GEPHE SUMMARY

Gephebase Gene
beta-tubulin (ben4) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^beta-tubulin (ben4)^#gephebase-summary-title)

GepheID
GP00001787

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Xenobiotic resistance (benzimidazole) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (benzimidazole)^#gephebase-summary-title)

Trait State in Taxon A
sensitive

Trait State in Taxon B
resistant

Ancestral State
Taxon A

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Aspergillus nidulans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Aspergillus nidulans^#gephebase-summary-title)

Common Name
-

Synonyms
Aspergillus nidulellus; ATCC 10074; ATCC:10074; A. nidulans; Aspergilus nidulans

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Pezizomycotina; leotiomyceta; Eurotiomycetes; Eurotiomycetidae; Eurotiales; Aspergillaceae; Aspergillus

Parent
Aspergillus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 5052)

NCBI Taxonomy ID
162425 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 162425)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Aspergillus nidulans (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Aspergillus nidulans^#gephebase-summary-title)

Common Name
-

Synonyms
Aspergillus nidulellus; ATCC 10074; ATCC:10074; A. nidulans; Aspergilus nidulans

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Fungi; Dikarya; Ascomycota; saccharomyceta; Pezizomycotina; leotiomyceta; Eurotiomycetes; Eurotiomycetidae; Eurotiales; Aspergillaceae; Aspergillus

Parent
Aspergillus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 5052)

NCBI Taxonomy ID
162425 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 162425)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
TUB2

Synonyms
ARM10; SHE8; YFL037W

String
4932.YFL037W (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 4932.YFL037W)

UniProtKB Saccharomyces cerevisiae (strain ATCC 204508 / S288c)
P02557 (http://www.uniprot.org/uniprot/P02557)

Sequence Similarities
Belongs to the tubulin family.

GenebankID or UniProtKB
P10653 (https://www.ncbi.nlm.nih.gov/nuccore/P10653)

GO - Molecular Function
GO:0005525 : GTP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005525)
GO:0003924 : GTPase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003924)
GO:0005200 : structural constituent of cytoskeleton (https://www.ebi.ac.uk/QuickGO/term/GO:0005200)

GO - Biological Process
GO:0007010 : cytoskeleton organization (https://www.ebi.ac.uk/QuickGO/term/GO:0007010)
GO:0000278 : mitotic cell cycle (https://www.ebi.ac.uk/QuickGO/term/GO:0000278)
GO:0000070 : mitotic sister chromatid segregation

(https://www.ebi.ac.uk/QuickGO/term/GO:0000070)
GO:0007017 : microtubule-based process
(https://www.ebi.ac.uk/QuickGO/term/GO:0007017)
GO:0046677 : response to antibiotic (https://www.ebi.ac.uk/QuickGO/term/GO:0046677)
GO:0000226 : microtubule cytoskeleton organization
(https://www.ebi.ac.uk/QuickGO/term/GO:0000226)
GO:0045143 : homologous chromosome segregation
(https://www.ebi.ac.uk/QuickGO/term/GO:0045143)
GO:0030473 : nuclear migration along microtubule
(https://www.ebi.ac.uk/QuickGO/term/GO:0030473)
GO:0090316 : positive regulation of intracellular protein transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0090316)

GO - Cellular Component

GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0005874 : microtubule (https://www.ebi.ac.uk/QuickGO/term/GO:0005874)
GO:0005816 : spindle pole body (https://www.ebi.ac.uk/QuickGO/term/GO:0005816)
GO:0005881 : cytoplasmic microtubule
(https://www.ebi.ac.uk/QuickGO/term/GO:0005881)
GO:0005828 : kinetochore microtubule
(https://www.ebi.ac.uk/QuickGO/term/GO:0005828)
GO:0005880 : nuclear microtubule (https://www.ebi.ac.uk/QuickGO/term/GO:0005880)
GO:0045298 : tubulin complex (https://www.ebi.ac.uk/QuickGO/term/GO:0045298)

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title)

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Phe200Tyr

Experimental Evidence

Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Phe	Tyr	200

Main Reference

Amino acid alterations in the benA (beta-tubulin) gene of Aspergillus nidulans that confer benomyl resistance. (1992) (https://pubmed.ncbi.nlm.nih.gov/1423663)

Authors

Jung MK; Wilder IB; Oakley BR

Abstract

We report the cloning and sequencing of 18 mutant alleles of the benA, beta-tubulin gene of Aspergillus nidulans that confer resistance to the benzimidazole antifungal, antimicrotubule compounds benomyl, carbendazim, nocodazole, and thiabendazole. In 12 cases, amino acid 6 was changed from histidine to tyrosine or leucine. In four cases, amino acid 198 was changed from glutamic acid to aspartic acid, glutamine, or lysine. In two cases, amino acid 200 was altered from phenylalanine to tyrosine. These data, along with previous data indicating that amino acid 165 is involved in the binding of the R2 group of these compounds [Jung and Oakley, 1990: Cell Motil. Cytoskeleton 17:87-94], suggest that regions of beta-tubulin containing amino acids 6, 165, and 198-200 interact to form the binding site of benzimidazole antimicrotubule agents. These results also suggest that the presence of phenylalanine at amino acid 200 contributes to the great sensitivity of many fungi to benzimidazole antimicrotubule agents.

Additional References

Extreme allelic heterogeneity at a Caenorhabditis elegans beta-tubulin locus explains natural resistance to benzimidazoles. (2018) (https://pubmed.ncbi.nlm.nih.gov/30372484)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Effect of the amino acid change tested in C. elegans - UniProtKB in Aspergillus is P10653 @&