GEPHE SUMMARY

Gephebase Gene
Acetylcholinesterase (Ace-2) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Acetylcholinesterase (Ace-2)^#gephebase-summary-title)

GepheID
GP00002583

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

Trait State in Taxon A
Cochliomyia hominivorax - sensitive

Trait State in Taxon B
Cochliomyia hominivorax - 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
Cochliomyia hominivorax (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Cochliomyia hominivorax^#gephebase-summary-title)

Common Name
primary screw-worm

Synonyms
primary screw-worm; Cochliomyia hominivorax (Coquerel, 1858)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calyptratae; Oestroidea; Calliphoridae; Chrysomyinae; Chrysomyini; Cochliomyia

Parent
Cochliomyia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 66360)

NCBI Taxonomy ID
115425 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 115425)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
primary screw-worm

Synonyms
primary screw-worm; Cochliomyia hominivorax (Coquerel, 1858)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calyptratae; Oestroidea; Calliphoridae; Chrysomyinae; Chrysomyini; Cochliomyia

Parent
Cochliomyia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 66360)

NCBI Taxonomy ID
115425 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 115425)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Ace

Synonyms
AcChE; ace; ACE; ace-2; ache; AchE; AChE; CG17907; CHE; dAChE; dmAChE; DmAChE; Dmel\CG17907; Dm_ace; FBgn0000024; l(3)26; l(3)87Ed

String
7227.FBpp0289713 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0289713)

Sequence Similarities
Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function
GO:0042803 : protein homodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0042803)
GO:0003990 : acetylcholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003990)
GO:0004104 : cholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004104)

UniProtKB Drosophila melanogaster
P07140 (http://www.uniprot.org/uniprot/P07140)

GenebankID or UniProtKB
()

GO:0043199 : sulfate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043199)

GO - Biological Process

GO:0006581 : acetylcholine catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006581)
GO:0001507 : acetylcholine catabolic process in synaptic cleft
(https://www.ebi.ac.uk/QuickGO/term/GO:0001507)
GO:0007268 : chemical synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0042426 : choline catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0042426)
GO:0042331 : phototaxis (https://www.ebi.ac.uk/QuickGO/term/GO:0042331)

GO - Cellular Component

GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0031225 : anchored component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0031225)
GO:0030054 : cell junction (https://www.ebi.ac.uk/QuickGO/term/GO:0030054)
GO:0043083 : synaptic cleft (https://www.ebi.ac.uk/QuickGO/term/GO:0043083)

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

F466Y

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	466

Main Reference

Acetylcholinesterase cDNA sequencing and identification of mutations associated with organophosphate resistance in Cochliomyia hominivorax (Diptera: Calliphoridae). (2011)
(https://pubmed.ncbi.nlm.nih.gov/21159442)

Authors

da Silva NM; de Carvalho RA; de Azeredo-Espin AM

Abstract

Altered acetylcholinesterase (AChE) has been identified in numerous arthropod species resistant to organophosphate (OP) and carbamate insecticides. The New World screwworm (NWS) Cochliomyia hominivorax (Coquerel), one of the most important myiasis-causing flies in the Neotropics, has been controlled mainly by the application of OP insecticides in its current geographical distribution. However, few studies have investigated insecticide resistance in this species. Based on previous studies about mutations conferring OP resistance in related dipteran species, AChE cDNA was sequenced allowing a survey for mutations (I298V, G401A, F466Y) in NWS populations. In addition, the G137D mutation in the carboxylesterase E3 gene, also associated with OP resistance, was analyzed in the same NWS populations. Only 2/135 individuals presented an altered AChE gene (F466Y). In contrast, a high frequency of the G137D mutation in the E3 gene was found in some localities of Brazil and Uruguay, while the mutant allele was not found in Cuba, Venezuela or Colombia. These findings suggest that the alteration in the carboxylesterase E3 gene may be one of the main resistance mechanisms selected in this ectoparasite. The knowledge of the frequency of these resistance-associated mutations in the NWS natural populations may contribute to the selection of appropriate chemicals for control as part of pest management strategies.

Copyright Â© 2010 Elsevier B.V. All rights reserved.

Additional References

RELATED GEPHE

Related Genes

1 (esterase isozyme E3) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^115425^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS