

# Novel methods for sharing and integrating web based data

John Wilbanks

Science Commons / Creative Commons

cyberinfrastructure is a technological solution to the problem of efficiently connecting data, computers, and people with the goal of enabling derivation of novel scientific theories and knowledge.

(wikipedia)

# Google™

Google Search

I'm Feeling Lucky

[Advanced Search](#)  
[Preferences](#)  
[Language Tools](#)

[Advertising Programs](#) - [Business Solutions](#) - [About Google](#)

©2007 Google

“find me genes involved in signal transduction that are related to pyramidal neurons”

## [Book results for pyramidal neurons signal transduction](#)



[Cerebral Signal Transduction](#) - by Maarten Eduard Anton Reith - 440 pages

[Neuroprotective Signal Transduction](#) - by Mark Paul. Mattson - 347 pages

[Toxins And Signal Transduction](#) - by Yehuda Gutman, Philip Lazarovici - 520 pages

### [Neurotrophin-3 and brain-derived neurotrophic factor activate ...](#)

... and brain-derived neurotrophic factor activate multiple **signal transduction** events but are not survival factors for hippocampal **pyramidal neurons**. ...

[www.ihop-net.org/UniPub/iHOP/pm/646092.html?pmid=8752100](http://www.ihop-net.org/UniPub/iHOP/pm/646092.html?pmid=8752100) - 12k -

[Cached](#) - [Similar pages](#) - [Note this](#)

### [K+ channel regulation of signal propagation in dendrites of ...](#)

**Pyramidal neurons** receive tens of thousands of synaptic inputs on their dendrites. ...

**Signal Transduction\*** Substances Potassium Channel Blockers ...

[www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=9202119&dopt=Abstract)

[db=PubMed&list\\_uids=9202119&dopt=Abstract](#) - [Similar pages](#) - [Note this](#)

### [Dopamine modulates inwardly rectifying potassium currents in ...](#)

Using outside-out patches of mPFC **pyramidal neurons**, which preclude involvement of ...

**Signal Transduction**/drug effects **Signal Transduction**/physiology ...

[www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=15044547&dopt=Abstract)

[db=PubMed&list\\_uids=15044547&dopt=Abstract](#) - [Similar pages](#) - [Note this](#)

[ [More results from www.ncbi.nlm.nih.gov](#) ]

### [Loss of Hippocampal CA3 Pyramidal Neurons in Mice Lacking STAM1 ...](#)

Loss of Hippocampal CA3 **Pyramidal Neurons** in Mice Lacking STAM1 ... and to be involved in the regulation of intracellular **signal transduction** mediated by ...

[mcb.asm.org/cgi/content/abstract/21/11/3807](http://mcb.asm.org/cgi/content/abstract/21/11/3807) - [Similar pages](#) - [Note this](#)

for signal transduction pyramidal neurons

Go

Clear

[Save Search](#)

Limits

Preview/Index

History

Clipboard

Details

Display Summary

Show

20

Sort By

Send to


All: 2580

Review: 160

Items 1 - 20 of 2580

Page 1 of 129 Next


1: [Naimark A, Barkai E, Matar MA, Kaplan Z, Kozlovsky N, Cohen H.](#) [Related Articles, Links](#)

 Upregulation of neurotrophic factors selectively in frontal cortex in response to olfactory discrimination learning.

Neural Plast. 2007;:13427.

PMID: 17710248 [PubMed - in process]


2: [Nistico R, Piccirilli S, Sebastianelli L, Nistico G, Bernardi G, Mercuri NB.](#) [Related Articles, Links](#)

 The blockade of K(+)-ATP channels has neuroprotective effects in an in vitro model of brain ischemia.

Int Rev Neurobiol. 2007;82:383-95.

PMID: 17678973 [PubMed - indexed for MEDLINE]


3: [Schmidt-Hieber C, Jonas P, Bischofberger J.](#) [Related Articles, Links](#)

 Subthreshold dendritic signal processing and coincidence detection in dentate gyrus granule cells.

J Neurosci. 2007 Aug 1;27(31):8430-41.

PMID: 17670990 [PubMed - indexed for MEDLINE]

4: [Alvarez VA, Ridenour DA, Sabatini BL.](#) [Related Articles, Links](#)







 Distinct structural and ionotropic roles of NMDA receptors in controlling spine and synapse stability.







J Neurosci. 2007 Jul 11;27(28):7365-76.



























PMID: 17626197 [PubMed - indexed for MEDLINE]



























5: [Smith SS, Gong QH.](#) [Related Articles, Links](#)



2580		<b>PubMed:</b> biomedical literature citations and abstracts	
959		<b>PubMed Central:</b> free, full text journal articles	
none		<b>Site Search:</b> NCBI web and FTP sites	

2		<b>Books:</b> online books	
4		<b>OMIM:</b> online Mendelian Inheritance in Man	
none		<b>OMIA:</b> online Mendelian Inheritance in Animals	

10		<b>CoreNucleotide:</b> Core subset of nucleotide sequence records	
none		<b>EST:</b> Expressed Sequence Tag records	
34		<b>GSS:</b> Genome Survey Sequence records	
16		<b>Protein:</b> sequence database	
5		<b>Genome:</b> whole genome sequences	
none		<b>Structure:</b> three-dimensional macromolecular structures	
none		<b>Taxonomy:</b> organisms in GenBank	
none		<b>SNP:</b> single nucleotide polymorphism	
35		<b>Gene:</b> gene-centered information	
10		<b>HomoloGene:</b> eukaryotic homology groups	
none		<b>PubChem Compound:</b> unique small molecule chemical structures	
none		<b>PubChem Substance:</b> deposited chemical substance records	
none		<b>Genome Project:</b> genome project information	

2		<b>dbGaP:</b> genotype and phenotype	
none		<b>UniGene:</b> gene-oriented clusters of transcript sequences	
none		<b>CDD:</b> conserved protein domain database	
none		<b>3D Domains:</b> domains from Entrez Structure	
none		<b>UniSTS:</b> markers and mapping data	
none		<b>PopSet:</b> population study data sets	
none		<b>GEO Profiles:</b> expression and molecular abundance profiles	
none		<b>GEO DataSets:</b> experimental sets of GEO data	
none		<b>Cancer Chromosomes:</b> cytogenetic databases	
none		<b>PubChem BioAssay:</b> bioactivity screens of chemical substances	
none		<b>GENSAT:</b> gene expression atlas of mouse central nervous system	
none		<b>Probe:</b> sequence-specific reagents	
1394		<b>Protein Clusters:</b> a collection of related protein sequences	

## A Gateway to Neuroscience Resources on the Web

### Databases List

[Home](#)

[Background Resources](#)

- [Experimental data](#)
- [Knowledge bases](#)
- [Software tools](#)
- [Bioinformatics](#)
- [Materials](#)
- [Links](#)
- [All Databases](#)

[Linked fields](#)  
[Browse](#)  
[Search](#)



[1] 2

[Show all](#)

[Previous](#) [Next](#)

#### Name/ Description/ URL

- |    |  |
|----|--|
| 1  | <a href="#">a7 Database</a><br>Biological aspects of alpha7 subunit of the nicotinic acetylcholine receptor<br><a href="http://www.lgics.org/a7db/">http://www.lgics.org/a7db/</a>                               |
| 2  | <a href="#">Allen Brain Atlas</a><br>Map of the Mouse Brain<br><a href="http://www.brain-map.org">http://www.brain-map.org</a>   |
| 3  | <a href="#">ALZForum</a><br>Alzheimer Research Forum<br><a href="http://www.alzforum.org/">http://www.alzforum.org/</a>  |
| 4  | <a href="#">Alzheimer's Research Center</a><br>Resource to disseminate information related to Alzheimer's Disease<br><a href="http://www.mcg.edu/centers/Alz/arc.htm">http://www.mcg.edu/centers/Alz/arc.htm</a> |
| 5  | <a href="#">Array Express-European Bioinformatics Institute</a><br>Public Repository of Microarray Data<br><a href="http://www.ebi.ac.uk/arrayexpress/">http://www.ebi.ac.uk/arrayexpress/</a>                   |
| 6  | <a href="#">ASTD</a><br>Audimotor Spike Train Database<br><a href="http://repositories.cdlib.org/mrrc/1">http://repositories.cdlib.org/mrrc/1</a>  |
| 8  | <a href="#">BAMS</a><br>Brain Architecture Management System (BAMS)<br><a href="http://brancusi.usc.edu/bkms">http://brancusi.usc.edu/bkms</a>   |
| 9  | <a href="#">BayGenomics</a><br>BayGenomics<br><a href="http://baygenomics.ucsf.edu/">http://baygenomics.ucsf.edu/</a>  |
| 10 | <a href="#">BCDB</a>   |



the Neurocommons:  
cyberinfrastructure proof of concept

“find me genes involved in signal transduction that are related to pyramidal neurons”

**Gene  
Ontology**

Reactome

PDSPki

Antibodies

**Entrez  
Gene**

BAMS

NeuronDB

Literature

SWAN

**Allen Brain  
Atlas**

BrainPharm

Homologene

Literature

SWAN

AlzGene

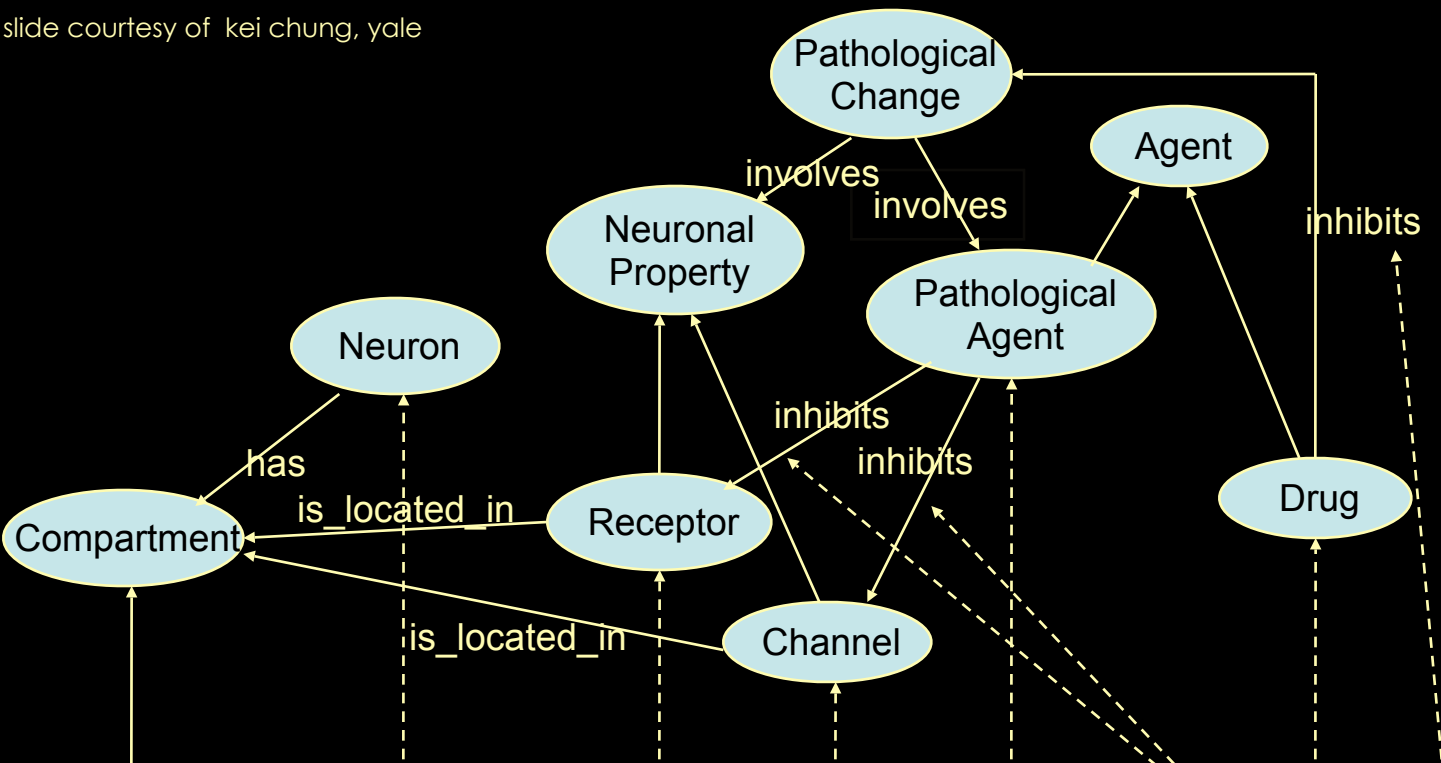
Homologene

**MESH**

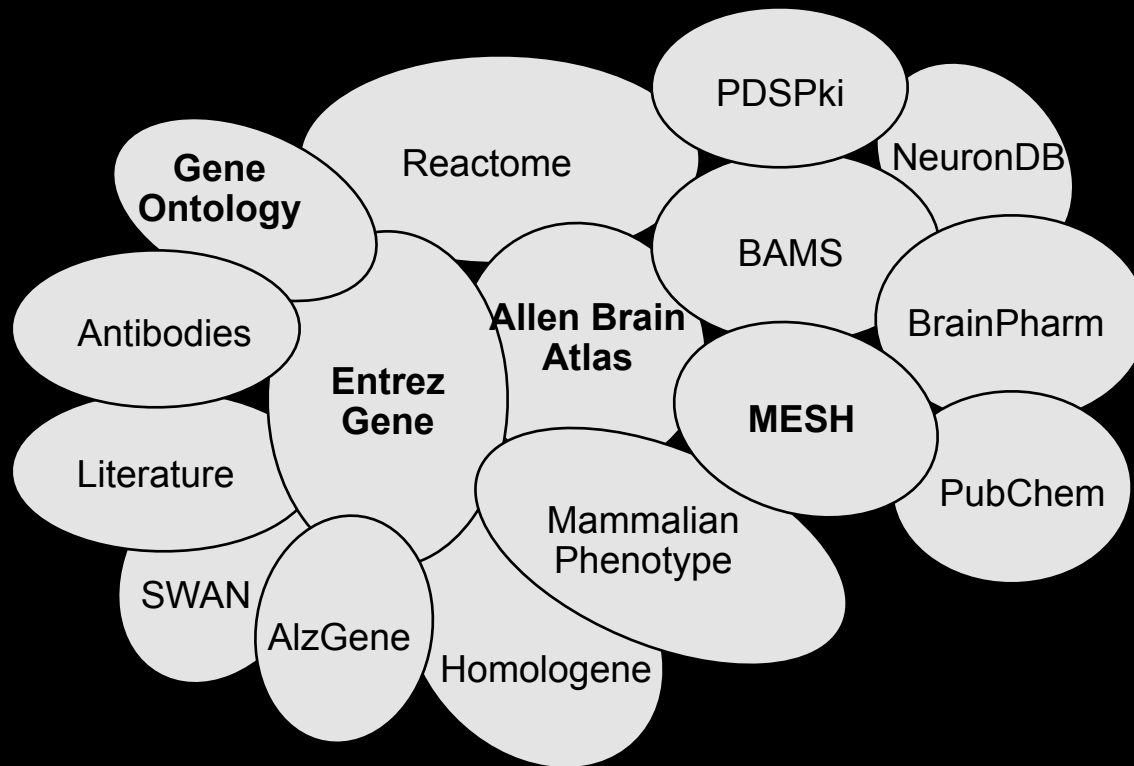
PubChem

Mammalian  
Phenotype

slide courtesy of kei chung, yale



Compartment	Cell: NeuronDB	Receptor	Channel	Pathological Agent (PA)	PA Action	Drug	Drug Action	Stage	Note	Detail
Soma	<a href="#">CA1 pyramidal neuron</a>		<a href="#">I A</a>	<a href="#">beta Amyloid</a>	<a href="#">Inhibits</a>			<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66240</a>
	<a href="#">Olfactory bulb mitral cell</a>	<a href="#">GabaA</a>						<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66750</a>
Dendrite	<a href="#">CA1 pyramidal neuron</a>		<a href="#">I A</a>	<a href="#">beta Amyloid</a>	<a href="#">Inhibits</a>			<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66240</a>
	<a href="#">Olfactory bulb mitral cell</a>	<a href="#">GabaA</a>						<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66750</a>
Unspecified	<a href="#">Oocyte</a>		<a href="#">I L high threshold</a>	<a href="#">beta Amyloid</a>	<a href="#">Inhibits</a>			<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66252</a>
								<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66753</a>
	<a href="#">CA1 pyramidal neuron</a>			<a href="#">beta Amyloid</a>	<a href="#">Inhibits</a>			<a href="#">Early</a>	<a href="#">View</a>	<a href="#">66758</a>
	<a href="#">CA1 pyramidal neuron</a>	<a href="#">NMDA</a>	<a href="#">I Calcium</a>	<a href="#">beta Amyloid</a>	<a href="#">Inhibits</a>		<a href="#">Inhibits</a>		<a href="#">View</a>	<a href="#">66250</a>



# running code: semantic web query / four open government data sources

```
prefix go: <http://purl.org/obo/owl/GO#>
prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
prefix owl: <http://www.w3.org/2002/07/owl#>
prefix mesh: <http://purl.org/commons/record/mesh/>
prefix sc: <http://purl.org/science/owl/sciencecommons/>
prefix ro: <http://www.obofoundry.org/ro/ro.owl#>

select ?genename ?processname
where
{
  graph <http://purl.org/commons/hcls/pubmesh>
  {
    ?paper ?p mesh:D017966 .
    ?article sc:identified_by_pmid ?paper.
    ?gene sc:describes_gene_or_gene_product_mentioned_by ?article.
  }
  graph <http://purl.org/commons/hcls/goa>
  {
    ?protein rdfs:subClassOf ?res.
    ?res owl:onProperty ro:has_function.
    ?res owl:someValuesFrom ?res2.
    ?res2 owl:onProperty ro:realized_as.
    ?res2 owl:someValuesFrom ?process.
  }
  graph <http://purl.org/commons/hcls/20070416/classrelations>
  {{{?process <http://purl.org/obo/owl/obo#part_of> go:GO_0007166}
  union
  {?process rdfs:subClassOf go:GO_0007166 }}
  ?protein rdfs:subClassOf ?parent.
  ?parent owl:equivalentClass ?res3.
  ?res3 owl:hasValue ?gene.
  }
  graph <http://purl.org/commons/hcls/gene>
  { ?gene rdfs:label ?genename }
  graph <http://purl.org/commons/hcls/20070416>
  { ?process rdfs:label ?processname }
}
```

Mesh: Pyramidal Neurons



Pubmed: Journal Articles



Entrez Gene: Genes



GO: Signal Transduction



DRD1, 1812  
ADRB2, 154  
ADRB2, 154  
DRD1P, 50632  
DRD1, 1812  
DRD2, 1813  
GRM7, 2917  
GNG3, 2785  
GNG12, 55970  
DRD2, 1813  
ADRB2, 154  
CALM3, 808  
HTR2A, 3356  
DRD1, 1812  
SSTR5, 6755  
MTNR1A, 4543  
CNR2, 1269  
HTR6, 3362  
GRIK2, 2898  
GRIN1, 2902  
GRIN2A, 2903  
GRIN2B, 2904  
ADAM10, 102  
GRM7, 2917  
LRP1, 4035  
ADAM10, 102  
ASCL1, 429  
HTR2A, 3356  
ADRB2, 154  
PTPRG, 5793  
EPHA4, 2043  
NRTN, 4902  
CTNND1, 1500

adenylate cyclase activation  
adenylate cyclase activation  
arrestin mediated desensitization of G-protein coupled receptor protein signaling pathway  
dopamine receptor signaling pathway  
dopamine receptor, adenylate cyclase activating pathway  
dopamine receptor, adenylate cyclase inhibiting pathway  
G-protein coupled receptor protein signaling pathway  
G-protein coupled receptor protein signaling pathway  
G-protein coupled receptor protein signaling pathway  
G-protein coupled receptor protein signaling pathway  
G-protein coupled receptor protein signaling pathway  
G-protein coupled receptor protein signaling pathway  
G-protein signaling, coupled to cyclic nucleotide second messenger  
G-protein signaling, coupled to cyclic nucleotide second messenger  
G-protein signaling, coupled to cyclic nucleotide second messenger  
G-protein signaling, coupled to cyclic nucleotide second messenger  
G-protein signaling, coupled to cyclic nucleotide second messenger  
glutamate signaling pathway  
glutamate signaling pathway  
glutamate signaling pathway  
glutamate signaling pathway  
integrin-mediated signaling pathway  
negative regulation of adenylate cyclase activity  
negative regulation of Wnt receptor signaling pathway  
Notch receptor processing  
Notch signaling pathway  
serotonin receptor signaling pathway  
transmembrane receptor protein tyrosine kinase activation (dimerization)  
transmembrane receptor protein tyrosine kinase signaling pathway  
transmembrane receptor protein tyrosine kinase signaling pathway  
transmembrane receptor protein tyrosine kinase signaling pathway  
Wnt receptor signaling pathway

Many of the genes are  
indeed related to  
Alzheimer's Disease  
through gamma  
secretase (presenilin)  
activity

Default Graph:

SPARQL Query

```
?res2 owl:someValuesFrom ?process.  
graph <http://purl.org/commons/hcls/20070416/classrelations>  
  {{?process <http://purl.org/obo/owl/obo#part_of> go:GO_0007166}  
  union  
  {?process rdfs:subClassOf go:GO_0007166 }}  
  ?protein rdfs:subClassOf ?parent.  
  ?parent owl:equivalentClass ?res3.  
  ?res3 owl:hasValue ?gene.  
  }  
graph <http://purl.org/commons/hcls/gene>  
  { ?gene rdfs:label ?genename }  
graph <http://purl.org/commons/hcls/20070416>  
  { ?process rdfs:label ?processname }  
}
```

Output format  Max Rows

Retrieve remote RDF data for all missing source graphs

```
POST /sparql/? HTTP 1.1  
Host: ashby.csail.mit.edu:8890  
Accept: text/html  
Content-Type: application/x-www-form-urlencoded  
Content-Length: 2074  
  
query=prefix%20go%3A%20%3Chttp%3A%2F%2Fpurl.org%2Fobo%2Fowl%2FGO%23%3E%0Aprefix%20rdfs%3A%20%3Chttp%3A%2F%2Fw
```



The image shows a screenshot of a web browser window. The address bar contains the file path: `file:///Users/johnwilbanks/Desktop/saved%20queries.html`. Below the address bar, there are several browser tabs: "Start Stumbling...", "HCLS & Neurocommon...", "QuickGO: Search results", "Editing PubMed Plus in...", "Google Reader (1)", and "Neuroco...". The main content area of the browser displays the text "Saved Queries: Neurocommons" followed by a blue, underlined hyperlink: [Show me all signal transduction genes on the cell surface in pyramidal neurons](#).

Saved Queries: Neurocommons

[Show me all signal transduction genes on the cell surface in pyramidal neurons](#)

[QuickGO home](#)[GO Annotation home](#)[Documentation](#)Search:  ▾ ▾ 

protein, 5 go term(s) in total were found: [ process (1) function (4) component (0) ]

Name	GO ID
<a href="#">ribosomal protein import into nucleus</a>	<a href="#">GO:0006610</a>
<a href="#">ribosomal protein S6 kinase activity</a>	<a href="#">GO:0004711</a>
<a href="#">structural constituent of ribosome</a>	<a href="#">GO:0003735</a>
<a href="#">ribosomal-protein-alanine N-acetyltransferase activity</a>	<a href="#">GO:0008999</a>
<a href="#">unfolded protein binding</a>	<a href="#">GO:0051082</a>

GO term, or to display multiple terms in context select checkboxes and press a view button below.

 context

# National Library of Medicine - Medical Subject Headings

2007 MeSH

## MeSH Descriptor Data

[Return to Entry Page](#)

Standard View. [Go to Concept View](#); [Go to Expanded Concept View](#)

<b>MeSH Heading</b>	Neoplasms
<b>Tree Number</b>	<a href="#">C04</a>
<b>Annotation</b>	avoid: too general; prefer specifics; policy: Manual section 24; / <a href="#">chem ind</a> permitted but consider also <a href="#">CARCINOGENESIS</a> ; / <a href="#">class</a> : consider also <a href="#">NEOPLASM STAGING</a> (see note there) but "grading" = / <a href="#">pathol</a> ; / <a href="#">etiol</a> : consider also <a href="#">ONCOGENIC VIRUSES</a> ; / <a href="#">vet</a> : Manual 24.6+ or TN 136; TN 135: MeSH terms for neoplasms classed by tissue; / <a href="#">drug ther</a> : consider also <a href="#">ANTINEOPLASTIC AGENTS</a> & its specifics; / <a href="#">genet</a> : consider also <a href="#">GENES, TUMOR SUPPRESSOR</a> / <a href="#">immunol</a> : consider also <a href="#">TUMOR ESCAPE</a> ; consider also <a href="#">ANTIGENS, NEOPLASM &amp; ANTIBODIES, NEOPLASM</a> ; / <a href="#">microbiol</a> : consider also <a href="#">ONCOGENIC VIRUSES</a> ; / <a href="#">nurs</a> = the patient, <a href="#">ONCOLOGIC NURSING</a> = the oncologic specialty; / <a href="#">prev</a> : consider also <a href="#">ANTICARCINOGENIC AGENTS</a> ; / <a href="#">radiother</a> = the patient, <a href="#">RADIATION ONCOLOGY</a> = the specialty; consider also <a href="#">BRACHYTHERAPY</a> ; / <a href="#">secord</a> : consider also <a href="#">NEOPLASM METASTASIS</a> but do not confuse with <a href="#">NEOPLASMS, SECOND PRIMARY</a> ; familial: consider <a href="#">NEOPLASTIC SYNDROMES, HEREDITARY</a> ; metastatic cancer of unknown origin: index under <a href="#">NEOPLASMS, METASTASIS</a> ; Tumor Key: TN Suppl
<b>Scope Note</b>	New abnormal growth of tissue. Malignant neoplasms show a greater degree of anaplasia and have the properties of invasion and metastasis, compared to benign neoplasms.
<b>Entry Term</b>	Benign Neoplasms
<b>Entry Term</b>	Cancer
<b>Entry Term</b>	Neoplasms, Benign
<b>Entry Term</b>	Tumors
<b>See Also</b>	<a href="#">Antibodies, Neoplasm</a>
<b>See Also</b>	<a href="#">Anticarcinogenic Agents</a>



# the “view source” effect

```
prefix go: <http://purl.org/obo/owl/GO#>
prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
prefix owl: <http://www.w3.org/2002/07/owl#>
prefix mesh: <http://purl.org/Commons/record/mesh/>
prefix sc: <http://purl.org/science/owl/sciencecommons/>
prefix ro: <http://www.obofoundry.org/ro/ro.owl#>
```

```
select ?genename ?processname
where
{ graph <http://purl.org/commons/hcls/pubmesh>
  { ?paper ?p mesh:D009369 .
    ?article sc:identified_by PMID ?paper.
    ?gene sc:describes_gene_or_gene_product_mentioned_by ?article.
  }
  graph <http://purl.org/commons/hcls/goa>
  { ?protein rdfs:subClassOf ?res.
    ?res owl:onProperty ro:has_function.
    ?res owl:someValuesFrom ?res2.
    ?res2 owl:onProperty ro:realized_as.
    ?res2 owl:someValuesFrom ?process.
  }
  graph <http://purl.org/commons/hcls/20070416/classrelations>
  {{{?process <http://purl.org/obo/owl/obo#part_of> go:GO_0007166}
  union
  {?process rdfs:subClassOf go:GO_0006610 }}
  ?protein rdfs:subClassOf ?parent.
  ?parent owl:equivalentClass ?res3.
  ?res3 owl:hasValue ?gene.
}
graph <http://purl.org/commons/hcls/gene>
{ ?gene rdfs:label ?genename }
graph <http://purl.org/commons/hcls/20070416>
{ ?process rdfs:label ?processname }
}
```

Mesh: Cancer

GO: Ribosomal Protein

file:///Users/johnwilbanks/Desktop/saved%20queries.html

Start Stumbling... or Sign-in

HCLS & Neurocommon... QuickGO: Search results Editing PubMed Plus in... Google Reader (1) Neuroco

Neurocommons - Saved Queries

Saved Queries: Neurocommons

[Show me all signal transduction genes on the cell surface in pyramidal neurons](#)

[Show me all ribosomal protein-coding genes in cancer development](#)

# Allen Brain Atlas Gene Expression Results

3 [entrez-gene-record](#) filtered from 26 originally ([reset](#))

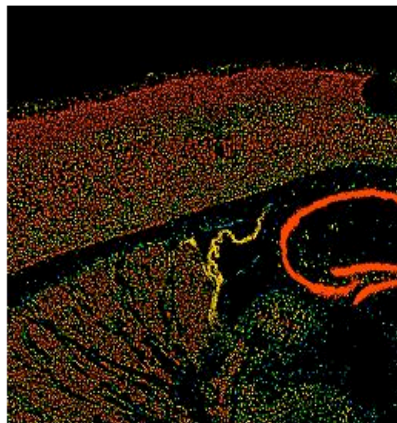
[Copy All](#)

sorted by: [hasName](#); then by...  grouped as sorted •  show duplicates

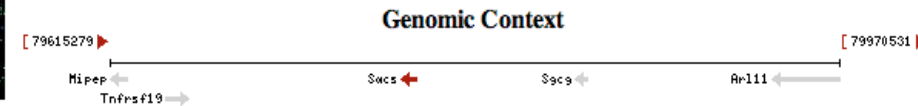
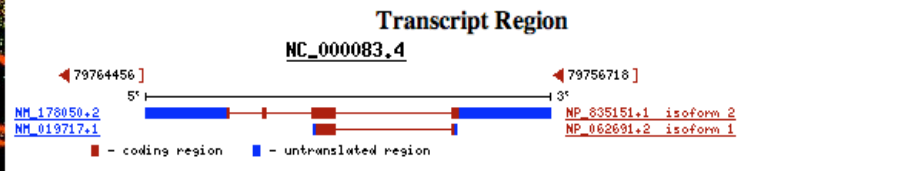
- hasName 3 ✓
- derecive
- 1b
- homolog
- (C.
- elegans)
- 1 ✓ apoptotic
- peptidas
- activatin
- factor 1



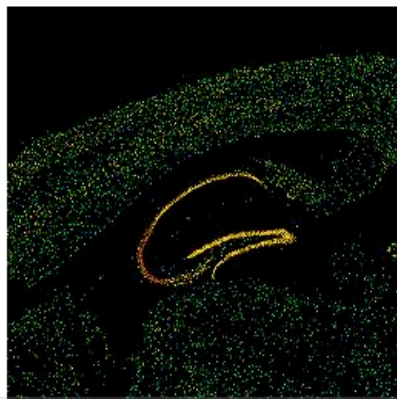
1.



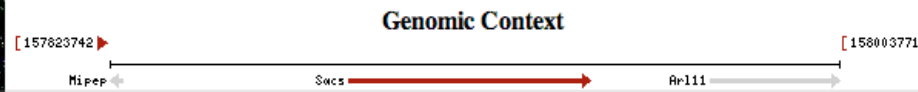
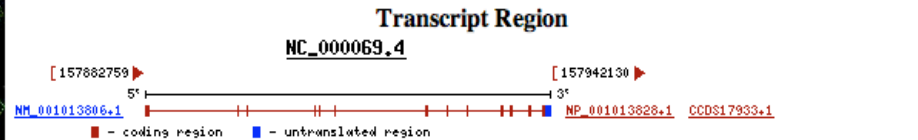
**56298**  
[Entrez-Gene 56298](#)  
**ADP-ribosylation factor-like 6 interacting protein 2**



2.



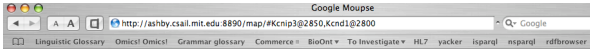
**433667**  
[Entrez-Gene 433667](#)  
**ankyrin repeat domain 13c**



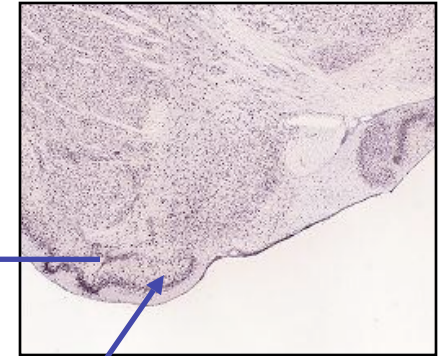
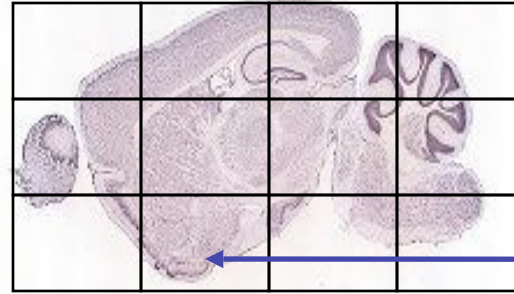
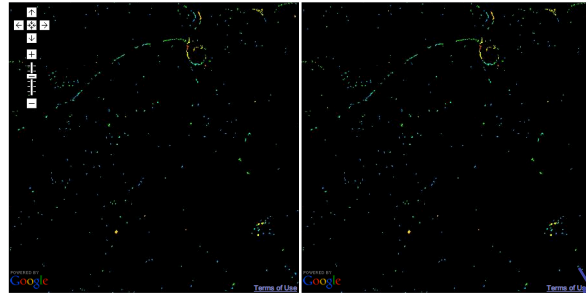
<http://hcls1.csail.mit.edu/map/#Kcnp3@2850,Kcnd1@2800>

# Javascript

# Allen Brain Institute Servers



- [documentation on google maps](#)
- [server side source code](#)
- [html source code](#)



[http://www.brainmap.org://...0205032816\\_B.aff/TileGroup3/1-0-1.jpg](http://www.brainmap.org://...0205032816_B.aff/TileGroup3/1-0-1.jpg)

SPARQL  
AJAX

Query

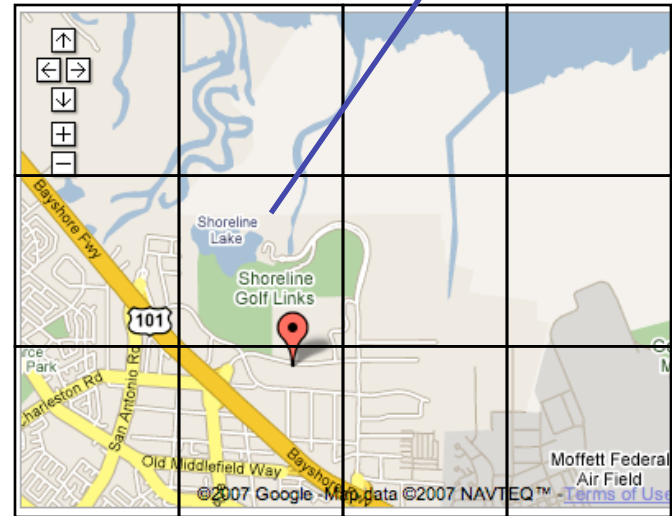


URL



Neurocommons Servers

Google  
Maps  
API



Windows desktop environment showing a web browser displaying the MBAT (Molecular Brain Atlas Tool) interface. The browser window is titled "ABA/NeuroCommons Query: Drd2".

The MBAT interface includes a "GeneExpression" section with the following query parameters:

- Data Source: GeneNetwork
- Strain: C57BL
- Gene Symbol: Drd2
- Gene Name: [Empty]

The "Query Results" section displays a table of results:

Source	User	Probe	Gene
GeneNetwork	rva	1418950	Drd2
GeneNetwork	rva	P111234	Drd2

Below the table, the "Probe 1418950" section shows a list of tissues and their corresponding expression levels:

Color	Name	Level	Database
[Red]	Caudoputamen	11.013	http://www...
[Blue]	EYE	8.863	http://www...
[Green]	WHOLE BRAIN	9.535520279	http://www...
[Blue]	WHOLE BRAIN	9.051	http://www...
[Blue]	Hippocampus	7.406	http://www...
[Blue]	KIDNEY	7.3	http://www...

The main visualization area shows a series of brain slices (Coronal and Sagittal) with gene expression data overlaid. The slices are labeled with positions: position 0, position 200, position 400, position 600, position 800, and position 1000. A vertical scale on the left indicates "Sagittal Level 1" from 0 to 77. The interface also includes a "Links go here" section with a "Links Help About" menu and a "Loading started." status bar at the bottom.



Default Graph:

SPARQL Query

```
prefix dc: <http://purl.org/dc/elements/1.1/>
prefix skos: <http://www.w3.org/2004/02/skos/core#>
prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>
prefix owl: <http://www.w3.org/2002/07/owl#>
prefix sc: <http://purl.org/science/owl/sciencecommons/>
prefix foaf: <http://xmlns.com/foaf/0.1/>
```

```
select distinct ?submeshname ?title ?plasmidname ?catalogpage ?generecname
  from <http://purl.org/commons/hcls/20070416>
  from <http://purl.org/commons/hcls/20070416/classrelations>
where
{
  # Alzheimer
  ?submesh skos:broader <http://purl.org/commons/record/mesh/D003704>.
```

Output format  Max Rows

Execution plan

Retrieve remote RDF data for all missing source graphs

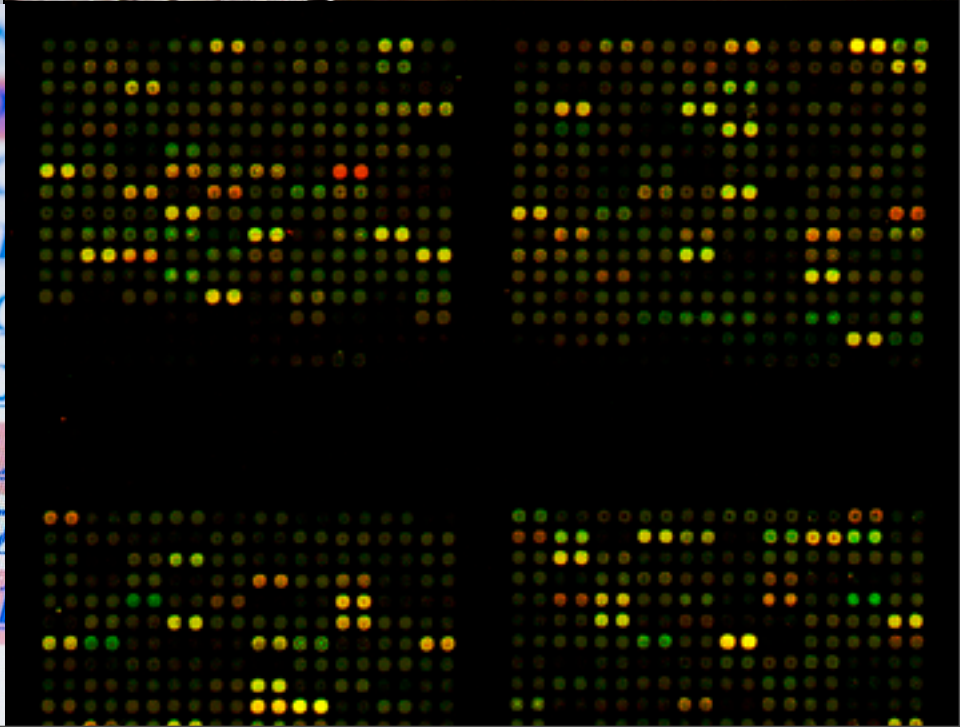
submeshname	title	plasmidname	catalogpage	generecname
Alzheimer Disease - metabolism	Nepriylsin regulates amyloid Beta peptide levels.	pCSC-SP-PW-Nep (aka: pBOB-NEP)	http://www.addgene.org/pgvec1	Entrez Gene record for mouse Mme, 17380
Alzheimer Disease - metabolism	Nepriylsin regulates amyloid Beta peptide levels.	pCSC-SP-PW-NepX (aka: pBOB-NEPX)	http://www.addgene.org/pgvec1	Entrez Gene record for mouse Mme, 17380
Huntington Disease - metabolism	Inaugural Article: A linear lattice model for polyglutamine in CAG-expansion diseases.	pET32a-HD16Q	http://www.addgene.org/pgvec1	Entrez Gene record for human HD, 3064
Huntington Disease - metabolism	Inaugural Article: A linear lattice model for polyglutamine in CAG-expansion diseases.	pET32a-HD25Q	http://www.addgene.org/pgvec1	Entrez Gene record for human HD, 3064
Huntington Disease - metabolism	Inaugural Article: A linear lattice model for polyglutamine in CAG-expansion diseases.	pET32a-HD39Q	http://www.addgene.org/pgvec1	Entrez Gene record for human HD, 3064



300,000,000+ RDF “triples”  
pre-formatted queries  
analytic software under BSD

available for download and mirroring

why was this so hard to do?



knowledge as “paper”  
knowledge as “product”

knowledge as “paper”  
knowledge as “product”

or

knowledge as “infrastructure”

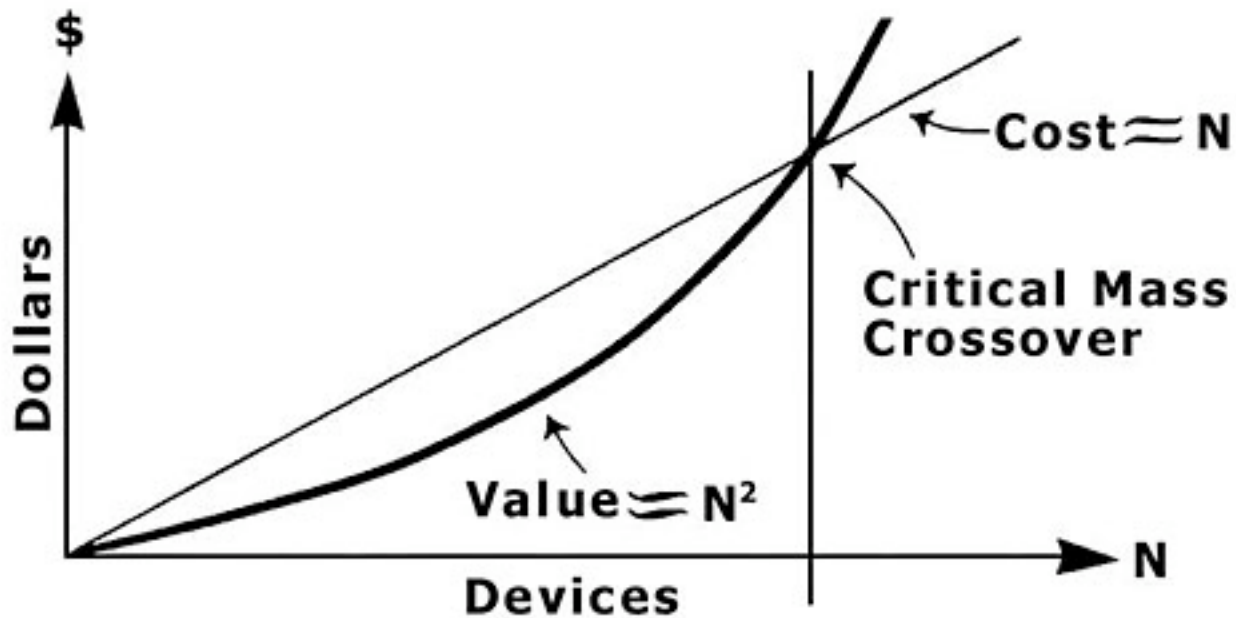
cyberinfrastructure requires:

open technical networks built on open standards and common names

knowledge sources that can be legally integrated with other knowledge sources

digital descriptions of physical research tools available under standard terms

**The Systemic Value of Compatibly Communicating Devices Grows as the Square of Their Number:**





thank you

<http://sw.neurocommons.org/>

<http://esw.w3.org/topic/HCLS/Banff2007Demo>

<http://hcls1.csail.mit.edu:8890/nsparql/>

<http://hcls1.csail.mit.edu:8890/map/#Kcnip3@2850,Kcnd1@2800>

<http://sciencecommons.org>