

Gephebase Gene		GepheID
Acetylcholinesterase (Ace-2) (https://www.gepibase.org/search-criteria?/and+Gene)	GP00002596	
Gepibase="Acetylcholinesterase (Ace-2)"#gepibase-summary-title		Main curator
Published	Entry Status	Courtier

	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
Culex tritaeniorhynchus Giles - sensitive	
	Trait State in Taxon B
Culex tritaeniorhynchus Giles -resistant	
	Ancestral State
Taxon A	
	Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title)	

GENOTYPIC CHANGE

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

F331W - F455W whose homologous position in Torped AChE (Phe331) is located in the vicinity of the catalytic His in the acyl pocket of the active site gorge

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	-	-	-

Main Reference

An amino acid substitution attributable to insecticide-insensitivity of acetylcholinesterase in a Japanese encephalitis vector mosquito, *Culex tritaeniorhynchus*. (2004) (<https://pubmed.ncbi.nlm.nih.gov/14697262>)

Authors

Nabeshima T; Mori A; Kozaki T; Iwata Y; Hidoh O; Harada S; Kasai S; Severson DW; Kono Y; Tomita T

Abstract

A cDNA sequence encoding a *Drosophila* Ace-paralogous acetylcholinesterase (AChE) precursor of 701 amino acid residues was identified as the second AChE gene (Ace2) transcript from *Culex tritaeniorhynchus*. The Ace2 gene is tightly linked to organophosphorus insecticide (OP)-insensitivity of AChE on chromosome 2. The cDNA sequences were compared between an insecticide-susceptible strain and the resistant strain, TYM, that exhibits a 870-fold decrease in fenitroxon-sensitivity of AChE. Two amino acid substitutions were present in TYM mosquitoes. One is F455W whose homologous position in Torped AChE (Phe331) is located in the vicinity of the catalytic His in the acyl pocket of the active site gorge. The other substitution is located to a C-terminal Ile697 position that apparently seems to be excluded from the mature protein and is irrelevant to catalytic activity. The F455W replacement in the Ace2 gene is solely responsible for the insecticide-insensitivity of AChE in TYM mosquitoes.

Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26047113>)

RELATED GEPHE

Related Genes

2 (Acetylcholinesterase (Ace-1), esterase B1) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~7178^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

