Pathway resources at the Rat Genome Database: a dynamic platform for integrating gene, pathway and disease information

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Rat Genome Database
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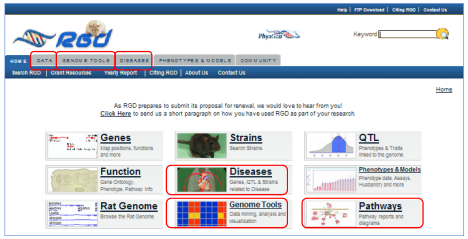
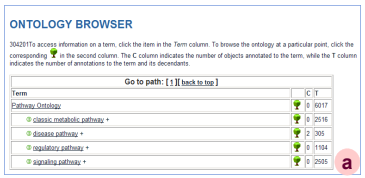
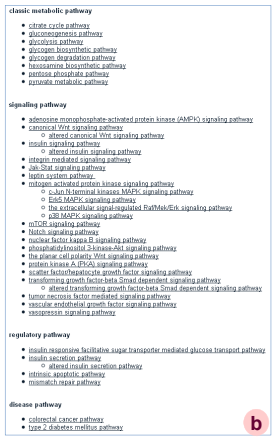
The Rat Genome Database offers comprehensive pathway data and visualization along with tools for easy access and navigation. Important for organizing and making data searchable is the Pathway Ontology (PW). The ontology provides a means to:
a) illustrate relationships and dependencies between pathway types;
b) standardize annotations of genes to pathway terms, including altered and disease pathways;
c) link to interactive pathway diagrams.
The diagrams can be accessed directly from the Pathway entry point of RGD homepage. Pathway terms can be searched using the Ontology Browser, Genome Viewer, keyword search or entries in the Disease Portals. The result is an ontology report with the rat, human and mouse genes annotated to the term. If available, the icon of an interactive pathway diagram is displayed and the diagram page can be accessed. Every diagram page provides links to gene report pages, lists for members of a family or target genes (individual entries link to gene report pages), PubChem entries for small molecules, Pfam entries for domains mentioned in the description, PubMed entries for cited references. Very importantly, links to pathways triggered by or connected to the pathway under investigation, or between a disease pathway and the underlying altered pathways, are provided. This latter feature allows users to 'travel' through the pathway landscape, explore how circuits connect to one another, how the altered version of a pathway differs from the normal one, or how malfunctioning pathways converge on a disease. Annotations and diagrams are based on the available review literature. The selection of pathways is made in conjunction with the Disease Portals project, the role the pathway plays within the global network of integrated circuits of the system or within major physiological pathways. Diagrams are built using the Pathway Studio software from Ariadne Genomics, version 6.0. The diagram pages are created using a Content Management System. The ontology and annotations are available for download from our ftp site.

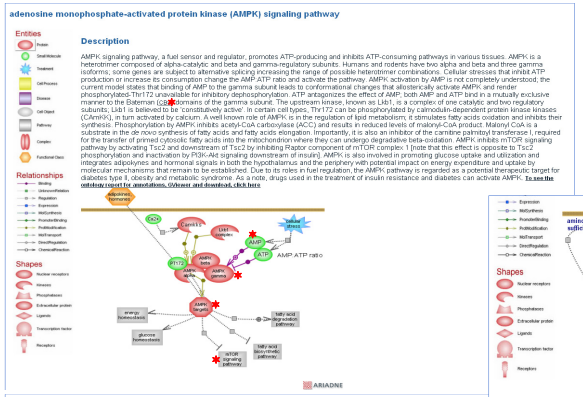


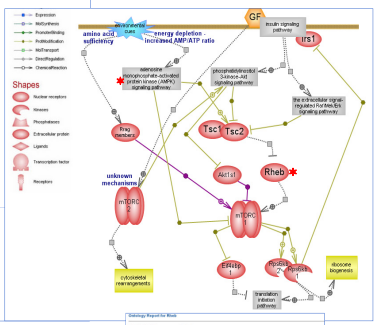


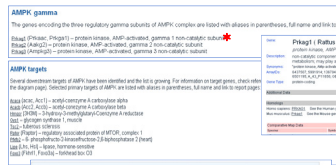
Pathway terms can be searched using the Ontology Browser from DATA, GViewer from Genome Tools, entries in the Disease Portals. Diagrams can be accessed from the ontology report or directly from the list in Pathways. The four nodes of the ontology (a); the list of interactive pathway diagrams - new diagrams are added on a regular basis (b)

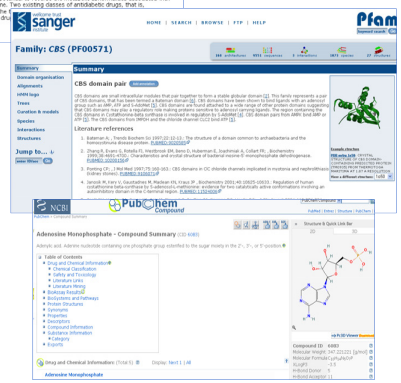
1





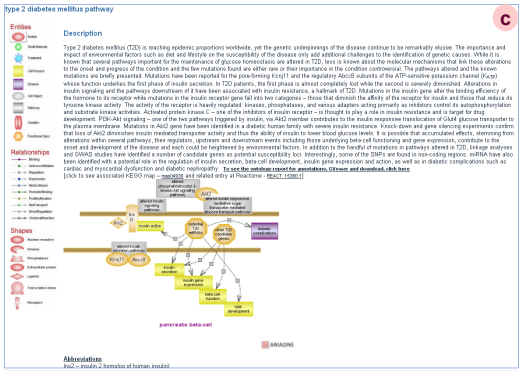


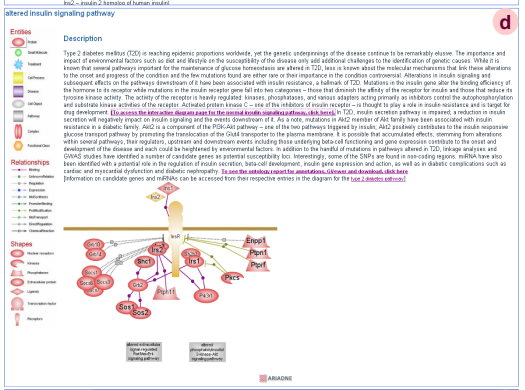


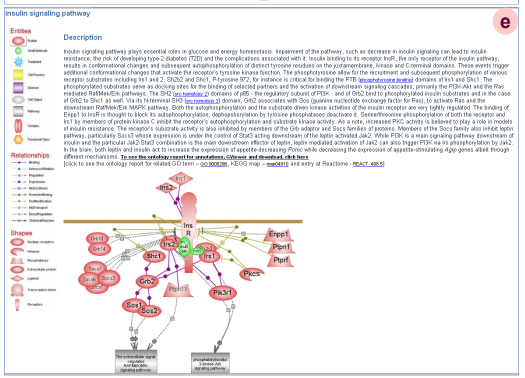


The anatomy of an interactive pathway diagram. The components of the diagram link to gene report pages or dynamic lists of genes, PubMed for cited references, Pfam for domains in the description, small molecules and to other pathways in the diagrams. Links shown are marked by the red star

2







Disease pathway and underlying altered pathways (c); an altered version of a pathway (d); its normal counterpart (e)

3

✱ From the main page one can directly select the "Pathways" entry point to get the list of available interactive diagrams and select one.

✱ From the main page one can choose DATA, Ontologies, select the 'pathway ontology', make a search and browse the vocabulary or get an Ontology Report for a pathway of interest. If there is a diagram, a link is provided from the icon displayed.

✱ From the main page, one can choose/go to Genome Tools and then GViewer to do ontology(ies) search or from "Diseases" go to one of the portals and select any of the entries listed within a category.

✱ An interactive diagram page provides a description, legend, the diagram itself with links to genes and other dynamic reports, abbreviations, references with links to PubMed, links to Pfam or PubChem databases for domains mentioned in the description or compounds in the diagram, links to other pathways and the .gpp file for Ariadne users.

✱ The ontology has entries for the altered version of a pathway and for disease pathways. Interactive disease pathway diagrams provide links to the underlying altered pathways. The user can go back and forth between disease and altered pathways or between the altered and normal version of a pathway. Note that culprit genes within an altered pathway are displayed in the disease pathway diagram and they are color-coded.

Would you like to explore in more detail the connections between genes and pathways, diseases and altered pathways, available links and navigational capabilities?
Visit us!
Would like to find pathway terms, annotations and/or diagrams not yet in the database?
Contact us!

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