from list Clear selection

- CART-EGFR-IL13Ra2 in EGFR Amplified Recurrent GBM
 ClinicalTrial.gov
 Study Sponsors University of Pennsylvania
 Start date: 2022
 Relations: 3 Info Record details >
- Purification and determination of antibody drugs in bio-samples by EGFR/cell membrane chromatography method.
 Journal of Pharmaceutical and Biomedical Analysis, volume 217, 5 August 2022
 J. Fu, Y. Lv, Q. Jia, C. Wang, S. Wang, P. Llang, S. Han, L. He
 Relations: 1 Abstract Full text >
- OaAEP1-mediated PNA-protein conjugation enables erasable imaging of membrane proteins.
 Chemical Communications, volume 58, Pages 8448-8451, 1 July 2022
 Z. Lu, Y. Liu, Y. Deng, B. Jia, X. Ding, P. Zheng, Z. Li
 Relations: 1 Abstract Full text >
- EGFR binding Fc domain-drug conjugates: stable and highly potent cytotoxic molecules mediate selective cell killing
 Biological Chemistry, volume 403, Pages 525-534, 1 April 2022
 S. Jäger, S. Dickjäger, J. Tonello, S. Hecht, W. Kolmar, C. Schelller
 Relations: 4 Abstract Full text >

- Save records (articles or clinical trials) to a list. Access your saved list by clicking 'Saved lists' (top right-hand of the screen).

Glossary of terms – Types of filters

Filter	Description
Publication filters	
Reference	Results will only include articles with relations supported by a specific number of references. Setting the filter to '5' means you will only see relations that have been reported in 5+ articles
Publication (year)	Results will include articles published on/before/between/after specific dates. Adjust the slide or fill in numbers for the publication years for which you would like to limit results
Direction filters	
Upstream or downstream	Results will include relations that are upstream or downstream of the search term. Upstream relations: search term is the 'object' (concepts act in some way on the search term). Downstream relations: search term is the 'subject' (it acts in some way) on downstream concepts
Effect filters	
Positive, negative, unknown or undefined	Most relations can have an effect (positive/negative). In cases where this information is not found in the snippet of text, the effect will be labelled 'unknown'. In cases where there is no effect for the relationship type (Binding, Cell Expression, Functional Association, the effect is labelled 'undefined'.
Relation filters	Articles in the results list will be selected based on the Search Term and relations selected in the Relations filter (see detailed information in slides 2-3)
Concept filters	Articles in the results list will be selected based the Search Term and concepts selected in the Concepts Filter. See detailed information in slide 4



Glossary of terms – Types of relations and examples

Relation	Description	Examples
Expression	Changes protein abundance by affecting levels of transcript or protein stability	<u>MDM2 has a negative "Expression" relationship with TP53</u>
miRNA Effect	Inhibitory effect of an miRNA on its mRNA target	<u>miR-30 has a negative "miRNAEffect" relationship with TP53</u>
Promoter Binding	Binds to the promoter of a gene	<u>FOXC1 has a positive "PromoterBinding" relationship with MMP7</u>
Regulation	Changes activity by an unknown mechanism (may be direct or indirect)	<u>SOCS3 has a positive "Regulation" relationship with diabetes mellitus</u>
Direct Regulation	Influences activity by direct physical interaction	<u>BRCA1 has a "DirectRegulation" relationship with BARD1</u>
Binding	Direct physical interaction between two molecules	<u>FANCD2 has a "Binding" relationship with BRCA1</u>
Protein Modification	Changes the modification of the target molecule, usually by direct interaction	<u>SRC has a "ProtModification" relationship with GRB2</u>
Biomarker	Identification of proteins/complexes/functional classes/metabolites that are prognostic or diagnostic biomarkers for a disease	<u>Lung cancer has a "Biomarker" relationship with IL6</u>
Genetic Change	Genetic changes such as gene deletions, amplifications, mutations or epigenetic changes	<u>Lung cancer has a "GeneticChange" relationship with ALK</u>
Quantitative Change	Changes in abundance/activity/expression of a gene/protein/small molecule in a disease state	<u>Breast cancer has a positive "QuantitativeChange" relationship with AGK</u>
State Change	Changes in a protein's post-translational modification status or alternative splicing events	<u>Breast cancer has a "StateChange" relationship with estrogen receptor</u>

Types of relations and examples (continued)

Relation	Description	Examples
Functional Assoc.	Between a disease and a cellular process or another disease	<u>Chronic pancreatitis has a "FunctionalAssociation" relationship with pancreatic cancer</u>
Chemical Reaction	Either enzyme catalysed or spontaneous chemical reaction	<u>CYP3A has a "ChemicalReaction" relationship with ticagrelor</u>
Molecular Synthesis	Changes the concentration of the target	<u>CYP3A has a "MolSynthesis" relationship with midazolam</u>
Molecular Transport	Changes the localization of the target	<u>Tamoxifen has a positive "MolTransport" relationship with MAPK3</u>
Clinical Trial	Clinical trials conducted for a drug against a disease (from CT.gov)	Tamoxifen has a positive "Clinical Trial" relationship with breast cancer*
Cell Expression	Expression of proteins within or on the surface of a cell	<u>Hepatocyte has a "CellExpression" relationship with EGFR</u>

Glossary of terms – Types of concepts

Concept	Description	Examples
Drugs & chemicals	Naturally occurring metabolites, small molecules found in cell, drugs (incl. small molecules & biologics)	Cisplatin, glucose, ATP, trastuzumab
Diseases	Health conditions and disease terms	Neoplasm, acute lung injury
Proteins	Represents both genes and the gene products, including proteins and miRNAs	TP53, mir293
Functional classes	Proteins classes based on biological function	DNA helicase, CYP3A
Complexes	One or more polypeptides that form a complex via physical interactions	Ribosome, p53-MDM2
Genetic variant	Variants searchable by SNPID and text	rs11553421, mutation in TP53, 524G>T (p.Arg175Leu)
Cells	Mammalian cell types & cell lines	T-cell, fibroblast, 298T
Cell Process	Biological processes	DNA damage, cytokinesis
Organs	Mammalian organ types	Brain, heart, lung
Tissues	Mammalian tissue types	Bone marrow, endothelium
Viruses	An agent that causes infectious diseases	Influenza A, Sars-CoV-2, HIV-1
Clinical parameter	Measured parameters of the human body used in clinical practice	Overall survival, platelet count
Treatment	Non-chemical treatments and environmental conditions	Radiation, hypoxia, stress
Cell object	Organelles and other structural components of the cell	Mitochondria, chromatin



Example workflows

Starting with a potential protein target: what diseases can be affected by my protein?

- Enter protein (e.g., TANK1) into the Search Field (dropdown will help you to find correct term)
 - If text indicates 'TANK1: use TNKS' – TNKS is the preferred term will appear in subsequent fields
- Apply filters: downstream, positive, disease
 - Articles in the results list include TANK1 positively regulating a disease (by an unknown mechanism)
- Look at all diseases positively regulate by TANK1 and/or further narrow down diseases using the Disease concept filter (de-select All diseases, select relevant ones and click 'Apply')

Relation filters

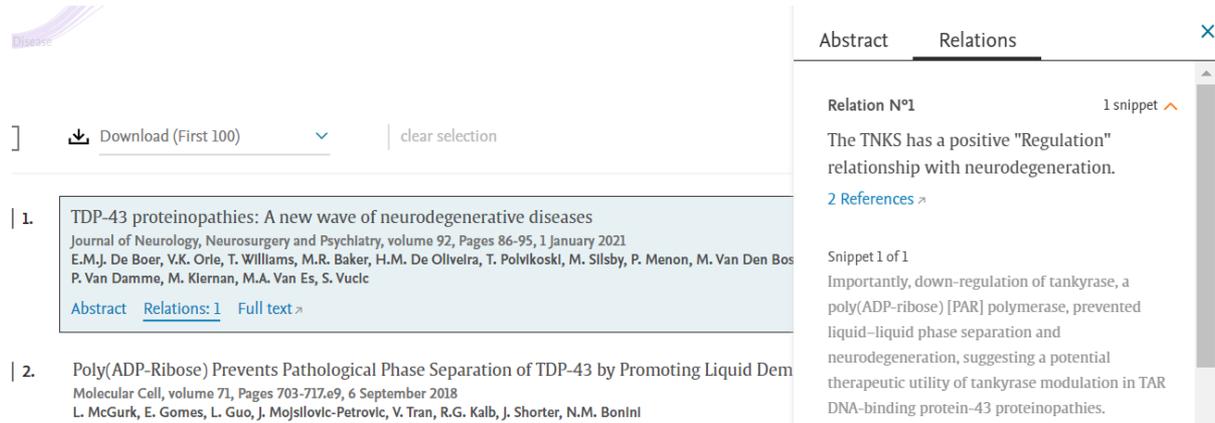
- Direction ^
- downstream 2

Relation Types

- Regulation 2
- Effect ^
- positive 2

Concept filters

- Disease ^
- neurodegeneration 2
- carcinogenesis 4
- experimental fibrosis 3
- hemostasis induced pulmonary fibrosis -



Download (First 100) | clear selection

- TDP-43 proteinopathies: A new wave of neurodegenerative diseases**
 Journal of Neurology, Neurosurgery and Psychiatry, volume 92, Pages 86-95, 1 January 2021
 E.M.J. De Boer, V.K. Orle, T. Williams, M.R. Baker, H.M. De Oliveira, T. Polivkoski, M. Silsby, P. Menon, M. Van Den Bos, P. Van Damme, M. Kiernan, M.A. Van Es, S. Vučić
[Abstract](#) [Relations: 1](#) [Full text >](#)
- Poly(ADP-Ribose) Prevents Pathological Phase Separation of TDP-43 by Promoting Liquid Dem**
 Molecular Cell, volume 71, Pages 703-717.e9, 6 September 2018
 L. McGurk, E. Gomes, L. Guo, J. Mojsilovic-Petrovic, V. Tran, R.G. Kalb, J. Shorter, N.M. Bonini

Abstract Relations X

Relation N°1 1 snippet ^

The TNKS has a positive "Regulation" relationship with neurodegeneration.
[2 References >](#)

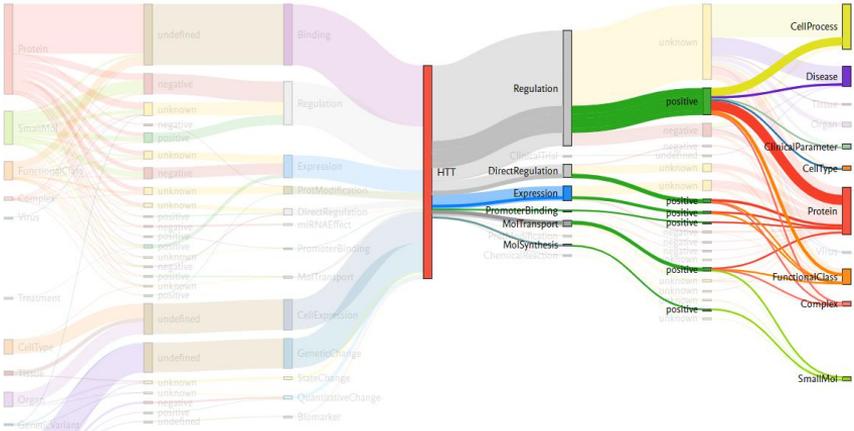
Snippet 1 of 1

Importantly, down-regulation of tankyrase, a poly(ADP-ribose) [PAR] polymerase, prevented liquid-liquid phase separation and neurodegeneration, suggesting a potential therapeutic utility of tankyrase modulation in TAR DNA-binding protein-43 proteinopathies.

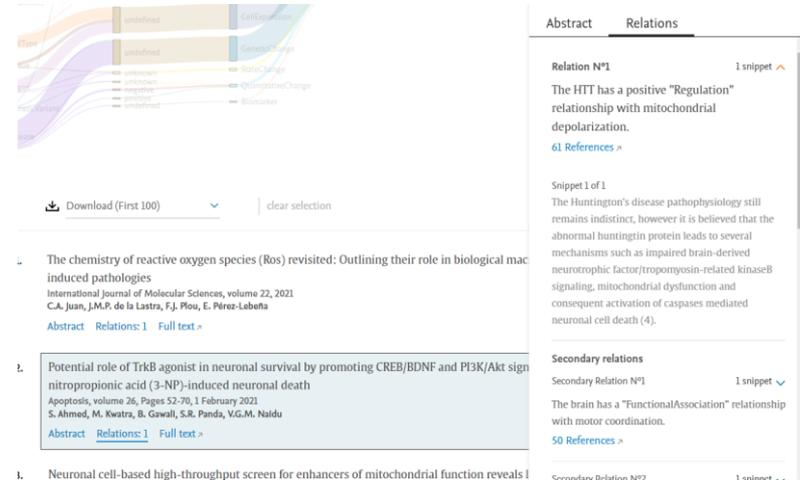
Starting with protein: what do increases in my protein cause?

- Enter protein (e.g., HTT) into the Search Field (dropdown will help you to find correct term)
- Apply filters: downstream, positive

TIP: It is not necessary to be an expert all categories – at first, select the fewest filters and leave the rest unchecked to see what information appears. Then narrow down as needed.



Articles in the results list include any concept that is positively affected by HTT



Abstract Relations

Relation N°1 1 snippet 

The HTT has a positive "Regulation" relationship with mitochondrial depolarization.

[61 References >](#)

Snippet 1 of 1

The Huntington's disease pathophysiology still remains indistinct, however it is believed that the abnormal huntingtin protein leads to several mechanisms such as impaired brain-derived neurotrophic factor/tropomyosin-related kinaseB signaling, mitochondrial dysfunction and consequent activation of caspases mediated neuronal cell death (4).

Secondary relations

Secondary Relation N°1 1 snippet 

The brain has a "FunctionalAssociation" relationship with motor coordination.

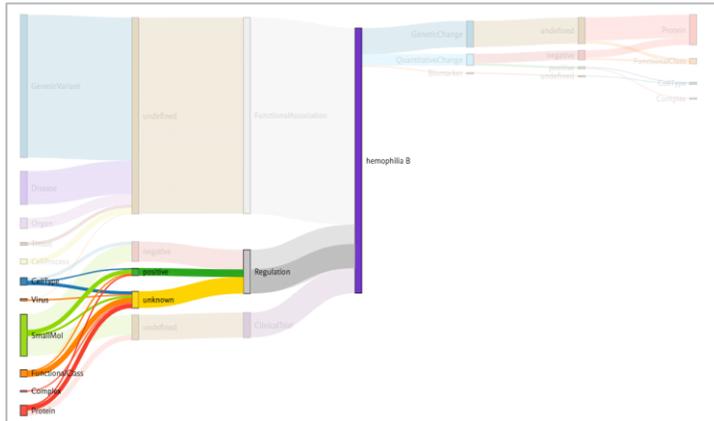
[50 References >](#)

1. Neuronal cell-based high-throughput screen for enhancers of mitochondrial function reveals l

Starting with disease

What are potential drug targets?

- Enter disease (Hemophilia B) into the Search Field (dropdown will help you to find correct term – you may also wish to look under the general term of Hemophilia)
- Apply filters: upstream, regulation, positive, unknown
 - Articles in the results list include concepts regulating a disease (either positively or with unknown effect) – it is important not to exclude 'unknown' effect as EmBio will only indicate an effect is 'positive' if it is in the snippet of text from where the relationship is extracted



What are potential biomarkers?

- Enter disease (Hemophilia B) into the Search Field (dropdown will help you to find correct term)
- Apply filters: downstream (Genetic change, Quantitative Change, State Change, Biomarker)
 - Articles in the results list include concepts that are changed as a result of the disease and could therefore be measured



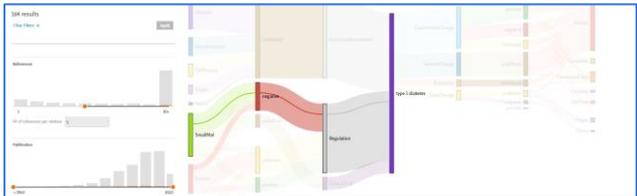
Starting with disease

What biologics negatively regulate the disease?

1. Enter disease (Type 1 diabetes) into the Search Field (there are other types of diabetes you may also want to search)
 - Apply filters: Direction: upstream; Effect: negative, Relations: 5+ (this limits the search to relations that are reported in 5+ publications)
2. Then view the Drugs & Small molecules filter popup to select the individual names of relevant biologics.



1



2

Drugs and small molecules Clear selection x

View Selected View All

All			
A	B	C	D
<input type="checkbox"/> albuterol 22	<input checked="" type="checkbox"/> antithymocyte globulin 16	<input type="checkbox"/> C-peptide 64	<input checked="" type="checkbox"/> CD20 antibody 15
<input type="checkbox"/> acarbose 6	<input type="checkbox"/> ascorbic acid 8	<input type="checkbox"/> calcitonin 42	<input checked="" type="checkbox"/> CD3 antibody 69
<input type="checkbox"/> ACE inhibitors 60	<input type="checkbox"/> aspartate 9	<input type="checkbox"/> canagliflozin 7	<input checked="" type="checkbox"/> CD4 antibody 8
<input type="checkbox"/> adefovir 5	<input type="checkbox"/> atorvastatin 11	<input type="checkbox"/> cholera toxin B subunit 7	<input type="checkbox"/> clonidine 5
<input type="checkbox"/> algininate 5	<input type="checkbox"/> candesartan 13	<input type="checkbox"/> clodronate 8	<input type="checkbox"/> complete Freund's adju... 18
<input type="checkbox"/> alpha-galactosylceramide 12	<input type="checkbox"/> BCG 8	<input type="checkbox"/> cannabidiol 7	<input type="checkbox"/> curcumin 11
<input type="checkbox"/> anakinra 5	<input type="checkbox"/> berberine 5	<input type="checkbox"/> captopril 7	
	<input type="checkbox"/> butyrate 11		

Apply filters

3. Results include articles that have a relationship with Type 1 diabetes negatively regulated by one of the selected biologics
4. The results list can be exported for an overview of who is publishing in this field.

3

164 results Abstract Relations: 1 Full text >

Clear filters x Apply

Concept filters

- Drugs and small molecules
- CD3 antibody 69
- teplizumab 34
- rituximab 19
- antithymocyte globulin 16
- CD20 antibody 15
- CD4 antibody 8
- DNA vaccine 8
- TNF-alpha antibody 6
- lymphocyte antibody 5
- obelimumab 5
- metformin 304
- recombinant human insulin 90
- C-peptide 64
- ACE inhibitors 60
- nicotinamide 48

3. Birth Cohorts in Type 1 Diabetes: Preparing for the Payoff
Journal of Clinical Endocrinology and Metabolism, volume 106, Pages E2044-E2045, 1 February 2022
K. Cesari, A. Mair
Abstract Relations: 1 Full text >

4. MIR-126, IL-7, CXCR1/2 receptors, inflammation and circulating endothelial progenitor cells: T a model of subclinical cardiovascular disease (type 1 diabetes mellitus)
Journal of Translational Medicine, volume 10, 1 December 2022
D.J. Cookson, S. Bahbahak, J.S. Latif, J.L. Weaver
Abstract Relations: 1 Full text >

5. INSBR-23 gene transfer to hepatocyte-based combined therapy abrogates recurrence of type 1 Diabetes, volume 70, Pages 175-181, 1 January 2023
F. Rossi, A. Cina, G. Spinas, F. Santillo, P. Motti, S. Gregori, M.G. Roncarolo, A. Annati
Abstract Relations: 1 Full text >

6. Regulation of B cell homeostasis by Ptpn22 contributes to type 1 diabetes in NOD mice.
Endocrine, volume 67, Pages 535-543, 1 March 2020
X. Shi, F. Shao, Z. Li, L. Kang, J. Liu, S. Knicker, Z. Zhou, L. Jin, P. Zhang
Abstract Relations: 1 Full text >

7. Reversal of autoimmunity by mixed chimerism enables reactivation of β cells and transdifferentiates Proceedings of the National Academy of Sciences of the United States of America, volume 117, Pages 31229-31236, 4 D
S. Tang, M. Zhang, S. Zeng, Y. Huang, M. Qin, U. Nasir, P. Santamaria, A.D. Riggs, L. Jin, D. Zeng
Abstract Relations: 1 Full text >

Relation N°1 3 snippets >

The CD3 antibody has a negative "Regulation" relationship with type 1 diabetes.
69 References >

Snippet 1 of 3
Figure 1—LV-InhB and anti-CD3 monoclonal antibody CT (CTS) after syngeneic islet transplantation (Tx) protects from recurrence of Type 1 diabetes.

Snippet 2 of 3
To investigate the capacity of the combination lentiviral vector-mediated hepatocyte-targeted insulin B chain 9-23 expression and anti-CD3 monoclonal antibody to cure Type 1 diabetes when a syngeneic or allogeneic islet transplantation is performed, nonobese diabetic mice received intravenously the CT (lentiviral vector-InhB and anti-CD3 monoclonal antibody) and islet transplantation under the kidney capsule according to different doses and schedules.

Snippet 3 of 3
Figure 2—LV-InhB and anti-CD3 monoclonal antibody CT (CTS) after allogeneic islet

Tips for using EmBiology

- Apply the Publication filters and Relation filters before making selections in the concept filters – the available options in concept filters will depend on the years and relationships you've selected
- If you are applying multiple concept filters in different categories, apply your selection from one category before making selections in the other
- Do you only want to see well studied relationships? Use the 'References' filter to limit result. (e.g., setting the 'References' filter to 5 limits results to articles that include relations that have been reported 5 or more times)
- It is not necessary to be an expert in the types of content that is in all categories – e.g., if you are interested in what concepts may positively affect your search term, select upstream and positive – leave the rest unchecked and see what categories appear
- Concept names that appear in left-hand filters and pop-ups are the preferred terms, which can be frustrating if you're searching for a filter by a different name.
 - To find out what the preferred term is, open up a new window of EmBio and type your term in the search box – the dropdown suggestions will include the preferred term (e.g., if you would like to filter by CD20 but it's not in the list of available filters, see in the dropdown that the preferred term is MS4A1 and search for this term. Note that synonym-based searching of filters is on our 2022 roadmap!)