Gene Ontology (GO) Extensions

A. Gene Summary Page GO Display

Gene Ontology Annotations for *ctnnA*

Molecular Function

beta-catenin binding **binds** aarA
beta-catenin binding **binds** Q02248
actin filament binding

Biological Process

mitotic cytokinesis **genetically interacts with** mhcA
protein secretion
sorocarp stalk development
culmination involved in sorocarp development
actin filament bundle assembly
positive regulation of cytoskeleton organization
centrosome localization
Golgi localization
establishment or maintenance of bipolar cell polarity
cellular protein localization **localizes** dcsA **during** sorocarp stalk development
cellular protein localization **localizes** rgaA, ctxA, mhcA **during** sorocarp stalk development
sorocarp stalk morphogenesis

Cellular Component

cell cortex
cell-cell junction
basal cortex **during** epithelial cell development **during** sorocarp stalk development

Annotation Extensions: Recently, the GO consortium developed annotation extensions, to add deeper information such as 'under what conditions' or 'during which developmental stage', a process, activity or localization occurs. This results in annotations that form sentence-like structures, providing a more complete answer to biological questions.

Left: **GO annotations displayed on the Gene Summary page**. This example depicts a gene, which contains **manual** annotations in each of the three GO aspects. When manual annotations are available, only those are shown on this page. See below for all GO annotations. The relations of the annotation extensions (such as **binds**, **during regulates**, **at**) are marked in black and bold.

B. GO Page Display

Gene Ontology Annotations for *p2xA*

All GO | Manual GO | Experimental GO | Electronic GO

Biological Process

GO term + Extension	Evidence	With	Reference	Date	Source
ATP-gated ion channel activity	IMP		Sivaramakrishnan & Fountain (2012)	21-02-2014	DDB
calcium ion transmembrane transport **requires** ATP	IGI	p2xA p2xC,p2xD,p2xE	Sivaramakrishnan & Fountain (2012)	21-02-2014	DDB
cation transport	IBA		Gaudet et. al (2010)	01-03-2011	GOC
cation transmembrane transport	IEA	UniProtKB-KW:KW-0406	GO_REF:0000037	25-04-2015	SPKW
cellular hypotonic response	IGI	p2xA,p2xC'p2xD,p2xE	Ludlow et. al (2009)	14-03-2014	DDB
ion transport	IDA		Ludlow et. al (2009)	10-03-2010	DDB
negative regulation of GTPase activity **regulates** rab11A	IDA		Parkinson et. al (2013)	22-04-2014	DDB
positive regulation of vesicle fusion **at** plasma membrane	IDA		Parkinson et. al (2013)	22-04-2014	DDB
regulation of calcium-mediated signaling	IGI	p2xA,p2xC'p2xD,p2xE	Ludlow et. al (2009)	14-03-2014	DDB
response to ATP	IEA	InterPro:IPR001429	GO_REF:0000002	25-04-2015	IPRO

Display of all annotations on the GO page. Only the Biological Process aspect is shown. At the top are tabs that allow easy filtering of annotations based on evidence code classes. This view shows a mixture of experimental annotations (IMP, IGI, IDA), manual annotations (all of the above plus IBA), and electronic annotations (IEA). GO terms and annotation extensions are found in the first column. In general, annotation extensions are associated with experimental annotations.