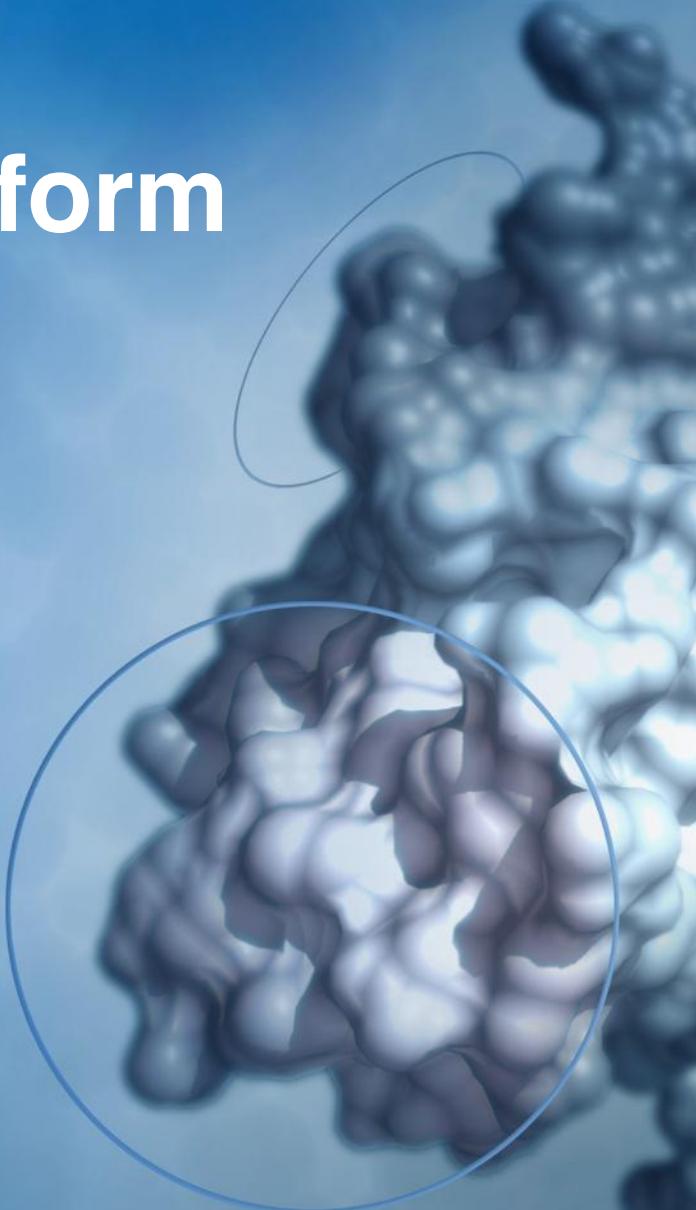


The Open Targets Platform

support@targetvalidate.org



Open Targets



Outline

- Open Targets Platform: what is it?
- Data: public databases and Open Targets
- Use case scenarios
- Help and documentation

Goals

The Open Targets Platform helps you identify and prioritise evidence-based relationships between targets and diseases.

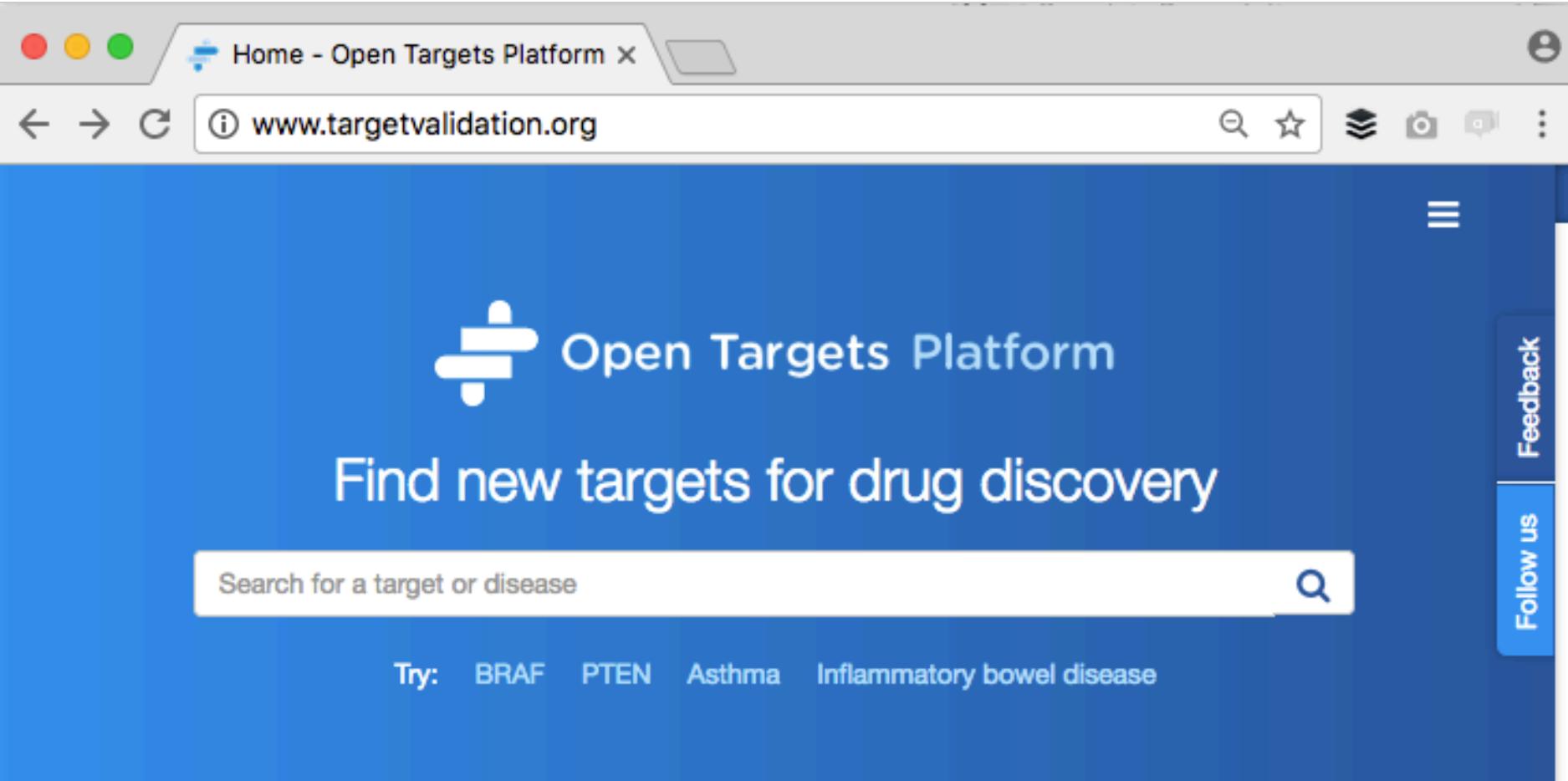


EMBL-EBI



<https://www.targetvalidation.org/>

Supported Internet Browsers



A screenshot of a web browser window showing the Open Targets Platform homepage. The browser interface includes standard controls like minimize, maximize, and close buttons, a back/forward/clear history button, a search bar containing the URL "www.targetvalidation.org", and various extension icons. The main content area features the Open Targets logo (a stylized blue and white cross-like symbol) and the text "Open Targets Platform". Below this, a large blue banner displays the tagline "Find new targets for drug discovery". A search bar with the placeholder "Search for a target or disease" and a magnifying glass icon is centered on the page. At the bottom of the banner, there is a "Try:" followed by a list of terms: BRAF, PTEN, Asthma, and Inflammatory bowel disease. To the right of the main content, there is a vertical sidebar with a "Feedback" button and a "Follow us" section.

Internet Explorer 11 (and above), Chrome, Firefox and Safari

Facilitating decision-making

A) Which targets are associated with a disease?

B) What evidence supports this target-disease association?

F) What else can I find out about my drug target?

E) Can I find the association focusing on two (or more) different therapeutic areas?

C) Are there drugs for this association in clinical trials?

D) For a given target, are there other diseases associated with it?



A) Which targets are associated with a disease?

Open Targets Platform

Survey About Help API Downloads Blog Search for a target or disease

3090 targets associated with asthma

Filter by target symbol

Download the table

Order by the strength of the score in a data type

Asthma

Image Credit: NIH

Feedback

Association score

Filter by 'Data types' e.g. Drugs

Filter by 'Pathway types' e.g. Metabolism

Filter by 'Target class' e.g. Kinases

Filter by 'Your target list' of genes in asthma

PDE4D is one of the targets associated with asthma. Let's explore it further...

Target Symbol Association score Genetic associations Somatic mutations Drugs Affected pathways RNA expression Tissue mining Aligned

Target Symbol	Association score	Genetic associations	Somatic mutations	Drugs	Affected pathways	RNA expression	Tissue mining	Aligned
IL13	1							
ORMDL3		1						
PDE4D	1							
CH3L1		1						
PTGDR		1						
ADAM33			1					
IL5			1					
PTGS2			1					
ADRB2			1					
NPSR1			1					
NR3C1			1					
VDR			1					
ALOX5			1					
DPP10			1					
CYSLTR1			1					
PLA2G7			1					
PTGS1			1					
MUC7			1					
IL5RA			1					
IRAK3			1					
HRH1			1					
ADRB1			1					
CHRM3			1					
DENN16		1						
ADR2A			1					
PDE6B			1					
ADRA1B			1					
PTGDR2			1					
IGF1			1					
ADRB3			1					

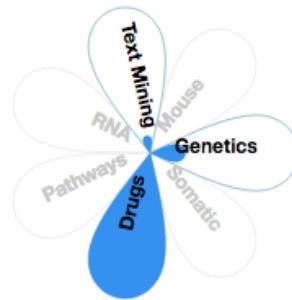
Score

Previous 1 2 3 4 5 ... 62 Next

Open Targets

B) What evidence supports this target-disease association?

Evidence for PDE4D in asthma



Genetic associations

Somatic mutations

Table view

Common diseases

Source: GWAS catalog

Showing 1 to 1 of 1 entries

Search:

Show 10 entries

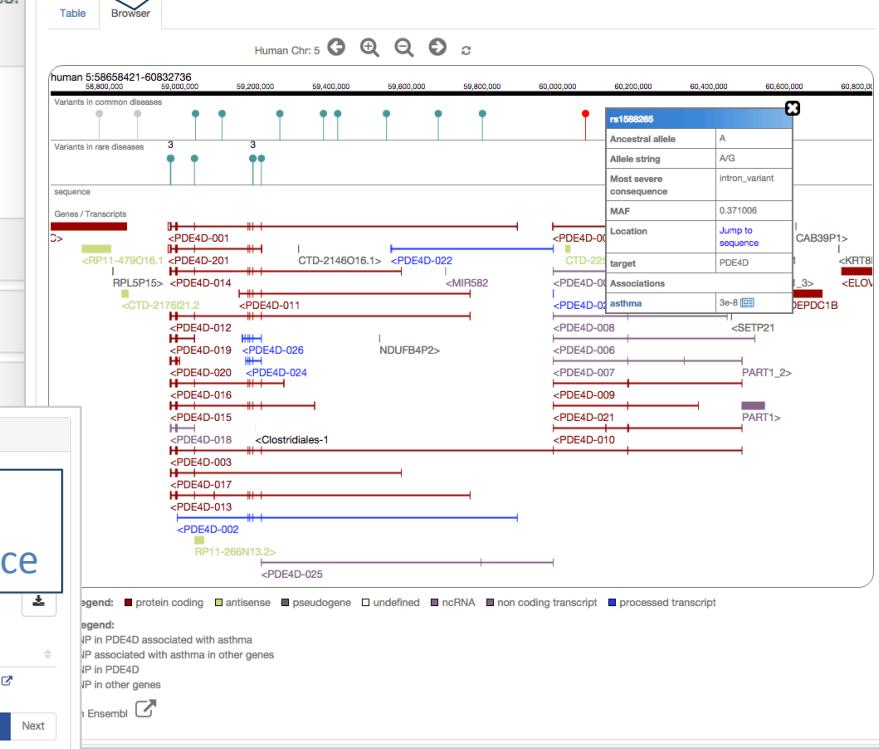
PDE4D

phosphodiesterase 4D, cAMP-specific
Synonyms: DPDE3

Hydrolyzes the second messenger cAMP, which is regulator of many important physiological processes.

Graphical visualisation on a browser

ASTHMA NOS W (AC) EXAC, Airway hyperreactivity, Asthma NOS, Asthma NOS (disorder)...



View publications supporting the evidence

Gene-Variant Evidence
Variant type
Evidence source

Variant-Disease Evidence

Evidence source

P-Value

Publications

Open Targets pipeline

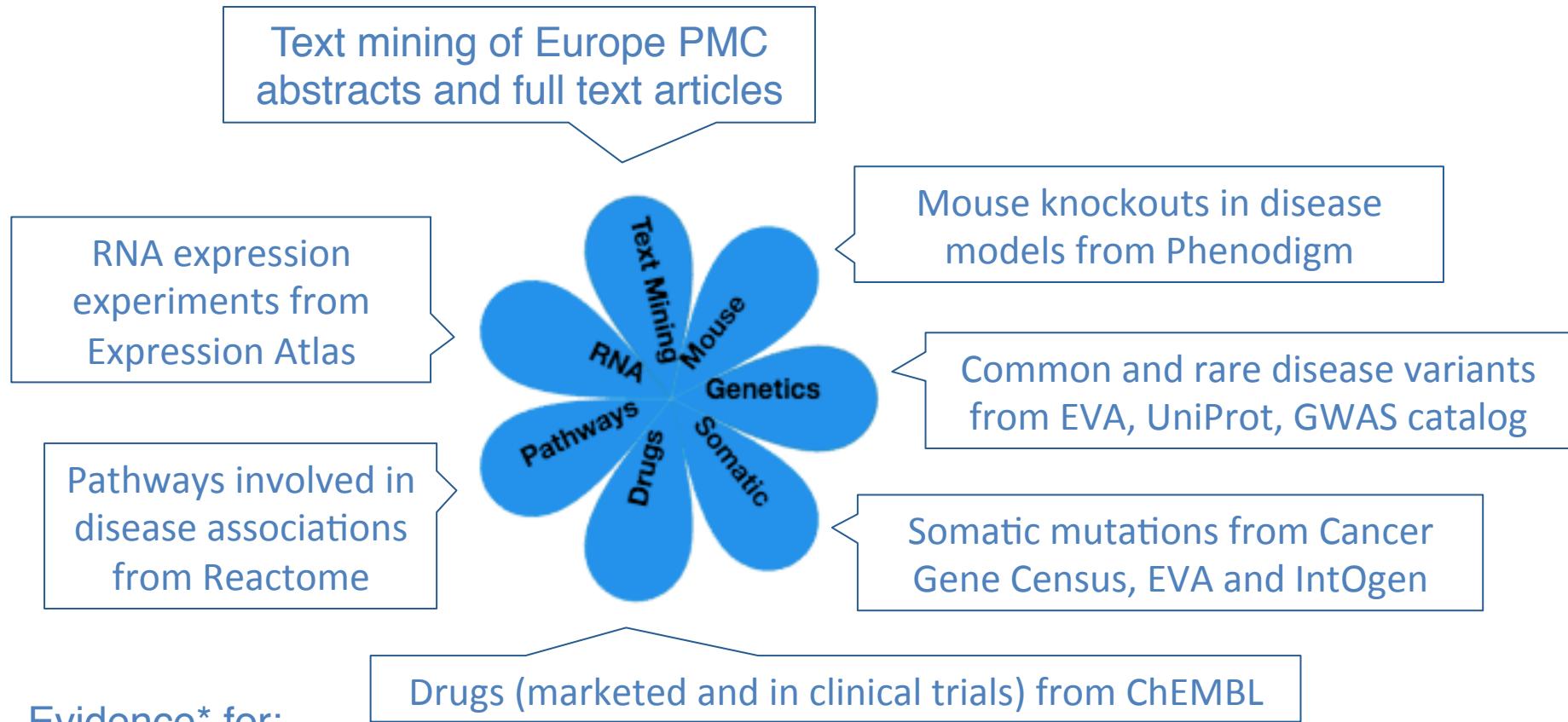
gwas catalog

3e-8

1 publication

Previous 1 Next

Evidence imported from public resources



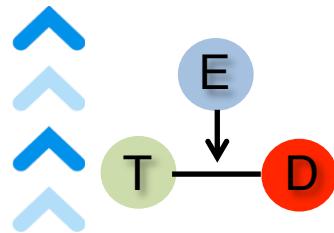
Evidence* for:

- > 31K targets
- A growing number of structured disease and clinical phenotype terms (over 8,600 to date) based on the Experimental Factor Ontology (EFO) including mappings to disease terms from MeSH, HPO, Orphanet, and OMIM.

* high confidence

Integration of existing and new data

Public Databases and Pipelines



Open Targets experimental NEW data
Physiologically relevant and at scale

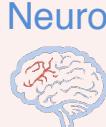
Oncology Immunity



Immunity



Neuro Cross-Disease



Cross-Disease



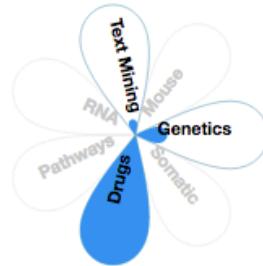
Graphical user interface
+
Programmatic access



Open Targets

C) Are there drugs for this association in clinical trials?

Evidence for PDE4D in asthma



PDE4D

phosphodiesterase 4D, cAMP-specific
Synonyms: DPDE3

Hydrolyzes the second messenger cAMP, which is a key regulator of many important physiological processes.

asthma

Synonyms: ASTHMA NOS W (AC) EXAC, Airway hyperreactivity, Asthma (disorder), Asthma NOS, Asthma NOS (disorder)...

A bronchial disease that is characterized by chronic inflammation and narrowing of the airways, which is caused by a combination of environmental and genetic factors resulting in recurring periods of ...

Genetic associations

Somatic mutations

Drugs

Source: CHEMBL

Found 3 unique drugs: [DYPHYLLINE](#) [ROFLUMILAST](#) [THEOPHYLLINE](#)

Showing 1 to 3 of 3 entries

Search:



Clinical trials

Disease	Drug	Drug Inform		Type	Mechanism of action	Activity	Gene-Drug Evidence	
		Phase	Status				Target class	Evidence source
asthma	DYPHYLLINE	Phase IV	N/A	Small molecule	Phosphodiesterase 4 inhibitor 1 publication DailyMed	antagonist	Phosphodiesterase 4A	Curated from Drug2Clinic Information
asthma	ROFLUMILAST	Phase II	Completed	Small molecule	Phosphodiesterase 4 inhibitor 1 publication DailyMed	antagonist	Phosphodiesterase 4A	Curated from Clinical Trials Information
asthma	THEOPHYLLINE	Phase II	Completed	Small molecule	Phosphodiesterase 4 inhibitor DailyMed	antagonist	Phosphodiesterase 4A	Curated from Clinical Trials Information

D) For a given target, are there other diseases associated with it?

PDE4D

phosphodiesterase 4D, cAMP-specific

[View associated diseases](#)

Filter by

Data types

[Clear all](#)  [Select all](#) 

- Genetic associations (14)
- Somatic mutations (0)
- Drugs (67)
- Affected pathways (0)
- RNA expression (39)
- Text mining (67)
- Animal models (0)

Therapeutic area

Neoplasm (36)

Phenotype (23)

Cardiovascular disease (21)

Digestive system disease (15)

Immune system disease (14)

Nervous system disease (14)

Endocrine system disease (13)

Skeletal system disease (13)

Respiratory system disease (12)

Genetic disorder (10)

Skin disease (7)

Reproductive system disease (6)

Hematological system disease (6)

Eye disease (5)

Infectious disease (5)

Metabolic disease (3)

Measurement (3)

Muscular disease (1)

Other (1)

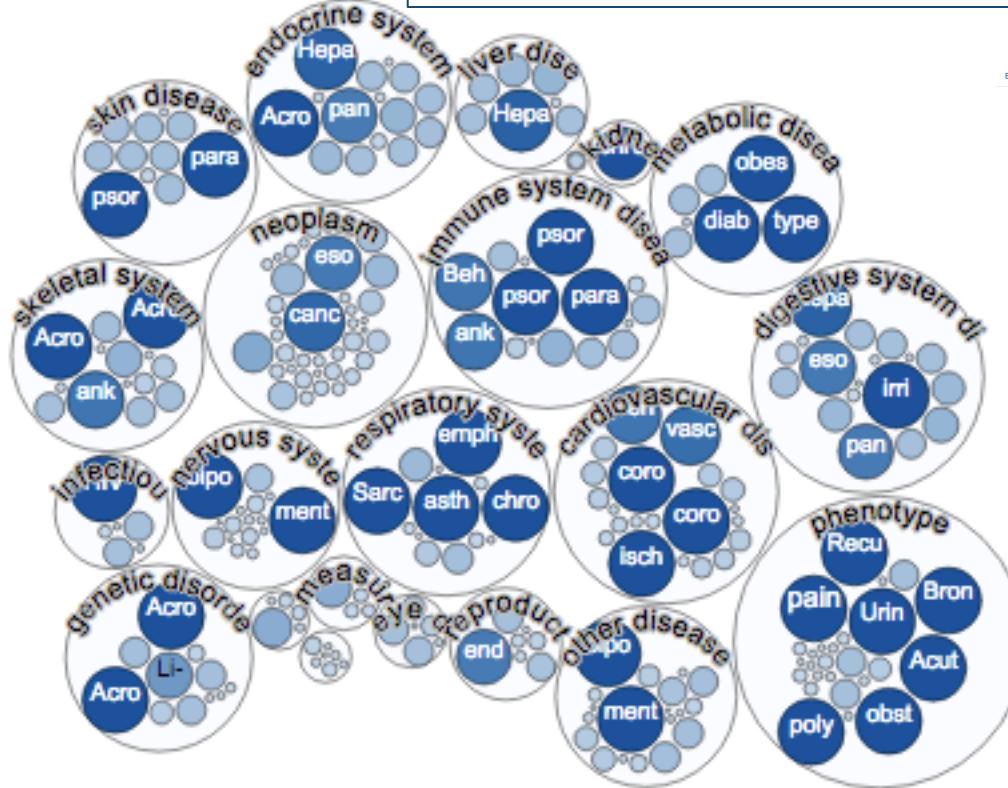
Bubble

Table

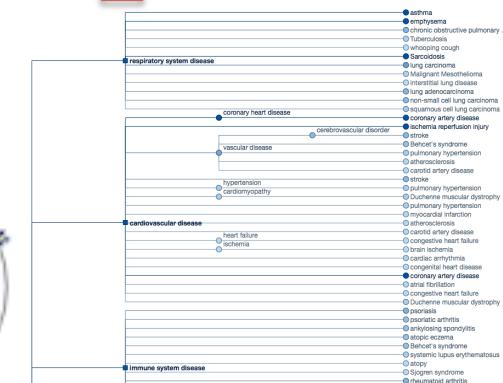
Tre

[View diseases grouped in therapeutic areas as:](#)

- Bubbles
 - Table
 - Tree



Bubbles Table Tree



Open Targets

E) For this target, can I find the association focusing on two (or more) different therapeutic areas?

28 diseases associated with PDE4D

 View PDE4D profile

For more details on the target e.g. RNA expression, Protein structure, etc.

bubbles Table Tree

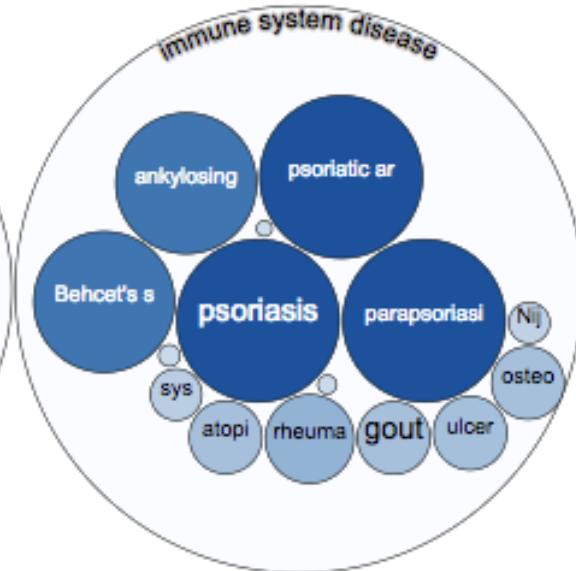
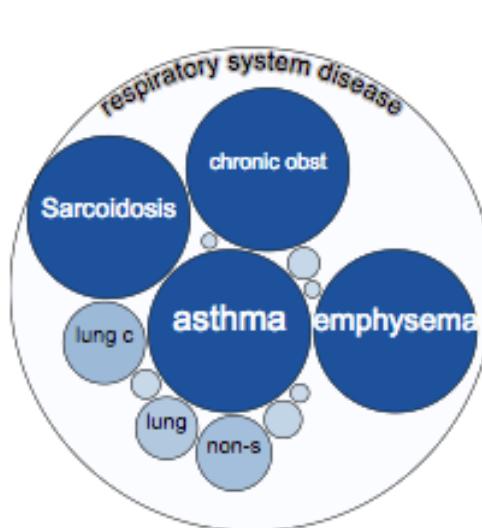
Download the image 

- Drugs (16)
- Affected pathways (0)
- RNA expression (11)
- Text mining (5)
- Animal models (0)

Therapeutic area

[Clear all](#) [Select all](#)

- Neoplasm (36)
- Phenotype (24)
- Cardiovascular disease (21)
- Digestive system disease (15)
- Immune system disease (14)
- Nervous system disease (14)
- Endocrine system disease (13)
- Respiratory system disease (12)
- Genetic disorder (11)
- Skin disease (11)
- Skeletal system disease (11)
- Reproductive system disease (6)
- Hematological system disease (6)
- Eye disease (5)
- Infectious disease (5)
- Metabolic disease (3)
- Measurement (3)
- Muscular disease (1)
- Other (1)



Filter by therapeutic area

Feedback

0  1
? Score



F) What else can I find out about my target?

PDE4D
phosphodiesterase 4D

 View associated diseases

Hydrolyzes the second messenger cAMP, which is a key regulator of many important physiological processes.

Synonyms: DPDE3 PDE43 3.1.4.53 phosphodiesterase E3 dunce homolog (Drosophila) cAMP-specific 3',5'-cyclic phosphodiesterase 4D

Protein Information (from Uniprot)

Variants, isoforms and genomic context

Protein baseline expression

RNA baseline expression

Gene Ontology

Protein Structure

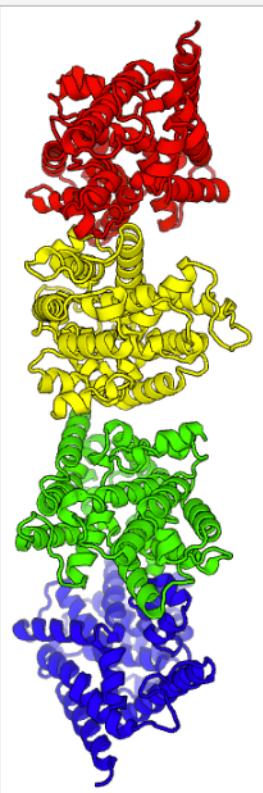
Pathways

Drugs

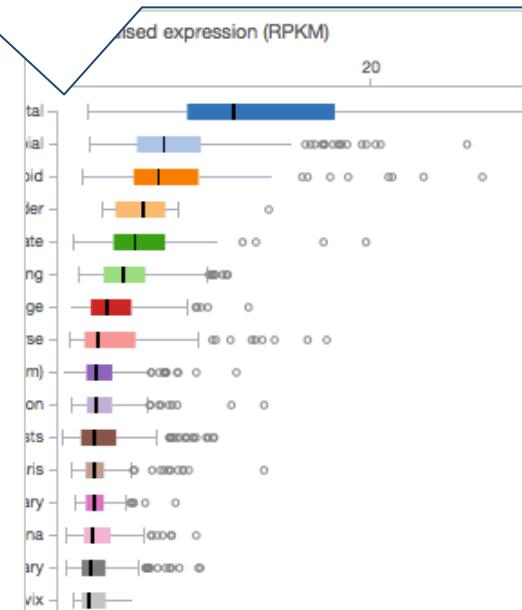
Gene tree

Bibliography

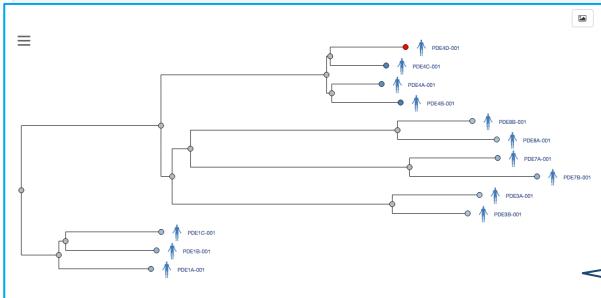
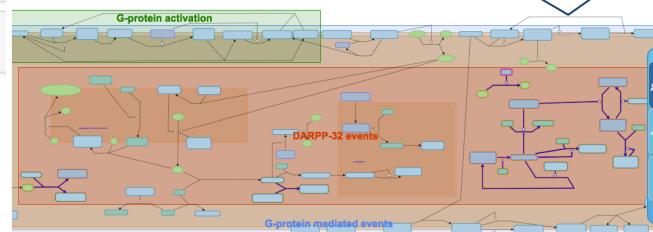
What is the 3D protein structure of PDE4D?



Where is PDE4D expressed according to the GTEx project?



Which pathways is PDE4D involved in?

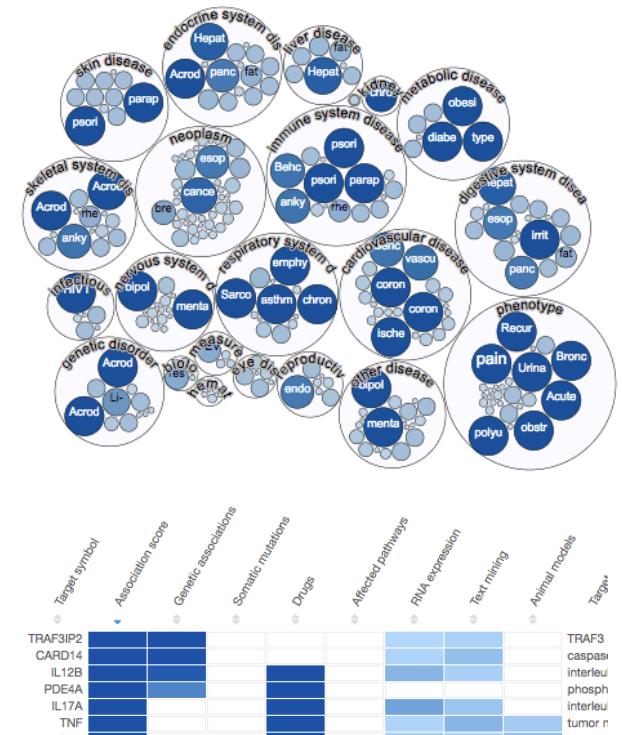


Are there orthologues PDE4D?



Open Targets

What do users say about our Platform?



Comprehensive Intuitive Resource

Derek

Investigator

Derek explores target space to find out what is already known about a target's role in his disease area of interest. Derek works in a matrix (multidisciplinary) team with scientists from genetics, computational biology, disease experts and clinical. He likes to work on a case-by-case examples of specific targets. It is not a large-scale approach, but rather detailed and focussed. Typically he accesses information by PubMed and uses Excel spreadsheets to analyse the data he collects. Derek occasionally uses bioinformatics databases websites such as OMIM, UniProt, ChEMBL and Orphanet.

Laura



Powerful resource, clear links and easy to use without training, especially for a non-bioinformatician!

Nick



Drug Discovery Head

Nick is a business decision maker.
He is concerned about the attrition rate prior to Phase III & believes correct target selection could be a key factor in addressing this. He would like to have more concrete target-disease evidence to include in his 3-year business plan; more evidence means less risk and increased confidence in target-disease associations.

Pulls lots of information together in an intuitive interface!

Drug Discovery Manager



Laura is interested in finding the best target for a specific disease area. She is concerned about the high failure rate in identifying targets for her team's disease area. Her team aims to investigate gaps & risks in knowledge about a particular target. Laura needs up-to-date information on several targets. She currently uses PubMed, some public databases and other in-house analysis pipelines and tools for investigating targets.

Lots of data in one place so saves time going to different websites.
It's easy to go into more depth if needed as the data is all there!



Open Targets

REST API endpoints



public : Publicly supported stable API.

Open/Hide | List operations | Expand operations

GET /public/evidence

POST /public/evidence

GET /public/evidence/filter

POST /public/evidence/filter

GET /public/association

GET /public/association/filter

POST /public/association/filter

GET /public/search

GET /public/auth/request_token

GET /public/auth/validate_token

GET /public/utils/ping

GET /public/utils/version

GET /public/utils/stats

- Query association and evidence by gene identifiers and diseases
- Filter by type of evidence

- Paste the URL in a location bar in a browser
- Use the terminal window (e.g. with CURL)
- Use one of our clients (i.e. R and Python)

<https://www.targetvalidation.org/documentation/api>



Open Targets

Python and R clients for the REST API

opentargets
latest

Search docs

Tutorial
High Level API
Low Level API
Code Documentation
Changelog

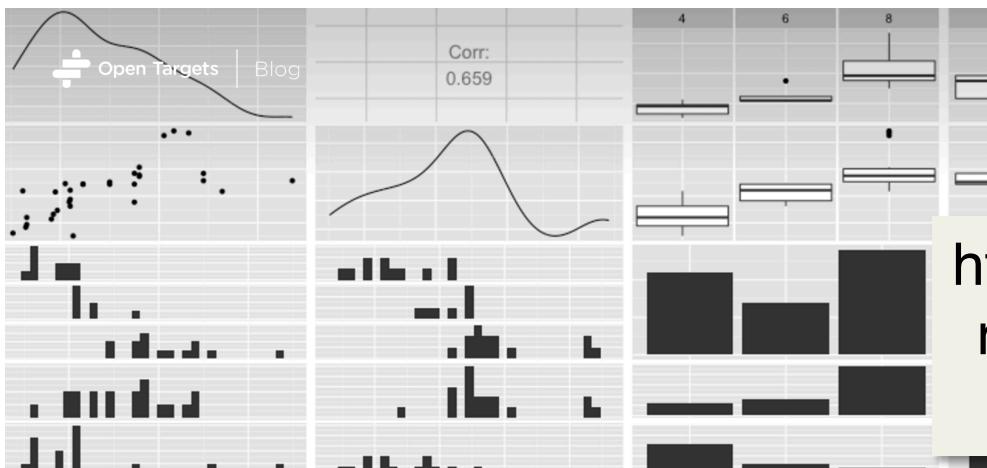
Docs » opentargets - Python client for targetvalidation.org

Edit on GitHub

opentargets - Python client for targetvalidation.org

opentargets is the official python client for the [Open Targets REST API](#) at [targetvalidation.org](#)

<http://opentargets.readthedocs.io>



[https://blog.opentargets.org/
rest-api-exploration-using-
an-r-client/](https://blog.opentargets.org/rest-api-exploration-using-an-r-client/)

How to access Open Targets
with R



“Is the Open Targets Platform for me?”

Are you working on biomedical research, studying associations of human genes with diseases?

Or are you trying to identify a biological target for a new therapy?

Perhaps you'd like to access drug targets that have been validated by genome-scale experiments and cutting edge analysis?

Would you like to have open and free access to all this data?



If you say yes to any of the above, then yes, our Platform is for you. If you are investigating a target on a case-by-case basis, use our graphical interface. Otherwise get the associations using our REST API.



Open Targets

How to cite us

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doi: 10.1093/nar/gkw1055

Open Targets: a platform for therapeutic target identification and validation

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<http://tinyurl.com/opentargets-in>