

eHealth

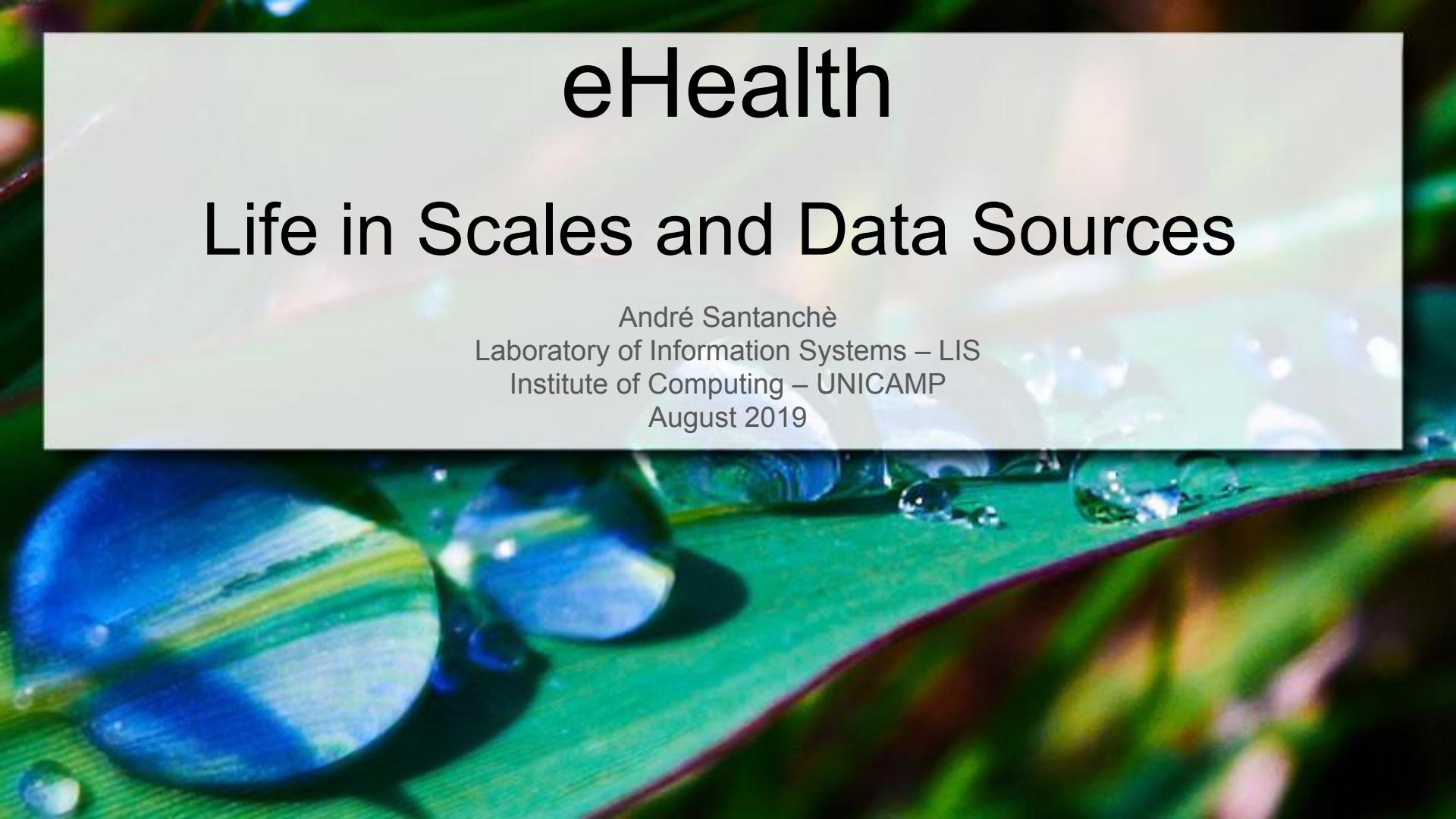
Life in Scales and Data Sources

André Santanchè

Laboratory of Information Systems – LIS

Institute of Computing – UNICAMP

August 2019



Life in Scales

(Holzinger, 2014)



Collective



Individual



Tissue



Cell



Bacteria



Virus

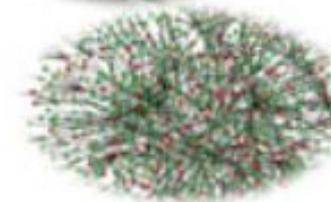


Molecule



10^{-12}

Atom





Building Life

Francis Crick

- British molecular biologist, biophysicist, and neuroscientist
- Co-discoverer of the structure of the DNA molecule in 1953
- Nobel Prize in Physiology or Medicine

(Wikipedia, 2018)

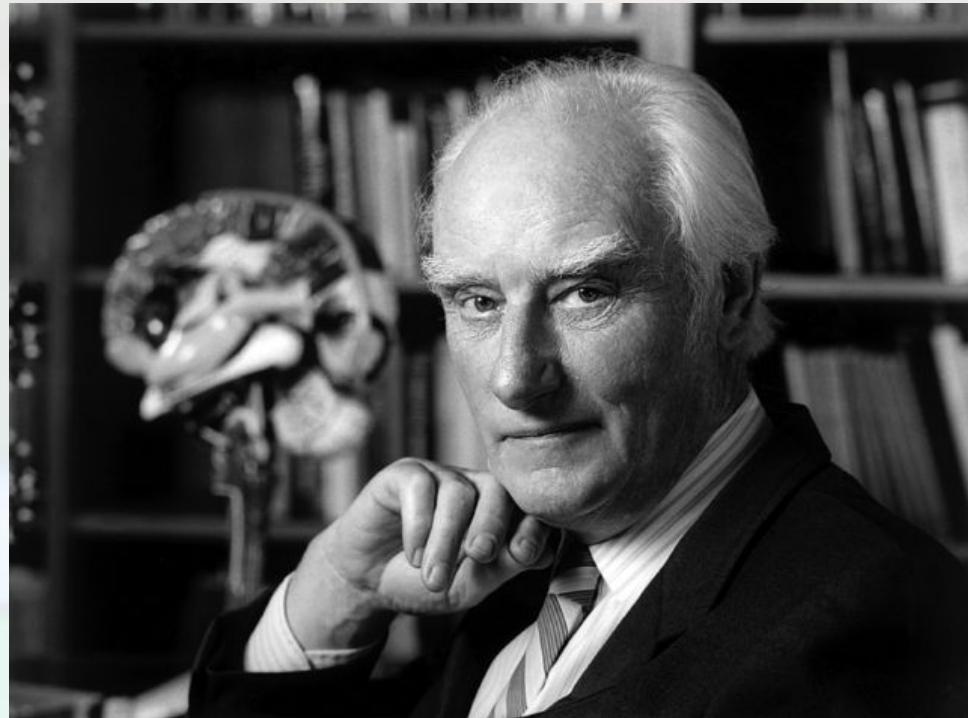
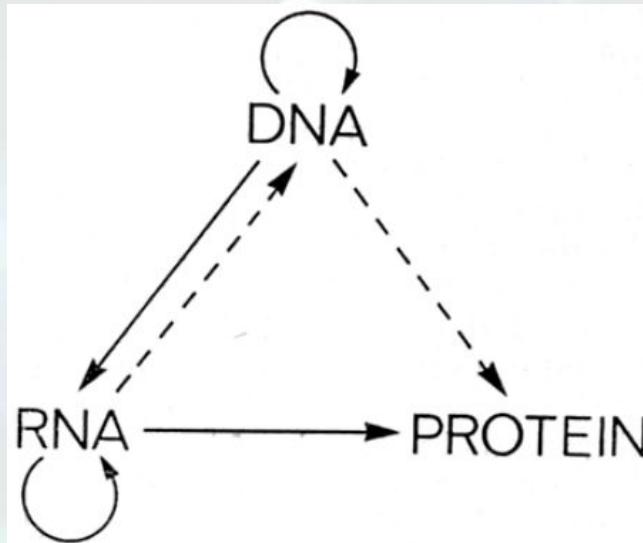


Photo: Marc Lieberman - Siegel RM, Callaway EM: Francis Crick's Legacy for Neuroscience: Between the α and the Ω . PLoS Biol 2/12/2004: e419. <https://dx.doi.org/10.1371/journal.pbio.0020419>

Central Dogma of Molecular Biology

(Crick, 1970)

"The central dogma of molecular biology deals with the detailed residue-by-residue **transfer of sequential information**. It states that such information cannot be transferred back from protein to either protein or nucleic acid."

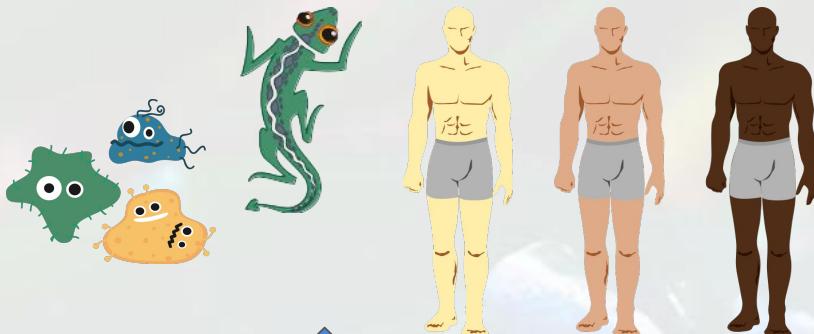


Phenotype

- Sets of organism observable characteristics
- Expression of organism's genotype interacting with the environment

Genotype to Phenotype

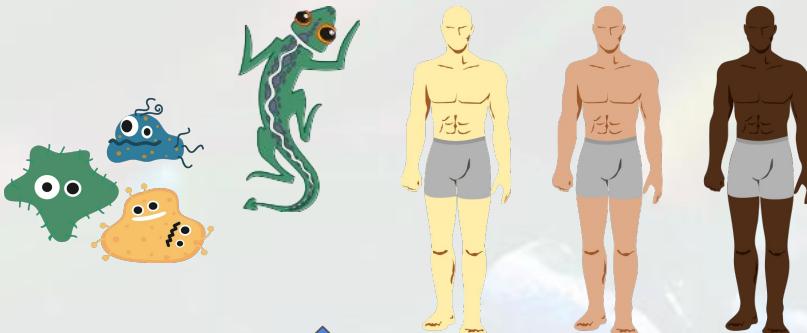
Phenotype



Genotype

Genotype to Phenotype

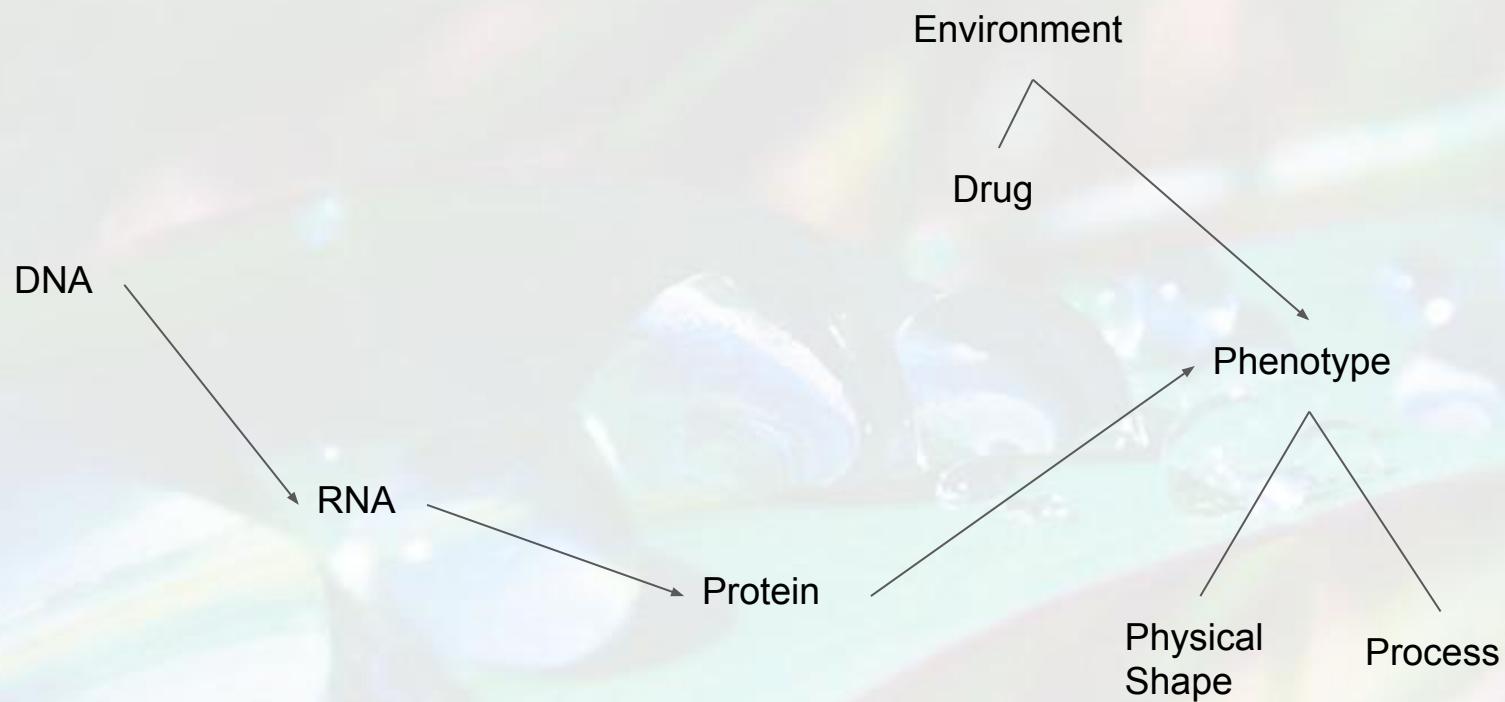
Phenotype



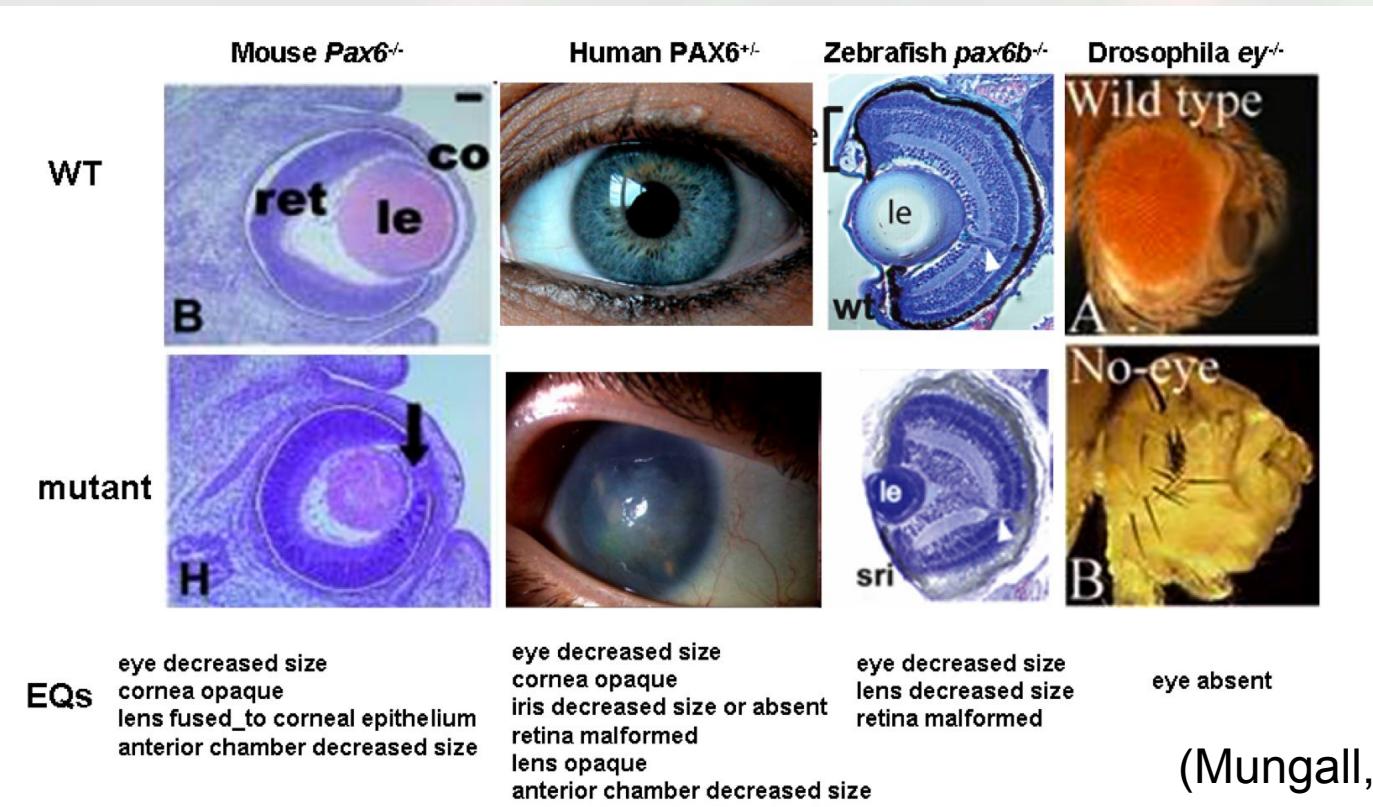
Descrição

Genotype

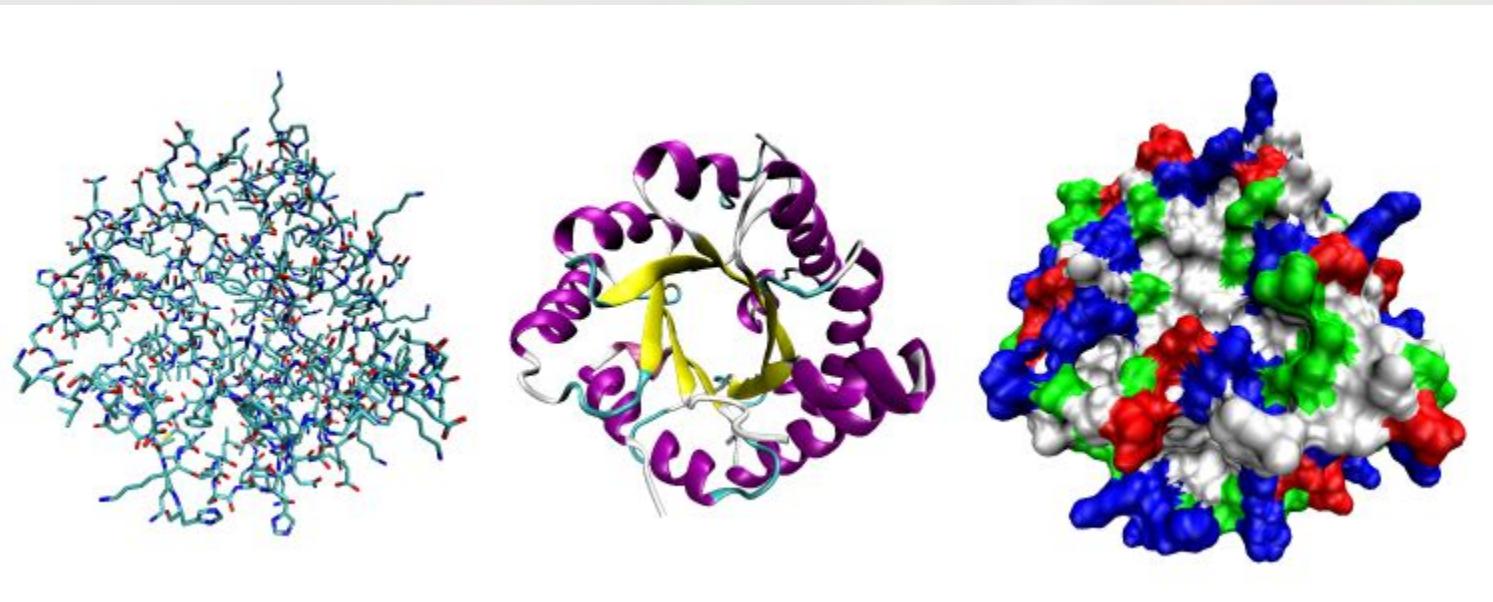
Código



Complexity: From Genes to Phenotypes

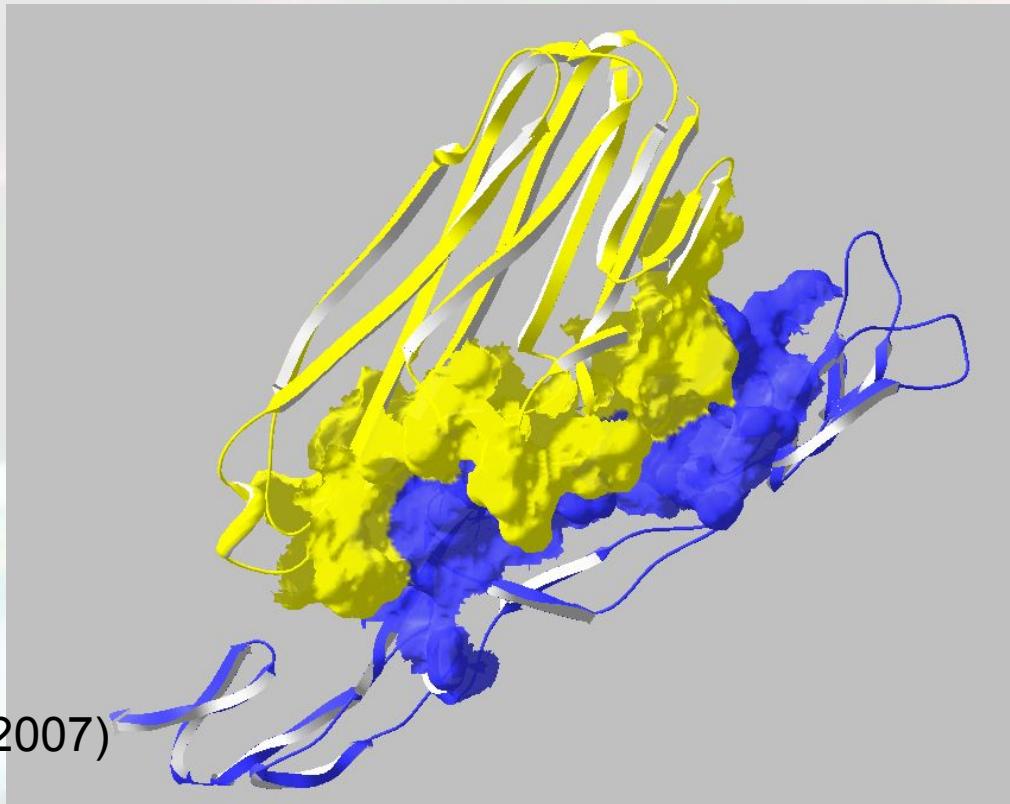


Protein



By Opabinia regalis - Self created from PDB entry 1TIM using the freely available visualization and analysis package VMD, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=1068554>

TNF and its Receptor



(Wiltgen et al., 2007)

Protein–Protein Interactions in Virus–Host Systems

(Brito, A. F., & Pinney, 2017)

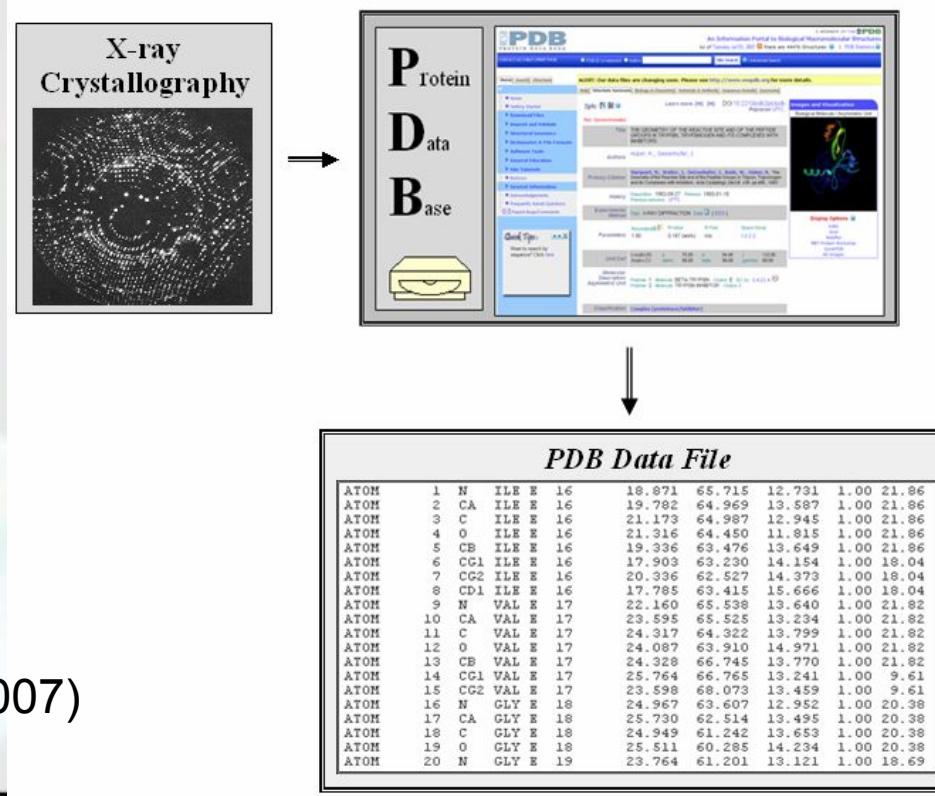
"To study virus-host protein interactions, knowledge about viral and host protein architectures and repertoires, their particular evolutionary mechanisms, and information on relevant sources of biological data is essential."

"From a biomedical perspective, blocking such interactions is the main mechanism underlying antiviral therapies."

Data Sources

Protein Data Base

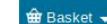
<http://www.rcsb.org/>



(Wiltgen et al., 2007)

From June 20, 2018 all traffic will be automatically redirected to HTTPS. [More information](#) or [view this page using https](#)

UniProtKB - P01375 (TNFA_HUMAN)



Display

BLAST Align Format Add to basket History

Feedback Help video Other tutorials and videos

Entry

Publications

Feature viewer

Feature table

All None

- Function
- Names & Taxonomy
- Subcellular location
- Pathology & Biotech
- PTM / Processing
- Expression

Protein **Tumor necrosis factor**

Gene **TNF**

Organism **Homo sapiens (Human)**

Status Reviewed - Annotation score: - Experimental evidence at protein level ⁱ

Function ⁱ

Cytokine that binds to TNFRSF1A/TNFR1 and TNFRSF1B/TNFBR. It is mainly secreted by macrophages and can induce cell death of certain tumor cell lines. It is potent pyrogen causing fever by direct action or by stimulation of interleukin-1 secretion and is implicated in the induction of cachexia. Under certain conditions it can stimulate cell proliferation and induce cell differentiation. Impairs regulatory T-cells (Treg) function in individuals with rheumatoid arthritis via FOXP3 dephosphorylation. Upregulates the expression of protein phosphatase 1 (PP1), which dephosphorylates the key 'Ser-418' residue of FOXP3, thereby inactivating FOXP3 and rendering Treg cells functionally defective (PubMed:23396208). Key mediator of cell death in the anticancer action of BCG-stimulated neutrophils in combination with DIABLO/SMAC mimetic in the RT4v6 bladder cancer cell line (PubMed:22517918). 3 Publications ^v

The TNF intracellular domain (ICD) form induces IL12 production in dendritic cells. 1 Publication ^v

GO - Molecular function ⁱ

- cytokine activity Source: BHF-UCL ^v
- identical protein binding Source: BHF-UCL ^v
- protease binding Source: BHF-UCL ^v
- transcription regulatory region DNA binding Source: UniProtKB ^v
- tumor necrosis factor receptor binding Source: BHF-UCL ^v

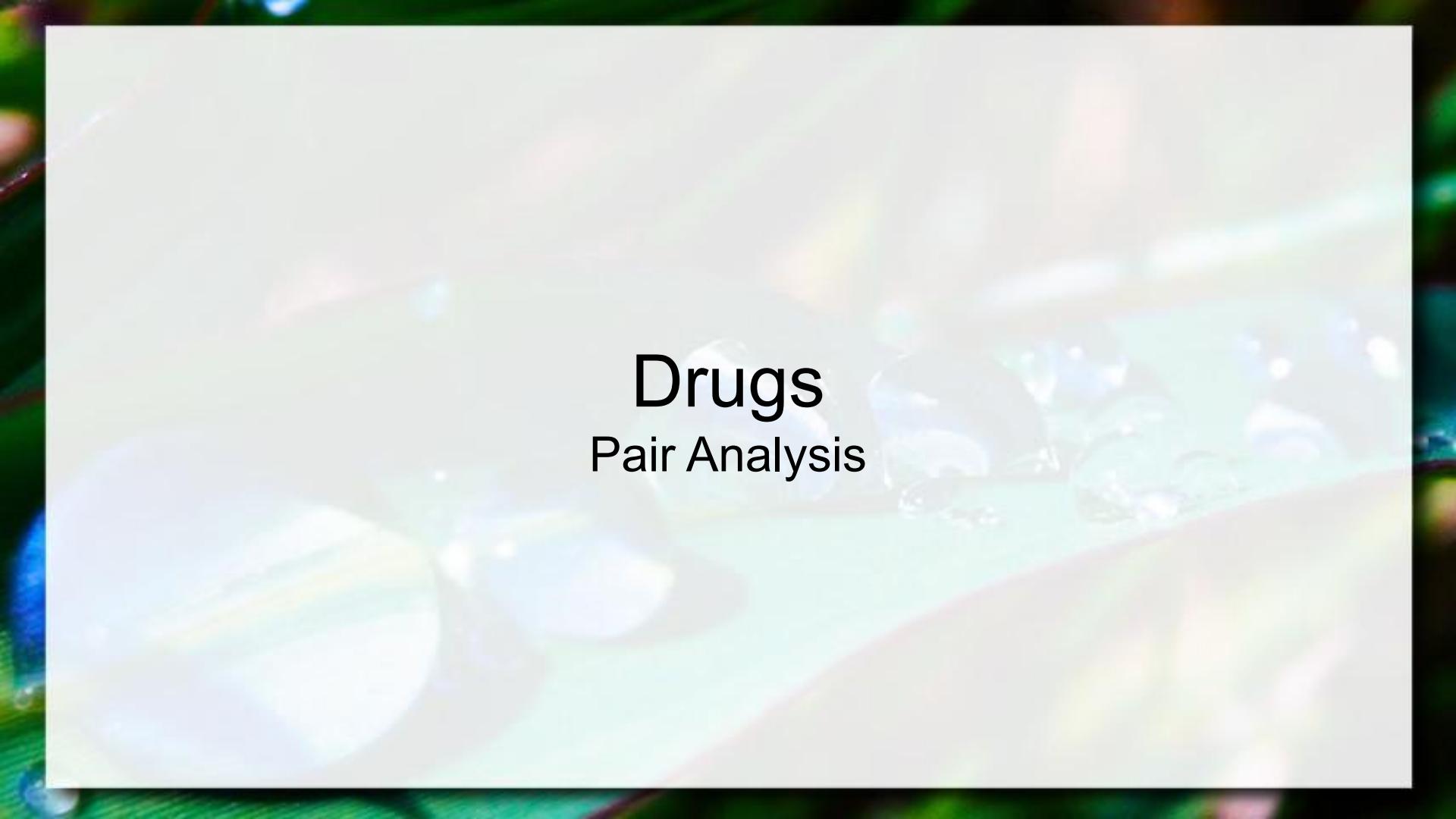
[View the complete GO annotation on QuickGO ...](#)

GO - Biological process ⁱ

- activation of cysteine-type endopeptidase activity involved in apoptotic process Source: UniProtKB ^v
- activation of MAPK activity Source: BHF-UCL ^v
- activation of MAPKKK activity Source: BHF-UCL ^v

TNF - UniProt

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



Drugs

Pair Analysis



Russ Altman at TEDMED 2015

What really happens when you mix medications?

14:42



Share

Added

Liked

Rate

DrugBank

<https://www.drugbank.ca/>

The screenshot shows the DrugBank search interface. At the top, there's a navigation bar with links for Browse, Search, Downloads, About, Help, Blog, and Contact Us. Below the navigation bar is a search input field with the placeholder "WHAT ARE YOU LOOKING FOR?". The word "Tylenol" is typed into the search field. To the right of the search input is a magnifying glass icon representing the search button. Below the search input, there are four categories with icons: Drugs (highlighted in pink), Targets, Pathways, and Indications.



The DrugBank database is a unique bioinformatics and cheminformatics resource that combines detailed drug data with comprehensive drug target information.

The latest release of DrugBank (version 5.0.11, released 2017-12-20) contains 11,002 drug entries including 2,504 approved small molecule drugs, 943 approved biotech (protein/peptide) drugs, 109 nutraceuticals and over 5,110 experimental drugs. Additionally, 4,910 non-redundant protein (i.e. drug target) sequences from 500 organisms are included in the database. Each DrugBank entry includes detailed pharmacological information, chemical structures, and links to other databases such as ChEMBL, PubChem, and UniProt.

PDB & DrugBank

- Search by Drugs & Drug Targets
 - http://www.rcsb.org/pages/search_features#search_drugs

U.S. Food & Drug Administration

Adverse Event Reporting Systems (AERs)

- Drug Approvals and Databases
 - <https://www.fda.gov/Drugs/InformationOnDrugs/>

The screenshot shows the official website of the U.S. Food and Drug Administration (FDA). The header features the FDA logo and navigation links for A to Z Index, Follow FDA, and En Español. A search bar is also present. The main content area is titled "Drug Approvals and Databases". On the left, there's a sidebar with "Drug Approvals and Databases" and "Approved Drugs" dropdown menus, along with "Resources for You" sections for FDA Online Label Repository and Drug Trials Snapshots. The main content area includes a "REMS website version 2.0 launches successfully" message and a table linking to Risk Evaluation and Mitigation Strategies. Below this, a list of various databases is provided, each with a "More information about the database" link.

Drug Approvals and Databases

Approved Drugs

Resources for You

- FDA Online Label Repository
- Drug Trials Snapshots

REMS website version 2.0 launches successfully
Table provides links to [Risk Evaluation and Mitigation Strategies](#)

- [Acronyms and Abbreviations Search](#)
More information about the database
- [Approved Risk Evaluation and Mitigation Strategies \(REMS\)](#)
More information about the database
- [Bioresearch Monitoring Information System \(BMIS\) Search](#)
More information about the database
- [Clinical Investigator Inspection List \(CLILI\) Search](#)
More information about the database
- [Dissolution Methods Database Search](#)
More information about the database
- [Drug Establishments Current Registration Site Search](#)
More information about the database
- [Drug Safety Labeling Changes \(SLC\)](#)
More information about the database
- [Drug Shortages](#)
More information about the database
- [Drugs@FDA Search](#)
More information about the database
- [FDA Adverse Event Reporting System \(FAERS\) Quarterly Data Files](#)
More information about the database

U.S. Food & Drug Administration

Adverse Event Reporting Systems (AERs)

- FAERS - FDA Adverse Event Reporting Systems
 - <https://www.fda.gov/Drugs/InformationOnDrugs/ucm135151.htm>

The screenshot shows the official FDA website for the Adverse Event Reporting System (FAERS). The header includes the U.S. Department of Health and Human Services logo, the FDA U.S. FOOD & DRUG ADMINISTRATION logo, and links for A to Z Index, Follow FDA, and En Español. A search bar is also present. The main navigation menu includes Home, Food, Drugs, Medical Devices, Radiation-Emitting Products, Vaccines, Blood & Biologics, Animal & Veterinary, Cosmetics, and Tobacco Products. Below the menu, a "Drugs" section is selected. The page title is "FDA Adverse Event Reporting System (FAERS)". Social sharing icons for Facebook, Twitter, LinkedIn, Pinterest, Email, and Print are available. A text box states: "FDA Adverse Event Reporting System supports the FDA's post-marketing safety surveillance program for all marketed drug and therapeutic biologic products. It contains adverse event reports FDA has received from manufacturers as required by regulation along with reports received directly from consumers and healthcare professionals. We provide downloadable files only; you cannot search the database online." Below this, it says "Dates of Coverage: January 2004 - present" and "Update Frequency: Quarterly". An "Additional Information" section lists links to the FAERS system, quarterly data files, and reporting an adverse event or medication error to FDA MedWatch.

Page Last Updated: 06/09/2017
Note: If you need help accessing information in different file formats, see Instructions for Downloading Viewers and Players.
Language Assistance Available: Español | 繁體中文 | Tiếng Việt | 한국어 | Tagalog | Русский | العربية | Kreyòl Ayisyen | Français | Polski | Português | Italiano | Deutsch | 日本語 | فارسی | English

FDA

Online Mendelian Inheritance in Man (OMIM)

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

“[...] catalog of human genes and genetic disorders and traits, with a particular focus on the gene-phenotype relationship.” (Wikipedia, 2018)

Mendelian Trait

“Mendelian trait is one that is controlled by a single locus in an inheritance pattern. In such cases, a mutation in a single gene can cause a disease that is inherited according to Mendel's laws. Examples include sickle-cell anemia, Tay-Sachs disease, cystic fibrosis and xeroderma pigmentosa.” (Wikipedia, 2018)

HIV-1 Human Interaction Database

<https://www.ncbi.nlm.nih.gov/genome/viruses/retroviruses/hiv-1/interactions/browse/>



NCBI Resources ▾ How To ▾

[Sign in to NCBI](#)

Retroviruses

Search NCBI

[Search](#)

HIV-1 Human Interaction Database

Browse

About

Help

Publications

Releases

HIV-1 Interactions: Browse and Download Data

Filters

HIV protein

All

Protein interaction

All interaction types

Replication interaction

All interaction types

[Download](#)

[View NCBI Gene records](#)

Items 1 - 20 of 18069

<<First

<Prev

Page

1

of 904

[Next >](#)

[Last >>](#)

HIV-1	Interaction	Human genes	Details
Asp	binds	HLA-A	more..
Asp	binds	HLA-B	more..
Asp	enhances	IFNG	more..

(Holzinger, 2014)

Collective



Individual



Tissue



Cell



Bacteria



Virus



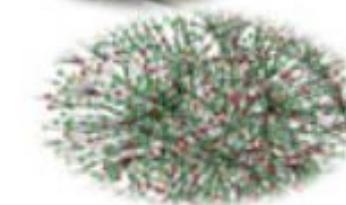
Molecule



Atom



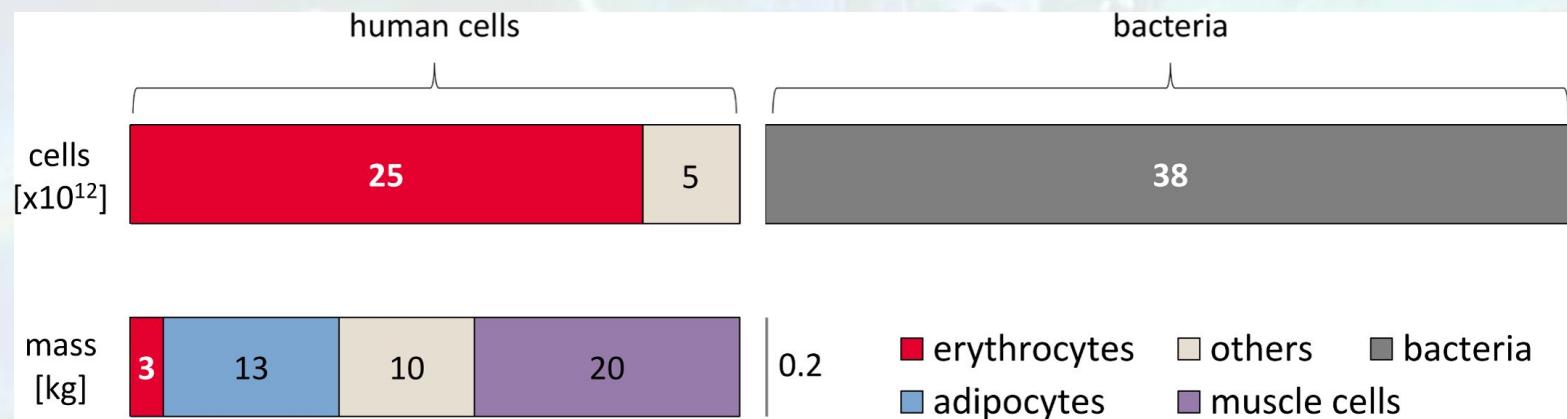
10^{-12}



Estimates of Cells in Human Body

- Reference man
 - 70 kilograms
 - 20–30 years old
 - 1.7 metres tall
- 30 trillion human cells
- 39 trillion bacteria

(Sender et al., 2016)



NIH Human Microbiome Project

<https://hmpdacc.org/>

NIH Human Microbiome Project



Characterization of the microbiomes of healthy human subjects at five major body sites, using 16S and metagenomic shotgun sequencing.

Enter HMP1



Characterization of microbiome and human host from three cohorts of microbiome-associated conditions, using multiple 'omics technologies.

Enter iHMP

HMP₁

<https://hmpdacc.org/hmp/>

- Initial Phase (2008)
- 300 healthy individuals
- Sites on the human body
 - nasal passages
 - oral cavity
 - Skin
 - gastrointestinal tract
 - urogenital tract
- 16S rRNA sequencing
- Metagenomic whole genome shotgun (wgs) sequencing
- Over 14.23 terabytes of data

Model Organisms

Model Organisms

- "Most of our knowledge about the basic properties of metabolism, growth, and division in living cells is a result of studies on species described as '**model organisms**'."
- These species include:
 - bacterium *Escherichia coli*
 - bakers' yeast (*Saccharomyces cerevisiae*),
 - the fruit fly (*Drosophila melanogaster*)
 - the nematode worm (*Caenorhabditis elegans*)
 - the mouse (*Mus musculus*)
 - the thale cress (*Arabidopsis thaliana*)

(Oliver et al., 2016)

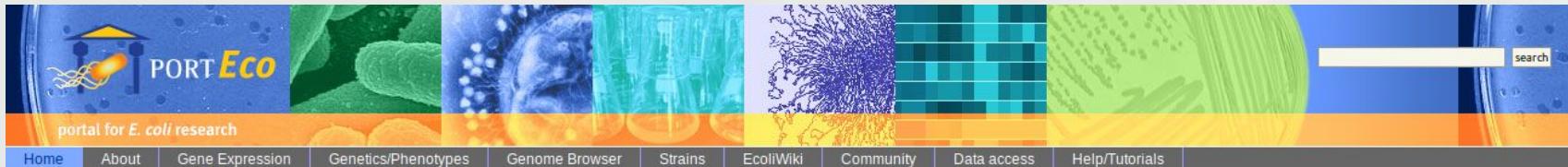
Model Organism Databases (MOD)

- "Model organism databases (MODs) host the genomic and functional information produced by organism-specific research projects and provide query and visualization tools to access these data"

(Oliver et al., 2016)

PortEco

<http://www.porteco.org/>



WHAT CAN I DO?

Find data for a particular gene

Search

Enter a list of genes and test for enriched functions

separate IDs by newline

Search

Find and analyze datasets

Currently Unavailable

PortEco is a next-generation data resource for the bacterial model organism, *Escherichia coli*

[Read more...]

PortEco Resources

- Pathway/Genome Databases for 130 *E. coli* genomes are available at BioCyc.org including curated databases for *E. coli* B Rel 606 and *E. coli* W3110
- EcoliHouse provides a publicly queryable MySQL database warehouse for *E. coli* data
- Community features including colleague search, event calendar, job postings
- E. coli* systems models at BioModels
- PortEco data downloads and database access
- PortEco also supports manual curation of Gene Ontology terms from published papers at EcoCyc

PortEco News and Events

PortEco needs letters of support

PortEco blog > PortEco: by jimhu (4 years ago):

Dear Colleagues, Since taking on the project in 20...[Read more...]

New version of the MG1655 sequence at Genbank

EcoCyc

<https://ecocyc.org/>

The screenshot shows the EcoCyc website interface for *Escherichia coli* K-12 MG1655. At the top, there's a navigation bar with links for Sites, Search, Genome, Metabolism, Analysis, SmartTables, and Help. The main content area features a large heading "EcoCyc *E. coli* Database". Below it, a text block describes the database as a scientific resource for *Escherichia coli* K-12 MG1655, mentioning curation of the genome, transcriptional regulation, transporters, and metabolic pathways. A "User Guide" link is also present.

New to EcoCyc? Take the [guided tour](#) of the EcoCyc.org Web site, watch our [free online instructional videos](#), or read our 2017 article "EcoCyc: reflecting new knowledge about *Escherichia coli* K-12"

The right side of the page displays a complex metabolic pathway diagram with various nodes and connecting arrows. Overlaid on this are several analytical tools:

- A "REACTION Summary" box showing a heatmap of reaction steps (Step 0, Step 1, Step 2, Step 3) across genes ilvI, ilvH, ilvN, ilvB, ilvG_1, ilvG_2, and ilvM. The heatmap shows high activity in Step 1 for most genes.
- A "REACTION Bar XY Heat" chart showing expression levels for genes inilC and metE across three conditions (0, 1, 2, 3). inilC shows high expression in condition 0, while metE shows a sharp increase from condition 0 to 1.
- A "Cellular Overview Omics Viewer" showing a scatter plot of metabolite levels.

Gene Expression Data Analysis
Multiple tools are available in this website for analysis of gene expression data.

[Learn More](#)

Page navigation: 1 2 3 4 5 6 7 8

(Holzinger, 2014)



Extending Worms Life

<https://www.npr.org/2015/05/22/408027400/how-do-you-make-an-elderly-worm-feel-young-again>

TED RADIO HOUR

A journey through fascinating ideas, astonishing inventions, and new ways to think and create.
Based on riveting TEDTalks from the world's most remarkable minds.



How Do You Make An Elderly Worm Feel Young Again?

May 22, 2015 · 8:24 AM ET

Heard on TED Radio Hour

NPR/TED STAFF

+ Queue

Download

Embed

Transcript



A *C. elegans* mutant that lives twice as long as wild type

- "WE have found that mutations in the gene **daf-2** can cause fertile, active, adult *Caenorhabditis elegans* hermaphrodites to **live more than twice as long as wild type.**" (Kenyon et al., 1993)

Caenorhabditis elegans



WormBase

<https://www.wormbase.org>

Welcome to WormBase - need help?

My WormBase (0 ⭐) | Login | For Developers | Contact Us

Search directory... for a gene ▾ | ↗

About Directory Tools Downloads Community Support Submit Data Micropublication ParaSite

browse Blast and more

Explore Worm Biology

facilitating insights into
nematode biology

control what you see on the page skip tutorial

see a ⭐? click on it to save to My Wormbase

Page Content

- News
- Discussion
- Activity
- Gene name changes
- Meetings

My WormBase

News

Please specify allele and strain names in publications Tue, 10 Apr 2018

WormBase curates data from published papers and attaches different types of data such as phenotype, overview, expression, human disease model, etc., to genetic

Sir John Sulston Thu, 15 Mar 2018

We mourn the passing of one of the founders of our field. John Sulston was personally responsible for establishing the use of *C. elegans* to study development –

WormBase Release WS263 Thu, 08 Mar 2018

We would like to announce the availability of the WormBase WS263 release on the WormBase website and FTP. Some of the highlights of this release are: [New](#)

[View More >](#)

Gene name changes

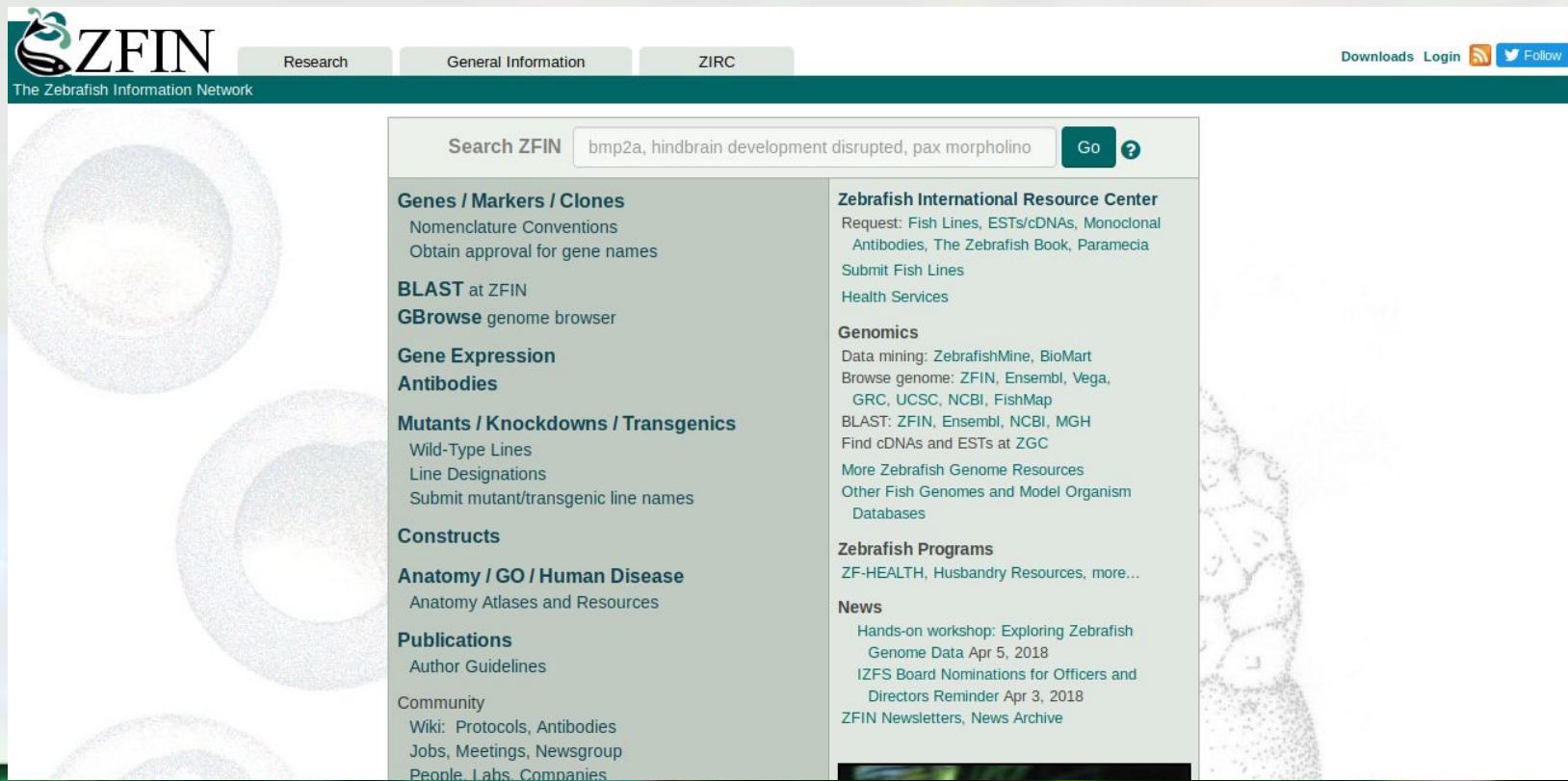
Below are changes in gene names since the previous release WS262. Gene name changes for each release since WS252 are archived [here](#).

Genes with new primary names

New primary name	Gene ID	Sequence
asc-1	WBGene00016019	C23H3.3
ddx-52	WBGene00011032	R05D11.4
efr-3	WBGene00016311	C32D5.3
fubp-3.1	WBGene00007534	C12D8.1

Zebrafish - ZFIN

<https://zfin.org/>

The background of the ZFIN homepage features a series of grayscale photographs of zebrafish embryos at various stages of development, arranged in a grid-like pattern.

The ZFIN logo is located in the top left corner, featuring a stylized green and blue zebrafish head icon followed by the text "ZFIN" in a bold, white, sans-serif font. Below the logo, the tagline "The Zebrafish Information Network" is written in a smaller, white, sans-serif font.

The top navigation bar includes links for "Research", "General Information", and "ZIRC". On the right side of the top bar are links for "Downloads", "Login", and social media icons for RSS feed and Twitter.

The main search bar is positioned in the center of the header, containing the placeholder text "Search ZFIN" and a search button labeled "Go". To the right of the search bar is a link to the help section, represented by a question mark icon.

The page content is organized into several sections:

- Genes / Markers / Clones**: Includes links to Nomenclature Conventions and Obtain approval for gene names.
- BLAST at ZFIN**
- GBrowse genome browser**
- Gene Expression**
- Antibodies**
- Mutants / Knockdowns / Transgenics**: Includes links to Wild-Type Lines, Line Designations, and Submit mutant/transgenic line names.
- Constructs**
- Anatomy / GO / Human Disease**: Includes links to Anatomy Atlases and Resources.
- Publications**: Includes links to Author Guidelines and Community.
- Zebrafish International Resource Center**: Includes links to Request: Fish Lines, ESTs/cDNAs, Monoclonal Antibodies, The Zebrafish Book, Paramecia, Submit Fish Lines, and Health Services.
- Genomics**: Includes links to Data mining: ZebrafishMine, BioMart, Browse genome: ZFIN, Ensembl, Vega, GRC, UCSC, NCBI, FishMap, BLAST: ZFIN, Ensembl, NCBI, MGH, Find cDNAs and ESTs at ZGC, More Zebrafish Genome Resources, Other Fish Genomes and Model Organism Databases.
- Zebrafish Programs**: Includes links to ZF-HEALTH, Husbandry Resources, and more...
- News**: Includes links to Hands-on workshop: Exploring Zebrafish Genome Data Apr 5, 2018, IZFS Board Nominations for Officers and Directors Reminder Apr 3, 2018, ZFIN Newsletters, and News Archive.

Mouse - MGI

<http://www.informatics.jax.org/>



About Help FAQ

Mouse Genome Informatics

Search ▾ Download ▾ More Resources ▾ Submit Data

Find Mice (IMSR)

Analysis Tools

Contact Us

Browsers



Keywords, Symbols, or IDs

Quick Search

Or use topic specific search and analysis tools:



Genes



Phenotypes & Mutant Alleles



Human–Mouse: Disease Connection



Gene Expression Database (GXD)



Recombinase (cre)



Function

MGI is the international database resource for the laboratory mouse, providing integrated genetic, genomic, and biological data to facilitate the study of human health and disease.

[About Us](#) [MGI Publications](#)



MGI is now annotating disease models to the Disease Ontology (DO) and offers a new Disease Ontology Browser.

Term with siblings

ciliopathy +
chondrodysplasia punctata +
chromosomal disease +
Coffin-Siris syndrome
Cornelia de Lange syndrome
malignant hyperthermia
maternity-onset diabetes of the young
monogenic disease +

Child terms(s)

Joubert syndrome +
Meckel syndrome
primary ciliary dyskinesia +

Fly - FlyBase

<http://flybase.org/>

FlyBase FB2017_05
FB2018_02, released Apr 3, 2018

A Database of *Drosophila* Genes & Genomes

Home Tools Downloads Links Community Species About Help Archives J2G ▾ Jump to Gene Go

D.*melanogaster* D.*virilis* A.*mellifera* BLAST GBrowse Antibodies RNAi CRISPR Resources ON OFF RNA-Seq GO PHENOTYPE ANATOMY DISEASE MORE Vocabularies ImageBrowse FIELD DATA XML sequence Batch Download

FlyBase 2.0: It's here! 1:26

FLYBASE 2.0 IT'S HERE!

FlyBase needs your help — Yearly Website Access Fee!

The NHGRI is significantly reducing the funding of FlyBase by 15% this year (which, with rising costs is normalized to 20%), and 20% (normalized to 30%) onward. With these cuts, we will not be able to deliver high quality, essential curation and tools. We are calling on you to help by implementing a scaled **FlyBase website access fee per person / per year**:

U.S. and U.K.	\$150.00
All other countries	\$300.00
Commercial	\$750.00

PLEASE COMPLETE THIS FORM.

More details [HERE](#) on our current funding situation and why we are implementing a fee-based approach.
Questions? See this [FAQ](#) or [email us](#). Optional general tax-deductible contributions [here](#).

FAST-TRACK YOUR PAPER FLYBASE NEWS FLY BOARD

FLY KIDS FLY MEETINGS FLY COLOR

Thank you for your help to sustain FlyBase!

Rat - Rat Genome Database (RGD)

<https://rgd.mcw.edu/>

Help | Publications | Poster Archive | FTP Download | REST API | Citing RGD | Contact Us [Sign In](#)

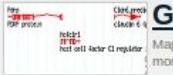
Enter Search Term... [Advanced Search \(OLGA\)](#)

 Gene Editing Rat Resource Center 

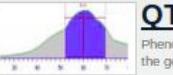
[HOME](#) [DATA](#) [ANALYSIS & VISUALIZATION](#) [DISEASES](#) [PHENOTYPES & MODELS](#) [GENETIC MODELS](#) [PATHWAYS](#) [COMMUNITY](#)

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 **Genes**
Map positions, functions and more

 **Strains**
Search Strains

 **QTL**
Phenotypes & Traits linked to the genome

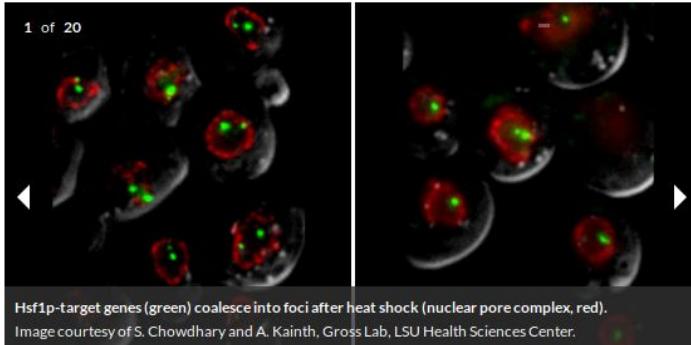
 **Function**
Gene Ontology, Phenotype, Pathway

 **Diseases**
Genes, QTL & Strains related to Disease

 **Phenotypes & Models**
Phenotype data, Assays, Husbandry and more

Yeast - Saccharomyces Genome Database (SGD)

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



The SGD homepage features a prominent image of yeast cells undergoing heat shock, with green spots indicating Hsf1p-target genes and red spots indicating the nuclear pore complex. Below the image is a caption: "Hsf1p-target genes (green) coalesce into foci after heat shock (nuclear pore complex, red). Image courtesy of S. Chowdhary and A. Kainth, Gross Lab, LSU Health Sciences Center."

1 of 20

Analyze ▾ Sequence ▾ Function ▾ Literature ▾ Community ▾

About Blog Download Help YeastMine

search: actin, kinase, glucose

About SGD

The *Saccharomyces* Genome Database (SGD) provides comprehensive integrated biological information for the budding yeast *Saccharomyces cerevisiae* along with search and analysis tools to explore these data, enabling the discovery of functional relationships between sequence and gene products in fungi and higher organisms.

Try this?

Meetings

31st VHYC Yeast Conference

April 16 to April 17, 2018 -
Leuven, Belgium

Fungal Pathogen Genomics

New & Noteworthy

In Memoriam: André Goffau - April 12, 2018

It was with great sadness that we learned that André Goffau, renowned yeast researcher and Professor at the Université Catholique de Louvain in Belgium, passed away on April 2, 2018. Prof. Goffau

Tweets by @yeastgenome

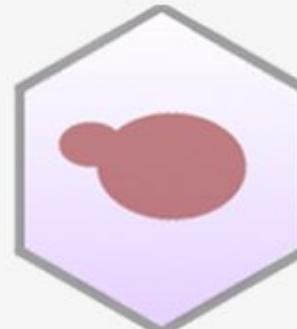
SGD Project

@yeastgenome

Full set of curated #yeast protein (and other) complexes, aka the yeast #complexome, now available at the [@complexportal](#) at the [@amblab1](#) check it out!

Alliance of Genome Resources

<http://www.alliancegenome.org/>



Intermine

<http://intermine.org/>



WormMine

<http://intermine.wormbase.org/tools/wormmine/>

WormBase WormMine WS263 Intermine data mining platform for *C. elegans* and related nematodes

Home Templates Lists QueryBuilder Regions Data Sources API MyMine Log in

Search WormMine e.g. aap-1, WP:CE18491 GO

Search

Search WormMine. Enter **names, identifiers or keywords** for genes, proteins, transcripts, ontology terms etc.

e.g. aap-1, WP:CE18491

SEARCH

Analyze a list

Enter a **list** of identifiers of the same type. (aka: all genes, or all proteins).

Gene

e.g. acr-10, unc-26, hih-2, WBGene00002299, WBGene00004323, WBGene00002992

advanced ANALYSE

First Time Here?

WormMine integrates many types of data for *C. elegans*. You can run flexible queries, export results and analyse lists of data.

TAKE A TOUR

GENOMICS PROTEINS EXPRESSION GENETIC VARIATIONS PHENOTYPES GENE ONTOLOGY REAGENTS

Query for genomics:

- Gene ➔ Proteins
- Chromosome Interval ➔ Genes
- Transcript Type, Species ➔ Genes

Digital Patient

- "a technological framework that, once fully developed, will make it possible to create a **computer representation of the health status of each citizen** that is descriptive and interpretive, integrative and predictive." Discipulus Consortium (2013)

eVip
Electronic Virtual Patients
<https://virtualpatients.eu/>

Referatory

electronic
eViP Virtual Patients

<https://virtualpatients.eu/referatory/>



Co-funded by the European Commission

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Search...



Referatory

These eViP virtual patients are available to use, by clicking on the URL link. In some cases this will immediately open the case in its original virtual patient player, in other cases you will be guided to a form, where you will be able to register for free and then open the case. There are several different type of players so don't be surprised if the different VPs open in very different player systems.

In addition to the URL link, the VPs are all available as a content package, which conforms to the virtual patient ANSI-accredited standard. To use these packages, you will need to import them into a suitable virtual patient player i.e. a player which is able to accept VP standard-compliant content. This will require the support of a suitably-experienced learning technologist.

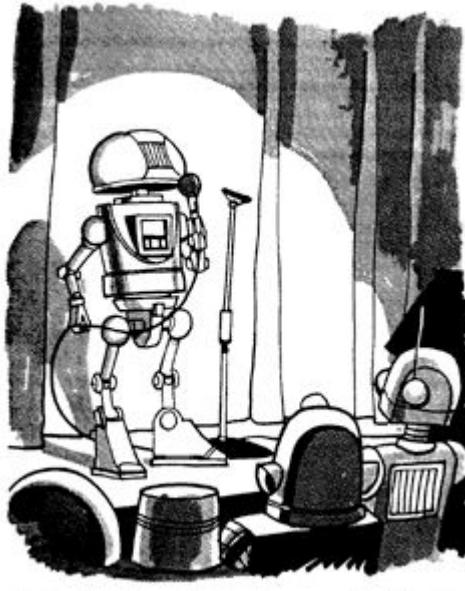
Search For:

Displaying 340 virtual patients

Title	Keywords	Language	Institution	License	Content Package	URL
Catherine Miller	Meningitis, Bacterial Meningitis, Sepsis	English	St George's, University of London			Link
Anna-Lena Olofsson	Failure to thrive	English	St George's, University of London			Link
John M	Idiopathic thrombocytopenic purpura, Bruises, Immunoglobulin	English	St George's, University of London			Link
Florian	Prematurity, Respiratory distress syndrome,	English	St George's, University of London			Link

Semantic Web

“... the idea of having data on the web defined and linked in a way that it can be used by machines not just for display purposes, but for automation, integration and reuse of data across various applications.”



W3C Semantic Web Activity Group, 2011

Linked Data

Wikipedia

Firefox W Paris - Wikipedia, the free encyclopedia en.wikipedia.org/wiki/Paris Article Talk Read View source View history Search

WIKIPEDIA The Free Encyclopedia

Paris

From Wikipedia, the free encyclopedia Coordinates: 48°51'24"N 2°21'03"E

This article is about the capital of France. For other uses, see Paris (disambiguation).

Paris (English /pɑrɪs/, /pərɪs/; French: [paʁi] (listen)) is the capital and most populous city of France. It is situated on the River Seine, in the north of the country, at the heart of the Île-de-France region. Within its administrative limits (the 20 arrondissements), the city had 2,234,105 inhabitants in 2009 while its metropolitan area is one of the largest populations in Europe.

than 12 An imp... millenn... had be...

Country	France
Region	Île-de-France
Department	Paris
Subdivisions	20 arrondissements
Government	• Mayor (2008–14) Bertrand Delanoë (PS)
Area ^[1]	• Urban (2010) 2,844.8 km ² (1,098.4 sq mi) • Metro (2010) 17,174.4 km ² (6,631.1 sq mi) • Land ¹ 105.4 km ² (40.7 sq mi)
Population (2010) ^[5]	• Rank 1st in France

Infobox

Country	France
Region	Île-de-France
Department	Paris
Subdivisions	20 arrondissements
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Population (2010) ^[5]	• Rank 1st in France

Firefox W Île-de-France - Wikipedia, the free encyclopedia en.wikipedia.org/wiki/Île-de-France_(region) Article Talk Read Edit View history Search

WIKIPEDIA The Free Encyclopedia

Île-de-France

From Wikipedia, the free encyclopedia (Redirected from Île-de-France (region))

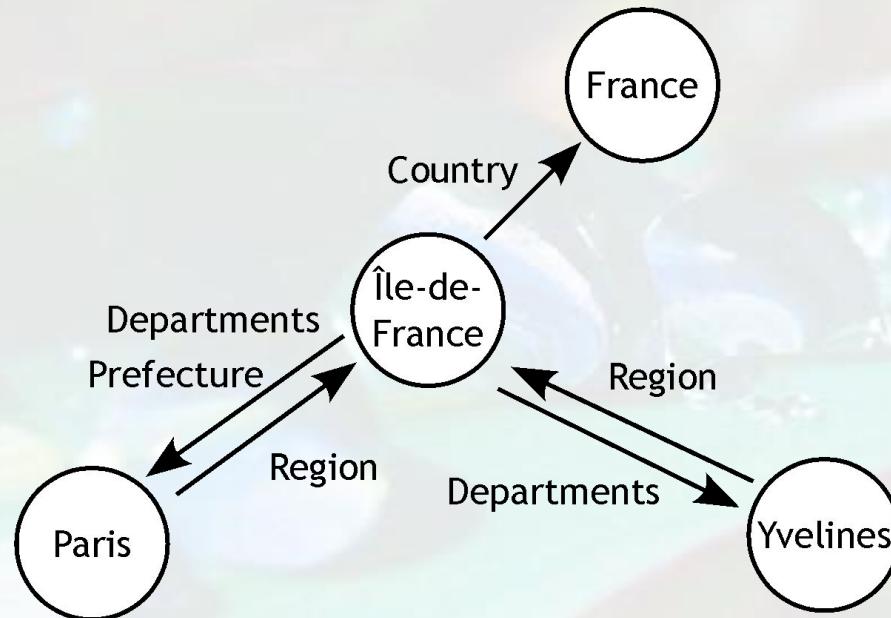
For other uses, see Île-de-France (disambiguation).

Country	France
Prefecture	Paris
Departments	8 Paris Seine-Saint-Denis Hauts-de-Seine Seine-Saint-Denis Seine-et-Marne Val-de-Marne Val-d'Oise Yvelines

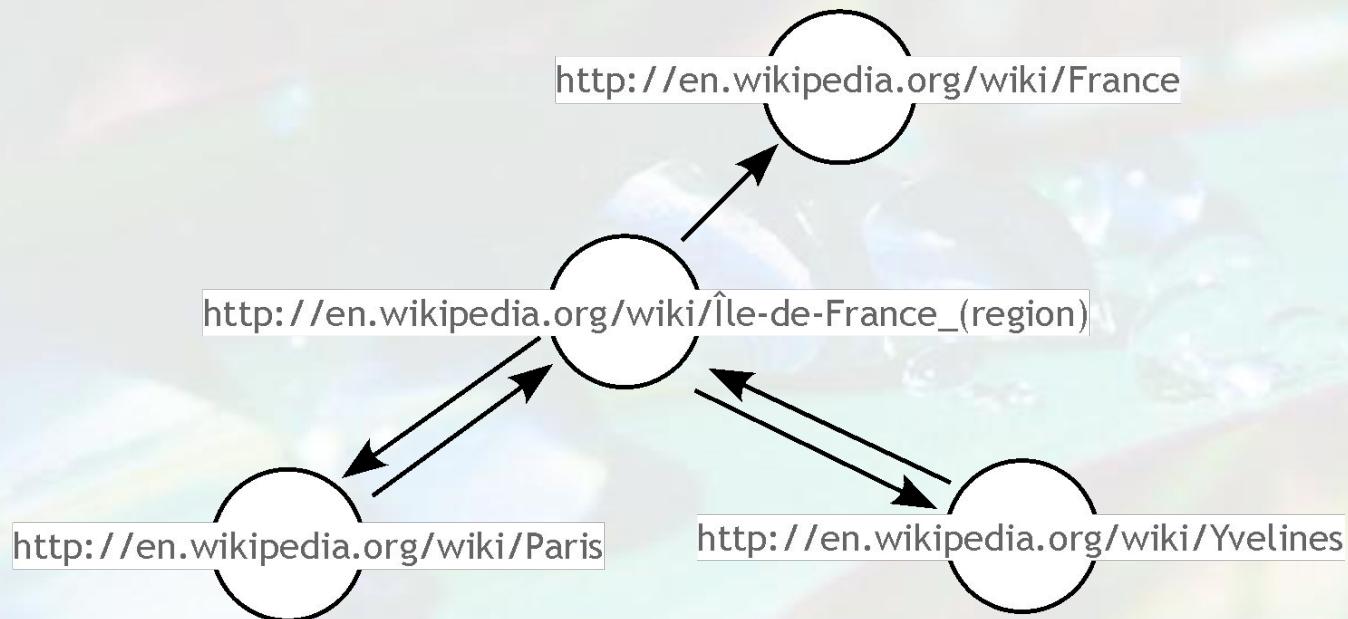
Country	France
Prefecture	Paris
Departments	8 Paris Seine-Saint-Denis Hauts-de-Seine Seine-Saint-Denis Seine-et-Marne Val-de-Marne Val-d'Oise Yvelines
Government	• President Jean-Paul Huchon (PS)
Area	• Total 12,012 km ² (4,638 sq mi)
Population (2012) ^[1]	• Total 11,914,812 • Density 990/km ² (2,600/sq mi)



DBpedia



DBpedia (URIs)



DBpedia - English

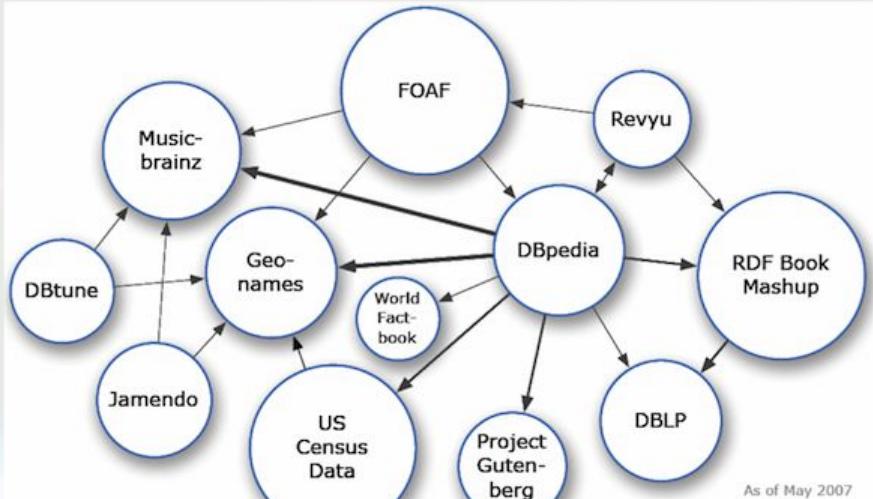
- **4.58 million things**
- **4.22 million classified in a consistent ontology**
 - 1,445,000 persons
 - 735,000 places (478,000 populated)
 - 411,000 creative works
 - 123,000 music albums; 87,000 films; 19,000 video games
 - 241,000 organizations

DBpedia - International

- 125 languages
- 38.3 million things
- 23.8 million interlinked with English

Linked Data

05/2007

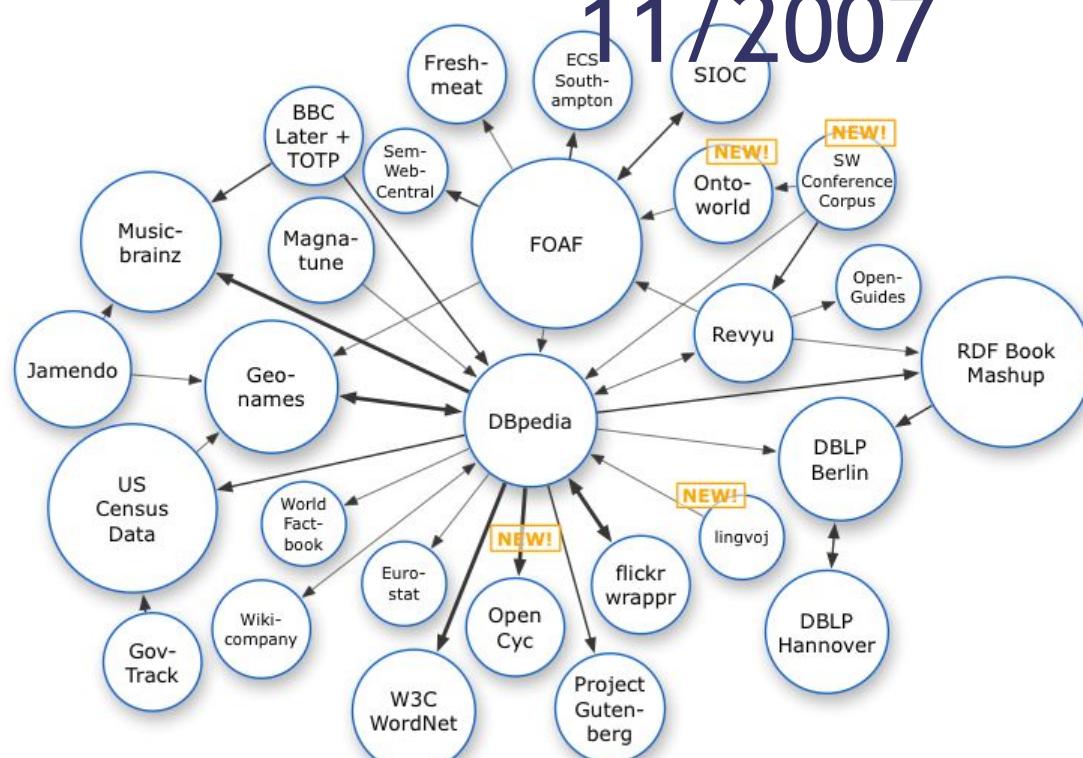


Source: <http://lod-cloud.net/>

Datasets published following Linked Data ‘format’: **05/2007**

Linked Data

11/2007

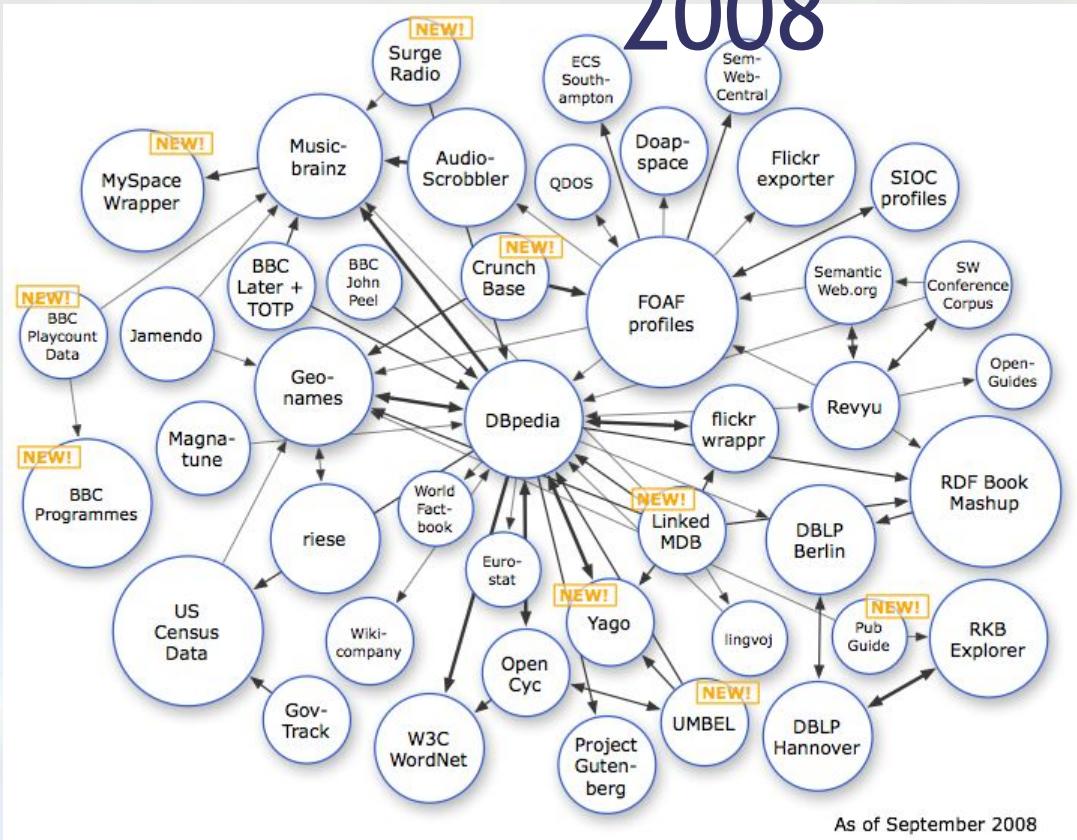


Source: <http://lod-cloud.net/>

Datasets published following Linked Data 'format': 11/2007

Linked Data

2008

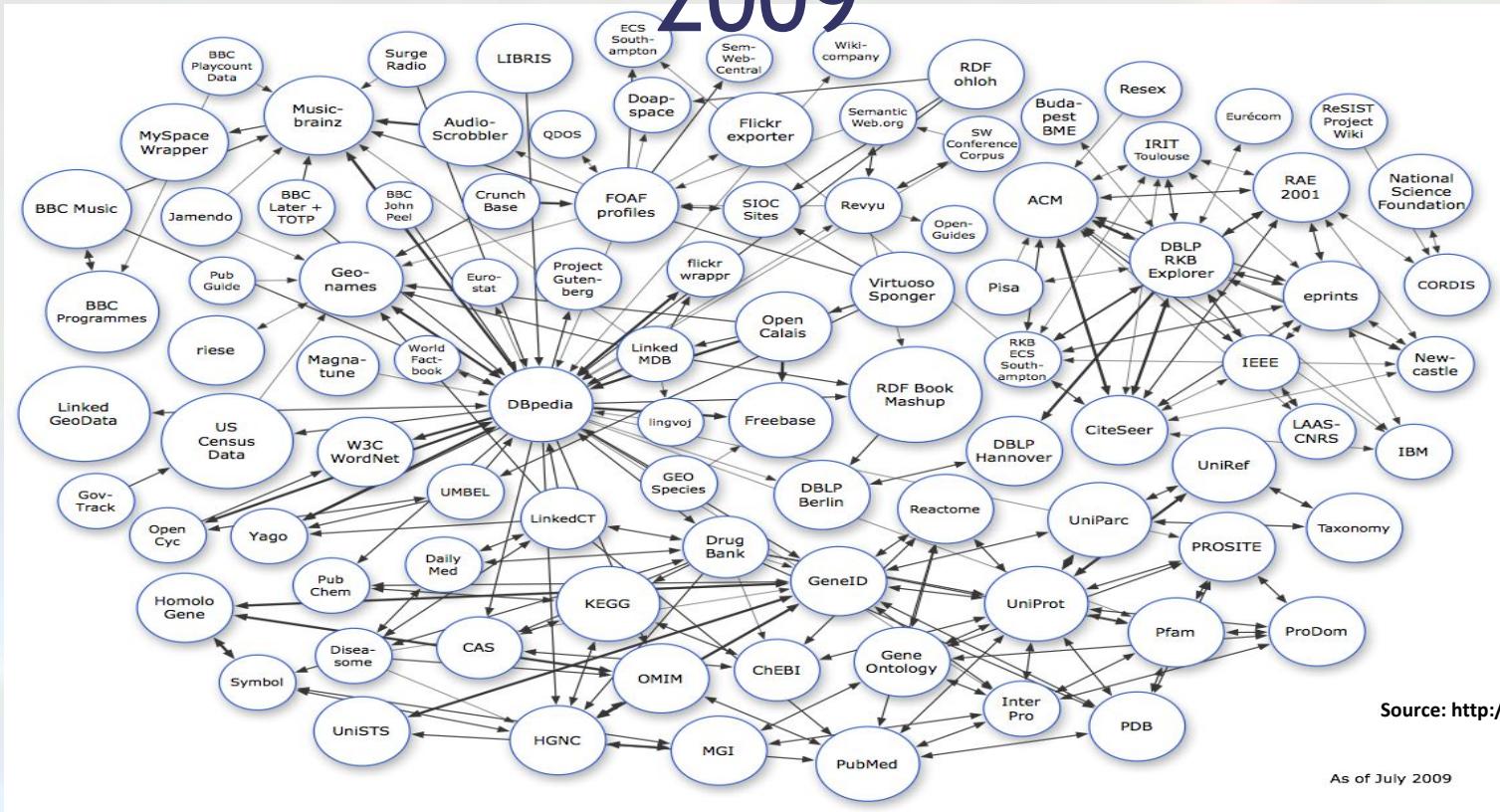


Datasets published following Linked Data 'format': 2008

Source: <http://lod-cloud.net>

Linked Data

2009



Datasets published following Linked Data 'format': 2009

Linked Data

2010



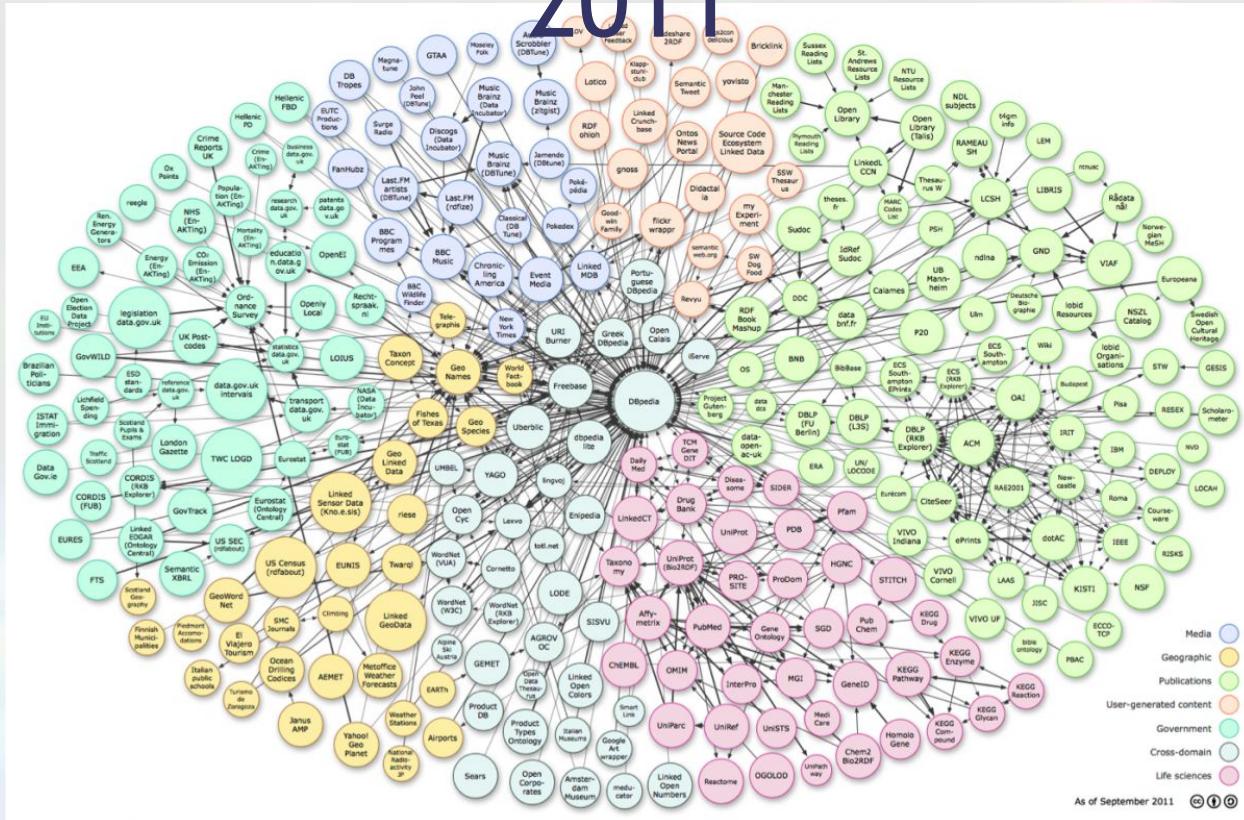
Datasets published following Linked Data 'format': 2010

As of September 2010

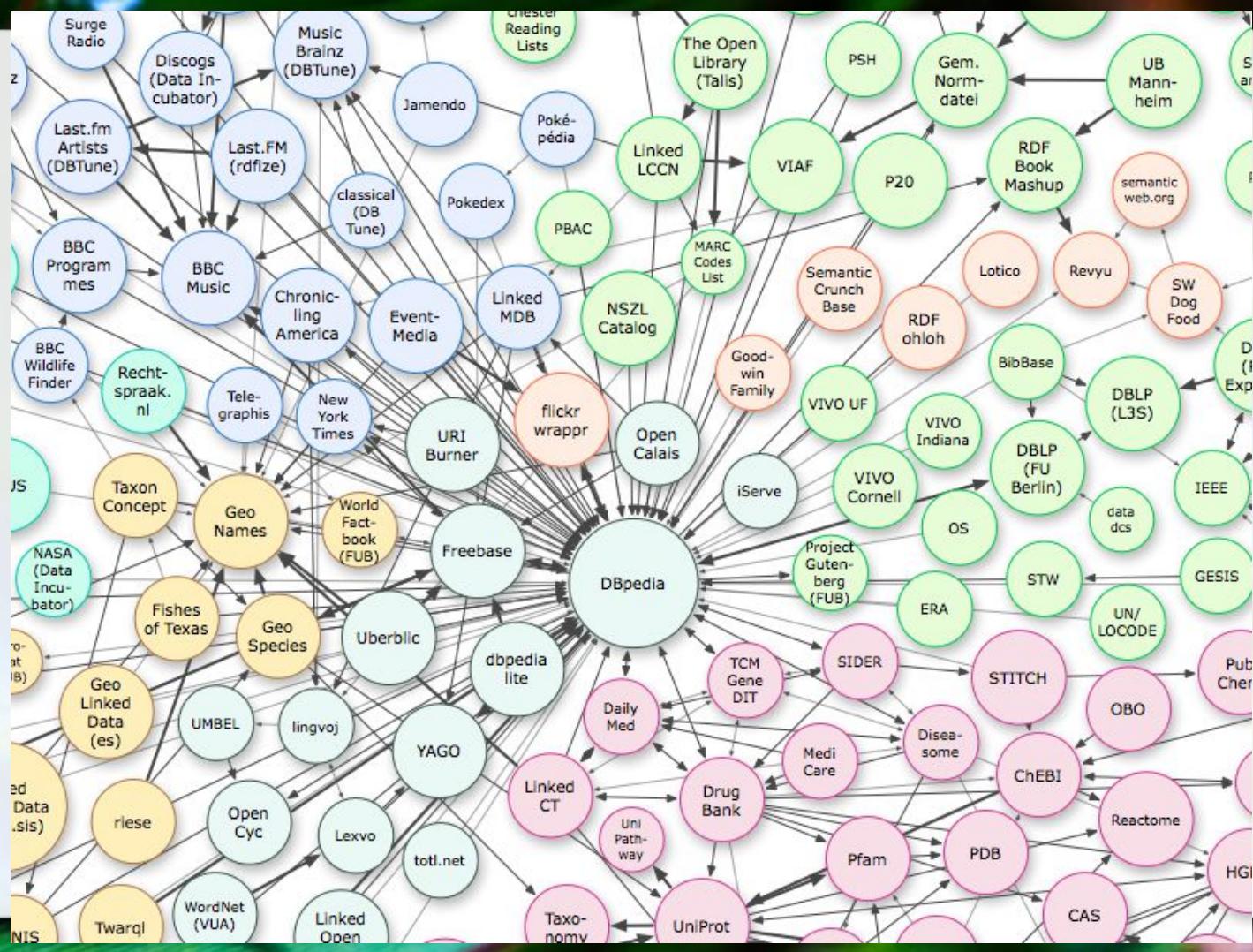


Linked Data

2011

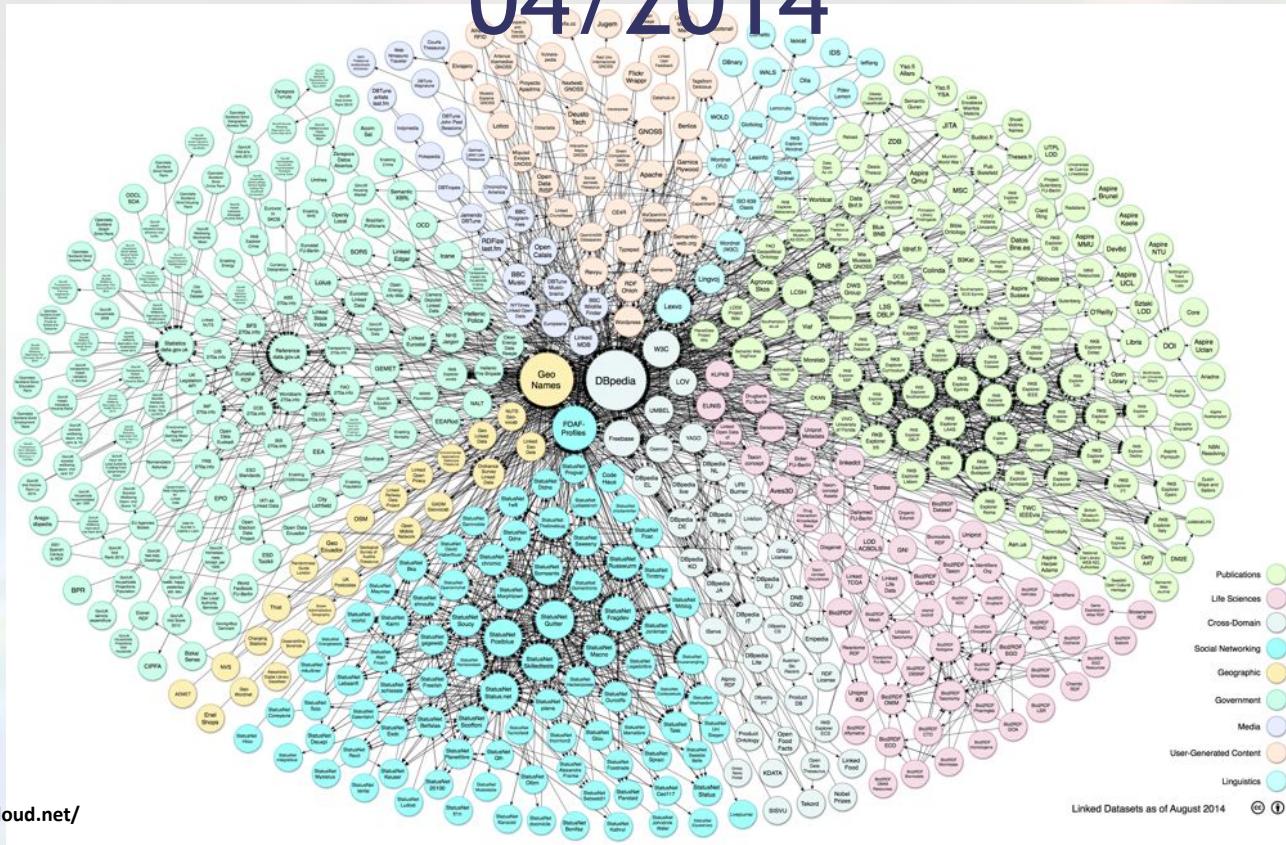


Datasets published following Linked Data 'format': 2011



Linked Data

04/2014



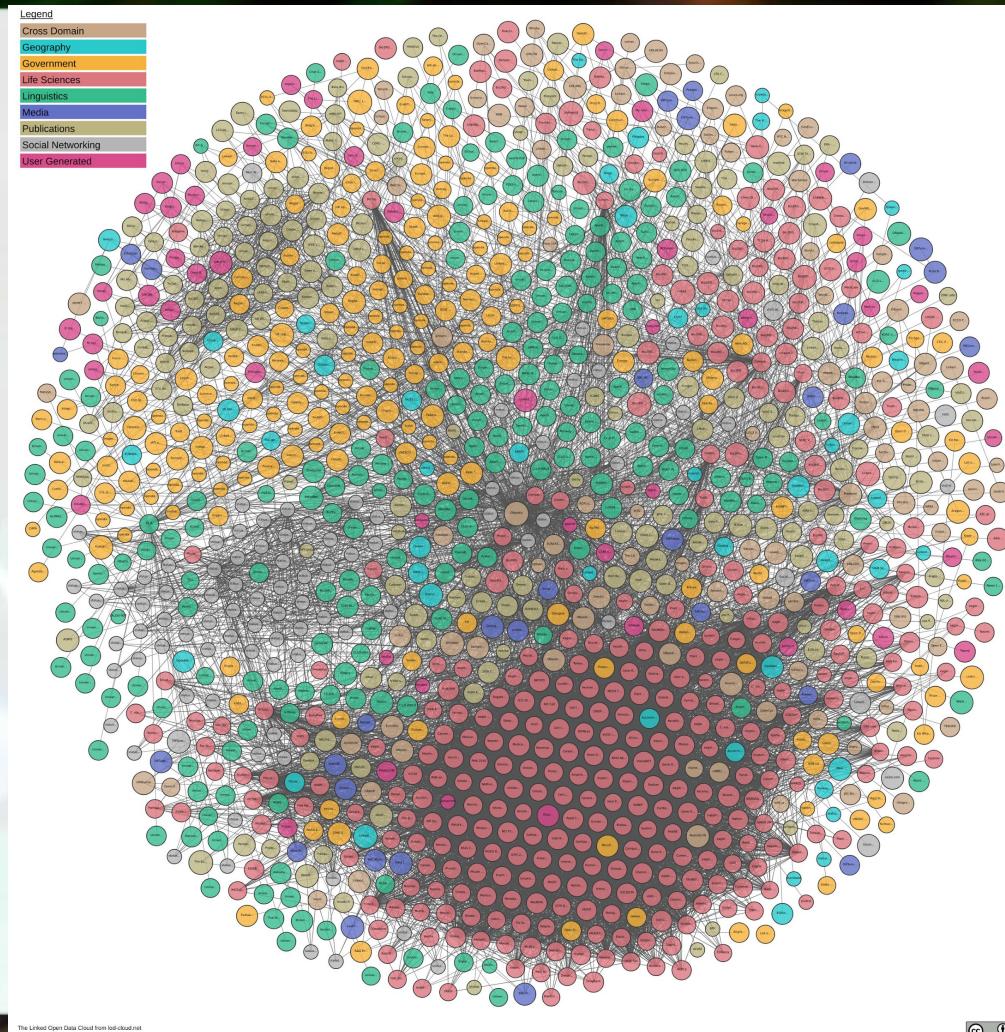
Linked Data

03/2019

1,239 datasets

16,147 links

<https://lod-cloud.net/>



Medical Subject Headings (MeSH)

<https://www.nlm.nih.gov/mesh/meshhome.html>

- “National Library of Medicine's controlled vocabulary thesaurus.”
- used by the MEDLINE/PubMed article database
- 28,000 descriptors
- 90,000 entry terms

Hierarchical Tree

Myocardial Infarction

- MeSH Browser
 - <https://meshb.nlm.nih.gov/search>
- Myocardial Infarction
 - C14.280.647.500
 - C stands for Diseases
 - C14 Cardiovascular Diseases
 - C14.280 Heart Diseases
 - C14.2280.647 Myocardial Ischemia
- https://en.m.wikipedia.org/wiki/Medical_Subject_Headings

Cardiovascular Diseases [C14]
Heart Diseases [C14.280]
Myocardial Ischemia [C14.280.647]
 Acute Coronary Syndrome [C14.280.647.124]
 Angina Pectoris [C14.280.647.187] +
 Coronary Disease [C14.280.647.250] +
 Kounis Syndrome [C14.280.647.375]
Myocardial Infarction [C14.280.647.500] -
 Anterior Wall Myocardial Infarction [C14.280.647.500.093]
 Inferior Wall Myocardial Infarction [C14.280.647.500.187]
 Non-ST Elevated Myocardial Infarction [C14.280.647.500.469]
 Shock, Cardiogenic [C14.280.647.500.750]
 ST Elevation Myocardial Infarction [C14.280.647.500.875]
 Myocardial Reperfusion Injury [C14.280.647.625]

PubMed

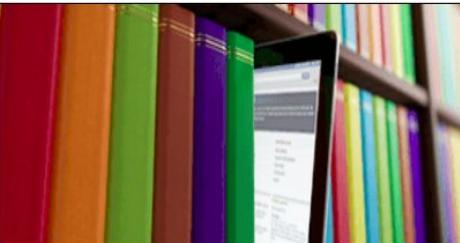
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Hum hom Stud Acut onto bd01 aula aula labo aula sants MeS MeS sant Corr E

NCBI Resources How To Sign in to NCBI

PubMed Advanced Help

PubMed.gov US National Library of Medicine National Institutes of Health

 PubMed

PubMed comprises more than 29 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

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PubMed MeSH Search

PubMed Search Builder

"Myocardial Infarction"
[Mesh] AND "Chest
Pain"[Mesh]

Add to search builder

AND ▾

Search PubMed

PubMed MeSH Search

"Myocardial Infarction"[Mesh] AND "Chest Pain"[Mesh] - PubMed - NCBI - Mozilla Firefox

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PubMed.gov US National Library of Medicine National Institutes of Health

MeSH "Myocardial Infarction"[Mesh] AND "Chest Pain"[Mesh] Search Create RSS Create alert Advanced Help

Article types Clinical Trial Review Customize ...

Text availability Abstract Free full text Full text

Publication dates 5 years 10 years Custom range...

Species Humans Other Animals

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Sort by: Best match Most recent

Items: 1 to 20 of 14939 << First < Prev Page 1 of 747 Next > Last >>

[Effect of Prehospital Blood Draws on Length of Stay for Chest Pain Patients in the Emergency Department: A Pilot Study.](#)
DuCharme B, Macchi Bires A, Montanye E, Khan M, DuCharme S, Linse M, Carlson JN. Crit Care Nurs Q. 2019 Apr/Jun;42(2):208-214. doi: 10.1097/CNQ.0000000000000257.
PMID: 30807348 [Similar articles](#)

[Targeted metabolomic analysis of plasma metabolites in patients with coronary heart disease in southern China.](#)
Zhong Z, Liu J, Zhang Q, Zhong W, Li B, Li C, Liu Z, Yang M, Zhao P. Medicine (Baltimore). 2019 Feb;98(7):e14309. doi: 10.1097/MD.00000000000014309.
PMID: 30762730 [Free PMC Article](#) [Similar articles](#)

[Spontaneous Coronary Artery Dissection Masquerading as Coronary Artery Stenosis in a Young Patient.](#)
Rawala MS, Naqvi STS, Yasin M, Rizvi SB. Am J Case Rep. 2019 Feb 6;20:159-162. doi: 10.12659/AJCR.913522.
PMID: 30723187 [Free PMC Article](#)

Results by year Download CSV

Titles with your search terms
Absence of chest pain and long-term mortality in patients with acute myocardial infarction [Open Heart. 2018]
Temporal Trends in Utilization of Cardiac Therapies and Outcomes [J Am Heart Assoc. 2018]
CT coronary angiography does not reduce mortality or myocardiopathy [BMJ Evid Based Med. 2018]

See more...

Gene Ontology (GO)

<http://www.geneontology.org/>

Gene Ontology Consortium

Home Documentation Downloads Tools About Contact us

Enrichment analysis

Your gene IDs here...

biological process

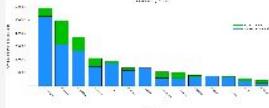
Homo sapiens

Submit

Help

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Statistics



Gene Ontology Consortium

Search GO data

Search for terms and gene products...

Search

Ontology

Filter classes

Download ontology

Gene Ontology: the framework for the model of biology. The GO defines concepts/classes used to describe gene function, and relationships between these concepts. It classifies functions along three aspects:

- molecular function**
molecular activities of gene products
- cellular component**

Annotations

Download annotations (standard files)

Filter and download (customizable files <100k lines)

GO annotations: the model of biology. Annotations are statements describing the functions of specific genes, using concepts in the Gene Ontology. The simplest and most common annotation links one gene to one function, e.g. FZD4 + Wnt signaling pathway. Each statement is based on a specified piece of evidence. [more](#)

Search documentation

Search

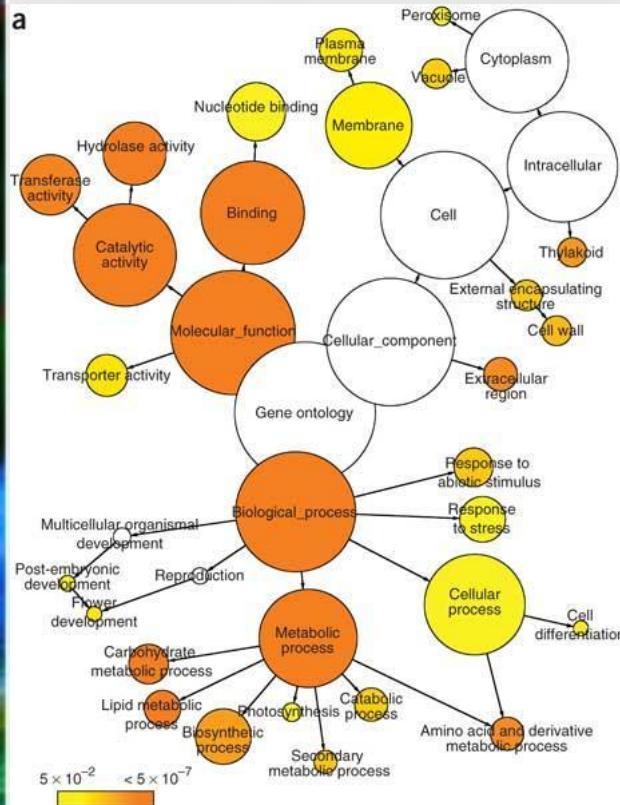
What is the Gene Ontology?

- An introduction to the Gene Ontology
- What are annotations?
- Enrichment analysis
- Downloads

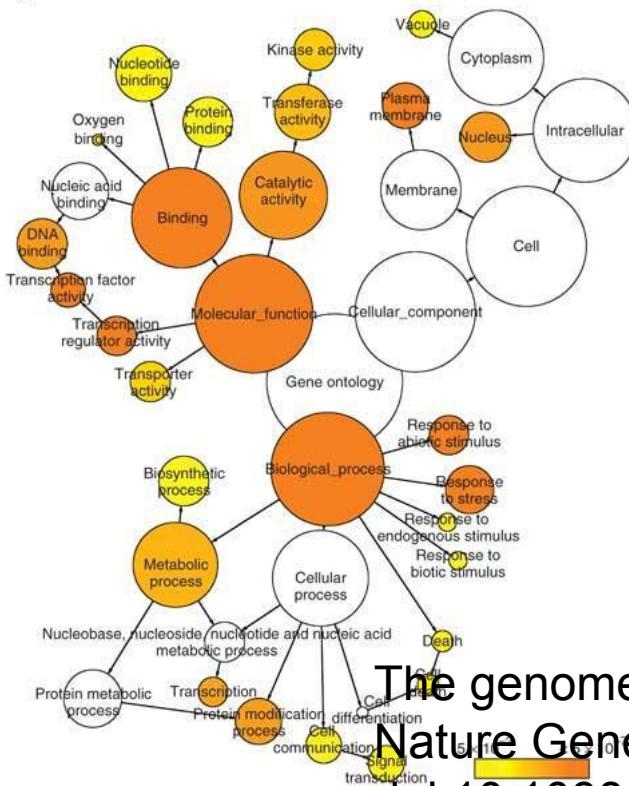
The mission of the GO Consortium is to develop an up-to-date, comprehensive, computational model of biological systems, from the molecular level to larger pathways, cellular and organism-level systems. [more](#)

Gene Ontology

a



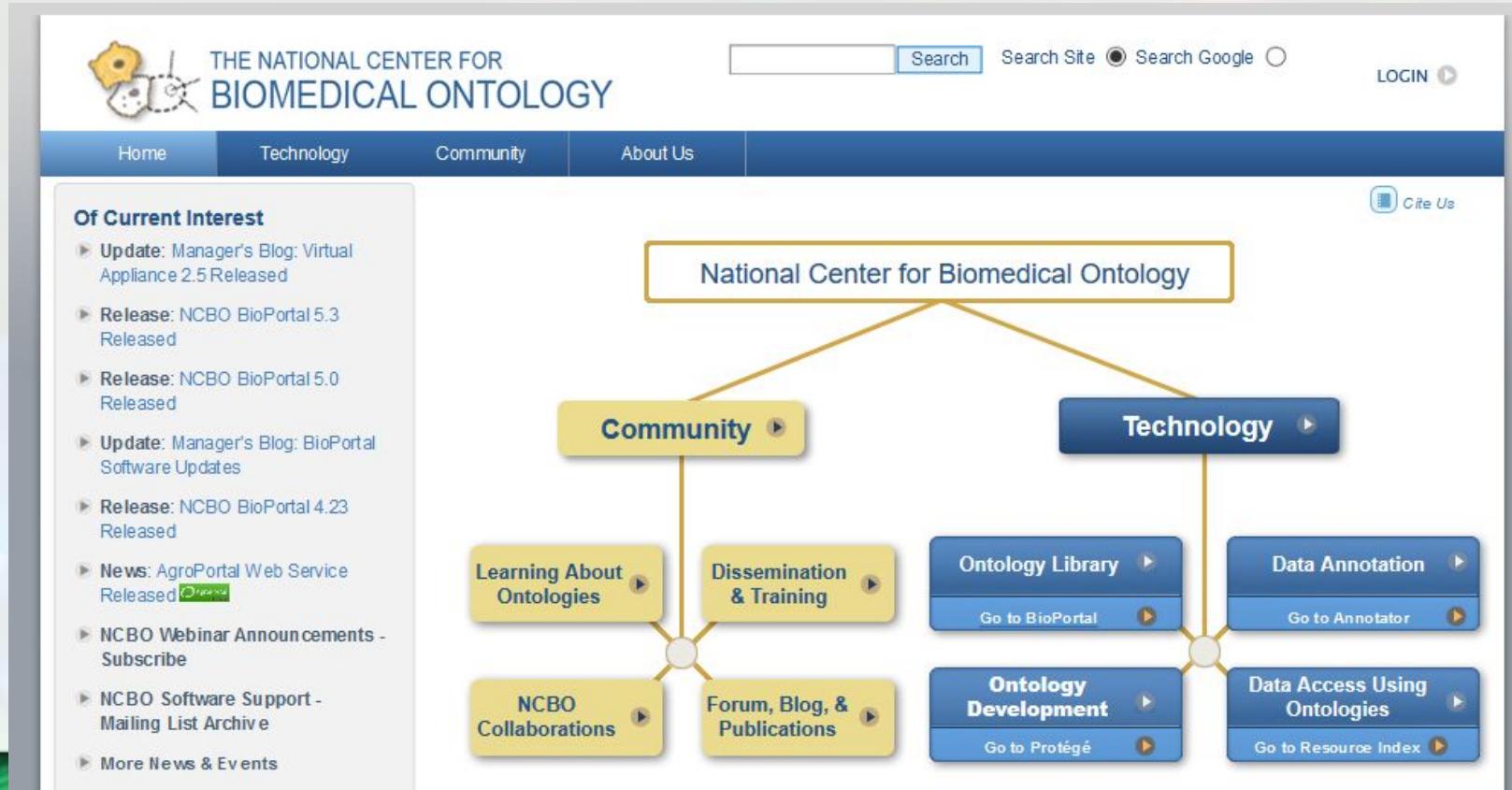
b



The genome of woodland strawberry
Nature Genetics 43, 109–116 (2011)
doi:10.1038/ng.740

Biomedical Ontology

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



BioPortal

<http://bioportal.bioontology.org/>

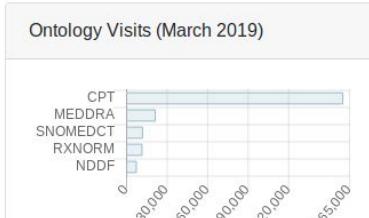


Welcome to BioPortal, the world's most comprehensive repository of biomedical ontologies

Search for a class

Enter a class, e.g. Melanoma

[Advanced Search](#)



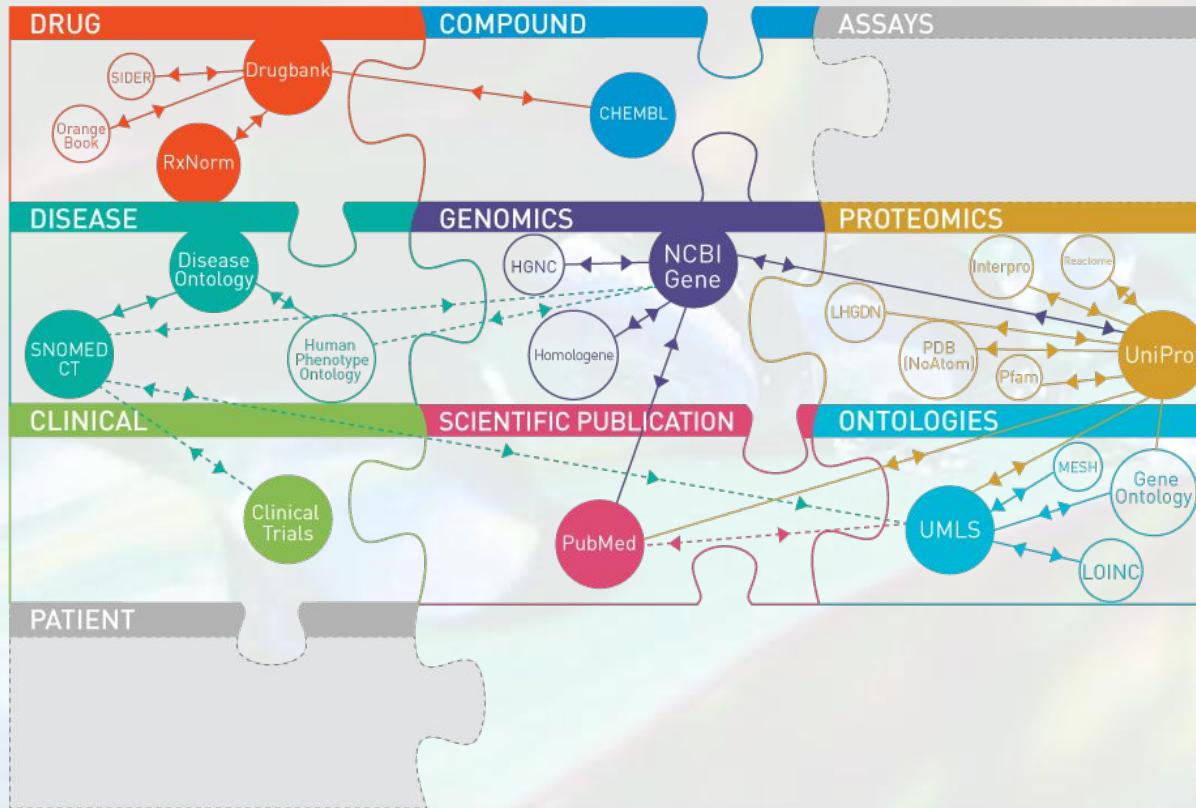
Find an ontology

Start typing ontology name, t

[Browse Ontologies](#)

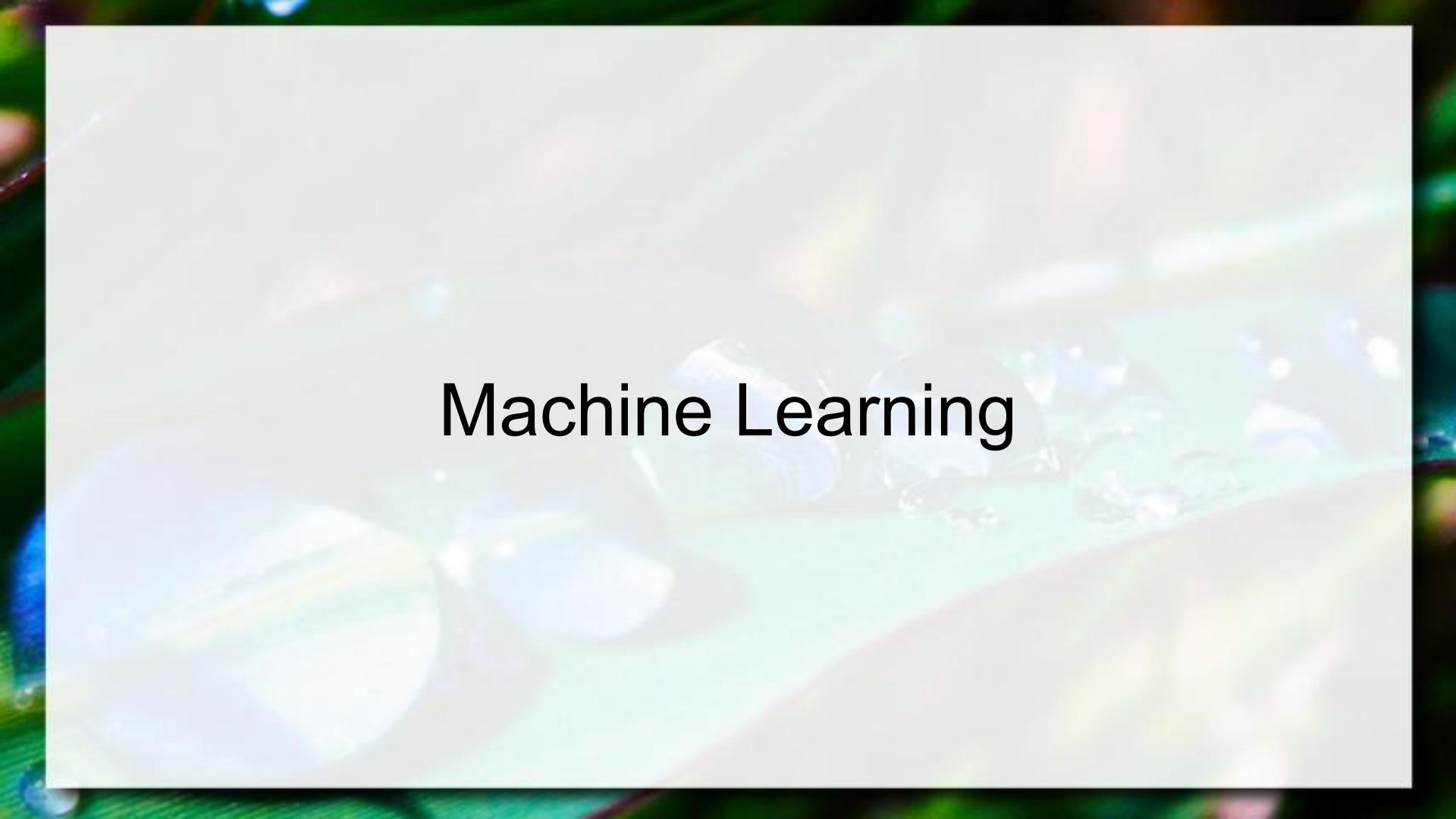
- BioPortal Statistics
- [Ontologies](#)
 - [Classes](#)
 - [Resources Indexed](#)

BioPortal Statistics	
Ontologies	766
Classes	9,238,120
Resources Indexed	48
Indexed Records	39,537,360
Direct Annotations	95,468,433,792
Direct Plus Expanded Annotations	144,789,582,932



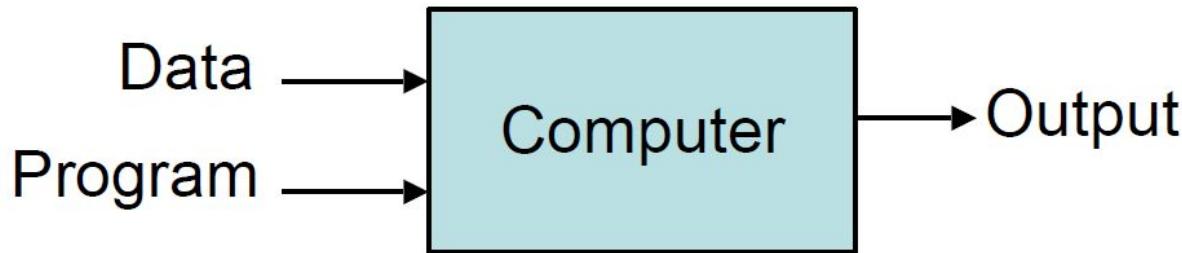
Human Phenotype Ontology

<http://human-phenotype-ontology.github.io/>

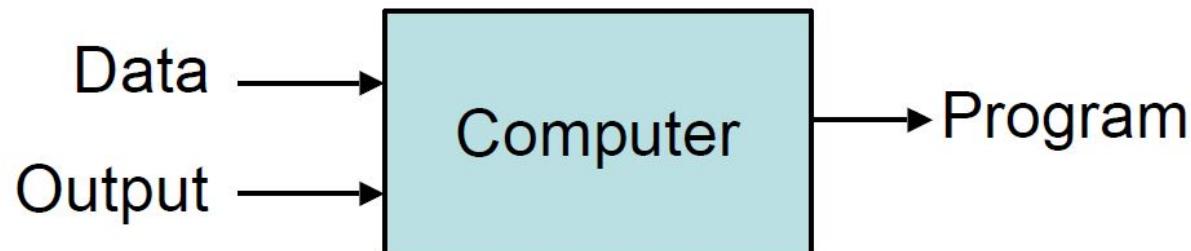
The background of the slide is a soft-focus, multi-colored image. It features a mix of green, blue, yellow, and white hues, creating a dreamlike or futuristic atmosphere. The colors are blended together, with no distinct shapes or figures visible.

Machine Learning

Traditional Programming



Machine Learning



(Domingos, 2017)

UCI 

Machine Learning Repository
Center for Machine Learning and Intelligent Systems

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Iris Data Set

Download: [Data Folder](#), [Data Set Description](#)

Abstract: Famous database; from Fisher, 1936



Data Set Characteristics:	Multivariate	Number of Instances:	150	Area:	Life
Attribute Characteristics:	Real	Number of Attributes:	4	Date Donated	1988-07-01
Associated Tasks:	Classification	Missing Values?	No	Number of Web Hits:	2512440

Source:

Creator:

R.A. Fisher

Donor:

Michael Marshall (MARSHALL%PLU '@' io.arc.nasa.gov)

<https://archive.ics.uci.edu/ml/datasets/iris>

Modeling Healthcare

Search NICE...



Improving health and social care through evidence-based guidance

Find NICE guidance

Browse guidance by area:

Conditions and diseases

Health protection

Lifestyle and wellbeing

Population groups

Service delivery, organisation and staffing

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<https://www.nice.org.uk/>

<https://pathways.nice.org.uk/pathways/bacterial-meningitis-and-meningococcal-septicaemia-in-under-16s>

Search NICE's interactive flowcharts ...



Help

Leave feedback

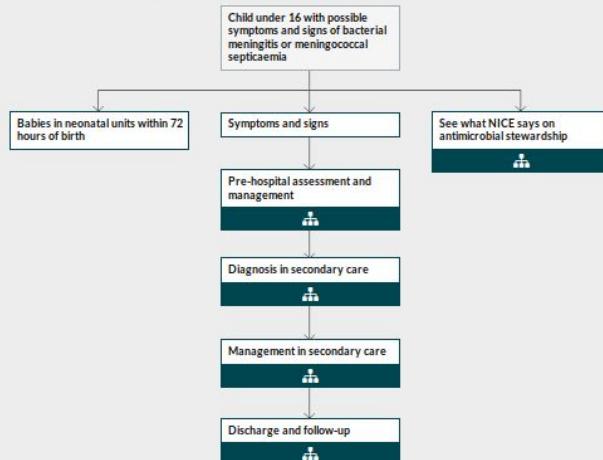
Recently viewed

Browse

Bacterial meningitis and meningococcal septicaemia in under 16s overview



i Bacterial meningitis and meningococcal septicaemia in under 16s – everything NICE says in an interactive flowchart



About Resources Information for the public Quality standards

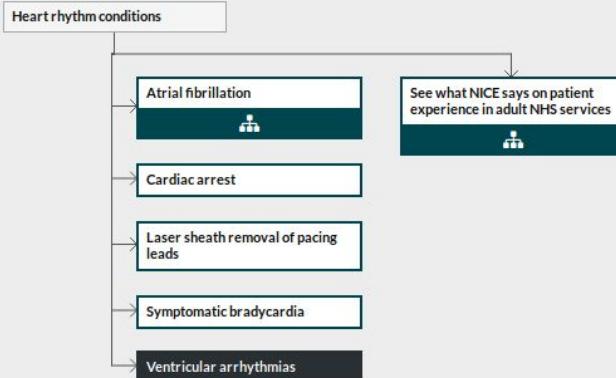
- ▼ Bacterial meningitis and meningococcal septicaemia in under 16s overview
- ▼ Pre-hospital assessment and management of bacterial meningitis and meningococcal septicaemia
- ▼ Diagnosis of bacterial meningitis and meningococcal septicaemia in secondary care
- ▼ Management of bacterial meningitis and meningococcal septicaemia in secondary care
- ▼ Discharge and follow-up for bacterial meningitis or meningococcal septicaemia

NICE National Institute for Health and Care Excellence

NICE Pathways NICE Guidance Standards and indicators Evidence services ▾ Sign in

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Heart rhythm conditions overview



Heart rhythm conditions – everything NICE says in an interactive flowchart

Ventricular arrhythmias

Implantable cardioverter defibrillators and cardiac resynchronisation therapy

The following recommendations are from NICE technology appraisal guidance on implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure.

Implantable cardioverter defibrillators are recommended as options for:

- treating people with previous serious ventricular arrhythmia, that is, people who without a treatable cause



U.S. Department of Health and Human Services

HHS.gov

AHRQ.gov



Agency for Healthcare Research and Quality
Advancing Excellence in Health Care



NATIONAL
GUIDELINE
CLEARINGHOUSE

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TIPS »

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HOME NEW THIS WEEK GUIDELINE SUMMARIES ▾ GUIDELINE SYNTHESES EXPERT COMMENTARIES MATRIX TOOL SUBMIT GUIDELINES HELP & ABOUT

**TAKE NOTICE: This Web site, AHRQ's National Guideline Clearinghouse,
will not be available after July 16, 2018.**

Federal funding through AHRQ will no longer be available to support the NGC as of that date. For additional information, read our [full announcement](#).

We will continue to post summaries of new and updated evidence-based clinical practice guidelines until July 2, 2018. For any questions, please contact Mary Nix, mary.nix@ahrq.hhs.gov.

Find Guideline Summaries and more...



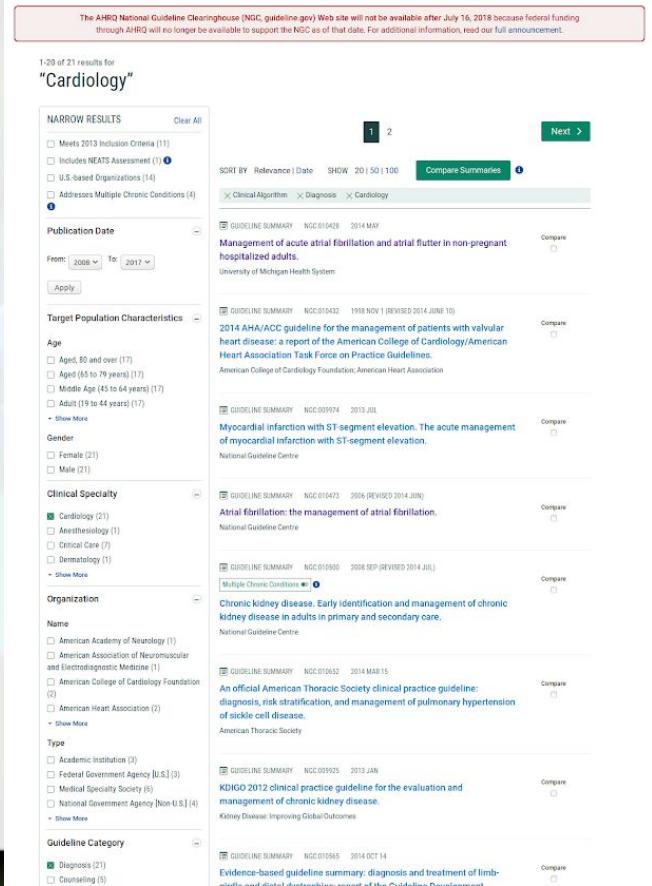
My Recent Searches: meningitis Clear Recent Searches

<https://www.guideline.gov/>

AHRQ Search



The screenshot shows the homepage of the AHRQ National Guideline Clearinghouse. At the top, there's a banner with the text "The AHRQ National Guideline Clearinghouse (NGC, guideline.gov) Web site will not be available after July 16, 2019 because federal funding through AHRQ will no longer be available to support the NGC as of that date. For additional information, read our full announcement." Below the banner, the main search interface is visible, featuring a search bar, navigation links like "HOME", "NEW THIS WEEK", "GUIDELINE SUMMARIES", etc., and a "SEARCH THIS" button. The top right corner includes links for "HHS.gov" and "AHRQ.gov".



This screenshot displays the search results for the term "Cardiology" on the AHRQ National Guideline Clearinghouse. The results page shows 1-20 of 21 total results. Each result is a card containing a thumbnail, the title, the date, and a brief description. The results are categorized by type: Guideline Summary, Clinical Algorithm, Diagnosis, and Cardiology. The "Clinical Algorithm" category is currently selected, indicated by a green highlight.

Result Type	Title	Date	Description
Guideline Summary	Management of acute atrial fibrillation and atrial flutter in non-pregnant hospitalized adults.	2014 MAY	University of Michigan Health System
Guideline Summary	2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines.	1998 NOV 1 (REVISED 2014 JUNE 10)	American College of Cardiology Foundation; American Heart Association
Clinical Algorithm	Myocardial infarction with ST-segment elevation. The acute management of myocardial infarction with ST-segment elevation.	2013 JUL	National Guideline Centre
Guideline Summary	Atrial fibrillation: the management of atrial fibrillation.	2006 (REVISED 2014 JUNE)	National Guideline Centre
Guideline Summary	Chronic kidney disease. Early identification and management of chronic kidney disease in adults in primary and secondary care.	2008 SEP (REVISED 2014 JUL)	National Guideline Centre
Guideline Summary	An official American Thoracic Society clinical practice guideline: diagnosis, risk stratification, and management of pulmonary hypertension of sickle cell disease.	2014 MAR 15	American Thoracic Society
Guideline Summary	KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease.	2013 JAN	Kidney Disease: Improving Global Outcomes
Guideline Summary	Evidence-based guideline summary: diagnosis and treatment of limbic and distal dystrophies: report of the Guideline Development	2014 OCT 14	



Cardiac arrhythmias in coronary heart disease

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Cardiac arrhythmias is a group of conditions in which the heartbeat is irregular. Symptoms include: palpitations or a pause between heartbeats; light-headedness; shortness of breath; and chest pain.

Remit and target users

This guideline provides evidence based recommendations for the management of cardiac arrest and the arrhythmias associated with acute coronary syndromes, chronic coronary heart disease and cardiac surgery. It excludes arrhythmias not associated with coronary heart disease such as supraventricular tachycardias associated with accessory pathways or dual atrioventricular (AV) nodal physiology, arrhythmias caused by inherited ion channel disorders (eg long QT syndrome, Brugada syndrome) and arrhythmias associated with non-ischaemic cardiomyopathies.

Guideline[Full guideline \(PDF\)](#)[Quick reference guide \(PDF\)](#)[Apple app](#)[Android app](#)[Patient publications](#)**Supporting material**[Search narrative \(PDF\)](#)[Copyright permission \(PDF\)](#)**Contact us**moray.nairn@nhs.net**SIGN 94, February 2007****ISBN 1 899893 69 5**

Management of invasive meningococcal disease in children & young people

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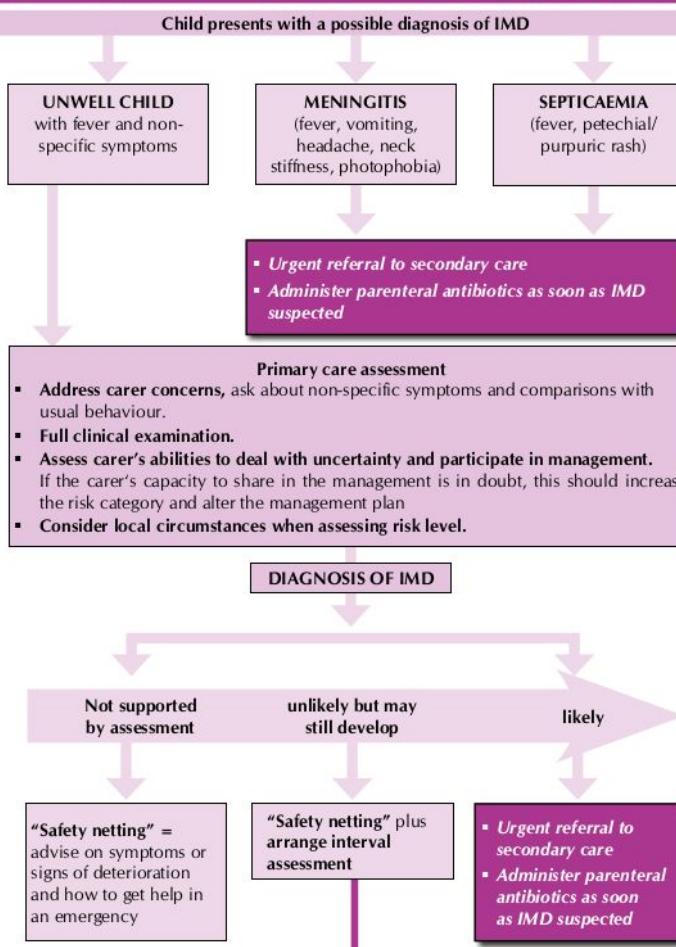
The most common clinical manifestation of invasive meningococcal disease is meningitis, but up to 20% of patients will develop meningococcal septicaemia, associated with the highest mortality. The majority of deaths continue to occur in the first 24 hours and the recorded case fatality rate varies between 2.6% and 10% each year.

Remit and target users

This guideline makes recommendations on best practice in the recognition and management of meningococcal disease in children and young people up to 16 years of age. It addresses pre-hospital care, referral, diagnostic testing, disease management, follow-up care and rehabilitation and considers public health issues.

Guideline[Full guideline \(PDF\)](#)[Quick reference guide \(PDF\)](#)[Apple app](#)[Android app](#)**Supporting material**[Register of Interests](#)[Search narrative \(PDF\)](#)[Equality Impact Assessment \(PDF\)](#)[Copyright permission \(PDF\)](#)**Contact us**ailsa.stein@nhs.net**SIGN 102 May 2008**

MANAGEMENT OF INVASIVE MENINGOCOCCAL DISEASE (IMD) IN CHILDREN AND YOUNG PEOPLE



<http://www.sign.ac.uk/assets/qrg102.pdf>

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