

Searching SGD and Navigating Gene Pages

Use SGD's Faceted Search and Locus Summary page to explore gene-specific information about RER2.

- Find a gene involved in protein glycosylation.
- Open the SGD homepage (<https://yeastgenome.org>). Search for “glycosylation”.
- From the categories (**facets**) in the left column, select the category **Genes**. This filters the results to genes that have the keyword “glycosylation” somewhere in their summaries and annotations.

The screenshot shows the SGD homepage with a search bar containing "glycosylation". The left sidebar has a facet for "Genes" highlighted with an orange arrow. The main content area shows 2,012 results for "glycosylation", with a detailed summary for "protein glycosylation" which is a Biological Process. It includes a definition, name, synonyms, and associated genes (61).

- Select more facets to further filter your results. Since we're interested in protein glycosylation, find **Biological Process** in the left column and select **protein glycosylation (direct)**.

The screenshot shows the SGD Locus Summary page for gene ALG8. The facet for "Biological Process" is highlighted with an orange arrow. The page displays 239 results for "glycosylation". The summary for ALG8 / YOR067C includes details about its function as a Glucosyl transferase and its role in N-linked glycosylation. Other genes listed include ALG1 / YBR110W and ALG13 / YGL047W.

- This filters for genes that are directly annotated to “protein glycosylation”. Terms without the “(direct)” suffix are annotated to either “protein glycosylation” or a more specific term, such as “protein N-linked glycosylation”.
- Let’s also filter for a specific enzymatic activity. Under **Molecular Function**, click on “Show more”. Find the term **dehydrodolichyl diphosphate synthase activity (direct)**.

calcium ion binding (direct)	3	ALG6 / YO
catalytic activity (direct)	3	Alpha 1,3 glucosidase; asparagine residue
dehydrodolichyl diphosphate synthase activity (direct)	3	name description ; molecular function; glycosylation /groups
hydrolase activity, acting on glycosyl bonds (direct)	3	summary: ALG6; glycosylation

- The results should now show 3 genes that have the following:
 - The keyword “glycosylation” somewhere in their summaries and annotations
 - A direct annotation to “protein glycosylation”
 - A direct annotation to “dehydrodolichyl diphosphate synthase activity”
- To see only the gene names (useful for many results) as shown in the figure, click on the **Wrapped** button above the list. The **Download** and **Analyze** buttons respectively allow you to save the list locally or send it to one of SGD’s tools for analysis. For now, click on RER2 to open its **Locus Summary page**.

3 results for **x "glycosylation"** **x protein glycosylation (direct)** **x Gene**
x dehydrodolichyl diphosphate synthase activity (direct)

Download **Analyze** **List** **Wrapped**

Genetic loci that are not mapped to the genome sequence will be excluded from the analysis list.

	NUS1	SRT1	RER2
transferase activity	3		
transferase activity (direct)	3		
transferase activity, transferring alkyl or aryl (other than methyl) groups (direct)	3		

Explore *S. cerevisiae* RER2 Locus Summary page.

You can scroll down and up the page, or you can jump to a specific section using the content table in upper left corner. Full pages for each category of data can be accessed via the top gray toolbar.

RER2 / YBR002C Overview

Standard Name: RER2¹
Systematic Name: YBR002C
SGD ID: SGD:S000000206
Feature Type: ORF, Verified
Description: Forms the dehydrodolichyl diphosphate synthase (DDS) complex with NUS1; major enzyme of polypropenol synthesis in both the endoplasmic reticulum (ER) and in lipid droplets; participates in ER protein sorting; human ortholog DHDDS functionally complements the heat sensitive growth defect of a ts allele, and is associated with retinitis pigmentosa^{2 3 4 5}
Name Description: Retention in the Endoplasmic Reticulum¹
Comparative Info: Integrated model organism details available at the [Alliance of Genome Resources](#) website

Sequence **Sequence Details**

- **Summaries:** What is known about this gene? (read the Description in Locus Overview, read summaries in Gene Ontology and Phenotype sections, and read the Summary Paragraph)

RER2 / YBR002C Gene Ontology i

[Gene Ontology Help ?](#)

Summary: Forms a dehydrodolichyl diphosphate synthase complex with NUS1; involved in dolichol biosynthesis and ER to Golgi vesicle-mediated transport

GO Slim Terms i: endomembrane system, transferase activity, Golgi vesicle transport, carbohydrate metabolic process, lipid metabolic process, protein glycosylation

RER2 / YBR002C Phenotype i

[Phenotype Help ?](#)

Summary: Non-essential gene; reduction of function causes abnormal ER, Golgi and vacuolar morphology and mislocalization of membrane proteins; null mutation results in severe growth defect

- **Gene Ontology:** Explore functional annotations on RER2 by visiting the Gene Ontology tab. What **biological processes** is RER2 involved in? Does Rer2p have any known **molecular function**, such as kinase activity? What **cellular components** does Rer2p localize to in the cell, and is it a member of any complexes?

Summary	Sequence	Protein	Gene Ontology	Phenotype	Disease	Interactions	Regulation	Expression	Literature
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RER2 / YBR002C
Gene Ontology Overview
 Manually Curated
 High-throughput
 Computational
 Shared Annotations

RER2 / YBR002C Gene Ontology i
Gene Ontology Help ?

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[Download All Annotations \(.txt\)](#)

Manually Curated i

Date Last Reviewed: 2007-03-12

Biological Process 5 entries for 3 Gene Ontology terms

Qualifier	Gene Ontology Term	Annotation Extension	Evidence	Source	Assigned On	Reference
	protein glycosylation		IDA	SGD	2002-03-07	Sato M, et al. (1999) PMID:9858571

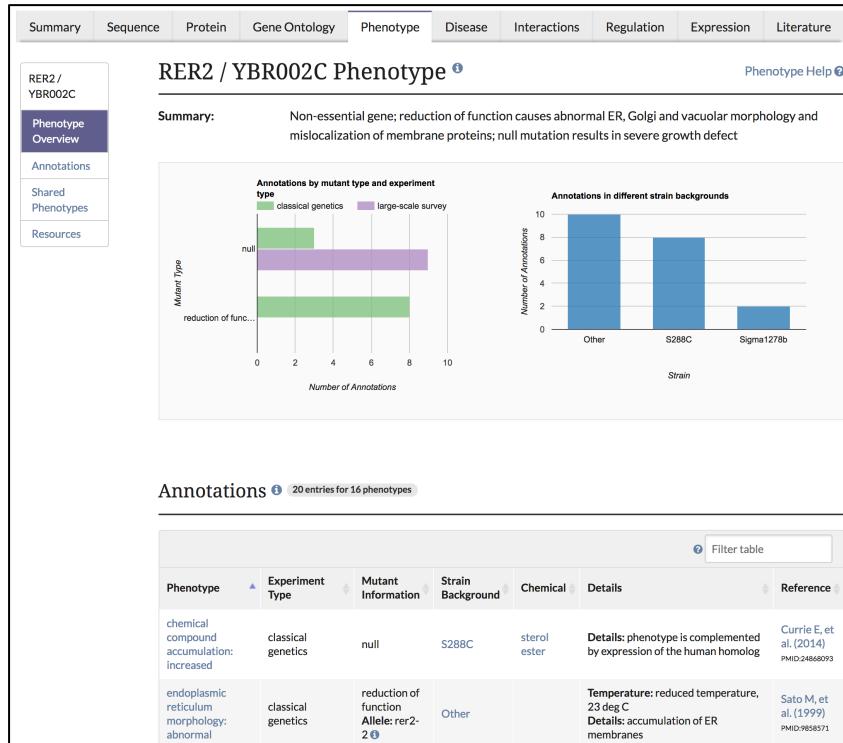
Current Locus Other Locus GO Term

SGD 2019-03

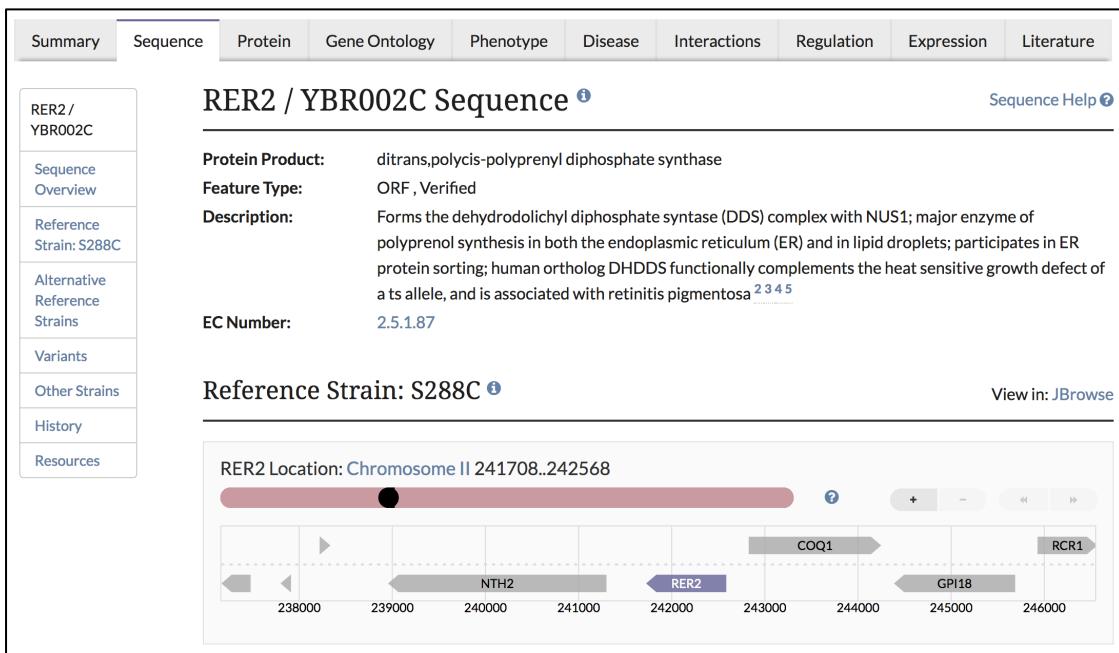
Filter Genes by # of GO Terms Shared With RER2: 5 6 7 8 9 10 11 12

- Scroll down the page and use the Shared Annotations diagram to find other genes that share the same biological processes.

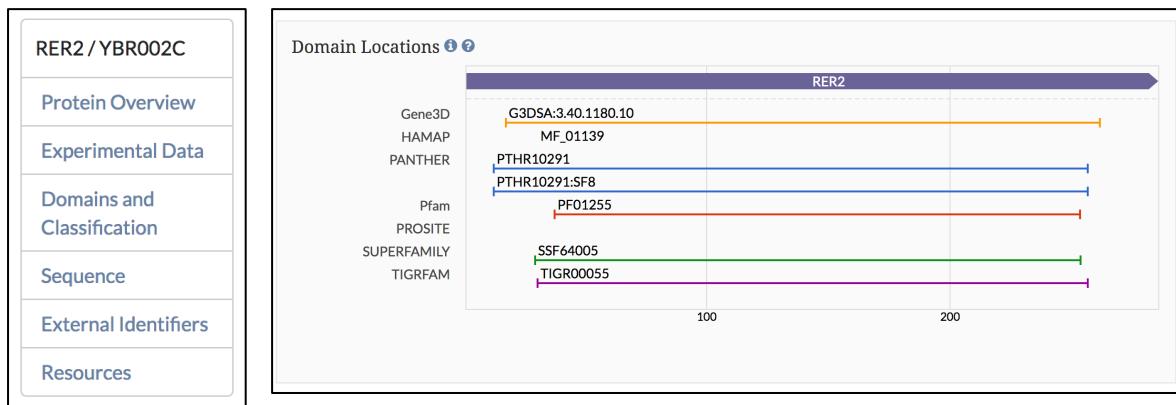
- **Phenotypes:** What details about the mutant phenotypes are available? See the Phenotype tab for information on mutant types, strain backgrounds, references. Based on the role of RER2 in ER to Golgi vesicle-mediated transport, do null mutants have phenotypes you would expect? Find other genes that share the same phenotypes by exploring the Network Diagram at the bottom of the page.



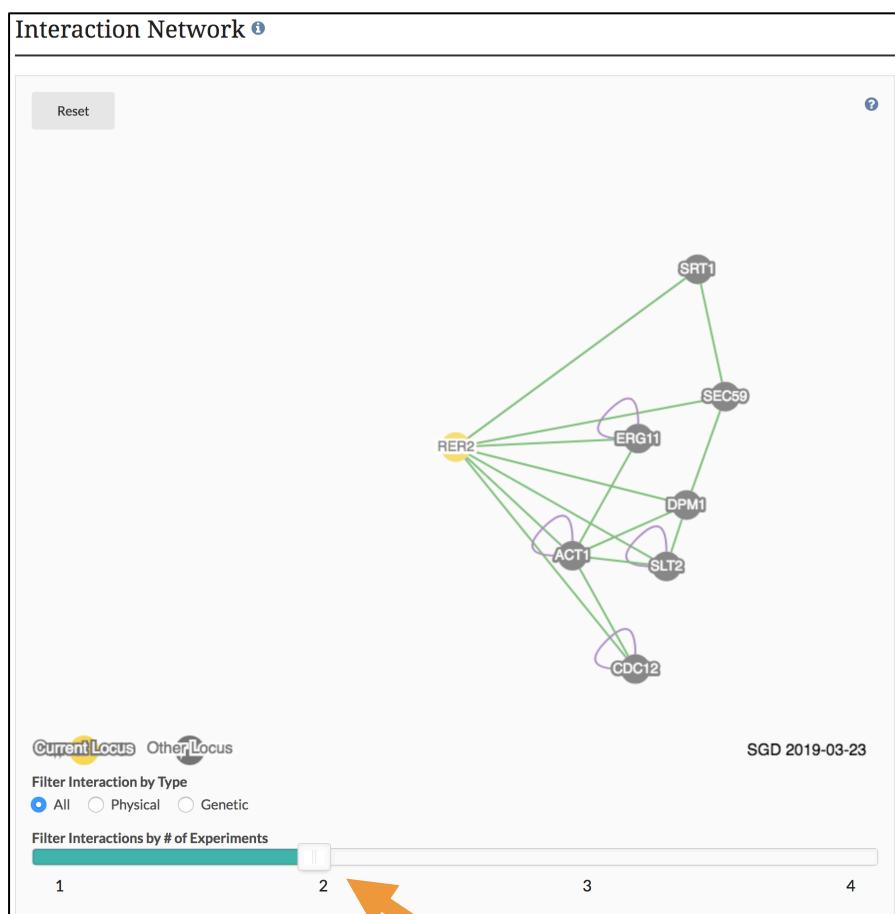
- **Sequence:** Visit the Sequence tab for RER2. What is the chromosomal location of RER2 and its neighboring genes? Note that the RER2 sequence can be downloaded here for the reference strain S288C and alternative strains.



- **Protein:** Visit the RER2 Protein tab. What is the Rer2p amino acid sequence? What is its half-life? What is the highest and lowest protein abundance listed for Rer2p? What protein domains does it have, and with which proteins does it share these domains? Is Rer2p post-translationally modified by ubiquitin? What is the calculated molecular weight and isoelectric point of this protein?



- **Interactions:** Go to the RER2 Interactions tab and look at the Annotations table. With which genes does RER2 have a genetic interaction? What about synthetic lethal interactions (hint: search the table for “synthetic lethal”)? Find the Interaction Network and set the # of experiments to 2 (see figure). Do any genetic interactors of RER2 also have a genetic interaction with each other?



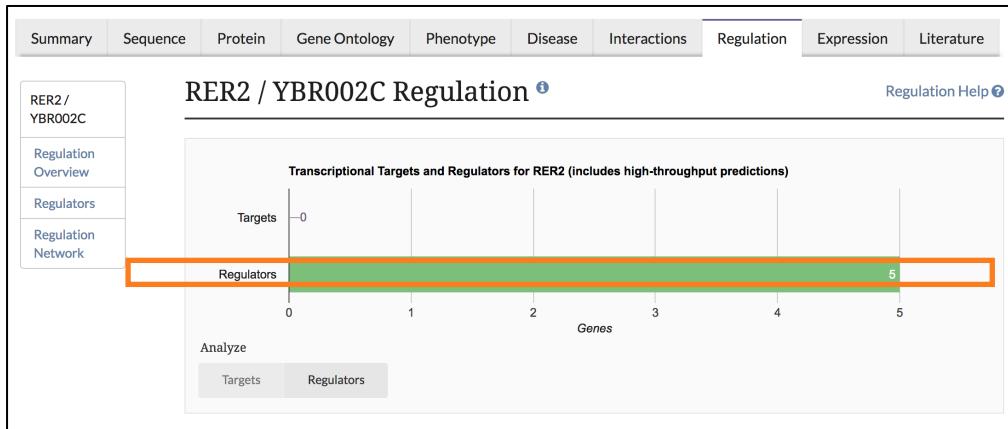
- **Disease:** Has yeast RER2 been used to study any human diseases? On the Disease tab, scroll to the bottom of the page and find the Shared Annotations network diagram. What other yeast genes have been used to study cancer? Do they have a human homolog?

Disease Ontology Term	Qualifier	Evidence	Source	Assigned On	Reference
cancer	ISS with DHDDS	SGD	2018-04-25	Hamza A, et al. (2015) PMID:26354769	
cancer	IGI with DHDDS	SGD	2018-04-25	Hamza A, et al. (2015) PMID:26354769	

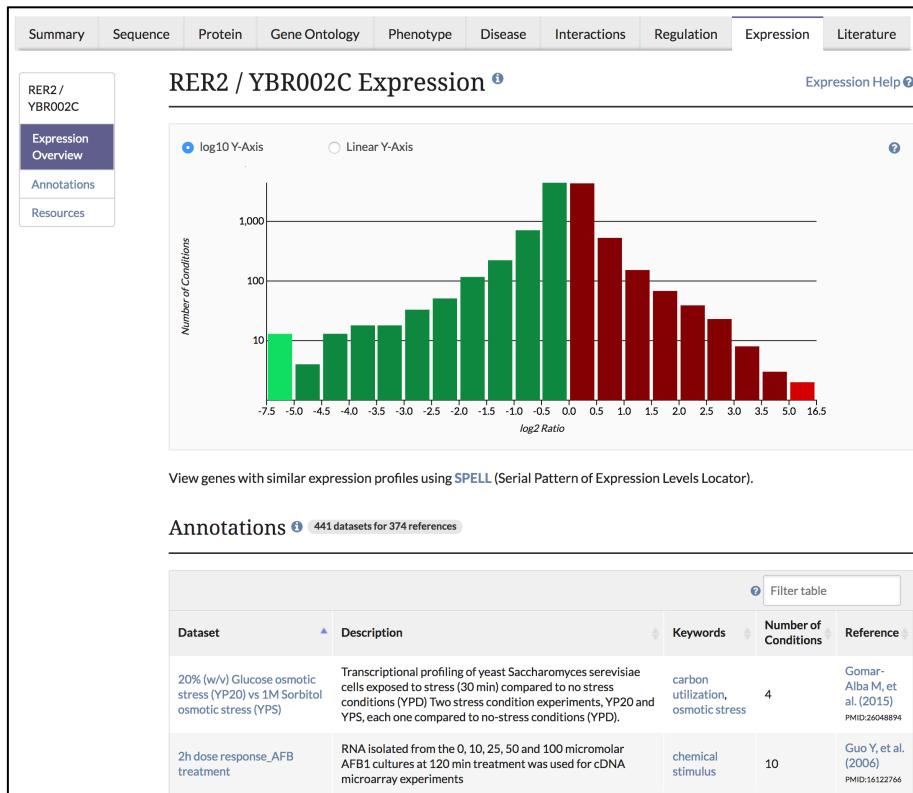
- **Homology:** Open the RER2 Homology tab. What are the homologous genes in other model organisms? Does the human homolog functionally complement the yeast mutant? What are the homologous genes in other fungi? Where can you find more information about these other fungal genes?

Species	Gene ID	Gene name	Source
<i>Caenorhabditis elegans</i>	WB:WBGene00044025	T01G1.4	Alliance
<i>Danio rerio</i>	ZFIN:ZDB-GENE-040426-2236	dhdds	Alliance
<i>Drosophila melanogaster</i>	FB:FBgn0029980	CG10778	Alliance
<i>Homo sapiens</i>	HGNC:20603	DHDDS	Alliance
<i>Mus musculus</i>	MGI:1914672	Dhdds	Alliance
<i>Rattus norvegicus</i>	RGD:13111560	Dhdds	Alliance

- **Regulation:** Open the RER2 Regulation tab. What regulatory relationships does RER2 have? Do any RER2 regulators regulate another (hint: see network diagram)?



- **Expression:** Go to the RER2 Expression tab. What factors affect the expression of RER2? The columns in the histogram indicate how many conditions result in a given increase/decrease in expression level of RER2 – click on a column to show the datasets, categories and references in the table below; hyperlinks lead to more details.



- **Literature:** Open the RER2 Literature tab. What reviews have been published that deal with RER2? Jump through the page using the content table.

RER2 / YBR002C Literature Literature Help 

Unique References: 56

Primary Literature 20 references

[Download References \(nbib\)](#)

Sun S, et al. (2016) An extended set of yeast-based functional assays accurately identifies human disease mutations. *Genome Res* 26(5):670-80 PMID:26975778
[SGD Paper](#) [DOI full text](#) [PMC full text](#) [PubMed](#)

Hamza A, et al. (2015) Complementation of Yeast Genes with Human Genes as an Experimental Platform for Functional Testing of Human Genetic Variants. *Genetics* 201(3):1263-74 PMID:26354769
[SGD Paper](#) [DOI full text](#) [PMC full text](#) [PubMed](#)

Surmacz L, et al. (2015) Short-chain polyisoprenoids in the yeast *Saccharomyces cerevisiae* - New companions of the old guys. *Biochim Biophys Acta* 1851(10):1296-303 PMID:26143379
[SGD Paper](#) [DOI full text](#) [PubMed](#)

Currie E, et al. (2014) High confidence proteomic analysis of yeast LDs identifies additional droplet proteins and reveals connections to dolichol synthesis and sterol acetylation. *J Lipid Res* 55(7):1465-77 PMID:24868093
[SGD Paper](#) [DOI full text](#) [PMC full text](#) [PubMed](#)

Park EJ, et al. (2014) Mutation of Nogo-B receptor, a subunit of cis-prenyltransferase, causes a congenital disorder of glycosylation. *Cell Metab* 20(3):448-57 PMID:25066056
[SGD Paper](#) [DOI full text](#) [PMC full text](#) [PubMed](#)

Akhtar TA, et al. (2013) The tomato cis-prenyltransferase gene family. *Plant J* 73(4):640-52 PMID:23134568
[SGD Paper](#) [DOI full text](#) [PubMed](#)

