

Gephebase Gene		GepheID
esterase isozyme E3 (https://www.gepibase.org/search-criteria?/and+Gene Gepibase="^esterase isozyme E3^#gepibase-summary-title")	GP00000295	
	Entry Status	Main curator
Published		

	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
Lucilia cuprina	
	Trait State in Taxon B
Lucilia cuprina	
	Ancestral State
Data not curated	
	Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title)	

Generic Gene Name	UniProtKB	Lucilia cuprina
LcaE7	Q25252 (http://www.uniprot.org/uniprot/Q25252)	
Synonyms		GenebankID or UniProtKB
-	U56636 (https://www.ncbi.nlm.nih.gov/nuccore/U56636)	
String		
-		
Sequence Similarities		
Belongs to the type-B carboxylesterase/lipase family.		
GO - Molecular Function		
GO:0016787 : hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016787)		
GO - Biological Process		
-		
GO - Cellular Component		
-		
No (<a +no^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Presumptive+Null=">https://www.gephebase.org/search-criteria?/and+Presumptive+Null="+No^#gephebase-summary-title)		Presumptive Null
		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

Trp251Leu

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

Structure and function of an insect Î±-carboxylesterase (Î±Esterase7) associated with insecticide resistance. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23733941>)

Authors

Jackson CJ; Liu JW; Carr PD; Younus F; Coppin C; Meirelles T; Lethier M; Pandey G; Ollis DL; Russell RJ; Weik M; Oakeshott JG

Abstract

Insect carboxylesterases from the Î±Esterase gene cluster, such as Î±E7 (also known as E3) from the Australian sheep blowfly *Lucilia cuprina* (LcÎ±E7), play an important physiological role in lipid metabolism and are implicated in the detoxification of organophosphate (OP) insecticides. Despite the importance of OPs to agriculture and the spread of insect-borne diseases, the molecular basis for the ability of Î±-carboxylesterases to confer OP resistance to insects is poorly understood. In this work, we used laboratory evolution to increase the thermal stability of LcÎ±E7, allowing its overexpression in *Escherichia coli* and structure determination. The crystal structure reveals a canonical Î±/Î²²-hydrolase fold that is very similar to the primary target of OPs (acetylcholinesterase) and a unique N-terminal Î±-helix that serves as a membrane anchor. Soaking of LcÎ±E7 crystals in OPs led to the capture of a crystallographic snapshot of LcÎ±E7 in its phosphorylated state, which allowed comparison with acetylcholinesterase and rationalization of its ability to protect insects against the effects of OPs. Finally, inspection of the active site of LcÎ±E7 reveals an asymmetric and hydrophobic substrate binding cavity that is well-suited to fatty acid methyl esters, which are hydrolyzed by the enzyme with specificity constants (âˆ³/410(6) M(-1) s(-1)) indicative of a natural substrate.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~esterase+isozyme+E3~/and+Taxon+ID=~7375~/or+Gene+Gephebase=~esterase+isozyme+E3~/and+Taxon+ID=~7375~#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS