GEPHE SUMMARY

Gephebase Gene
CYP6D1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CYP6D1^#gephebase-summary-title)

GepheID
GP00002118

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
Musca domestica - sensitive

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

Common Name
house fly

Synonyms
house fly; Musca domestica Linnaeus, 1758

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calyptratae; Muscoidea; Muscidae; Muscinae; Muscini; Musca; Musca

Parent
Musca () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 44052)

NCBI Taxonomy ID
7370 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7370)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
house fly

Synonyms
house fly; Musca domestica Linnaeus, 1758

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Diptera; Brachycera; Muscomorpha; Eremoneura; Cyclorrhapha; Schizophora; Calyptratae; Muscoidea; Muscidae; Muscinae; Muscini; Musca; Musca

Parent
Musca () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 44052)

NCBI Taxonomy ID
7370 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7370)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
CYP6D1

Synonyms
-

String
-

Sequence Similarities
Belongs to the cytochrome P450 family.

GO - Molecular Function
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)
GO:0004497 : monooxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004497)
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016705)

GO - Biological Process
-

UniProtKB Musca domestica
Q27698 (http://www.uniprot.org/uniprot/Q27698)

GenebankID or UniProtKB
()

GO - Cellular Component

GO:0005789 : endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005789)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Insertion Size

10-99 bp

Molecular Details of the Mutation

15 bp insertion which disrupts a putative mdGfi-1 binding site in the CYP6D1v1 promoter. mdGfi-1 is a negative regulator of transcription so this leads to increased expression of CYP6D1

Experimental Evidence

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

Main Reference

Role of the transcriptional repressor mdGfi-1 in CYP6D1v1-mediated insecticide resistance in the house fly, Musca domestica. (2006) (https://pubmed.ncbi.nlm.nih.gov/16651185)

Authors

Gao J; Scott JG

Abstract

Gfi-1 is a C(2)H(2)-type zinc finger protein that is a transcriptional repressor in vertebrates and has been implicated in control of CYP6D1 expression in house flies (Musca domestica). A 15 bp insert, which disrupts a putative mdGfi-1 binding site in the CYP6D1v1 promoter has been implicated as a cause of increased expression of CYP6D1, and thus insecticide resistance. Using electrophoretic mobility shift assays we demonstrate that the CYP6D1 promoter from susceptible strains binds mdGfi-1. The 15 bp insert that interrupts the mdGfi-1-binding site in insecticide-resistant strains reduces the amount of mdGfi-1 binding by 9- to 20-fold, consistent with the role of mdGfi-1 in resistance. Partial sequences of mdGfi-1 (spanning the first intron) from individual houseflies from 11 different strains revealed the presence of 23 alleles. There was no consistent difference in the mdGfi-1 alleles between susceptible and CYP6D1-mediated insecticide-resistant strains, indicating that mdGfi-1 alleles were not likely involved in resistance. Polymorphisms were used to map mdGfi-1 to autosome 1. Quantitative real time PCR (qRT-PCR) revealed Gfi-1 expression was higher in the thorax compared to the head and abdomen, and varied between life stages and between strains. However, similar levels of mdGfi-1 were detected in susceptible and resistant adults suggesting that altered levels of mdGfi-1 were not likely a cause of insecticide resistance. The significance of these results to understanding insecticide resistance is discussed.

Additional References

RELATED GEPHE

Related Genes

5 (Acetylcholinesterase (Ace-2), Acetylcholinesterase (Ace), esterase isozyme E7 = E3, para (kdr), resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7370^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS