

Open Targets, an update

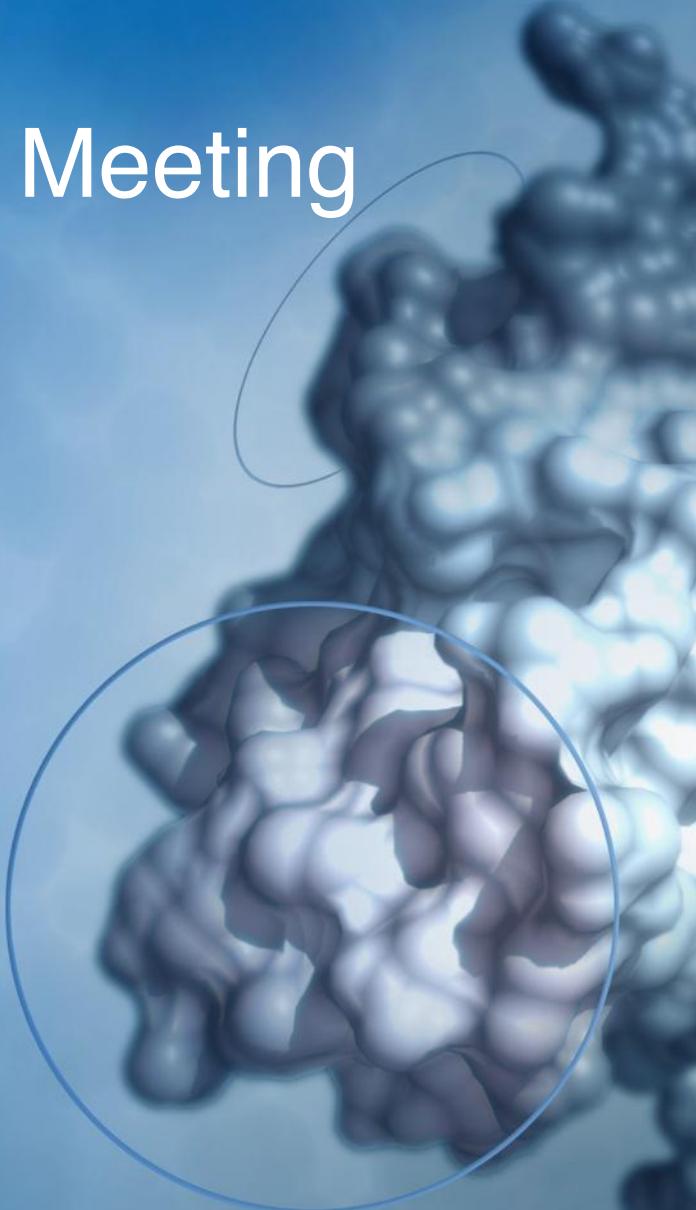
Industry Program Quarterly Meeting

Denise Carvalho-Silva
EMBL-EBI

www.opentargets.org
www.targetvalidation.org



Open Targets



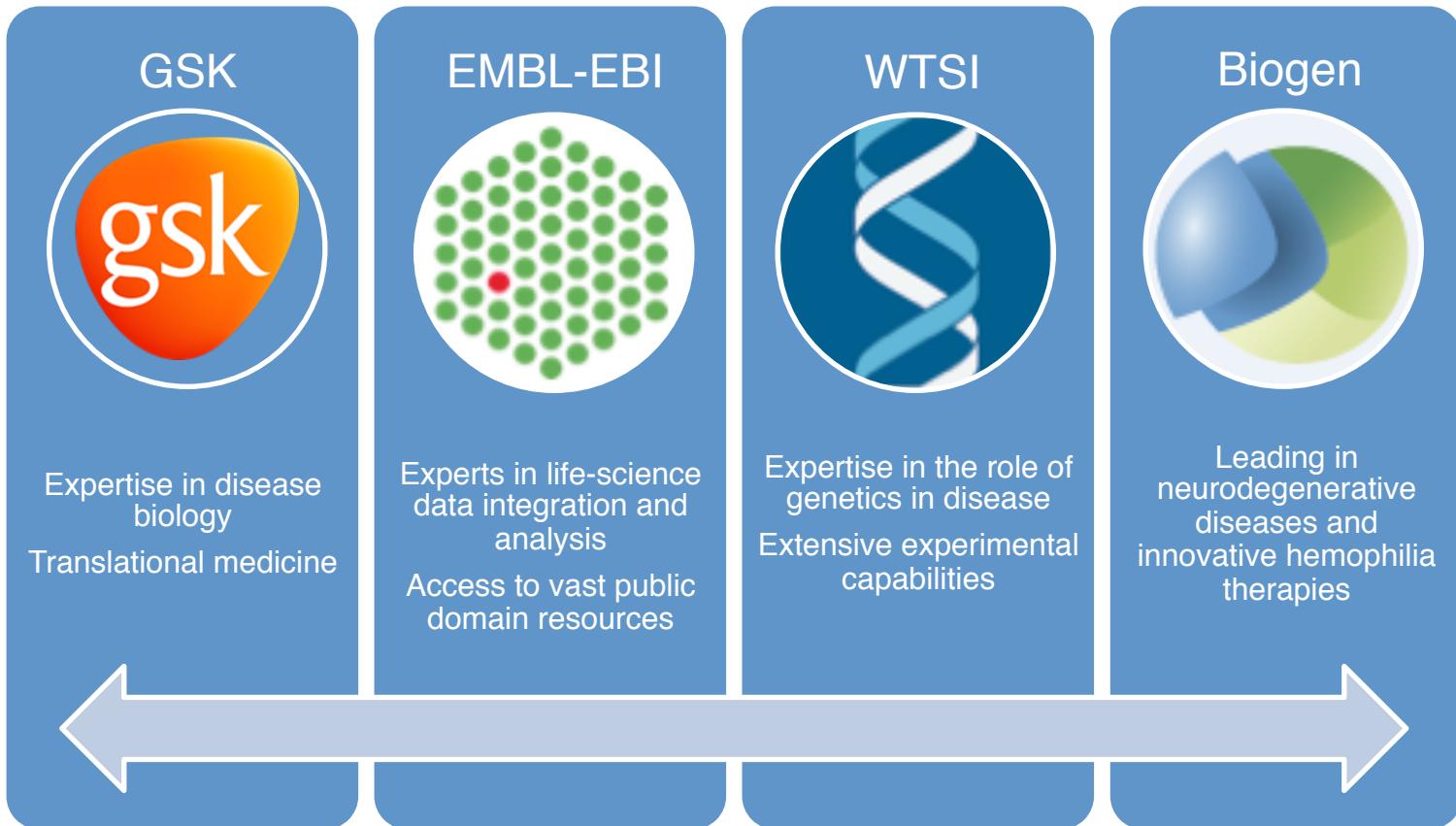
What I will cover in this talk

- What is Open Targets?
- What is new in the Platform?
- What is next?

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Industry – Academia partnership



* Launched in March 2014

Three founding partners, Biogen joined in 2016

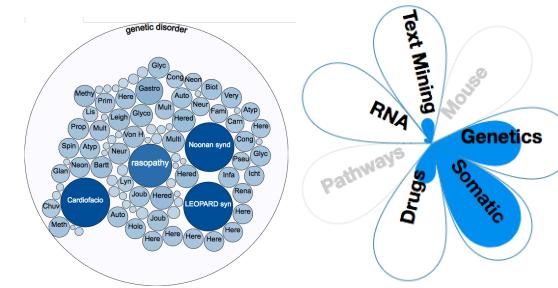
The two major areas of work* within Open Targets

Experimental projects



Generate new evidence
CRISPR
Organoids
Single cell RNASeq
Cell line fusion analyses
Metabolite GWAS

Core bioinformatics pipelines



Database for data integration
Web portal
REST API
Python client (fully supported)
R client (community)
Data dumps

* Concurrent
www.opentargets.org/projects

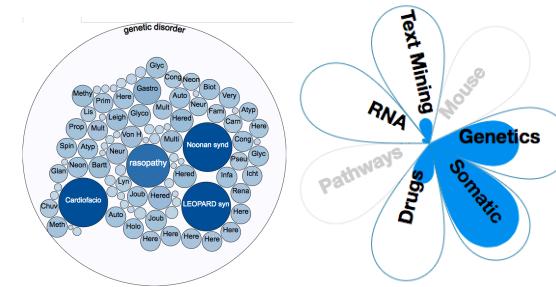
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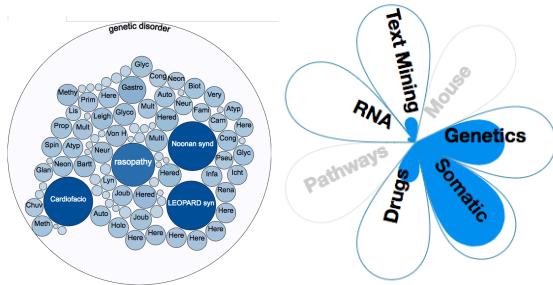


Database for data integration
Web portal
REST API
Python client (fully supported)
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Open Targets Platform*

- Developed by the Core Bioinformatics team at EMBL-EBI
- Allow scientists to identify target–disease associations
- Frequent updates: new data, new web features
- Improvements driven by our user communities

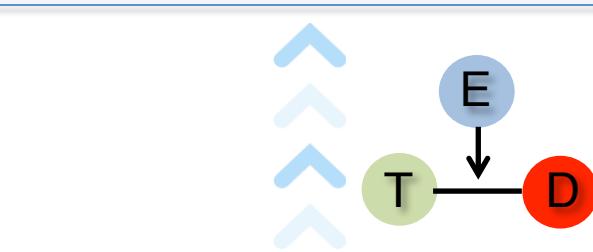
<https://www.targetvalidation.org/>



* First release: December 2015

Currently: Integration of existing data

Public Databases and Pipelines



Open Targets experimental data: NEW
Physiologically relevant and at scale

Oncology



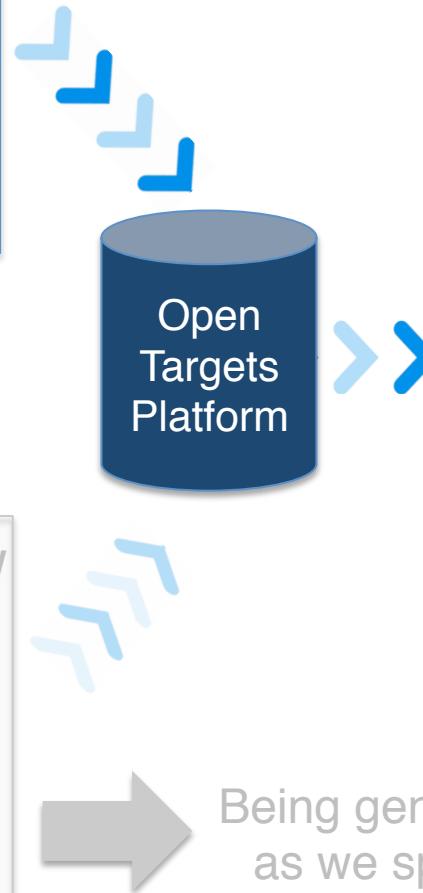
Immunity



Neuro



Cross-Disease



www.targetvalidation.org



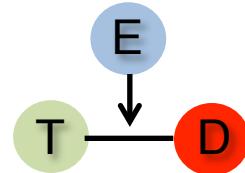
Graphical user interface

Being generated
as we speak.



Open Targets

Publicly available data



- Similar data sources are grouped into data types

Data sources	Data types
GWAS catalog, UniProt, EVA, G2P	Genetic associations
Cancer Gene Census, EVA, IntOgen	Somatic mutations
Expression Atlas	RNA expression
ChEMBL	Drugs
Reactome	Affected pathways
Europe PMC	Text mining
PhenoDigm	Animal models
Your favourite data?	Let us know!

What I will cover in this talk

- Why Open Targets?
- What is new?
- What is next?



...And the 2017 Breakthrough Articles Award goes to...

#OpenTargets, as well as @MonarchInit & @denovodb! @NAR_Open buff.ly/2iGMXlc

<http://www.narbreakthrough.com/>



RETWEETS
10

LIKES
8



New functionality: your target list

6 targets associated with inflammatory bowel disease

[View disease profile](#)

Filter by

- Data types
- Pathway types
- Target class
 - [Clear all ×](#) [Select all ✓](#)
 - Membrane rece... (3)
 - Adhesion (1)
 - Unclassified pr... (1)

Your target list

- [Clear targets from IBD_genes.txt ×](#)
- Target names foun... (6) [▶](#)
- Have associations ... (6)
- No associations fo... (0)

Showing 1 to 6 of 6 targets

Search:

[!\[\]\(022f85fbc232fe05473d290ffdcd27fc_img.jpg\)](#)

Target symbol	Association score	Genetic associations	Somatic mutations	Drugs	Affected pathways	RNA expression	Text mining	Animal models	Target name
IL23R	High	Medium	Low	Low	Medium	Medium	Medium	Low	interleukin 23 rece...
ITGA4	High	Low	High	Low	Low	Medium	Medium	Low	integrin subunit al...
MST1	High	High	Low	Low	Low	Low	Low	Low	macrophage stim...
IL2RA	High	High	Low	High	Low	Low	High	Low	interleukin 2 recep...
ITGAL	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium	integrin subunit al...
ITGB8	Low	Low	Low	Low	Medium	Medium	Low	Low	integrin subunit be...

Show 50 entries

No data

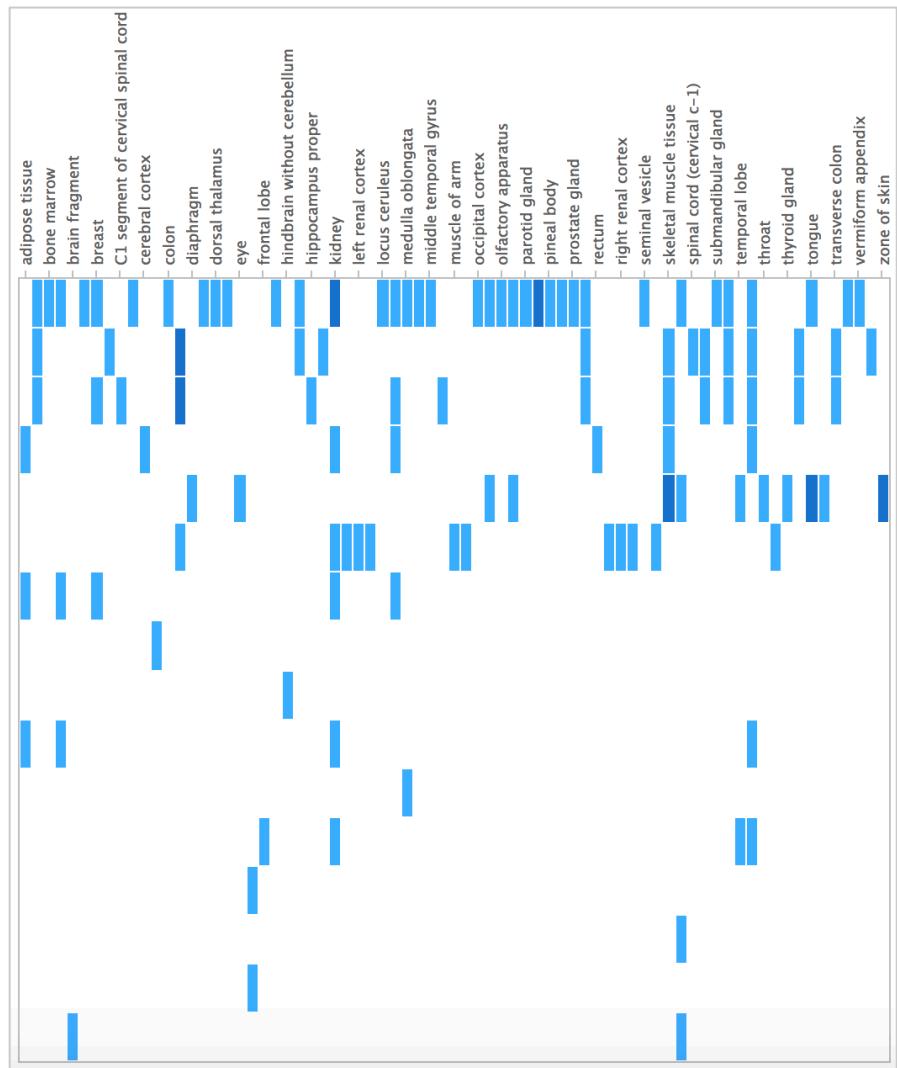
0  1

?

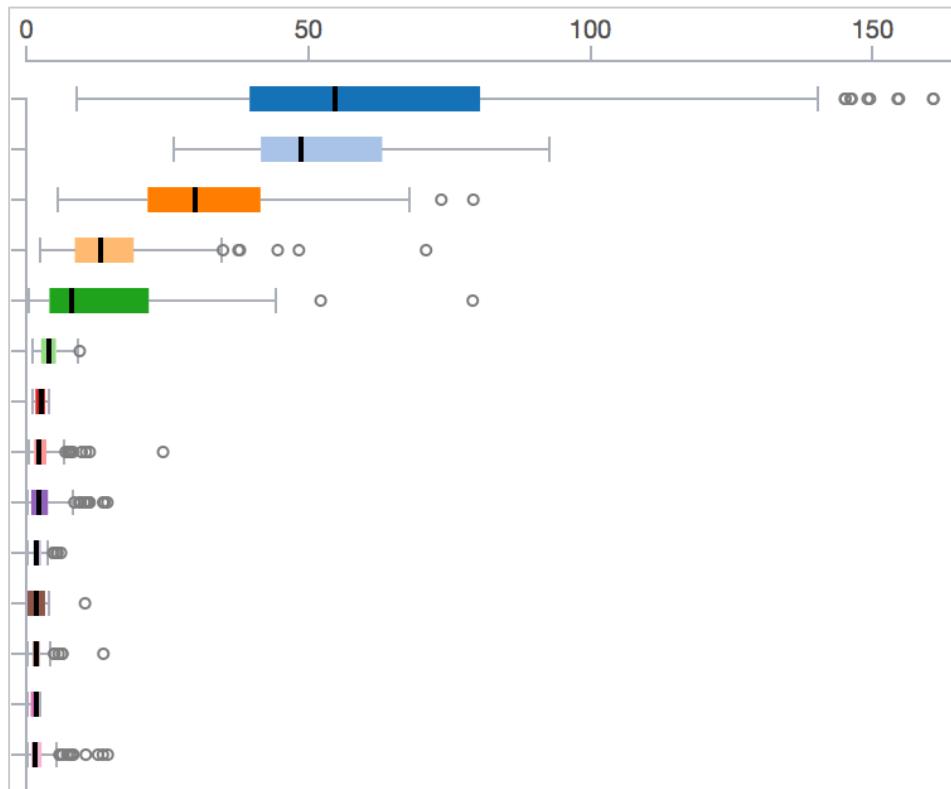
Score

Previous **1** Next

New visualisations



Expression Atlas

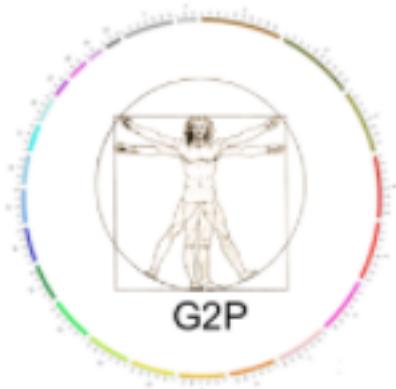


GTEx



Open Targets

New data sources: Gene2Phenotype



Search panel ALL for: Search

For example: *CRYBA1, ZEB2, TBX1, CHANARIN-DORFMAN SYNDROME or MITOCHONDRIAL COMPLEX III DEFICIENCY, NUCLEAR TYPE 1*

- Catalog of variants, genes, phenotypes
- Developmental disorders
- Literature curation → consultant clinical geneticists in the UK

New data sources: IntOGen

The screenshot shows the IntOGen website. At the top is a navigation bar with links for Search, Downloads, Analysis, and About, along with a Sign In button. Below the navigation bar is the IntOGen logo, which consists of a stylized orange 'i' icon followed by the word 'intOGen' in lowercase. To the right of the logo is the text 'Integrative Onco Genomics'. Below the logo is a search bar containing the placeholder text 'e.g. Mutation frequency of VHL'. To the right of the search bar is a microphone icon. Below the search bar are links for 'Search example' and 'Show more examples'.

intOGen

Search Downloads Analysis About Sign in

e.g. Mutation frequency of VHL

Search example | Show more examples

- catalog of genes and somatic (driver) mutations
- involvement in cancer biology

<https://www.intogen.org/search>



Matching fly and worm genes

dyb | Search

DTNA
dystrobrevin alpha
76 diseases associated

Target Match from ortholog

May be involved in the formation and stability of synapses as well as being involved in the clustering of nicotinic acetylcholine receptors.

Targets

DTNB dystrobrevin beta

WBGene00021075 Search

SGMS1
sphingomyelin synthase 1
105 diseases associated

Target Match from ortholog

Targets

SGMS2 sphingomyelin synthase 2

The diagram illustrates the orthologous relationships of SGMS1 across different species. A central node represents SGMS1 (Target). Three lines connect it to three other nodes, each representing an ortholog: SMSG-RA (fly), F53B1.2 (worm), and Samd8-001 (mouse/rat). From each of these ortholog nodes, two more lines extend to additional orthologs: SAMD8-201 (human), F53H8.4 (worm), and Y22D7AL.8 (worm).

```
graph TD; SGMS1[SGMS1] --- SMSGRA[SMSG-RA]; SGMS1 --- F53B1_2[F53B1.2]; SGMS1 --- Samd8001[Samd8-001]; SMSGRA --- SAMD8201[SAMD8-201]; F53B1_2 --- F53H84[F53H8.4]; Samd8001 --- Y22D7AL8[Y22D7AL.8]
```

Matching drugs and phenotypes

humira



TNF

1447 diseases associated

Target Match from drug

Diseases

immune system disease

colitis

Generalized pustular psoriasis

hyperlordosis



Duchenne and Becker muscular dystrophy

1341 targets associated

Disease Match from phenotype

Diseases

Spondyloepiphyseal dysplasia and spondyloepimetaphyseal dysplasia

Facioscapulohumeral dystrophy



Open Targets

Revamped homepage

www.targetvalidation.org



Survey About ▾ Help ▾ API ▾ Downloads Blog



Open Targets Platform

Find new targets for drug discovery

Search for a target or disease



Try: BRAF PTEN Asthma Inflammatory bowel disease

Feedback

Follow us

Comprehensive data

31,071
targets

2,559,080
associations

8,659
diseases

13
data sources

New clients for our REST API

opentargets
latest

Search docs

Tutorial
High Level API
Low Level API
Code Documentation
Changelog

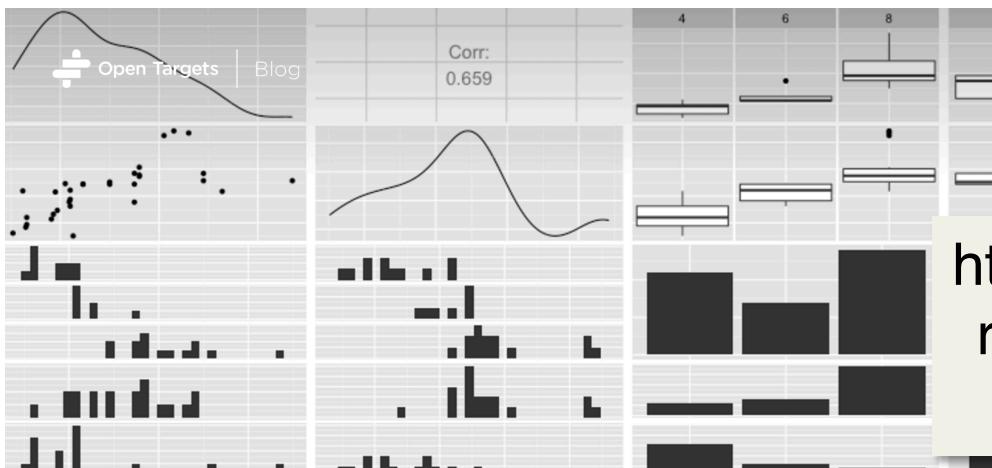
Docs » opentargets - Python client for targetvalidation.org

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>

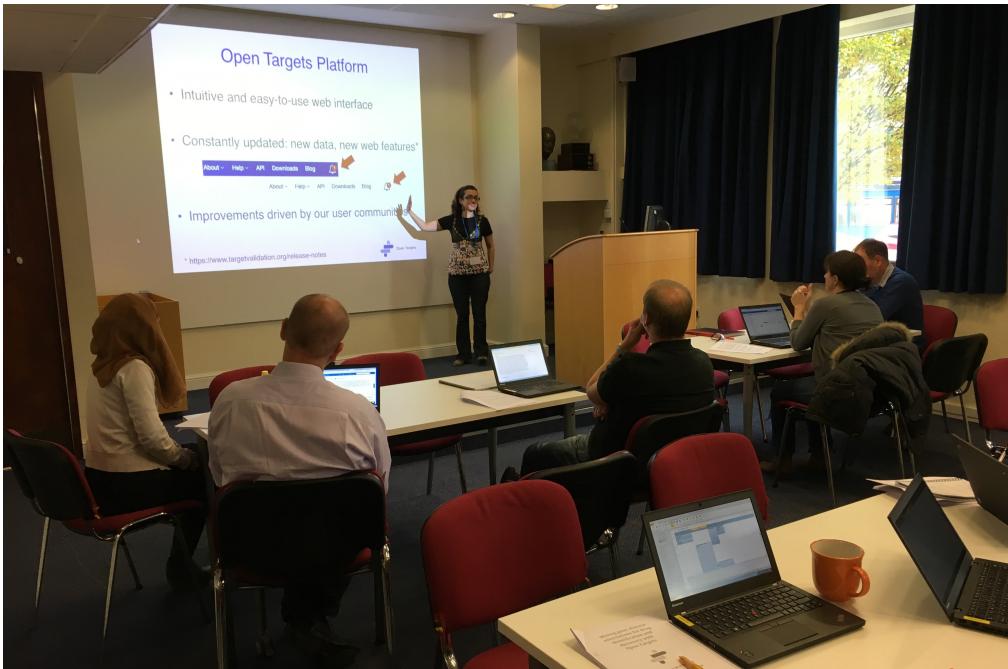


[https://blog.opentargets.org/
rest-api-exploration-using-
an-r-client/](https://blog.opentargets.org/rest-api-exploration-using-an-r-client/)

How to access Open Targets
with R

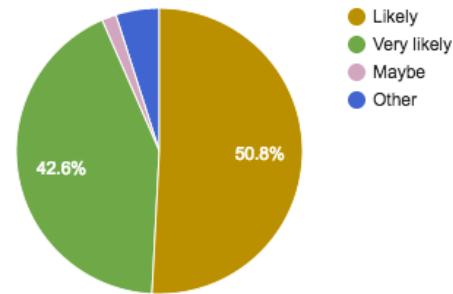


Launch of Outreach

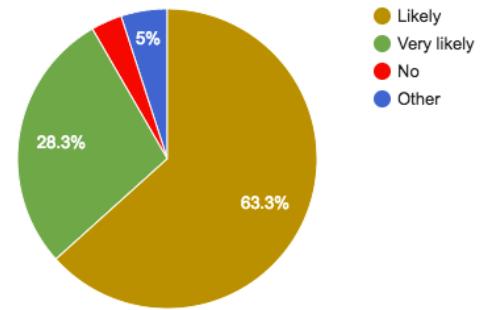


106 participants in total

Would you use the Platform after this workshop?



Would you recommend this workshop to your colleagues?



- 3 face-to-face workshops (Cambridge and Manchester)
- 1 webinar with PhD at AZ, 1-2-1 webinar with Biogen
- User support via email and Biostars
- Social media: LinkedIn, Twitter, Facebook

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- Search for many genes at once
- Search for PubMed, pathways and SNPs IDs
- Provide D-D and T-T associations
- Workshops DDU (Dundee) and ARUK (Cambridge)

Get in touch



@targetvalidate



support@targetvalidation.org



www.facebook.com/OpenTargets/



blog.opentargets.org/



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