GEPHE SUMMARY

Gephebase Gene
glycerol-3-phosphate dehydrogenase (Gpdh) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^glycerol-3-phosphate dehydrogenase (Gpdh)^#gephebase-summary-title)

GepheID
GP00001998

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

Trait State in Taxon A
Drosophila melanogaster - wild-type activity

Trait State in Taxon B
Drosophila melanogaster - reduced activity

Ancestral State
Taxon A

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

Taxon A

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

Common Name
fruit fly

Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster

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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup

Parent
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)

NCBI Taxonomy ID
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
fruit fly

Synonyms
Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster

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; Acalyptratae; Ephydroidea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup

Parent
melanogaster subgroup () - (Rank: species subgroup) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32351)

NCBI Taxonomy ID
7227 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7227)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Gpdh

Synonyms
GPD; alpha-GPD; alpha-Gpdh; alpha-GPDH; alpha-GPDH-1; alphaGpd; alphaGpdh; alphaGPDH; alphaGpdh-1; CG9042; dGpdh; Dmel\CG9042; DmG3PDH; DROGPDHA; G3pdh; G3PDH; GAPDH; Gdh; Gpd; GPDA; gpdh; Gpdh; GPDH; gpdh-1; GPDH-1; sn-Gpdh

String
7227.FBpp0305431 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0305431)

Sequence Similarities
Belongs to the NAD-dependent glycerol-3-phosphate dehydrogenase family.

GO - Molecular Function

UniProtKB Drosophila melanogaster
P13706 (http://www.uniprot.org/uniprot/P13706)

GenebankID or UniProtKB
()

GO:0042803 : protein homodimerization activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0042803)
GO:0051287 : NAD binding (https://www.ebi.ac.uk/QuickGO/term/GO:0051287)
GO:0004367 : glycerol-3-phosphate dehydrogenase [NAD+] activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0004367)

GO - Biological Process

GO:0005975 : carbohydrate metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0005975)
GO:0006067 : ethanol metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006067)
GO:0055114 : oxidation-reduction process
(https://www.ebi.ac.uk/QuickGO/term/GO:0055114)
GO:0006641 : triglyceride metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006641)
GO:0055093 : response to hyperoxia (https://www.ebi.ac.uk/QuickGO/term/GO:0055093)
GO:0007629 : flight behavior (https://www.ebi.ac.uk/QuickGO/term/GO:0007629)
GO:0046168 : glycerol-3-phosphate catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0046168)
GO:0006072 : glycerol-3-phosphate metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006072)
GO:0006650 : glycerophospholipid metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006650)
GO:0006116 : NADH oxidation (https://www.ebi.ac.uk/QuickGO/term/GO:0006116)

GO - Cellular Component

GO:0005829 : cytosol (https://www.ebi.ac.uk/QuickGO/term/GO:0005829)
GO:0030018 : Z disc (https://www.ebi.ac.uk/QuickGO/term/GO:0030018)
GO:0009331 : glycerol-3-phosphate dehydrogenase complex
(https://www.ebi.ac.uk/QuickGO/term/GO:0009331)
GO:0031430 : M band (https://www.ebi.ac.uk/QuickGO/term/GO:0031430)

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

1-10 kb

Molecular Details of the Mutation

insertion of a 8kb blood retrotransposon in the 3′ region of the Gpdh gene 66bp downstream of the stop codon. This mutation induces a GPDH isozyme-GPDH-4-and alters the pattern of expression of the three normal isozymes-GPDH-1 to GPDH-3.

Experimental Evidence

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

Main Reference

Retrotransposon insertion induces an isozyme of sn-glycerol-3-phosphate dehydrogenase in Drosophila melanogaster. (1995) (https://pubmed.ncbi.nlm.nih.gov/8618845)

Authors

Wilanowski TM; Gibson JB; Symonds JE

Abstract

The insertion of the blood retrotransposon into the untranslated region of exon 7 of the sn-glycerol-3-phosphate dehydrogenase-encoding gene (Gpdh) in Drosophila melanogaster induces a GPDH isozyme-GPDH-4-and alters the pattern of expression of the three normal isozymes-GPDH-1 to GPDH-3. The process of transcript terminus formation inside the retrotransposon insertion reduces the level of the Gpdh transcript that contains exon 8 and increases the level of the transcript that contains exons 1-7. The induced GPDH-4 isozyme is a translation product of the three transcripts that contain fragments of the blood retrotransposon. The mechanism of mutagenesis by the blood insertion is postulated to involve the pause or termination of transcription within the blood sequence, which in turn is caused by the interference of a DNA-binding protein with the RNA polymerase. Thus, we show the formation of a new functional GPDH protein by the insertion of a transposable element and discuss the evolutionary significance of this phenomenon.

Additional References

RELATED GEPHE

Related Genes

3 (Dopa oxidase-3 (Dox-3), prophenoloxidase 1 (PPO1), tryptophan phenylalanine hydroxylase) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7227^/and+Trait=Enzymatic activity/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^glycerol-3-phosphate dehydrogenase (Gpdh)^/and+Taxon ID=^7227^/or+Gene Gephebase=^glycerol-3-phosphate dehydrogenase (Gpdh)^/and+Taxon ID=^7227^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@TE - http://flybase.org/reports/FBal0048805