

NATIONAL CENTER FOR

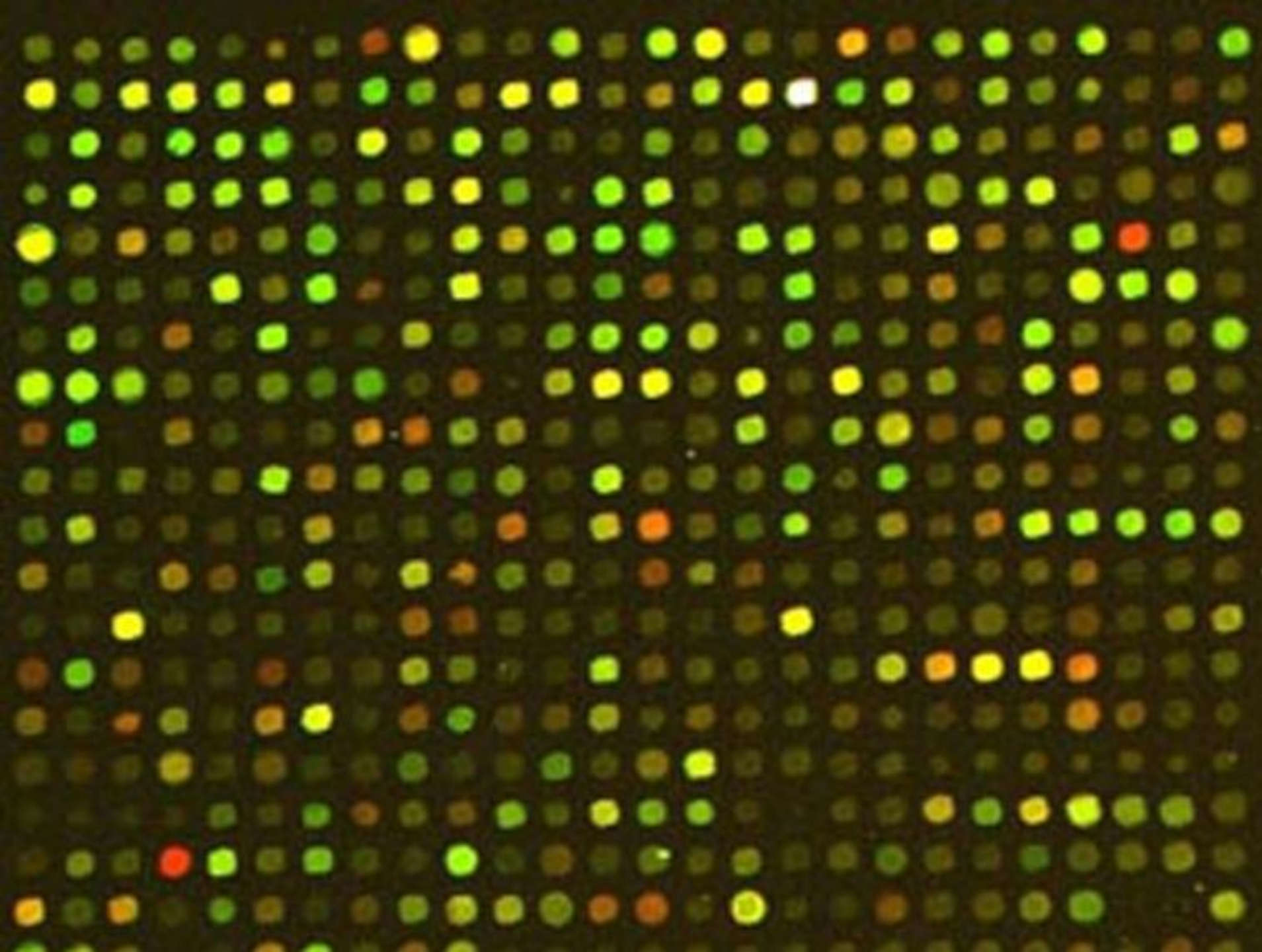
# BIOMEDICAL ONTOLOGY

Mark Musen and the NCBO team  
Stanford University

*Big Data Needs Big Ontology!*







Search

Browse

BLAST

Homolog Annotations

Tools &amp; Resources

Help

Search GO



terms



genes or proteins



exact match

## Tree Browser

### Filter tree view

Filter by ontology

Ontology

All  
 biological process  
 cellular component  
 molecular function

Filter Gene Product Counts

Data source

All  
 ASAP  
 AspGD  
 CGD

Species

All  
 Arabidopsis thaliana  
 Aspergillus fumig...  
 Aspergillus niger

View Options

Tree view  Full  Compact all : all [582472 gene products]   **GO:0008150 : biological\_process [442277 gene products]**   GO:0022610 : biological adhesion [7784 gene products]  GO:0065007 : biological regulation [106873 gene products]  GO:0009758 : carbohydrate utilization [35 gene products]  GO:0015976 : carbon utilization [251 gene products]  GO:0001906 : cell killing [1176 gene products]  GO:0008283 : cell proliferation [9942 gene products]  GO:0071840 : cellular component organization or biogenesis [55517 gene products]  GO:0009987 : cellular process [266466 gene products]  GO:0016265 : death [12861 gene products]  GO:0032502 : developmental process [49009 gene products]  GO:0051234 : establishment of localization [55604 gene products]  GO:0040007 : growth [13918 gene products]  GO:0002376 : immune system process [12542 gene products]

Actions...

Last action: Opened

GO:0008150

Graphical View

Permalink

Download...

OBO

RDF-XML

GraphViz dot

Jump To:

Details

Visualization

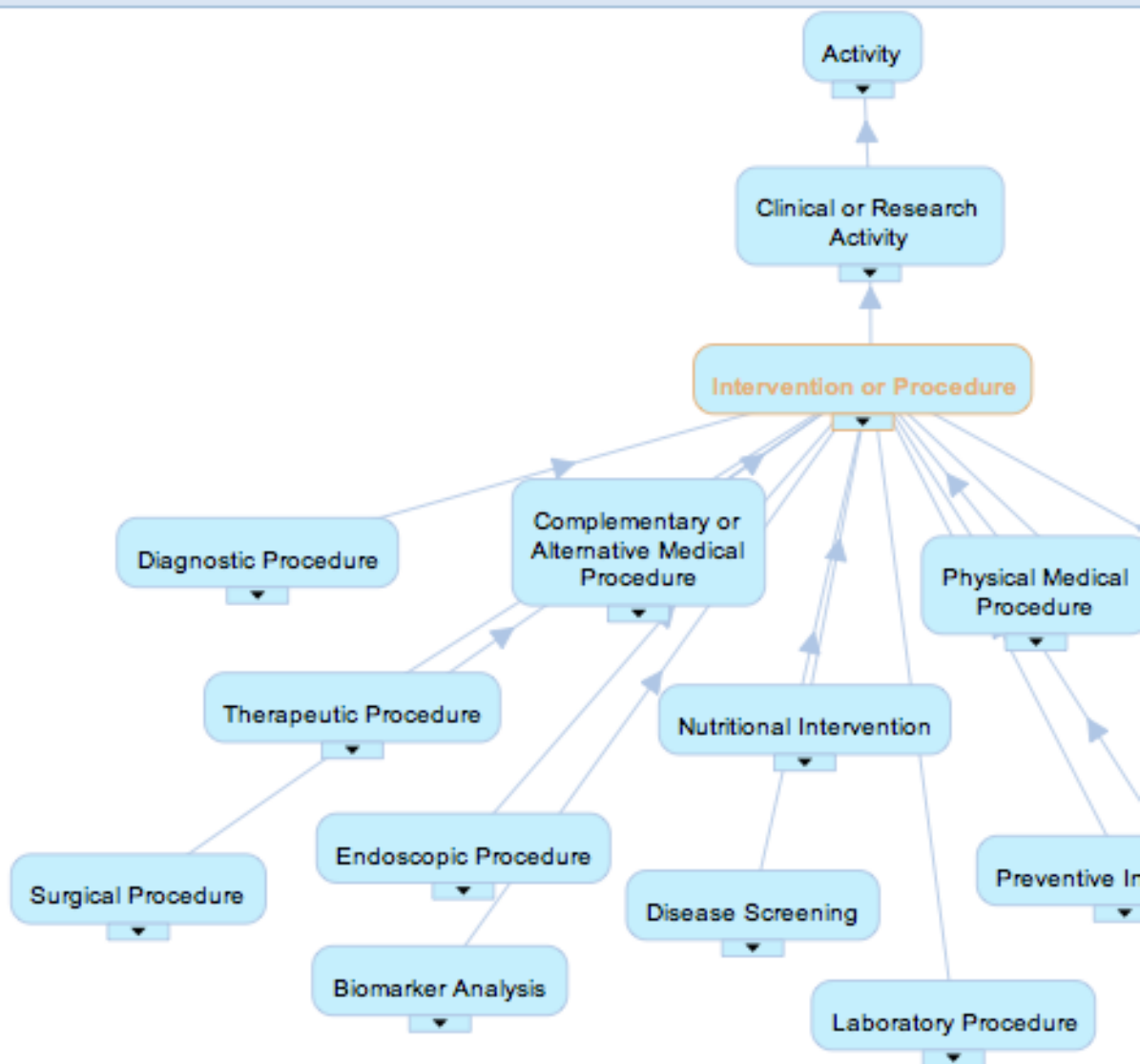
Notes (0)

Term Mappings (30)

Term Resources

path to root ▾

- ⊕ Abnormal Cell
- ⊖ Activity
  - ⊕ Action
  - ⊕ Administrative Activity
  - ⊕ Behavior
  - ⊖ Clinical or Research Activity
    - ⊕ Healthcare Activity
    - ⊖ Intervention or Procedure
      - ⊕ Behavioral, Psychological or Informational Intervention
      - ⊕ Biomarker Analysis
      - ⊕ Cancer Diagnostic or Therapeutic Procedure
      - ⊕ Complementary or Alternative Medical Procedure
      - ⊕ Diagnostic Procedure
      - ⊕ Disease Screening
      - ⊕ Endoscopic Procedure
      - ⊕ Laboratory Procedure
      - ⊕ Nutritional Intervention
      - ⋯ Pediatric Intervention or Procedure
      - ⋯ Physical Medical Procedure
      - ⊕ Preventive Intervention
      - ⊕ Surgical Procedure
      - ⊕ Therapeutic Procedure
    - ⊕ Research Activity
    - ⊕ Study Activity
  - ⊕ Educational Activity
  - ⊕ Physical Activity
  - ⊖ Technique
    - ⊕ Birth Method of Delivery
    - ⋯ Catheterization
    - ⊕ Computational Technique
    - ⊕ Modeling
    - ⊕ Radiation Dosimetry
    - ⊕ Research Technique
    - ⊕ Statistical Technique





# SNOMED Clinical Terms

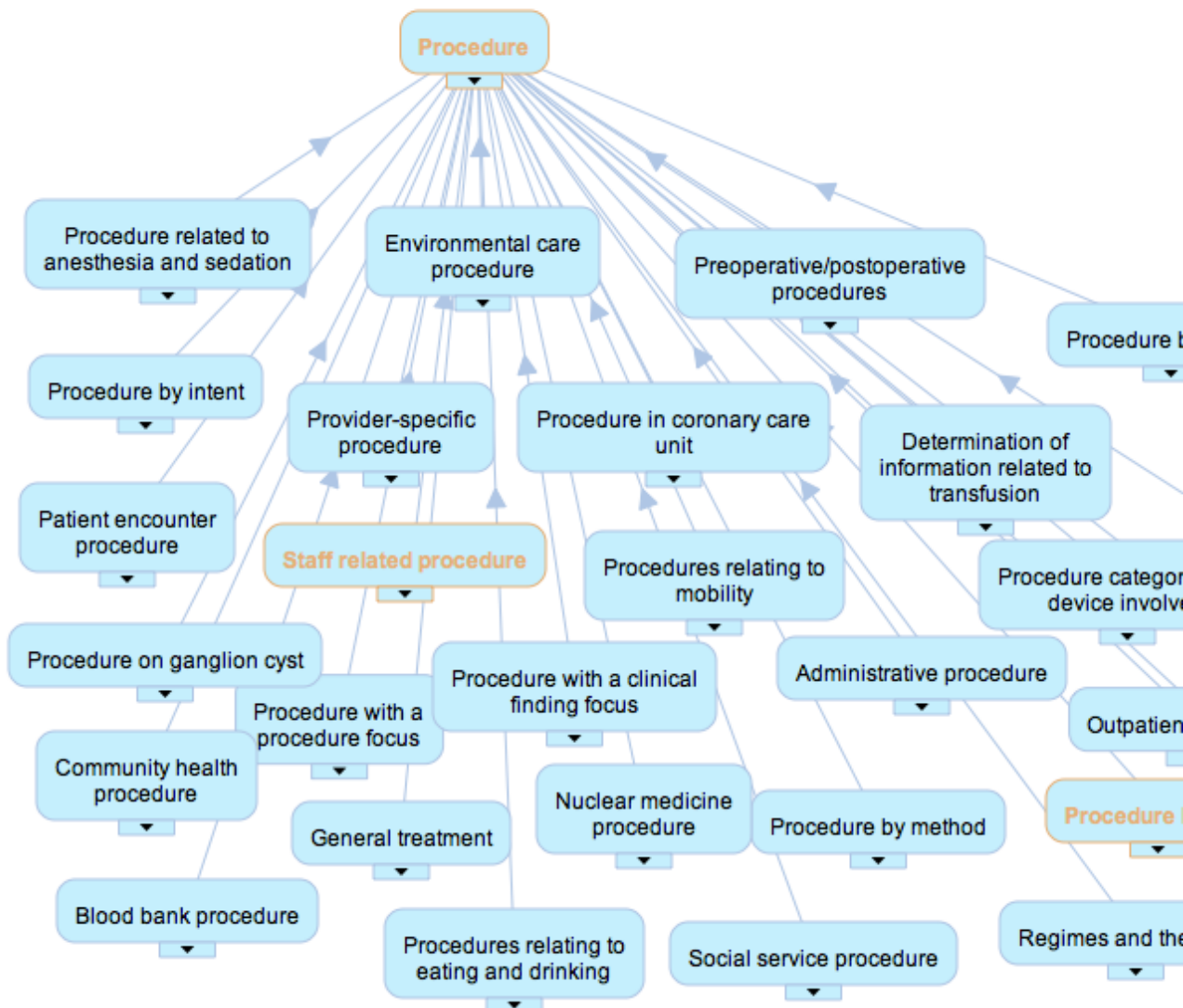
Terms ▾

Jump To:

Details Visualization Notes (0) Term Mappings (31) Term Resources

path to root ▾

- ⊕ Body structure
- ⊕ Clinical finding
- ⊕ Environment or geographical location
- ⊕ Event
- ⊕ Linkage concept
- ⊕ Observable entity
- ⊕ Organism
- ⊕ Pharmaceutical / biologic product
- ⊕ Physical force
- ⊕ Physical object
- ⊖ **Procedure**
  - ⊕ Administrative procedure
  - ⊕ Blood bank procedure
  - ⊕ Community health procedure
  - ⊕ Determination of information related to transfusion
  - ⊕ Environmental care procedure
  - ⋯ General treatment
  - ⊕ Laboratory procedure
  - ⊕ Nuclear medicine procedure
  - ⊕ Obstetric procedure
  - ⋯ Outpatient procedure
  - ⊕ Patient encounter procedure
  - ⊕ Preoperative/postoperative procedures
  - ⊕ Procedure by intent
  - ⊕ Procedure by method
  - ⊕ Procedure by priority
  - ⊕ Procedure by site
  - ⊕ Procedure categorized by device involved
  - ⋯ Procedure in coronary care unit
  - ⊕ Procedure on ganglion cyst
  - ⊕ Procedure related to anesthesia and sedation
  - ⊕ Procedure related to breastfeeding
  - ⊕ Procedure with a clinical finding focus



# The National Center for Biomedical Ontology

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





## Of Current Interest

- ▶ **News:** Discovery Informatics Symposium: The Role of AI Research in Innovating Scientific Processes, Nov. 2-4
- ▶ **Webinar:** Wed, Oct 17, 10:00am PDT, Knowledge Organization System (KOS) for biodiversity information resources
- ▶ **Recent Publication:** Harpaz, R, et al. (2012): Novel Data-Mining Methodologies for Adverse Drug Event Discovery and Analysis
- ▶ **Recent Release:** BioPortal 3.10 (July 2012)
- ▶ **NCBO Webinar Announcements - Subscribe**
- ▶ **NCBO Software Support - Mailing List Archive**
- ▶ **More News & Events**

[Follow us on Twitter](#)

## NCBO User Profile

**Jin-Dong Kim**

Database Center for Life Science

[More >](#)[Other profiles >](#)

## Video

Learn about Biomedical Ontologies. Watch a series of introductory videos.



## Browse ontologies in BioPortal!

BioPortal allows users to browse, search and visualize ontologies.



## National Center for Biomedical Ontology

### Community


[Learning About Ontologies](#)[Dissemination & Training](#)[NCBO Collaborations](#)[Forum, Blog Publications](#)

### Technology

[Ontology Library](#)[Go to BioPortal](#)[Data Annotation](#)[Go to Annotator](#)[Ontology Development](#)[Go to Protégé](#)[Data Access Using Ontologies](#)[Go to Resource Index](#)



# BioPortal Ontology Repository

Welcome to BioPortal! For help using BioPortal, click on this icon: 

## Search all ontologies

Enter term, e.g. Melanoma

Search

[Advanced Search](#)

## Find an ontology

Enter ontology name, e.g. NCI Thesauru

Explore

[Browse Ontologies >](#)

## Most Viewed Ontologies (September, 2012)

Ontology	Views
<a href="#">National Drug File</a>	7025
<a href="#">SNOMED Clinical Terms</a>	4430
<a href="#">MedDRA</a>	3520
<a href="#">International Classification of Diseases</a>	3133
<a href="#">NCI Thesaurus</a>	1332

## Statistics

Ontologies	326
Terms	5,496,375
Resources Indexed	27
Indexed Records	4,566,805
Direct Annotations	2,036,458,468
Direct Plus Expanded Annotations	15,231,854,602

## Latest Notes

[Suggest synonym removal \(Human disease ontology\)](#) 5 days ago by ceyockey  
Suggest removing "cancer of prostate" as a synonym and associate this with the present term's par...

[Please use the tracker for this ontology to make notes \(Zebrafish anatomy and development\)](#) 13 days ago by cervis  
Please make comments, new term requests, issue reports etc for this ontology using the official t...

[Languages \(BRENDA tissue / enzyme source\)](#) 17 days ago by anonymous  
does the ontology contain terms in different languages?

[Terms \(BRENDA tissue / enzyme source\)](#) 17 days ago by anonymous  
How many terms does the BTO include?

[Please use the tracker for this ontology to make notes \(Uber anatomy ontology\)](#) 17 days ago by cmungall  
Please make comments, new term requests, issue reports etc for this ontology using the official t...

# Browse

Browse the library of ontologies [?](#)

**New:** [Configure](#) which ontologies you see in BioPortal

FILTER BY CATEGORY	All Categories
FILTER BY GROUP <a href="#">?</a>	All Groups
FILTER BY TEXT	<input type="text"/>

[Submit New Ontology](#)

 [Subscribe to all updates](#)

ONTOLOGY NAME	▲ VISIBILITY	TERMS	NOTES	REVIEWS	PROJECTS	UPLOADED	CONTACT
<a href="#">ABA Adult Mouse Brain (ABA)</a>	<a href="#">Public</a>	<a href="#">913</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">7</a>	08/08/2009	Allen Institute for Brain Science
<a href="#">Adverse Event Reporting ontology (AERO)</a>	<a href="#">Public</a>	<a href="#">374</a>	<a href="#">1</a>	<a href="#">0</a>	<a href="#">3</a>	11/13/2012	Melanie Courtot
<a href="#">African Traditional Medicine (ATMO)</a>	<a href="#">Public</a>	<a href="#">223</a>	<a href="#">2</a>	<a href="#">2</a>	<a href="#">4</a>	06/28/2009	Ghislain Atemezang
<a href="#">AI/RHEUM (AIR)</a>	<a href="#">Public</a>	<a href="#">681</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">2</a>	02/05/2010	May Cheh
<a href="#">Amino Acid (amino-acid)</a>	<a href="#">Public</a>	<a href="#">46</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">5</a>	07/02/2010	Nick Drummond, Georgina Moulton, Robert Stevens, Phil Lord
<a href="#">Amphibian gross anatomy (AAO)</a>	<a href="#">Public</a>	<a href="#">1,603</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">5</a>	07/22/2011	David Blackburn
<a href="#">Amphibian taxonomy (ATO)</a>	<a href="#">Public</a>	<a href="#">6,135</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">3</a>	11/02/2009	AmphiAnat list
<a href="#">Anatomical Entity Ontology (AEO)</a>	<a href="#">Public</a>	<a href="#">250</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">3</a>	06/01/2012	EMAP Administrators
<a href="#">Animal natural history and life history (ADW)</a>	<a href="#">Public</a>	<a href="#">360</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">2</a>	08/31/2010	Animal Diversity Web technical staff
<a href="#">apollo-akesios (apollo)</a>	<a href="#">Public</a>	<a href="#">3</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">1</a>	09/30/2010	Jeremy Espino
<a href="#">Ascomycete phenotype ontology (APO)</a>	<a href="#">Public</a>	<a href="#">328</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">4</a>	03/01/2012	SGD curators
<a href="#">Basic Formal Ontology (BFO)</a>	<a href="#">Public</a>	<a href="#">39</a>	<a href="#">0</a>	<a href="#">1</a>	<a href="#">21</a>	07/24/2009	Holger Stenzhorn
<a href="#">Basic Vertebrate Anatomy (basic-vertebrate-gross-anatomy)</a>	<a href="#">Public</a>	<a href="#">99</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">4</a>	01/16/2007	
<a href="#">Bilateria anatomy (BILA)</a>	<a href="#">Public</a>	<a href="#">114</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">4</a>	03/03/2010	Thorsten Heinrich
<a href="#">Bio-health ontological knowledge base- cystic fibrosis (OntoKBCF)</a>	<a href="#">Public</a>	<a href="#">405</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">3</a>	09/18/2012	Xia Jing
<a href="#">BioAssay Ontology (BAO)</a>	<a href="#">Public</a>	<a href="#">1,292</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">7</a>	04/12/2012	Stephan Schurer
<a href="#">Bioinformatics operations, types of data, data formats and topics (EDAM)</a>	<a href="#">Public</a>	<a href="#">2,719</a>	<a href="#">0</a>	<a href="#">2</a>	<a href="#">6</a>	07/05/2012	Jon Ison
<a href="#">Bioinformatics Web Service Ontology (OBIws)</a>	<a href="#">Public</a>	<a href="#">195</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">1</a>	07/17/2012	jie zheng
<a href="#">Biological imaging methods (FBbi)</a>	<a href="#">Public</a>	<a href="#">624</a>	<a href="#">0</a>	<a href="#">0</a>	<a href="#">6</a>	06/09/2011	Chris Woodcock
<a href="#">Biomedical Resource Ontology (BRO)</a>	<a href="#">Public</a>	<a href="#">484</a>	<a href="#">72</a>	<a href="#">1</a>	<a href="#">8</a>	08/31/2010	Trish Whetzel, Csongor Nyulas, Natasha



# Gene Ontology

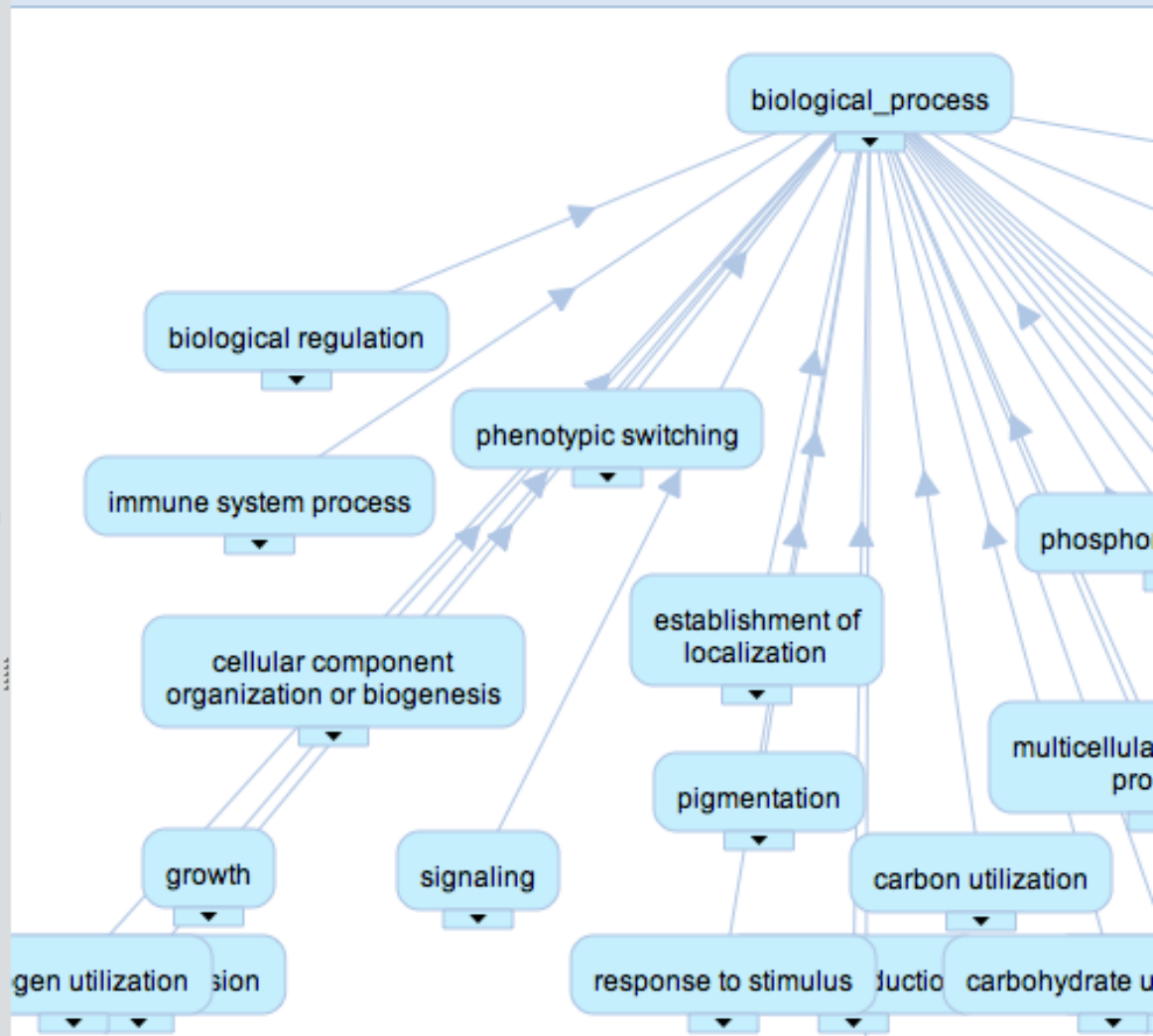
Terms ▾

Jump To:

Details Visualization Notes (0) Term Mappings (31) Term Resources

path to root ▾

- ⊕ biological\_process
- ⊕ cellular\_component
- ⊖ molecular\_function
  - ⊕ ⓘ antioxidant activity
  - ⊕ ⓘ binding
  - ⊕ ⓘ catalytic activity
  - ⊕ ⓘ channel regulator activity
  - ⊕ ⓘ chemoattractant activity
  - ⊕ ⓘ chemorepellent activity
  - ⊕ ⓘ electron carrier activity
  - ⊕ ⓘ enzyme regulator activity
  - ⊕ ⓘ metallochaperone activity
  - ⊕ ⓘ molecular transducer activity
  - ⊕ ⓘ morphogen activity
  - ⊕ ⓘ nucleic acid binding transcription factor activity
  - ⊕ ⓘ nutrient reservoir activity
  - ⊕ ⓘ protein binding transcription factor activity
  - ⊕ ⓘ protein tag
  - ⊕ ⓘ receptor activity
  - ⊕ ⓘ receptor regulator activity
  - ⊕ ⓘ structural molecule activity
  - ⊕ ⓘ translation regulator activity
  - ⊕ ⓘ transporter activity





# Community Comments in BioPortal

The screenshot displays the BioPortal interface. On the left is a hierarchical tree of terms, with 'osseous' selected under 'disc composition'. The main content area shows a 'Notes (1)' tab with a table of comments. The comment is titled 'does not fit to taxonomy' by user 'daumkep' on 03/08/2011. The comment text discusses the classification of 'osseus' and suggests a better terminology practice. Below the comment is a 'Responses' section with one reply from 'beverlycollins' agreeing with the comment and suggesting a move to the 'composition' class.

Details Visualization **Notes (1)** Mappings (6) Resource Index

Show  entries [Filtering Options](#)

SUBJECT	AUTHOR	TYPE	CREATED
<b>does not fit to taxonomy</b>	<b>daumkep</b>	<b>Comment</b>	<b>03/08/2011</b>

**does not fit to taxonomy** Archive Note

Comment submitted by **daumkep** 5 months ago on [osseous](#) in [RadLex](#)

Hi all, to my view, "osseus" does not really fit as a child of "disc composition" as it can appear in many other contexts. A good terminology practice would be to name the preferred terms in a unique way, e.g. "osseus disc composition" and put the term "osseous" on a place such as Qualifier "value->Appearance->osseous". What do you think? All the best Philipp

**Responses** [hide all](#) | [show all](#)

**Agree** by [beverlycollins](#) 5 months ago

Thanks, Philipp, we agree that the terms in this category more correctly belong in the "composition" class. We will move them there and move the class "disc composition" to Obsolete Radlex terms, since this term does not seem necessary. Beverly

[reply](#)

**Add Reply**

Showing 1 to 1 of 1 entries  
[First](#) [Previous](#) **1** [Next](#) [Last](#)

# Users can view and create mappings

BioPortal Browse Search Mappings Recommender Annotator Resource Index Projects Recently Viewed Sign In Help Feedback

## SNOMED Clinical Terms Terms ▾

Jump To:

- Body structure
- Clinical finding
  - Administrative statuses
  - Adverse incident outcome categories
  - Bleeding
  - Calculus finding
  - Clinical history and observation findings
  - Clinical stage finding
  - Cyanosis
  - Deformity
  - Disease
  - Drug action
  - Drug interaction**
    - Adverse drug interaction
      - Drug interaction potentiation
    - Drug interaction with alcohol
    - Drug interaction with drug
    - Drug interaction with food
  - Edema
  - Effect of exposure to physical force
  - Enzyme activity finding
  - Erythema
  - Evaluation finding
  - Fetal finding
  - Finding by method
  - Finding by site
  - Finding of grade
  - Finding related to physiologic substance
  - Finding reported by subject or history provider
  - General clinical state finding
  - Jaundice
  - Neurological finding
  - Parosmia

Details Visualization Notes (0) **Term Mappings (21)** Term Resources

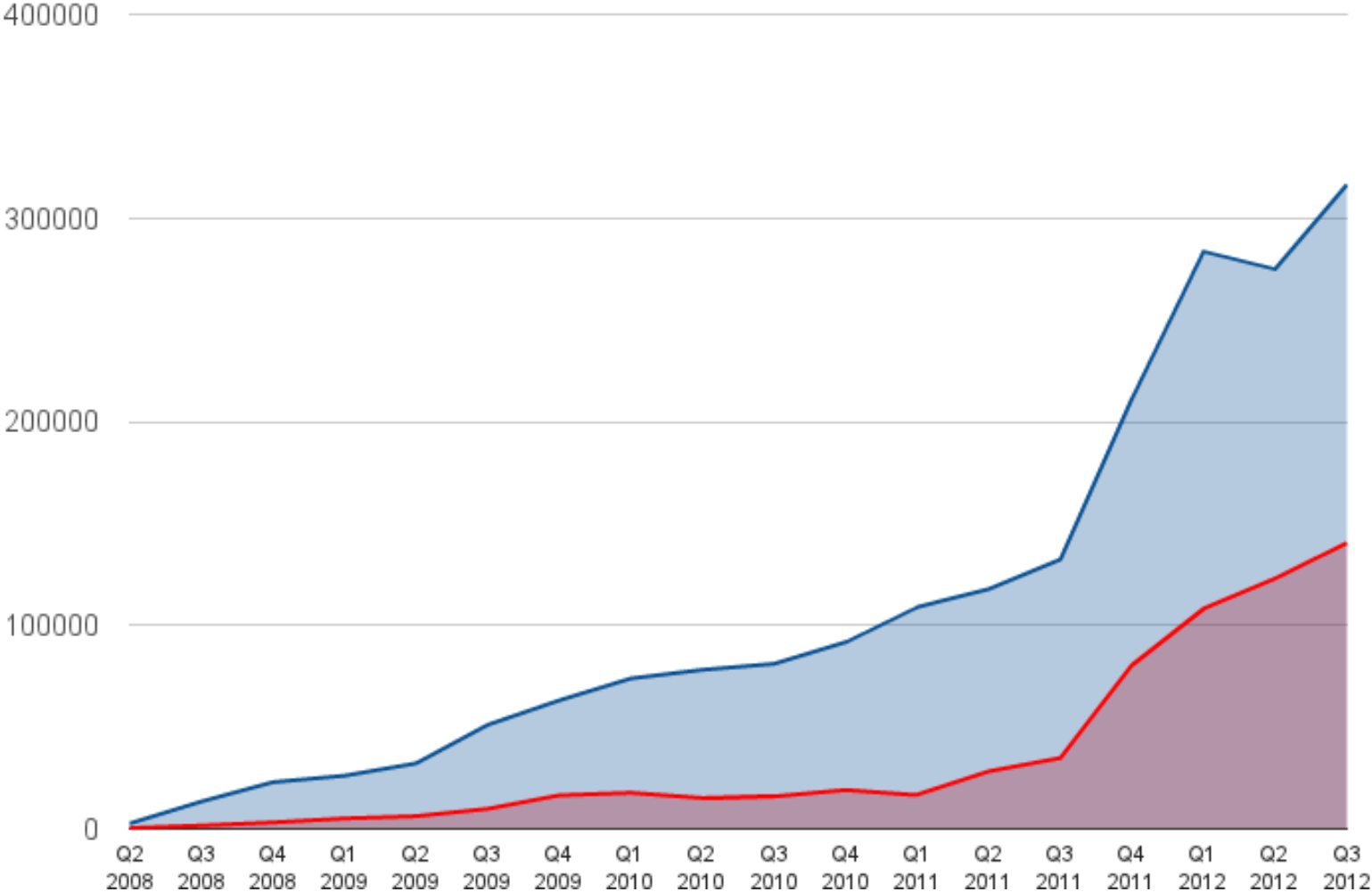
[Create New Mapping](#)

MAPPING TO	ONTOLOGY	SOURCE	COMMENT	RELATIONSHIP	ADDED BY	ADDED ON	NOTES
<a href="#">drug interaction</a>	<a href="#">CRISP Thesaurus, 2006</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">http://purl.bioontology.org/ontology/MEDLINEPLUS/T5603</a>	<a href="#">MedlinePlus Health Topics</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">interaction drug (NOS)</a>	<a href="#">MedDRA</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">Drug interaction (NOS)</a>	<a href="#">MedDRA</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">Drug interaction</a>	<a href="#">MedDRA</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">DRUG INTERACTION</a>	<a href="#">COSTART</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">drug interaction</a>	<a href="#">Translational Medicine Ontology</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">Drug_Interaction</a>	<a href="#">DIKB-Evidence-Ontology</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">Drug Interactions</a>	<a href="#">Medical Subject Headings (MeSH)</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">Interactions</a>	<a href="#">MedDRA</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">Drug interaction</a>	<a href="#">Read Codes, Clinical Terms Version 3 (CTV3)</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">other drug interaction</a>	<a href="#">Protein-protein interaction</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">interaction</a>	<a href="#">MedDRA</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">Drug interaction NOS</a>	<a href="#">MedDRA</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>
<a href="#">drug interaction</a>	<a href="#">CRISP Thesaurus, 2006</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">DrugInteraction</a>	<a href="#">Galen</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">Drug Interaction</a>	<a href="#">NCI Thesaurus</a>	<a href="#">NCBO (lexical mapping)</a>		<a href="#">skos:closeMatch</a>	loom	11/04/12	<a href="#">View Notes</a>
<a href="#">Drug Interactions</a>	<a href="#">Medical Subject Headings (MeSH)</a>	<a href="#">NLM UMLS (CUI)</a>	CUI: C0687133	<a href="#">skos:closeMatch</a>	loom	11/05/12	<a href="#">View Notes</a>

# BioPortal Traffic – Volume

BioPortal UI Traffic (per quarter, excluding Stanford)

Unique Visitors Pageviews





# BioPortal UI Traffic – Top Users

Thomson Financial

Japan Network Information Center

Department of Veterans Affairs

National Health Service (UK)

University of British Columbia

University of Florida

MRC Human Genome Mapping Project Resource Centre

University of California, San Diego

Mayo Foundation for Medical Education and Research

University of California, Davis

University of Pennsylvania

# 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

# Annotator

Get annotations for biomedical text with terms from the ontologies [?](#)

[insert sample text](#)

Cyclic nucleotide phosphodiesterases (PDEs) are enzymes that regulate the cellular levels of the second messengers, cAMP and cGMP, by controlling their rates of degradation. There are 11 different PDE families, with each family typically having several different isoforms and splice variants. These unique PDEs differ in their three-dimensional structure, kinetic properties, modes of regulation, cellular expression, and inhibitor sensitivities. Current data suggest that individual isozymes modulate distinct regulatory pathways in the cell.

## Select Ontologies

[clear selection](#)

[select from list](#)

## Select UMLS Semantic Types

Include Mappings:  Automatic  Manual

Include Ancestors Up To Level:

[Get Annotations](#)



# Annotator

Get annotations for biomedical text with terms from the ontologies ?

insert sample text

Cyclic nucleotide phosphodiesterases (PDEs) are enzymes that regulate the cellular levels of the second messengers, cAMP and cGMP, by controlling their rates of degradation. There are 11 different PDE families, with each family typically having several different isoforms and splice variants. These unique PDEs differ in their three-dimensional structure, kinetic properties, modes of regulation, cellular expression, and inhibitor sensitivities. Current data suggest that individual isozymes modulate distinct regulatory pathways in the cell.



Get Annotations

## Annotations

total results 5 (direct 2 / ancestor 3)

TERM <small>filter</small>	ONTOLOGY <small>filter</small>	TYPE <small>filter</small>	CONTEXT	MATCHED TERM <small>filter</small>	MATCHED ONTOLOGY
<a href="#">cell</a>	<a href="#">Gene Ontology</a>	direct	regulatory pathways in the <b>cell</b>	<a href="#">cell</a>	<a href="#">Gene Ontology</a>
<a href="#">metabolic process</a>	<a href="#">Gene Ontology</a>	ancestor	controlling their rates of <b>degradation</b> . There are 11 different	<a href="#">catabolic process</a>	<a href="#">Gene Ontology</a>
<a href="#">cellular component</a>	<a href="#">Gene Ontology</a>	ancestor	regulatory pathways in the <b>cell</b>	<a href="#">cell</a>	<a href="#">Gene Ontology</a>
<a href="#">catabolic process</a>	<a href="#">Gene Ontology</a>	direct	controlling their rates of <b>degradation</b> . There are 11 different	<a href="#">catabolic process</a>	<a href="#">Gene Ontology</a>
<a href="#">biological process</a>	<a href="#">Gene Ontology</a>	ancestor	controlling their rates of <b>degradation</b> . There are 11 different	<a href="#">catabolic process</a>	<a href="#">Gene Ontology</a>

# NCBO Annotator

- Typically called as Web service by client programs
- Takes as input some text; generates as output links between the text and terms in any or all NCBO ontologies
- Enables high-throughput
  - Annotation of textual metadata
  - Text mining of electronic medical records
  - Concept-based indexing and retrieval of online data sets



## Search Resource Index

Search biomedical resources [?](#)

Start typing to find terms to search the index with

Search Resource Index

[select ontologies to search](#)

## Available Resources

RESOURCE ▲	DESCRIPTION
<a href="#">AgingGenesDB (via NIF)</a>	This database provides a searchable and browsable list of aging related genes and their effects ... <a href="#">[more]</a>
<a href="#">ArrayExpress</a>	ArrayExpress is a public repository for microarray data, which is aimed at storing MIAME-compli ... <a href="#">[more]</a>
<a href="#">ARRS GoldMiner</a>	ARRS GoldMiner provides instant access to images published in selected peer-reviewed radiology ... <a href="#">[more]</a>
<a href="#">Biositemaps</a>	Biositemaps represent a mechanism for computational biologists and bio-informaticians to openly ... <a href="#">[more]</a>
<a href="#">caNanoLab</a>	caNanoLab is a data sharing portal designed to facilitate information sharing in the biomedical ... <a href="#">[more]</a>
<a href="#">Cell Centered Database (via NIF)</a>	The Cell Centered Database is a publicly accessible resource for high resolution 2D, 3D and 4D ... <a href="#">[more]</a>
<a href="#">ClinicalTrials.gov</a>	ClinicalTrials.gov provides regularly updated information about federally and privately support ... <a href="#">[more]</a>
<a href="#">Conserved Domain Database (CDD)</a>	The Conserved Domain Database (CDD) contains protein domain models imported from outside source ... <a href="#">[more]</a>
<a href="#">Database of Genotypes and Phenotypes</a>	The database of Genotypes and Phenotypes (dbGaP) was developed to archive and distribute the re ... <a href="#">[more]</a>
<a href="#">DrugBank</a>	DrugBank is offered to the public as a freely available resource. Use and re-distribution of th ... <a href="#">[more]</a>
<a href="#">Gene Expression Omnibus DataSets</a>	A gene expression/molecular abundance repository supporting MIAME compliant data submissions, ... <a href="#">[more]</a>
<a href="#">MICAD</a>	Molecular Imaging and Contrast Agent Database
<a href="#">ModelDB (via NIF)</a>	ModelDB provides an accessible location for storing and efficiently retrieving computational ne ... <a href="#">[more]</a>
<a href="#">Online Mendelian Inheritance in Man</a>	OMIM is a comprehensive, authoritative, and timely compendium of human genes and genetic phenot ... <a href="#">[more]</a>
<a href="#">Pathway Commons</a>	Pathway Commons is a convenient point of access to biological pathway information collected fro ... <a href="#">[more]</a>





## Of Current Interest

- ▶ **News:** Discovery Informatics Symposium: The Role of AI Research in Innovating Scientific Processes, Nov. 2-4
- ▶ **Webinar:** Wed, Oct 17, 10:00am PDT, Knowledge Organization System (KOS) for biodiversity information resources
- ▶ **Recent Publication:** Harpaz, R, et al. (2012): Novel Data-Mining Methodologies for Adverse Drug Event Discovery and Analysis
- ▶ **Recent Release:** BioPortal 3.10 (July 2012)
- ▶ **NCBO Webinar Announcements - Subscribe**
- ▶ **NCBO Software Support - Mailing List Archive**
- ▶ **More News & Events**

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## NCBO User Profile

**Jin-Dong Kim**

Database Center for Life Science

[More >](#)[Other profiles >](#)

## Video

Learn about Biomedical Ontologies. Watch a series of introductory videos.



## Browse ontologies in BioPortal!

BioPortal allows users to browse, search and visualize ontologies.



## National Center for Biomedical Ontology

### Community

[Learning About Ontologies](#)[Dissemination & Training](#)[NCBO Collaborations](#)[Forum, Blog Publications](#)

### Technology

[Ontology Library](#)[Go to BioPortal](#)[Data Annotation](#)[Go to Annotator](#)[Ontology Development](#)[Go to Protégé](#)[Data Access Using Ontologies](#)[Go to Resource Index](#)

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

File Edit View History Bookmarks Tools Help

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# Word Add-in For Ontology Recognition

CodePlex  
Open Source Community

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Search Wiki

## 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 documented 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 NCBO

### Downloads

Current release:  
Technology Preview - March 2009  
Tue Mar 10 2009, Alpha

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

Done

<http://ucsdbiolit.codeplex.com>

# ECG Gadget uses NCBO services

The screenshot displays the CVRG Grid Node web application interface. The main window shows a navigation bar with 'Back', 'Forward', 'Refresh', 'Stop', and 'Compile/Browse' buttons. Below the navigation bar is the URL: `http://localhost:8888/org.cvrgrid.widgets.node.NodeWidget/NodeWidget.html`. The main content area features the 'CardioVascular Research Grid' logo and a sidebar with options: 'Connect', 'Store', 'Visualize', 'Analyze', and 'Review'. The 'Visualize' section is active, showing an ECG waveform for 'Lead II' with a peak amplitude of -69 mV. A red box highlights the annotation: 'A. MN Code 1-1-1 Q/R amplitude ratio  $\geq 1/3$ , plus Q duration  $\geq 0.03$  sec.' Below the waveform, there are controls for 'Scroll Down' and 'Annotate'. A modal dialog box is open, showing the 'Time & Amplitude' section with 'Second: 1 .00', the 'Ontology' section with 'MN Code 1-1-1', and the 'Annotation' section with the text: 'Q/R amplitude ratio  $\geq 1/3$ , plus Q duration  $\geq 0.03$  sec.' At the bottom of the dialog are 'Save', 'Delete', and 'Close' buttons. The bottom status bar of the application shows 'Done'.

# Elsevier SciVerse uses NCBO technology for ontology-based IR

The screenshot displays the Elsevier SciVerse search interface for the term "atherosclerosis". The search results page shows approximately 109,863 results. The results list includes:

- Atherosclerosis (arteriosclerosis - hardening of the arteries)**  
<http://www.netdoctor.co.uk/diseases/facts/atheroscler...>, December 2010  
...Home / Heart and blood / Heart health **Atherosclerosis** (arteriosclerosis - hardening of...consultant cardiologist What is **atherosclerosis**? Term watch What is an artery? An...arteries carry blood to the heart. **Atherosclerosis** refers to the build up of fatty deposits...
- Applications of Nanotechnology to Atherosclerosis, Thrombosis, and Vascular Biology -- Wickline et al. 26 (3): 435 -- Arteriosclerosis, Thrombosis, and Vascular Biology**  
<http://atvb.ahajournals.org/cgi/content/full/26/3/435>, September 2010  
...differentiation Fibrinogen/fibrin Mechanism of **atherosclerosis**/growth factors Arteriosclerosis...Applications of Nanotechnology to **Atherosclerosis**, Thrombosis, and Vascular Biology...have been applied to the arenas of **atherosclerosis**, thrombosis, and vascular biology...
- Atherosclerosis - Overview**  
<http://www.umm.edu/ency/article/000171.htm>, September 2010  
...Your Heart Maryland Heart Center Our Doctors **Atherosclerosis** - Overview Overview Symptom Treatment Prevention...arteries Plaque buildup - arteries Definition of **Atherosclerosis**: **Atherosclerosis** is a condition in which fatty material collects

The ODISSea application window is open, showing the following recognized terms found in the query:

- atherosclerosis
- atherosclerosis (& [nos])
- arteriosclerotic vascular disease nos
- coronary atherosclerosis
- heart disease: [arteriosclerotic] or [chronic ischemic nos]
- generalized atherosclerosis
- arteriosclerotic vascular disease
- vascular sclerosis
- arteriosclerosis
- ischemic heart disease

Buttons for "See all terms & resources" and "About ODiSSea" are visible at the bottom of the application window.



# 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.

# Collaborations with other NCBCs

- **Simbios** uses NCBO Web widgets for accessing ontology-derived value sets
- **I2b2** uses NCBO ontology repository to build its ontology “hive”
- NCBO Annotator uses *mgrep* named-entity recognizer from **NCIBI**
- **NA-MIC** Slicer system uses NCBO for semantic annotation of images
- NCBO has collaborated with **CCB** and **NCIBI** to develop BioSitemaps

# “Collaborating R01” Program

- Nine NIH-funded collaborations with NCBO to date
- Collaborators have benefitted from
  - Early access to NCBO technology to enable their research
  - Opportunity to shape some of our work
- NCBO has benefitted from
  - Continuous feedback on our work
  - Actual code that we have incorporated into our technology (e.g., support for ontology “views”)

# Driving Biological Projects (DBPs)

- Nine DBPs supported by NCBO to date
- DBPs allow NCBO to target “applications pull”
- Lots of important contributions
  - Structural visualization of clinical-trial results
  - Tool for annotating electrophysiological signals
  - Concept-based search of data regarding therapeutic nanoparticles in caNanoLab
  - Annotation of microarray data in Array Express
  - General-purpose tool for ontology-based enrichment analysis



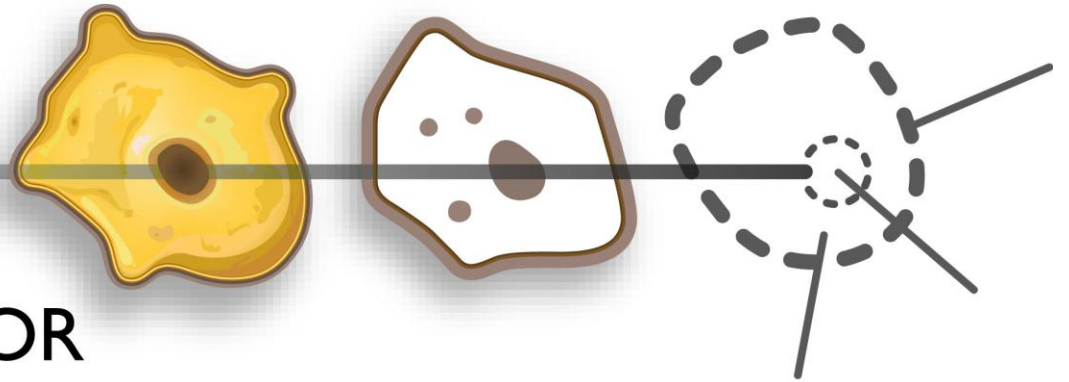
# Our initial proposal did not predict ...

- The exponential increase in the use of semantic technology in biomedicine
- The huge user community that NCBO would attract
- The time that it would take for our technology to become sufficiently robust for other investigators to stake their success on us
- All the applications that investigators would find for our technology
- That people would take us for granted

# The National Center for Biomedical Ontology

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





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<http://bioontology.org>