

# Collaborating with the National Center for Biomedical Ontology

Mark Musen and the NCBO Team

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**NIH Roadmap**

# **National Centers for Biomedical Computing**

**Home**

**NCBC Summary**

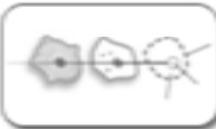
**SDI/WG**

**Tools and Applications**

**Ontology Working Group**

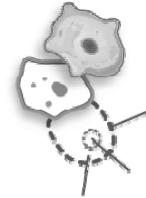
**DBP Interactions**

**ATTENTION: Final Report from National Centers for Biomedical Computing 2006 All Hands Meeting**



<http://www.ncbi.org>

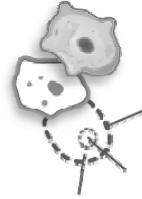
# The National Center for Biomedical Ontology



- One of three National Centers for Biomedical Computing launched by NIH in 2005
- Collaboration of Stanford, Mayo, Buffalo, Washington University, Johns Hopkins, and the Medical College of Wisconsin
- Primary goal is to make ontologies accessible and usable
- Research will develop technologies for ontology dissemination, use, indexing, alignment, and peer review



# NCBO: Key activities



- We **create and maintain a library** of biomedical ontologies.
- We **build tools and Web services** to enable the use of ontologies.
- We **collaborate with scientific communities** that develop and use ontologies.

www.bioontology.org

THE NATIONAL CENTER FOR  
BIOMEDICAL ONTOLOGY

Software Tools & Services

Collaboration

Education & News

Community

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The NCBO is one of seven National Centers for Biomedical Computing funded by the NIH Roadmap. We are truly a national center, fueled by researchers in informatics, computer science and biomedicine across the country striving to support biomedical research, providing tools to improve the management and analysis of biomedical data and knowledge.

[About NCBO](#) [Go To BioPortal Now](#)

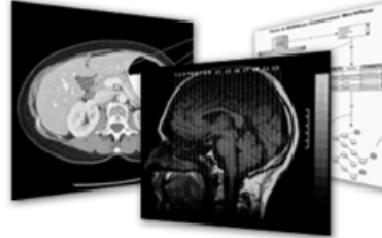
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**Software Tools & Services**



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**Collaboration**



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## Welcome to the NCBO Bioportal

Use BioPortal to access and share ontologies that are actively used in biomedical communities. You can search for terms in ontologies (try typing "Melanoma" in the "Search all ontologies" box in the left column), browse a list of ontologies in BioPortal (type "NCI Thesaurus" in the "Find an ontology" box in the middle column), search biomedical resources that we automatically annotated with ontology terms (try typing "Melanoma" in the "Search resources" box in the right column). You can create ontology-based annotations for your own text, link your own project that uses ontologies to the description of those ontologies, find and create relations between terms in different ontologies, review and comment on ontologies and their components as you browse them. [Sign in to BioPortal](#) to submit a new ontology or ontology-based project, provide comments on ontologies or add ontology mappings.

## Search all ontologies

   
[Advanced Search](#)

## Find an ontology

   
[Browse Ontologies >](#)

## Search resources

   
[Advanced Resource Search](#)

## Most Active Ontologies

Ontology	Version	Notes	Mappings
Human developmental anatomy, timed version	1.3	0	168488
Human developmental anatomy, abstract version	1.3	0	146067
NCI Thesaurus	09.07	11	91995
Cell Cycle Ontology (H. sapiens)	1.01	0	61199
Cell Cycle Ontology (S. cerevisiae)	1.01	0	58563

## Statistics

Ontologies	168
Concepts	723,806
Resources Indexed	11

## Latest Notes

Term name misspelled?  
[leaf\\_vascular\\_tissue \(Minimal anatomical terminology\)](#) 10/11/09 whetzel

Incorrect mapping  
[SDN \(Rat Strain Ontology\)](#) 09/23/09 whetzel

RE:NEMO.owl subontologies/modules  
[scalp\\_surface\\_region \(Neural ElectroMagnetic Ontologies\)](#) 08/22/09 gfrishkoff

NEMO subontologies/modules  
[entity \(Neural ElectroMagnetic Ontologies\)](#) 08/22/09 gfrishkoff

NEMO.owl subontologies/modules  
[scalp\\_surface\\_region \(Neural ElectroMagnetic Ontologies\)](#) 08/22/09 gfrishkoff

## Latest Mappings

human (Human developmental anatomy, timed version) => Humans (Medical Subject Headings)  
10/03/09 yongqunh@med.umich.edu

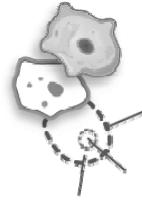
Humans (Medical Subject Headings) => human (Human developmental anatomy, timed version)  
10/03/09 yongqunh@med.umich.edu

sand\_fly (Parasite Life Cycle) => Phlebotomus (SNOMED Clinical Terms)  
08/17/09 preets1511

Phlebotomus (SNOMED Clinical Terms) => sand\_fly (Parasite Life Cycle)  
08/17/09 preets1511

amastigote (Parasite Life Cycle) => Amastigote form of protozoa (SNOMED Clinical Terms)  
08/14/09 preets1511

# **BioPortal allows us to experiment with new models for**



- Dissemination of knowledge on the Web
- Integration and alignment of online content
- Knowledge visualization and cognitive support
- Peer review of online content

Access all ontologies that are available in BioPortal: You can filter this list by category to display ontologies relevant for a certain domain (try selecting "Anatomy or Experimental Conditions" in the "Filter by category" menu below). You can also filter ontologies that belong to a certain group such as ontologies from the OBO Foundry, or ontologies from the Cancer Biomedical Informatics Grid (caBIG). Subscribe to the BioPortal RSS feed to receive alerts for submissions of new ontologies, new versions of ontologies, new notes, and new projects. You can subscribe to feeds for a specific ontology at the individual ontology page. Add a new biomedical ontology to BioPortal using the Submit New Ontology link (you need to [sign in](#) to see this link).

SUBMIT ONTOLOGY	<a href="#">Submit New Ontology</a>
FILTER BY CATEGORY	
<input style="width: 100%;" type="button" value="All Categories"/>	
FILTER BY GROUP	
<input style="width: 100%;" type="button" value="All Groups"/> <span style="float: right;"><a href="#">Link To This Filter</a></span>	
FILTER BY TEXT	
<input type="text"/>	

 [Subscribe to all updates](#)

ONTOLOGY NAME	FORMAT	VERSION	AUTHOR	UPLOADED ON	GROUP	STATUS
<a href="#">ABA_Adult_Mouse_Brain_(ABA)</a>	OWL	1.0	Allen Institute for Brain Science	08/08/2009		<a href="#">Explore</a>
<a href="#">African Traditional Medicine_(ATMO)</a>	OBOfilter	1.101	Ghislain Atemezing	06/28/2009		<a href="#">Explore</a>
<a href="#">Amino Acid_(amino-acid)</a>	OWL	1.2	Nick Drummond, Georgina Moulton, Robert Stevens, Phil Lord	04/25/2009		<a href="#">Explore</a>
<a href="#">Amphibian_gross_anatomy_(AAO)</a>	OBOfilter	1.8	AmphiAnat list	07/30/2008	OBOfoundry	<a href="#">Explore</a>
<a href="#">Amphibian_taxonomy_(ATO)</a>	OBOfilter	See Remote Site	AmphiAnat list	08/14/2009		
<a href="#">Animal_natural_history_and_life_history_(ADW)</a>	PROTEGE	See Remote Site	Http://animaldiversity Administrators	04/27/2009		
<a href="#">Ascomycete_phenotype_ontology_(APO)</a>	OBOfilter	1.6	Fungal_anatomy Administrators	09/01/2009		<a href="#">Explore</a>
<a href="#">Basic Formal Ontology_(BFO)</a>	OWL	1.1		07/24/2009		<a href="#">Explore</a>
<a href="#">Basic_Vertebrate_Anatomy_(basic-vertebrate-gross-anatomy)</a>	OWL	1.1		01/16/2007		<a href="#">Explore</a>
<a href="#">Bilateria_anatomy_(BILA)</a>	OBOfilter	See Remote Site	Thorsten Heinrich	04/13/2009		
<a href="#">Biological_imaging_methods_(FBbi)</a>	OBOfilter	1.1	Image Administrators	07/30/2008		<a href="#">Explore</a>

## View Ontology Details

Details

Visualization

Notes (0)

Mappings (0)

Resources alpha

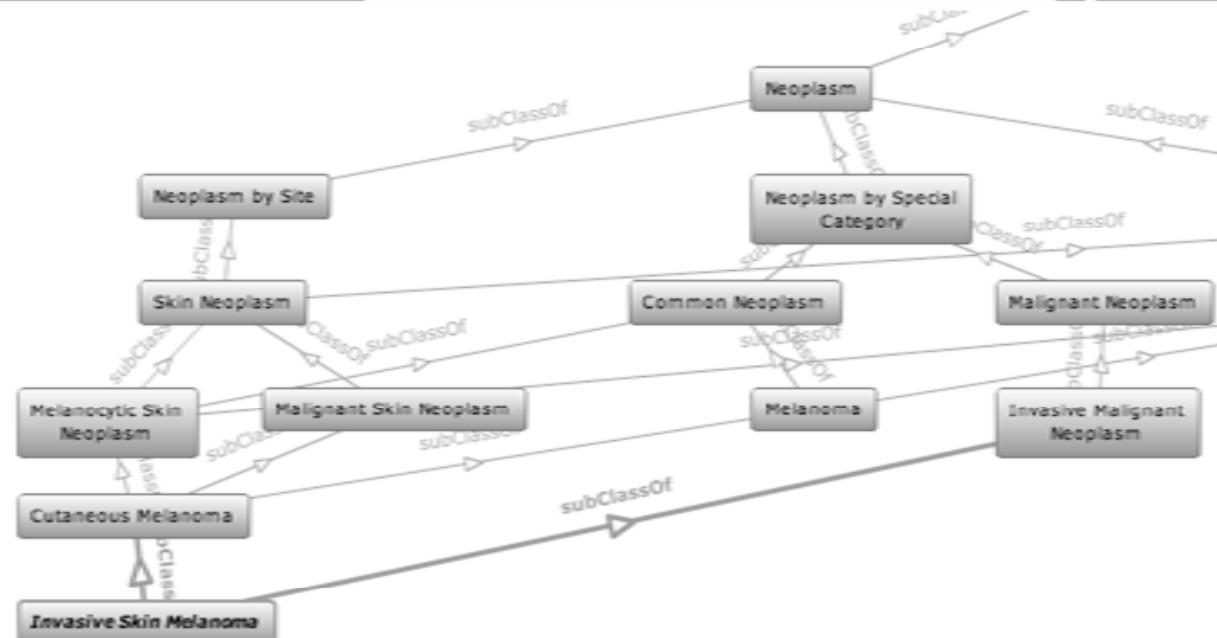
Jump To:

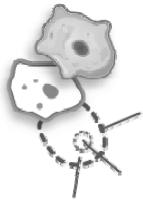
Go

## Legend

- ⊕ Endocrine Neoplasm
- ⊕ Eye Neoplasm
- ⊕ Gastrointestinal Neoplasm
- ⊕ Head and Neck Neoplasm
- ⊕ Hematopoietic and Lymphoid System Neoplasm
- ⊕ Nervous System Neoplasm
- ⊕ Peritoneal and Retroperitoneal Neoplasms
- ⊕ Reproductive System Neoplasm
- ⊕ Respiratory Tract Neoplasm
- ⊕ Skin Neoplasm
  - ⊕ Benign Skin Neoplasm
  - ⊕ Cutaneous Hematopoietic and Lymphoid
  - ⊕ Dermal Neoplasm
  - ⊕ Epithelial Skin Neoplasm
  - ⊕ Malignant Skin Neoplasm
    - ⊕ Blastic Plasmacytoid Dendritic Cell N
    - ⊕ Cutaneous Lymphoma
    - ⊕ Cutaneous Melanoma
      - ⊕ Acral Lentiginous Melanoma
      - ⊕ Amelanotic Skin Melanoma
      - ⊕ Balloon Cell Melanoma
      - ⊕ Desmoplastic Melanoma
      - ⊕ Hereditary Melanoma
      - ⊕ Invasive Skin Melanoma
      - ⊕ Lentigo Maligna Melanoma
      - ⊕ Malignant Melanoma in Precance
      - ⊕ Melanoma Arising from Blue Nevi
      - ⊕ Melanoma in Congenital Melanoc
      - ⊕ Melanoma in Junctional Nevus
      - ⊕ Minimal Deviation Melanoma
      - ⊕ Nevvoid Melanoma
      - ⊕ Nodular Melanoma
      - ⊕ Old Burn Scar-Related Skin Mela
      - ⊕ Recurrent Melanoma of the Skin
      - ⊕ Repressing Skin Melanomolike Nati

Show Hierarchy To Root (All Relationships)





# Users can view and create mappings

BioPortal    Browse    Search    Projects    Annotate    All Mappings    All Resources    Alpha    Sign In

Human developmental anatomy, timed version    Cell Line Ontology    Cell Cycle Ontology (H. sapiens)

Cell Cycle Ontology (H. sapiens) Version 1.01    protein | Link Here | Subscribe

View Ontology Details    Details    Visualization    Notes (0)    **Mappings (27)**    Resource Index

Jump To:      Legend

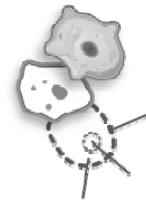
biological entity

- biological continuant
- biological reference
- cell cycle continuant
- cellular\_component
- gene
  - cell cycle gene
- gene product
  - protein
    - cell cycle protein
    - modified protein
- molecular\_function
- organism
- small molecule
- biological process

"New Point-to-Point Mapping"

MAPPING TO	SOURCE	MAPPED BY	MAPPED ON	NOTES
<a href="#">Protein (Cardiac Electrophysiology Ontology)</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">Protein (Galen)</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">protein (SNP-Ontology)</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">protein (Cell Cycle Ontology (S. pombe))</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">protein (Sequence Ontology)</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">protein (Cell Cycle Ontology (S. cerevisiae))</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">protein (Cell Cycle Ontology (A. thaliana))</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>
<a href="#">Protein (Foundational Model of Anatomy)</a>	<a href="#">LOOM</a>	amirg	08/13/09	<a href="#">View Notes</a>

# Biomedical Resource Ontology



# in BioPortal

BioPortal | Browse | Search | Projects | Annotate | All Mappings | All Resources | Alpha | Sign In | Register | Help/Account | Search

Biomedical Resource Ontology | NCI Thesaurus

Biomedical Resource Ontology Version 2.7.1 | Software | Link Here | Subscribe

View Ontology Details | Details | Visualization | Notes (3) | Mappings (0) | Resource Index

Jump To:  Go

Legend: Activity, Area of Research, Biositemaps Information Model, core:Collection, core:Concept, core:ConceptScheme, Deprecated Activity, Deprecated Area of Research, Deprecated Resource, Resource: Funding Resource, Information Resource, Material Resource, People Resource, Service Resource, Software, Training Resource

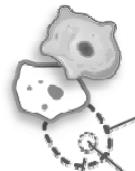
Show Network Neighborhood

Full Version

```

graph TD
    Resource[Resource] -- superClassOf --> Software[Software]
    Software -- superClassOf --> DT[Data Transfer and Communication]
    Software -- superClassOf --> Alg[Algorithm]
    Software -- superClassOf --> Mod[Modeling and Simulation]
    Software -- superClassOf --> DPS[Data Processing Software]
    Software -- superClassOf --> DA[Data Analysis]
    DT -- superClassOf --> n1[n]
    Alg -- superClassOf --> n2[n]
    Mod -- superClassOf --> n3[n]
    DPS -- superClassOf --> n4[n]
    DA -- superClassOf --> n5[n]
  
```

# “Notes” in BioPortal



BioPortal | Browse | Search | Projects | Annotate | All Mappings | All Resources | Alpha | Sign In | Register | Help/About | Search

Biomedical Resource Ontology | NCI Thesaurus

Biomedical Resource Ontology Version 2.7.1 | Software | Link Here | Subscribe

View Ontology Details | Details | Visualization | Notes (3) | Mappings (0) | Resource Index

Jump To:  Go

Legend:

- Activity
- Area of Research
- Biositemaps Information Model
- core:Collection
- core:Concept
- core:ConceptScheme
- Deprecated Activity
- Deprecated Area of Research
- Deprecated Resource
- Resource
  - Funding Resource
  - Information Resource
  - Material Resource
  - People Resource
  - Service Resource
  - Software
    - Algorithm
    - Data Acquisition Software
    - Data Analysis Software
    - Data Processing Software
    - Data Storage Repository
    - Data Transfer and Communication
    - Integration and Interoperability Tool
    - Interactive Tool
    - Knowledge Mining and Capturing
    - Modeling and Simulation
    - Software Distribution
  - Training Resource

Comment: Software needs structure, too many top level subclasses DavidStates at 08/09/08 06:56

"binary executable" is not a top level subclass of software, it is a form of software distribution and there are several other subclasses of software distribution (source code, web site, library, toolkit, etc.).

Similarly, "network editor" is just one class of interactive editing tools. Lots of others.

These are just a couple of examples. Software really needs a complete reorganization.

Reply

Comment: RE:Software needs structure, too many top level subclasses PeterLyster at 08/12/08 08:29

The BRO used the initial design principle of: when in doubt make it flat at the top. This is a design principle whose purpose is to get the class names 'on the board and agreed upon' first, i.e., it is a componentization of the design process. This is a way of avoiding getting into debates about hierarchical location too early in the process. We can discuss location in the hierarchy in the future; that is appropriate.

Reply

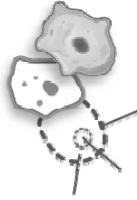
Comment: RE:Software needs structure, too many top level subclasses PeterLyster at 08/12/08 08:43

I (Peter Lyster) copy marginal notes that I also place in the 'Portals' class. I think this helps to explain the design principles.

We adopted the design principle of (i) initially align the BRO top level with NIFSTD (Data Resource; Bibliographic Resource; Software; Research Supplies; Portals; Funding Source) (see agreement that was made in broad tcon of 20080416 [http://na-mic.org/Wiki/index.php/SDIWG:Meeting\\_Minutes\\_20080416](http://na-mic.org/Wiki/index.php/SDIWG:Meeting_Minutes_20080416)). As with the discussion on 'Software' class, the goal was to get a reasonable first cut and then stabilize the BRO development process; then the development team (called 'tiger team' after the April tcon) agreement (interdigitate etc) on the overall list of class names (this was successfully done by Rubin, Martone, and Lyster between July 28 and August 1 2008). This process was highly successful, and validated the logic behind taking one step at a time; (ii) continue to work with NIFSTD and other stakeholders to plan current and future efficient and effective mappings. It is good to revisit in the future the position of upper-level classes such as 'portals' or 'funding source'.

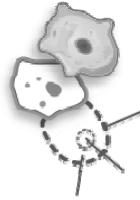
Reply

# Community-Based Annotation as Peer Review



- Makes ontology evaluation a democratic process
- Assumes users' application of ontologies will lead to insights not achievable by inspection alone
- Assumes end-users will be motivated to comment on and engage in dialog about ontologies in the repository

# **BioPortal is building an online community of users who**



- Develop, upload, and apply ontologies
- Map ontologies to one another
- Comment on ontologies via “notes” to give feedback
  - To the ontology developers
  - To one another
- Make proposals for specific changes to ontologies
- Stay informed about ontology changes and proposed changes via “push” technology
- Incorporate BioPortal services into their own technologies

Word Add-in For Ontology Recognition - Home - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://ucsdbiolit.codeplex.com/

Register | Sign In | CodePlex Home

CodePlex  
Open Source Community

Search all CodePlex projects | Search

Home Releases Discussions Issue Tracker Source Code Stats People License RSS

View All Comments | Print View | Page Info | Change History (all pages) | Search Wiki

[Home](#)

**Project Description**  
A Word 2007 add-in that enables the annotation of Word documents based on terms that appear in Ontologies

**Summary**  
Microsoft External Research's goal with this project is to enable communities who maintain ontologies to more easily experiment and to enhance the experience of authors who use Microsoft Word for content creation, incorporating semantic knowledge into the content. This add-in should simplify the development and validation of ontologies, by making ontologies more accessible to a wide audience of authors and by enabling semantic content to be integrated in the authoring experience, capturing the author's intent and knowledge at the source, and facilitating downstream discoverability.

The goal of the add-in is to assist scientists in writing a manuscript that is easily integrated with existing and pending electronic resources. The major aims of this project are to add semantic information as XML mark-up to the manuscript using ontologies and controlled vocabularies (from the National Center for Biomedical Ontology) and identifiers from major biological databases, and to integrate manuscript content with existing public data repositories.

As part of the publishing workflow and archiving process, the terms added by the add-in, providing the semantic information, can be extracted from Word files, as they are stored as custom XML tags as part of the content. The semantic knowledge can then be preserved as the document is converted to other formats, such as HTML or the XML format from the National Library of Medicine, which is commonly used for archiving.

The full benefit of semantic-rich content will result from an end-to-end approach to the preservation of semantics and metadata through the publishing pipeline, starting with capturing knowledge from the subject experts, the authors, and enabling this knowledge to be preserved when published, as well as made available to search engines and presented to people consuming the content.

This project resulted from an initial and ongoing collaboration between Microsoft External Research and Dr. Phil Bourne and Dr. Lynn Fink, at the University of California San Diego. Additional collaboration with the staff from Science Commons aims to make the add-in relevant to a wider audience and also to preserve semantic data along the publishing pipeline.

**Audience**  
This project is focused on researchers and software developers in domains utilizing ontologies- as well as publishers, archivists, and early adopters in the scientific, technical, and scholarly publishing fields.

**Specific features**

- » Inline Syntax Coloring of Informative Words
- » Built-in Knowledge of Ontologies and Controlled Vocabularies maintained and delivered by NCBIO

Done

Downloads  
Current release:  
Technology Preview - March 2009  
Tue Mar 10 2009, Alpha 1  
269 downloads  
[More info](#)

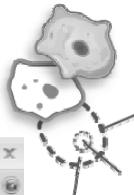
Activity 7 30 All days

Page Views	950
Visits	209
Pages Per Visit	4.55
Work Items Closed	7
Discussion Posts	1

Analytics powered by [WebTrends](#).

<http://ucsdbiolit.codeplex.com>

# Automated recognition of ontology terms *before* publication



test\_manuscript - Microsoft Word

Home Insert Page Layout References Mailings Review View Developer BioLit

Turn Parsing Off Undo Highlighting Configure Bio-Lit

InfoPanels

BioLit Ontology Recognition Application

## Background

Tuberculosis (TB) remains a major cause of mortality in developing countries, and in these countries diabetes prevalence is increasing rapidly. Diabetes increases the risk of TB. Our aim was to assess the potential impact of diabetes as a risk factor for incident pulmonary tuberculosis, using India as an example.

## Methods

We constructed an epidemiological model using data on tuberculosis incidence, diabetes

BioLit: prevalence  
Add mark-up for ID:0000019 - quality of host population(infectious disease ontology)  
Remove this Smart Tag  
Stop Recognizing 'prevalence'  
Smart Tag Options...

## Results

In India in 2000 there were an estimated 20.7 million adults with diabetes, and 900,000 incident adult cases of pulmonary tuberculosis. Our calculations suggest that diabetes accounts for 14.8% (uncertainty range 7.1% to 23.8%) of pulmonary tuberculosis and 20.2% (8.3% to 41.9%) of smear-positive (i.e. infectious) tuberculosis.

We estimate that the increased diabetes prevalence in urban areas is associated with a 15.2% greater smear-positive tuberculosis incidence in urban than rural areas – over a fifth of the

BioLit Info Pane

BROWSER INFO

Incidence

INFECTION DISEASE ONTOLOGY  
quality  
quality of infectious disease  
incidence

INFECTION DISEASE ONTOLOGY  
quality  
quality of infectious disease  
incidence

Ontology Name:

Page: 1 of 2 Words: 244

# BioLit Web resource: automated recognition of ontology terms and database IDs *after* publication



**BioLit**

- Tools
- Views
- Related Articles
- Information

Article Search:

Found 53 terms.

- Pathway Ontology  metabolic syndrome (1)
- Human Disease  Ontology infectious diseases (4) lung disease (5) syndrome (2)
- Infectious Disease  Ontology
- Mammalian Phenotype Ontology impaired glucose tolerance (5) insulin resistance (1)
- Physico-chemical Methods and Properties Ontology
- Physico-chemical Process Ontology
- BRENDA Tissue/Enzyme Source Ontology
- C. elegans Phenotype Ontology
- Environment Ontology
- C. elegans Development Ontology
- Plant Structure Ontology

## Diabetes and tuberculosis: the impact of the diabetes epidemic on tuberculosis incidence

Catherine R Stevenson, Nita G Forouhi, Gojka Roglic, Brian G Williams, Jeremy A Lauer, Christopher Dye, Nigel Unwin  
*BMC Public Health* (BMC Public Health. 2007; 7:234) [PubMed central]

## Background

Tuberculosis (TB) remains a major cause of mortality in developing countries, and in these countries diabetes prevalence is increasing rapidly. Diabetes increases the risk of TB. Our aim was to assess the potential impact of diabetes as a risk factor for incident pulmonary tuberculosis, using India as an example.

## Methods

We constructed an epidemiological model using data on tuberculosis incidence, diabetes prevalence, population structure, and relative risk of tuberculosis associated with diabetes. We evaluated the contribution made by diabetes to both tuberculosis incidence, and to the difference between tuberculosis incidence in urban and rural areas.

## Results

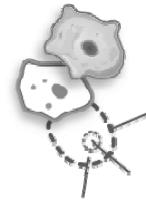
In India in 2000 there were an estimated 20.7 million adults with diabetes, and 900,000 incident adult cases of pulmonary tuberculosis. Our calculations suggest that diabetes accounts for 14.8% (uncertainty range 7.1% to 23.8%) of pulmonary tuberculosis and 20.2% (8.3% to 41.9%) of smear-positive (i.e. infectious) tuberculosis.

We estimate that the increased diabetes prevalence in urban areas is associated with a 15.2% greater smear-positive tuberculosis incidence in urban than rural areas – over a fifth of the estimated total difference.

## Conclusion

Diabetes makes a substantial contribution to the burden of incident tuberculosis in India, and the association is particularly strong for the infectious form of tuberculosis. The current diabetes epidemic

# IO informatics uses Ontology Services



Sentient Knowledge Explorer

File Edit View Tools Help

Import Biomedical Ontology from Web...

Service: BioPortal

Ontologies:

Ontology	Version	Creator	Description
Cell Behavior Ont...	0.0	Benjamin Zaitlen	The Cell Behavior Ontology is designed as a str...
Drosophila devel...	1.15	Http://obo Adm...	A structured controlled vocabulary of the devel...
NMRInstrument ...	See Remote Site	Https://ivm Adm...	Descriptors relevant to the experimental conditi...
Medical Subject ...	2009_2009_02_...	Stuart Nelson, M...	Medical Subject Headings (MeSH) National Libr...
Bedrocardiograph...	0.15	Raimond L. Wm...	The Bedrocardiography (ECG) Ontology is a Dr...
Protein modification	See Remote Site	Psimod Admin...	PSI-MOD is an ontology consisting of terms that...
NeI Vocabulary	beta	Patty Košeková	A SKOS vocabulary for the infectious disease d...
PRotein Ontology...	1.14	Daren Natale	PRotein Ontology (PRO) has been designed to ...
Mouse adult gross	1.195	Anatomy JAX	A structured controlled vocabulary of the adult ...
Tick gross anatomy	1.2	Http://www Adm...	The anatomy of the Tick, Families: Ixodidae, Ar...
Ontology for Bion...	0.9	OBI Consortium	OBI models the design of an investigation, the p...
SNP Ontology	1.6	Adrien Coulet	SNP Ontology is a domain ontology that provide...
African Traditiona...	1.101	Ghulan Ahmed...	African Traditional Medicine Ontology (ATMO) d...
BiTop	dev	Holger Stenstrom	A top-domain ontology that provides definitions f...
Spatial Ontology	1.15	Http://obo Adm...	A small ontology for anatomical spatial referenc...
GeoSpecies Ont...	beta	Peter J. De Vee	The ontology was designed to help integrate sp...
Chemical entities	1.58	ChEBI Administra...	A structured classification of chemical compoun...
Logheadhead netw...	See Remote Site	Http://www Adm...	A demonstration of ontology construction as a g...
MeGO	1.8	Arane Toussaint	bacteriophage and plasmid reproduction and m...
Pseudogene	0.1	Genstein Lab	
C. elegans devel...	1.3	Worm_develop...	A structured controlled vocabulary of the devel...

Instances of:

Ready

Entity List Entity Details Relationship

Name / Content Class Type

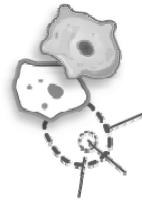
Relations

Back Forward

Gmail - BioPortal 0... Presentations Using-NCBO-Servic... Ontology services F... Downloads slide4nigam.ppt [Co... Sentient Knowledge... Import Biomedical...

528 PM

# Wikipathways uses Ontology Services



**special**

## Ontology Index

**Species :**

- All Species
- Anopheles gambiae
- Arabidopsis thaliana
- Bos taurus
- Bacillus subtilis
- Caenorhabditis elegans
- Canis familiaris
- Danio rerio
- Drosophila melanogaster
- Escherichia coli
- Equus caballus
- Gallus gallus
- Homo sapiens
- Mus musculus
- Oryza sativa
- Pan troglodytes
- Rattus norvegicus
- Saccharomyces cerevisiae
- Xenopus tropicalis

**Ontologies :**

**Pathway Ontology**

- regulatory pathway (42)
- signaling pathway (4)
- classic metabolic pathway (19)
- disease pathway (1)

**Disease**

- temp holding (2)

**List** **Image** **Tree**

## Ontology Tags



**Pathway Ontology** : cell adhesion signaling pathway, immune response pathway, inflammatory response pathway

**Disease** : Signal Transduction Pathway Deregulation, disease of response to stimulus

**Cell Type** : lymph gland plasmacytocyte

dna repair

altered DNA repair pathway

Pathway ontology

DNA repair pathway

Pathway ontology

Abnormal DNA Repair

Human disease

DNA Repair Deficiency

Human disease

To add a tag, either select from the available ontology trees below or type a search term in the search box.

+ Disease

+ Cell Type

## Ontology Tags

**Pathway Ontology** : cell adhesion signaling pathway, immune response pathway, inflammatory response pathway

**Disease** : Signal Transduction Pathway Deregulation, disease of response to stimulus

**Cell Type** : lymph gland plasmacytocyte

Term : altered DNA repair pathway

ID : PW:0000292



altered DNA repair pathway

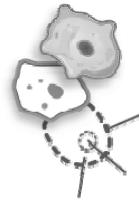
To add a tag, either select from the available ontology trees below or type a search term in the search box.

+ Pathway Ontology

+ Disease

+ Cell Type

# ISACreator uses Ontology Services



file view help

**OVERVIEW**

— Growth control of the e...  
— BII-S-1  
→ s\_BII-S-1.txt  
→ a\_proteome.txt  
→ a\_metabolome.txt  
→ a\_transcriptome.txt  
+ BII-S-2

Assay measuring protein expression profiling using mass spectrometry

Data Transformation Name	Derived Data File	Factor Value[limiting nutrient]	Factor Value[rate]	Unit
atatransformation1	PRIDE_Exp_Complete_Ac_8761.xml	CHEBI:sulphur	0.1	l/hr
atatransformation1	PRIDE_Exp_Complete_Ac_8761.xml	CHEBI:carbon	0.1	l/hr
atatransformation1	PRIDE_Exp_Complete_Ac_8761.xml	CHEBI:Nitrogen	0.1	l/hr
atatransformation1	PRIDE_Exp_Complete_Ac_8761.xml	CHEBI:sulphur		
atatransformation1	PRIDE_Exp_Complete_Ac_8761.xml	CHEBI:carbon		
atatransformation1	PRIDE_Exp_Complete_Ac_8761.xml	CHEBI:Nitrogen		
atatransformation2	PRIDE_Exp_Complete_Ac_8762.xml	CHEBI:sulphur	0.2	l/hr
atatransformation2	PRIDE_Exp_Complete_Ac_8762.xml	CHEBI:carbon	0.2	l/hr
atatransformation2	PRIDE_Exp_Complete_Ac_8762.xml	CHEBI:Nitrogen	0.1	l/hr
atatransformation2	PRIDE_Exp_Complete_Ac_8762.xml	CHEBI:sulphur		
atatransformation2	PRIDE_Exp_Complete_Ac_8762.xml	CHEBI:carbon		
atatransformation2	PRIDE_Exp_Complete_Ac_8762.xml	CHEBI:Nitrogen		
atatransformation3	PRIDE_Exp_Complete_Ac_8763.xml	CHEBI:Nitrogen	0.2	l/hr
atatransformation3	PRIDE_Exp			

**ontologylookup** recenthistory

recommended search  all ontologies

term

— 279 results in 18 ontologies

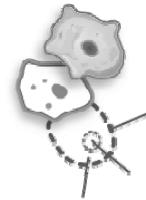
+ CCO - Cell Cycle Ontology

— CHEBI - Chemical Entities of Biological

- 2'-carboxy-2-methylphenylazo nit
- Nitrogen oxide cation << 29120 >>
- Nitrogen << 17997 >>
- boron-carbon-nitrogen nanotube << 508
- diatomic nitrogen << 33266 >>
- elemental nitrogen << 33267 >>

selected term(s) **CHEBI:Nitrogen**

# ECG Gadget uses Ontology Services



**CVRG Grid Node**

http://localhost:8888/org.cvrgrid.widgets.node.NodeWidget/NodeWidget.html

**CardioVascular Research Grid**

HL7/WFDB Widget

Connect Store Visualize

Lead I Lead II Lead III All Leads

Analyze Review

Time & Amplitude  
Second: 1 .00

Ontology  
MN Code 1-1-1

Annotation  
Q/R amplitude ratio  $\geq 1/3$ , plus Q duration  $\geq 0.03$  sec.

19:08 January 01, 1970  
• Lead II Amplitude (mV) -69

400  
200  
0

Jan 01 19:05

Scroll Up Enter a filter term  
A.MN Code 1-1-1 Q/R amplitude ratio  $\geq 1/3$ , plus Q duration  $\geq 0.03$  sec.

1970-1-1

Done

Save Delete Close

Done

Google Web Toolkit

Go

English | 中国版 | German | 日本 | Spanish

Annotation

Q/R amplitude ratio  $\geq 1/3$ , plus Q duration  $\geq 0.03$  sec.

# Biositemaps Editor



**BIO SITEMAPS EDITOR**

**Resource Descriptions**

- Name: BioPortal
- Jambalaya
- LexGrid
- OBA
- OBO\_Converter
- OBO\_Edit
- OBR
- Phenote
- PROMPT
- Protege

**Resource Properties**

**Resource Name:** BioPortal

**Organization:** Stanford University

**Center or Institute:** National Center for Biomedical Ontology

**Research Program:** NCBC

**Description:** A Web portal to a virtual library of ontologies and ontology tools.

**Resource Type:**

- BRO (2 Items)
  - BRO:Ontology\_Development\_and\_Management
  - BRO:Web\_Service
- BRO (2 Items)
  - j:0:Bioinformatics
  - j:0:Research\_IT
- BRO (2 Items)
  - j:1:Community\_Engagement
  - j:1:Software\_Development

**Related Areas Of Research:**

**Related Activities:**

**Select a resource type**

**Class hierarchy of available types**

- visualization**
  - BRO:Data\_Transfer\_and\_Communication
  - BRO:Integration\_and\_Interoperability\_Tool
  - BRO:Interactive\_Tool
    - BRO:Communication\_and\_Collaborative\_Work
    - BRO:Data\_Editor
    - BRO:Graphical\_Composition
    - BRO:Interactive\_Network\_Analysis
    - BRO:Interactive\_Web-Based\_Tool
    - BRO:Knowledge\_Mining\_and\_Capturing
    - BRO:Software\_Development\_Resource
  - BRO:Visualization**
    - BRO:Data\_Exploration
    - BRO:Graph\_Viewer
    - BRO:Heat\_Map
    - BRO:Imaging
    - BRO:Sequence\_Visualization**
    - BRO:Website
    - BRO:Workbench
  - BRO:Knowledge\_Mining\_and\_Capturing
  - BRO:Modeling\_and\_Simulation
  - BRO:Software\_Distribution

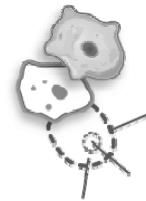
**Buttons:** Cancel, OK

**Message:** This biositemap was not saved yet

**Buttons:** Cancel, Save

The Biositemap Editor is a component of The National Center for Biomedical Ontology  
The National Center for Biomedical Ontology is one of the National Centers for Biomedical Computing supported by the NIH Roadmap.

# Protégé BioPortal-reference plug-in



P3F-exp1-4\_test Protégé 3.4 (file:/work/protege/projects/Alan-frames/2009.05.04/P3F-exp1-4\_test.pprj, Protégé Files (.pont and .pins))

File Edit Project Code Window Help

ICD Tab Slots Forms Missing resource bundle for tab:queries

CLASS BROWSER CLASS EDITOR

For Project: P3F-exp1-4\_test For Class: Myocardial Infarct (instance of Metadata, Formal Representation, Diagnostic Criteria, Etiology, Functional Impact, All information)

Class Hierarchy

- :THING
- :SYSTEM-CLASS
- google(SCT:123)
- HeartDisease(SCT:)
- ICD\_Category\_class
  - Heart disease
    - Myocardial Infarct
  - Hypertensive disease
  - Kidney disease
- Standard\_term
- yahoo(SCT:345)

ICD-ID: Generated by the system Type: Diagnosis

Unique Ref Term (International English): Myocardial Infarct

Text Definition: Infarction of myocardium caused by ischaemia.

Comment on Definition: Explicitly excludes infarction from other causes - see exclusions

Synonyms

Synonym	language
Heart attack	en:colloquial
Acute coronary syndrome	en
Coronary thrombosis	en

Editorial Status: In\_discussion

References

Create a new reference from BioPortal	Create a new manual reference	Browse BioPortal	Browse LexWiki
Preferred term: Myocardial Infarct	code: 22296006	Code System: SCT	url: <a href="http://stage.bioontology.org/visualize/39934/SCTID_57054005">http://stage.bioontology.org/visualize/39934/SCTID_57054005</a>
acute anterolateral myocardial infarction	code: DOID:10651	Code System: SCT	url: <a href="http://stage.bioontology.org/visualize/39948/DOID:10651">http://stage.bioontology.org/visualize/39948/DOID:10651</a>
Myocardial Infarction	code: Myocardial_Infarction	Code System: NCI Thesaurus	url: <a href="http://stage.bioontology.org/visualize/39478/Myocardial_Infarction">http://stage.bioontology.org/visualize/39478/Myocardial_Infarction</a>
myocardial infarction	code: EFO_0000612	Code System: Experimental Factor Ontology	url: <a href="http://stage.bioontology.org/visualize/39715/EFO_0000612">http://stage.bioontology.org/visualize/39715/EFO_0000612</a>

Superclasses: Heart disease

# Simbios uses NCBO Ontology Web Widgets

## 7. Classify your project (required)

a) Choose one or more terms from the Biological Resource Ontology that most closely describe your project. These will be used in searches so others can more easily find your work.

1) Search for a term by starting to enter it in the box below - all terms that contain what you entered will be shown below the box. Select one of these, or...

2) Alternatively, you can try browsing the [Biological Resource Ontology](#). Only terms under BRO:Resource are allowed. You are most likely to find suitable terms under BRO:Resource → BRO:Software → BRO:Modeling\_and\_Simulation. Enter the term or any part of it in the box below *without* the BRO prefix and continue as in 1).

**Restriction:** only terms from the BRO:Resource branch of the Biological Resource Ontology allowed.

*Samples:* *Neuromuscular\_Model, Molecular\_Dynamics*

**Ontology terms:**

Computational_Model	<a href="#">Remove</a>
Protein_Model	<a href="#">Remove</a>
Standalone_Application	<a href="#">Remove</a>
Structure-Based_Protein_Classification	<a href="#">Remove</a>

[Add](#) (click after choosing a term)

b) Please also choose one or more keywords for your project. These will also be used in searches so others can more easily find your project.

**Keywords: (required)**

allosteric communication	<a href="#">Remove</a>
allostery	<a href="#">Remove</a>

[Add](#) (one at a time)

To save changes, click [Save Project Info](#) here or at the bottom of the page.

## 8. Short Purpose/Synopsis (required)

Please provide a synopsis of your project. This will be displayed in the search results.

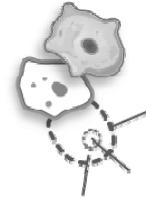
**Restriction: 255 characters**

*Samples:*

- 1) Provide an easy-to-use application for manipulating RNA structures
- 2) Provides the code base for creating, simulating, and visualizing three-dimensional finite-element models of skeletal muscle.
- 3) Geometric models in VTK/XML PolyData format for download, for use in cardiovascular applications.

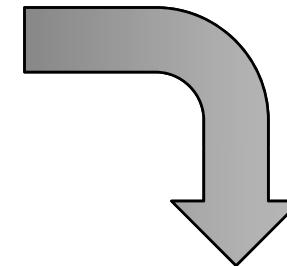


# NCBO Annotator: The Basic Idea



Process textual metadata to tag text automatically with as many ontology terms as possible.

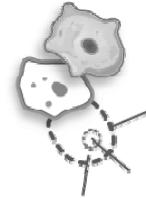
GDS Summary	
Accession:	GDS906 <a href="#">View Expression (GEO profiles)</a>
Title:	Bladder smooth muscle cell response to mechanical stretch
Data Set type:	gene expression array-based (RNA / in situ oligonucleotide)
Summary:	Expression profiling of cultured bladder smooth muscle cells subjected to repetitive mechanical stimulation for 4 hours. Chronic overdistension results in bladder wall thickening, associated with loss of muscle contractility. Results identify genes whose expression is altered by mechanical stimuli.
Platform:	GPL95: Affymetrix GeneChip Human Genome U133 Array Set HG-U133A
Citations:	Adam RM, Eaton SH, Estrada C, Nimgaonkar A et al. Mechanical stretch is a highly selective regulator of gene expression in human bladder smooth muscle cells. <i>Physiol Genomics</i> 2004 Dec 15;20(1):36-44. PMID: 15467014
Sample organism:	Homo sapiens
Platform organism:	Homo sapiens
Feature count:	22283
Value type:	count
Series:	GSE1595
Series published:	07/25/2004
Last GDS update:	12/20/2004



Expression, Expression of bladder, bladder, smooth, bladder muscle, muscle, smooth muscle, cells, mechanical, mechanical stimulation, stimulation, Chronic, results, bladder overdistension, associated, associated with, with, loss, genes, altered

# NCBO Annotator

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



- Give your text as input
- Select your parameters
- Get your results ... in text or XML

Open Biomedical Annotator

Ontologies: SNOMEDCT

Semantic Types: 7,T033,T200,T026,T029,T023,T038,T017,T047,T048,T191,T019,T121,T195,T020,T050

Annotate Text  Get Annotations By Resource Element Alpha

Options:

Text: Melanoma is a disease of the melanocytes affecting the bowel and the eye

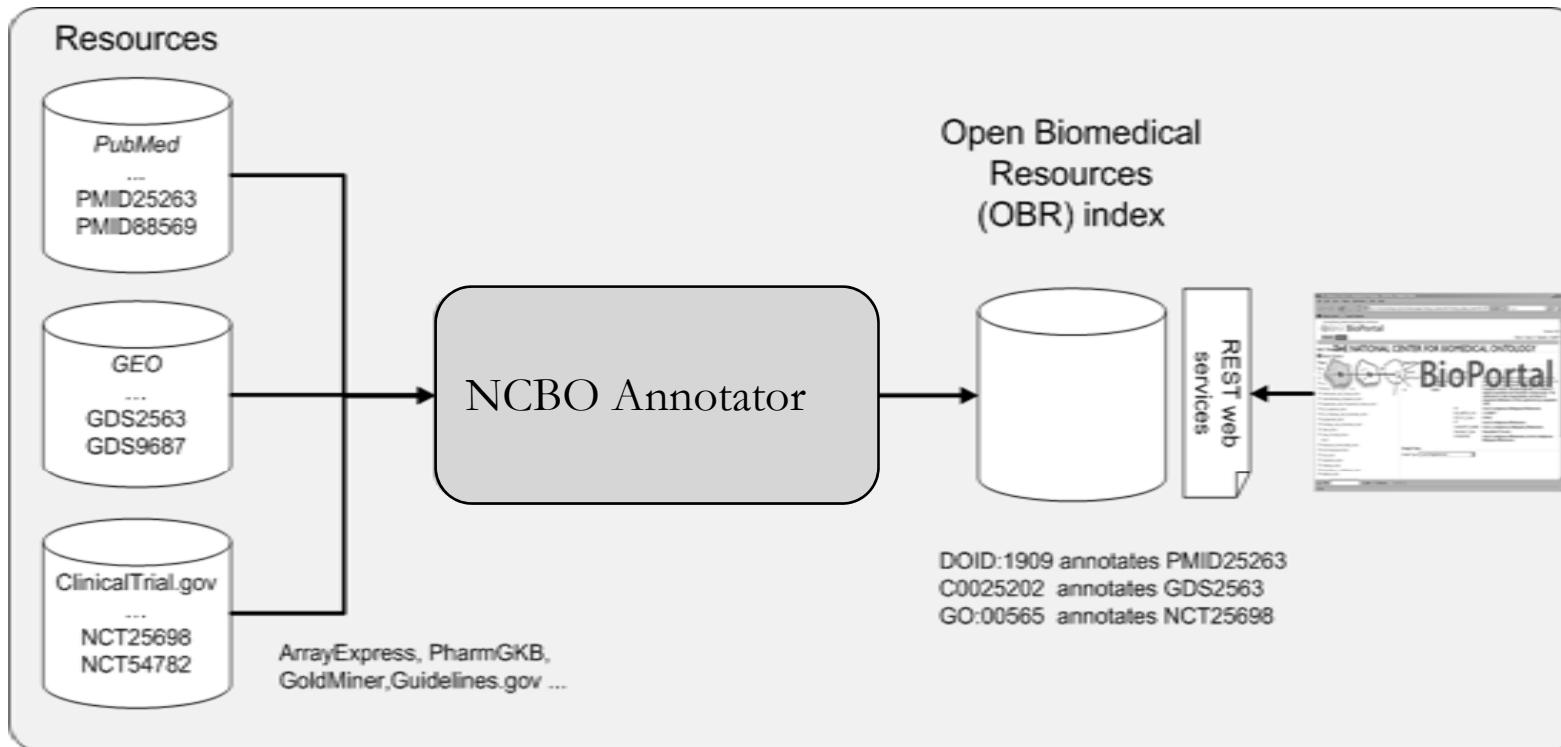
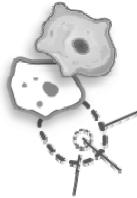
Ontologies (1):  
Filter: UMLS and BioPortal Ontologies    
 SNOMED Clinical Terms, 2008\_07\_31

Annotation Tag Cloud (5):  
Annotation statistics  
Expanded annotations generated from the is\_a transitive closure (ISA\_CLOSURE): 0  
Expanded annotations generated from mappings (MAPPING): 0  
Direct annotations generated from concept recognition on the given text (MGREP): 5

**Melanoma Eye Disease** Entire eye Intestines

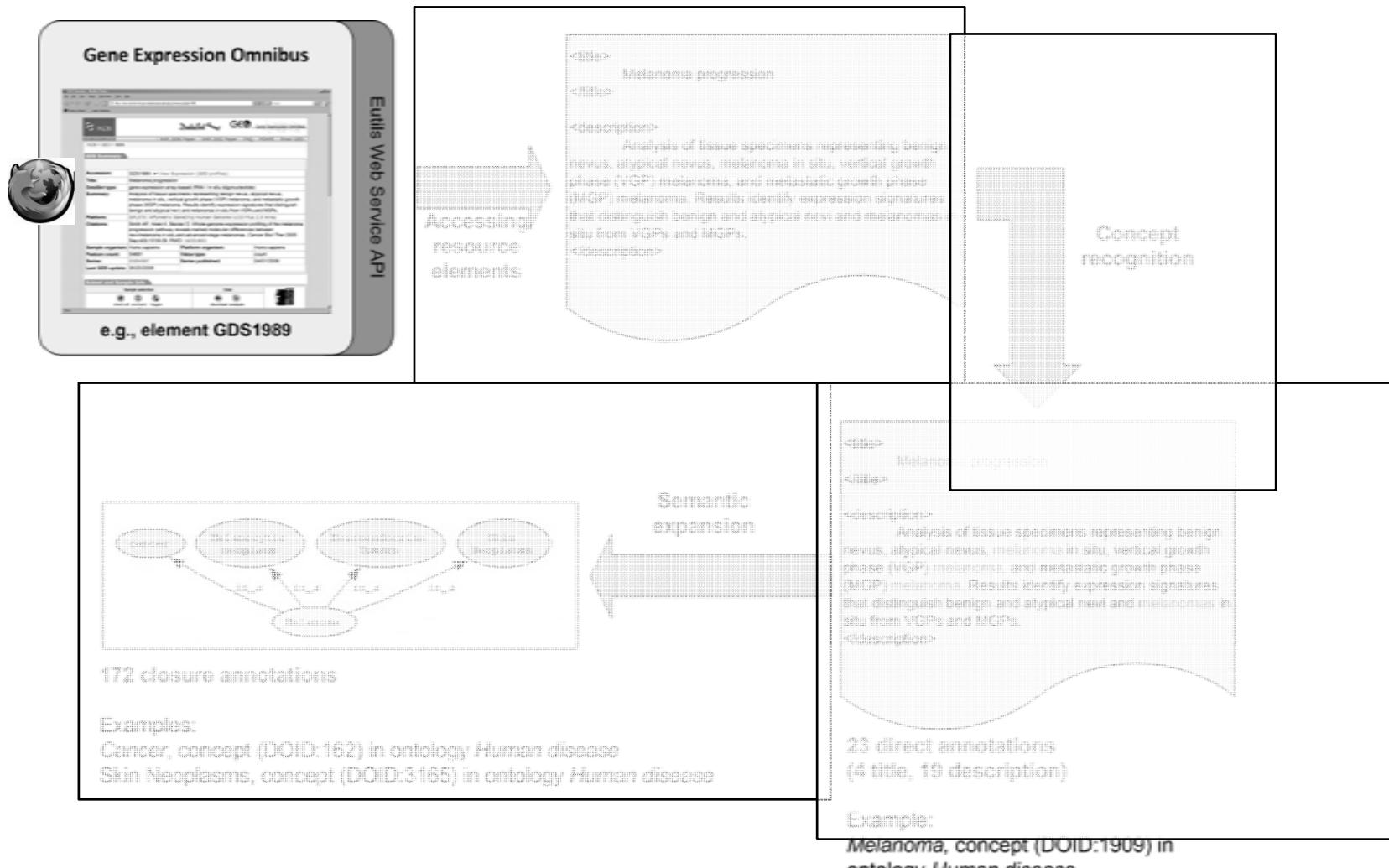
Learn more about the [NCBO Annotator web service](#) | Learn more about the [NCBO Biomedical Resources index](#)

# Resources Index: The Basic Idea



- The index can be used for:
  - Search
  - Data mining

# Example: Indexing GEO



## View Ontology Details

Details

Visualization

Notes (0)

Mappings (0)

Resources alpha

Jump To:

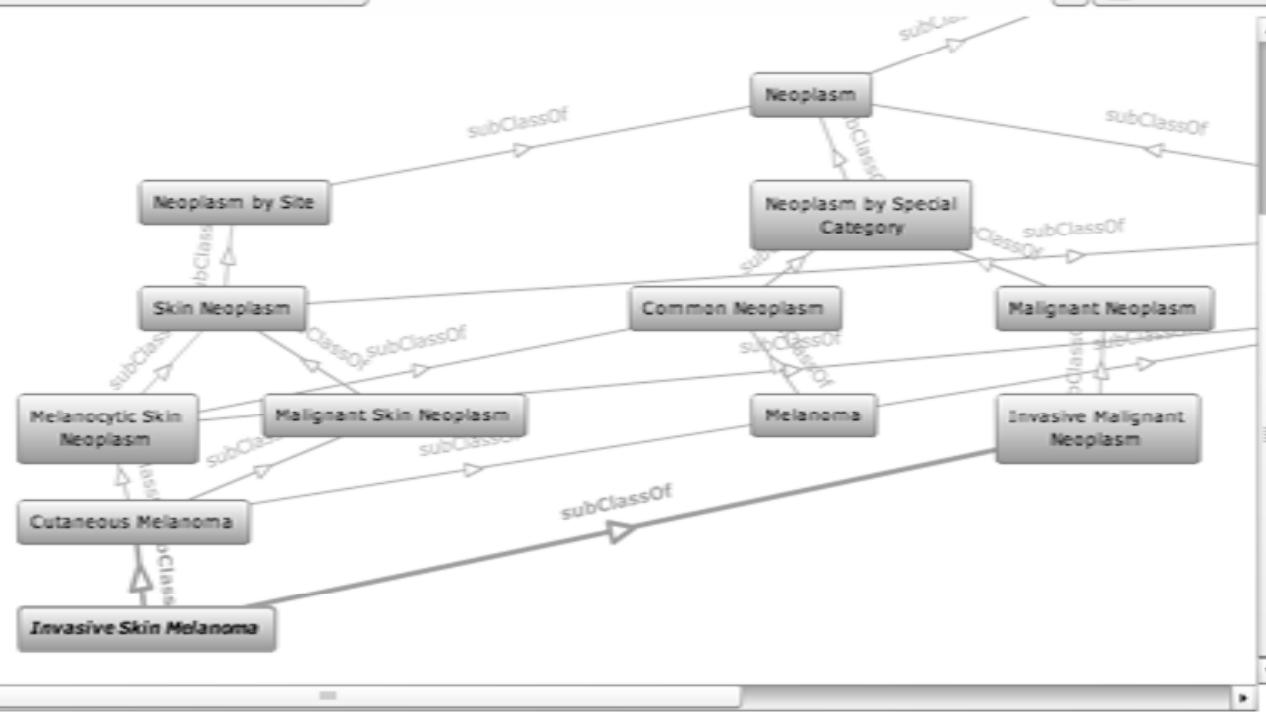
Go

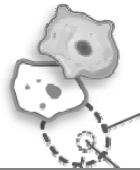
## Legend

- Endocrine Neoplasm
- Eye Neoplasm
- Gastrointestinal Neoplasm
- Head and Neck Neoplasm
- Hematopoietic and Lymphoid System Neoplasm
- Nervous System Neoplasm
- Peritoneal and Retroperitoneal Neoplasms
- Reproductive System Neoplasm
- Respiratory Tract Neoplasm
- Skin Neoplasm
  - Benign Skin Neoplasm
  - Cutaneous Hematopoietic and Lymphoid
  - Dermal Neoplasm
  - Epithelial Skin Neoplasm
  - Malignant Skin Neoplasm
    - Blastic Plasmacytoid Dendritic Cell N
    - Cutaneous Lymphoma
    - Cutaneous Melanoma
      - Acral Lentiginous Melanoma
      - Amelanotic Skin Melanoma
      - Balloon Cell Melanoma
      - Desmoplastic Melanoma
      - Hereditary Melanoma
      - Invasive Skin Melanoma
      - Lentigo Maligna Melanoma
      - Malignant Melanoma in Precance
      - Melanoma Arising from Blue Nevi
      - Melanoma in Congenital Melanoc
      - Melanoma in Junctional Nevus
      - Minimal Deviation Melanoma
      - Nevvoid Melanoma
      - Nodular Melanoma
      - Old Burn Scar-Related Skin Mela
      - Recurrent Melanoma of the Skin
      - Repressing Skin Melanomolike Nati

Show Hierarchy To Root (All Relationships)

Full Version





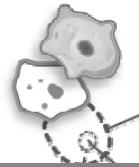
# NCBO Indexed Resources

NCI Thesaurus Version 09.07

[Skin Neoplasm](#) | [Link Here](#) |  [Subscribe](#)

View Ontology Details		Details	Visualization	Notes (0)	Mappings (3)	Resource Index
Jump To:	<input type="text"/>	<a href="#">Go</a>				
<p><u>Legend</u> </p> <ul style="list-style-type: none"><li> Hematopoietic and Lymphoid Neoplasm</li><li> Nervous System Neoplasm</li><li> Peritoneal and Retroperitoneal Neoplasm</li><li> Reproductive System Neoplasm</li><li> Respiratory Tract Neoplasm</li><li> Skin Neoplasm<ul style="list-style-type: none"><li> Benign Skin Neoplasm</li><li> Cutaneous Hematopoietic Neoplasm</li><li> Dermal Neoplasm</li><li> Epithelial Skin Neoplasm</li><li> Malignant Skin Neoplasm</li><li> Melanocytic Skin Neoplasm</li><li> Scrotal Neoplasm</li><li> Skin Appendage Neoplasm</li></ul></li><li> Thoracic Neoplasm</li><li> Urinary System Neoplasm</li><li> Neoplasm by Special Category</li><li> Non-Neoplastic Disorder</li><li> Polyp</li><li> Psychiatric Disorder</li><li> Radiation-Related Disorder</li><li> Rare Disorder</li><li> Syndrome</li><li> Finding</li><li> Drug, Food, Chemical or Biomedical Material</li></ul>						
<p>This tab shows records in public data sources that we have automatically annotated with the terms associated with the class Skin Neoplasm or its subclasses based on the textual descriptions of those records.</p>						
 UniProt KB	The mission of UniProt is to provide the scientific community with a comprehensive, high-quality and freely accessible resource of protein sequence and functional information.					Annotations:0
 ClinicalTrials.gov	ClinicalTrials.gov provides regularly updated information about federally and privately supported clinical research in human volunteers. ClinicalTrials.gov gives you information about a trial's purpose, who may participate, locations, and phone numbers for more details. The information provided on ClinicalTrials.gov should be used in conjunction with advice from health care professionals. Before searching, you may want to learn more about clinical trials.					Annotations:129
 DrugBank	DrugBank is offered to the public as a freely available resource. Use and redistribution of the data, in whole or in part, for commercial purposes requires explicit permission of the authors and explicit acknowledgment of the source material (DrugBank) and the original publication.					Annotations:4
 Biositemaps	Biositemaps represent a mechanism for computational biologists and bio-informaticians to openly broadcast and retrieve meta-data about biomedical data, tools and services (i.e., biomedical resources) over the Internet.					Annotations:0
 Gene Expression Omnibus	A gene expression/molecular abundance repository supporting MIAME compliant data submissions, and a curated, online resource for gene expression data browsing, query and retrieval.					Annotations:8

# Links to specific resources



BioPortal    Browse    Search    Projects    Annotate    All Mappings    All Resources    Alpha    Sign In

NCI Thesaurus

NCI Thesaurus Version 09.07

Skin Neoplasm | Link Here | Subscribe

View Ontology Details

Jump To:  Go

Legend

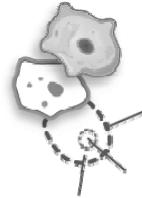
- Hematopoietic and Lymphoid Neoplasm
- Nervous System Neoplasm
- Peritoneal and Retroperitoneal Neoplasm
- Reproductive System Neoplasm
- Respiratory Tract Neoplasm
- Skin Neoplasm
  - Benign Skin Neoplasm
  - Cutaneous Hematopoietic Neoplasm
  - Dermal Neoplasm
  - Epithelial Skin Neoplasm
  - Malignant Skin Neoplasm
  - Melanocytic Skin Neoplasm
  - Scrotal Neoplasm
  - Skin Appendage Neoplasm
- Thoracic Neoplasm
- Urinary System Neoplasm
- Neoplasm by Special Category
- Non-Neoplastic Disorder
- Polyp
- Psychiatric Disorder
- Radiation-Related Disorder
- Rare Disorder
- Syndrome
- Finding
- Drug, Food, Chemical or Biomedical Material

Details    Visualization    Notes (0)    Mappings (3)    Resource Index

This tab shows records in public data sources that we have automatically annotated with the terms associated with the class Skin Neoplasm or its subclasses based on the textual descriptions of those records.

UniProt KB	The mission of UniProt is to provide the scientific community with a comprehensive, high-quality and freely accessible resource of protein sequence and functional information.	Annotations:0												
ClinicalTrials.gov	ClinicalTrials.gov provides regularly updated information about federally and privately supported clinical research in human volunteers. ClinicalTrials.gov gives you information about a trial's purpose, who may participate, locations, and phone numbers for more details. The information provided on ClinicalTrials.gov should be used in conjunction with advice from health care professionals. Before searching, you may want to learn more about clinical trials.	Annotations:129												
<table border="1"><tbody><tr><td colspan="2">Title: <a href="#">Tretinoin With or Without Fenretinide in Treating Patients With Dysplastic Nevus Syndrome</a></td></tr><tr><td>ElementId: NCT00003601</td><td>Score: 39.9</td></tr><tr><td colspan="2">Title: <a href="#">Imatinib Mesylate in Treating Patients With Locally Advanced or Metastatic Dermatofibrosarcoma Protuberans or Giant Cell Fibroblastoma</a></td></tr><tr><td>ElementId: NCT00085475</td><td>Score: 38.5</td></tr><tr><td colspan="2">Title: <a href="#">A Short Course of Neoadjuvant Gleevec (Imatinib Mesylate) in Dermatofibrosarcoma Protuberans</a></td></tr><tr><td>ElementId: NCT00176709</td><td>Score: 28.8</td></tr></tbody></table>			Title: <a href="#">Tretinoin With or Without Fenretinide in Treating Patients With Dysplastic Nevus Syndrome</a>		ElementId: NCT00003601	Score: 39.9	Title: <a href="#">Imatinib Mesylate in Treating Patients With Locally Advanced or Metastatic Dermatofibrosarcoma Protuberans or Giant Cell Fibroblastoma</a>		ElementId: NCT00085475	Score: 38.5	Title: <a href="#">A Short Course of Neoadjuvant Gleevec (Imatinib Mesylate) in Dermatofibrosarcoma Protuberans</a>		ElementId: NCT00176709	Score: 28.8
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ElementId: NCT00176709	Score: 28.8													

# GMiner uses NCBO Annotation Services



**MEDICAL COLLEGE OF WISCONSIN**

# gminer

THE NATIONAL CENTER FOR BIOMEDICAL ONTOLOGY

Home  
Logout: simont@mow.edu

Views

- Platforms
- Samples
- Series
- Datasets
- Annotations
- Annotation Cloud
- Ontologies
- Ontology Terms
- Results

Welcome to GMiner

All Terms

Age ANAL And At For From  
injuries Male Procedures Rat

**Rattus** Rattus norvegicus

**RNA** Standard therapy

Tissues To Total Treatment With

Rat Strain Ontology

ACI ACIN AN AS AT b C  
CD COP F344 G P R SD  
SDIHsdFoen SDINTac SDJ SDN TX U

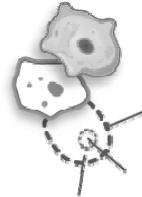
Mouse adult gross anatomy

amygdala blood brain  
brainstem fat frontal cortex hand  
heart hippocampus kidney  
kidney cortex liver lung nose  
pituitary gland serum supraoptic  
nucleus testis trunk urinary  
bladder urothelium

Medical Subject Headings, 2009\_2008\_08\_06

ANAL Animals Biotin Cells  
Complementary RNA control  
Formaldehyde Inhalation injuries  
Male Procedures Rattus  
Rattus norvegicus RNA  
Strains therapy Time Tissues TO

# See our wiki to learn more!



Using NCBO Technology In Your Project - NCBO Wiki - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.bioontology.org/wiki/index.php/Using\_NCBO\_Technology\_In\_Your\_Proj... UMLSKS

UMLSKS: Metathesaurus

Using NCBO Technology In Your Project

Log in / create account

Using NCBO Technology In Your Project

There are several ways in which you can use the NCBO technology on your own Web site or in your application.

**Ontology Web Services**

All the content that the NCBO BioPortal uses (and more!) is available via REST services. You can use the NCBO REST Services:

- to access all BioPortal ontologies, their different versions, and metadata for those versions
- to access information about any ontology concept in BioPortal (its definition, synonyms, and other properties)
- to search across all ontologies in BioPortal
- to get hierarchy information for BioPortal ontologies (such as parents, children, or siblings of a class, roots or leaves of a class hierarchy)

**Annotator Web Service**

A service that identifies mentions of biomedical ontology concepts in text that users submit. You can use the annotator service to tag automatically any item of interest with terms from UMLS and BioPortal ontologies.

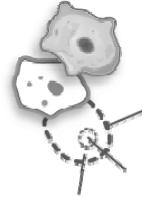
**Ontology Widgets**

Put elements of BioPortal, custom-tailored for your ontology of interest, on your own Web site or in your Web form. To add these widgets, you need only to copy simple HTML or Javascript code to your own Web page (go to the "Ontology Widgets" tab on the page for individual ontology details to get the code pre-configured for the widgets using your ontology of interest). The widgets are described in detail at the Ontology Widgets page. The main kinds of widgets you get are:

- Term selection field on a form: You can add a text field to your Web form that will let users enter a term from a controlled vocabulary (e.g., terms from a single ontology)
  - Example use case: Suppose you are running a tissue microarray database and users upload sample descriptions to your database using a web form. There is usually a field for the user to enter the diagnosis for the tissue sample that she is entering. Usually, this field is a text-box or a drop down menu populated with a list of controlled terms. The free text-box is prone to errors, the drop-down gets too unwieldy with large terminologies. Using the NCBO term-selection widget to have users easily select a term from an ontology or controlled vocabulary (such as the NCI Thesaurus) to fill in the field. For example, when the user starts typing "cutaneous me", the term "cutaneous melanoma" pops up.
  - What does the term-selection field get you:
    - Look-ahead so that you don't need to type the whole term
    - Controlled vocabulary provides consistency of the way different users use the term (if you want to put "Malignant melanoma", it will always be the same term from NCIT, regardless of how a user started typing it)
    - When a new version of your controlled vocabulary becomes available in BioPortal, the widget will automatically use that new version.
- Ontology search widget: You can add to your Web site a search box that searches a specific BioPortal ontology. When the user selects the term of interest (with the help of the look-ahead feature), he can jump to the BioPortal page for the corresponding concept in BioPortal.
  - Example use case: Suppose your web site provides textbook information for anatomy students. When describing a particular organ or organ part, you want to enable access to the formal definition of that organ part in the Foundational Model of Anatomy (FMA) developed at the University of Washington. Your web pages can contain a widget that enables you to search FMA in BioPortal and jump directly to the definition of the selected term.
- Track updates (RSS Feed widget): you can put a widget on your site that will have a live feed of all the changes to your ontology of interest, such as uploads of a new version, comments from other users, new mappings for concepts in your ontology.
- Ontology visualization widget: You can put a widget on your Web site that visualizes your entire ontology of interest, or some part of it, as on the "Visualize" tab in BioPortal.

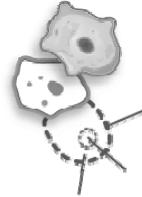
[www.bioontology.org/wiki/index.php/Using\\_NCBO\\_Technology\\_In\\_Your\\_Project](http://www.bioontology.org/wiki/index.php/Using_NCBO_Technology_In_Your_Project)

# Ways to collaborate with NCBO



- Be a user!
- Propose a Driving Biological Project (DBP)
- Get a collaborating research grant (NIH R01)
- Initiate an industrial or academic joint projects

# Current Driving Biological Projects



- **caNanoLab:** Workers at Stanford and Wash U developing searchable catalog of therapeutic nanoparticles



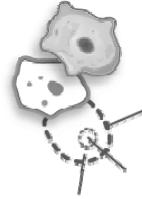
- **Cardiovascular Research Grid:** Workers at Hopkins developing ontology of ECGs and electrophysiological studies



- **Rat Genome Database:** Workers at MCW use ontologies to annotate genomic data

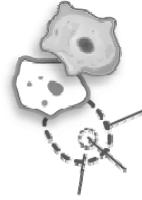


# Current “Collaborating R01” grants



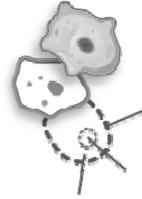
- **UW:** Creating views of ontologies
- **UCSD:** Using ontologies to annotate neuroimaging data
- **UC Denver:** Ontology enrichment through published literature
- **Pittsburgh:** Ontology enrichment through EMR data
- **Wright State:** Semantic data integration

# Some other collaborative activities



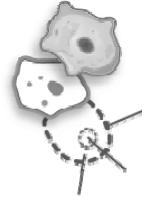
- **CollaboRx, Inc.** — Resource annotation
- **NextBio, Inc.** — Ontology-based search
- **Google, Inc.** — Web of Trust
- **University of Karlsruhe** — Use of OMV in BioPortal metadata
- **World Health Organization** — Ontology support for ICD11

# Other NCBO components

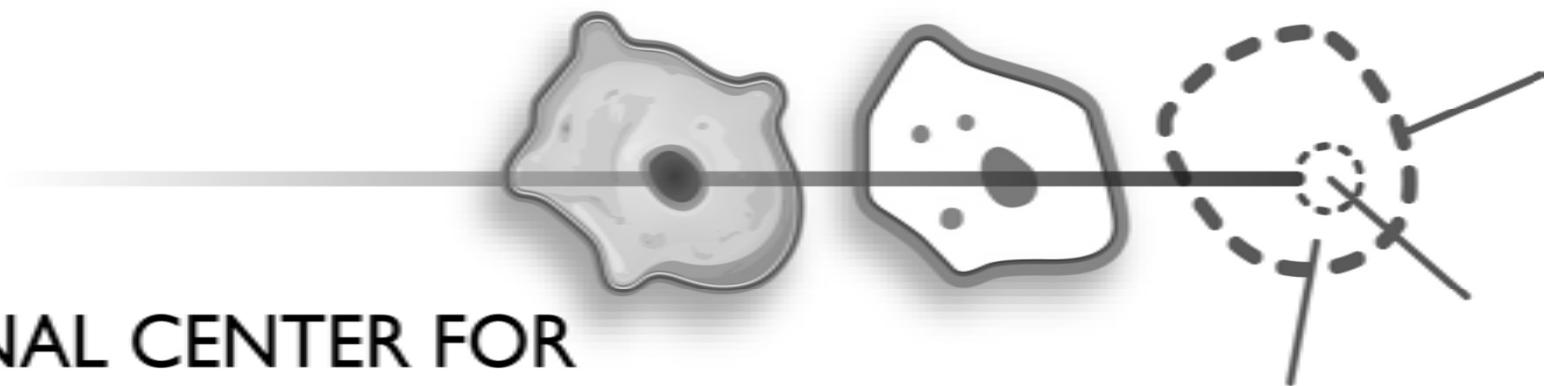
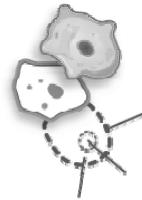


- Education and training
  - Graduate students
  - Post docs
  - Visiting researchers
- Outreach and dissemination
  - Specialized workshops
  - Support for conferences
    - ISMB Bio-ontologies SIG
    - International Conference on Biomedical Ontology

# NCBO needs HCLS!



- To push on our technology
- To drive our requirements
- To help disseminate ontology-based methods in biomedicine
- To help promote W3C recommendations in biomedicine
- To help us in our mission to educate the community and to encourage best practices



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