

# GEPHE SUMMARY

cyp6d2 ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase=cyp6d2#gephebase-summary-title)	Gephebase Gene	GP00001983	GepheID
	Entry Status	Courtier	Main curator
Published			

## PHENOTYPIC CHANGE

Trait Category			
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category=Physiology#gephebase-summary-title)	Trait		
Xenobiotic resistance (chemotherapeutic agent, camptothecin) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance">https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance</a> (chemotherapeutic agent, camptothecin)#gephebase-summary-title)	Trait State in Taxon A		
Drosophila melanogaster	Trait State in Taxon B		
Drosophila melanogaster - more sensitive to camptothecin - no phenotypic effect with the camptothecin analog topotecan or with ionizing radiation	Ancestral State		
Taxon A	Taxonomic Status	Taxon B	Latin Name
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status=Intraspecific#gephebase-summary-title)	Drosophila melanogaster ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster</a> #gephebase-summary-title)	Drosophila melanogaster ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster</a> #gephebase-summary-title)	
Taxon A	Latin Name	Taxon B	Latin Name
Drosophila melanogaster ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster</a> #gephebase-summary-title)		Drosophila melanogaster ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Drosophila+melanogaster</a> #gephebase-summary-title)	
Common Name	Synonyms	Common Name	Synonyms
fruit fly	Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster	fruit fly	Sophophora melanogaster; fruit fly; Drosophila melanogaster Meigen, 1830; Sophophora melanogaster (Meigen, 1830); Drosophila melangaster
Rank	Lineage	Rank	Lineage
species	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; Ephydriodea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup	species	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; Ephydriodea; Drosophilidae; Drosophilinae; Drosophilini; Drosophila; Sophophora; melanogaster group; melanogaster subgroup
Parent	NCBI Taxonomy ID	Parent	NCBI Taxonomy ID
melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )	7227 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227</a> )	melanogaster subgroup () - (Rank: species subgroup) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=32351</a> )	7227 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7227</a> )
is Taxon A an Infraspecies?	is Taxon B an Infraspecies?		
No	No		

## GENOTYPIC CHANGE

Cyp6g2	Generic Gene Name	UniProtKB Drosophila melanogaster
6g2; CG8859; Cyp6G2; Dmel\CG8859	Synonyms	GenebankID or UniProtKB
7227.FBpp0087117 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=7227.FBpp0087117">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=7227.FBpp0087117</a> )	String	0
Belongs to the cytochrome P450 family.	Sequence Similarities	
	GO - Molecular Function	
GO:0020037 : heme binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0020037">https://www.ebi.ac.uk/QuickGO/term/GO:0020037</a> )		
GO:0005506 : iron ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005506">https://www.ebi.ac.uk/QuickGO/term/GO:0005506</a> )		

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

GO:0046680 : response to DDT (<https://www.ebi.ac.uk/QuickGO/term/GO:0046680>)

GO:0017085 : response to insecticide (<https://www.ebi.ac.uk/QuickGO/term/GO:0017085>)

GO:0046701 : insecticide catabolic process

(<https://www.ebi.ac.uk/QuickGO/term/GO:0046701>)

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

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

G>C in CATA GGtaagga...caagCTCT so that intron 3 is not spliced and the codon GCT (spanning the intron) is transformed into CCT. The splicing is defective and intron 3 is transcribed and results in a stop codon and a protein truncated from its native C terminal part.

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Linkage+Mapping^#gephebase-summary-title>)

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Common variants of *Drosophila melanogaster* *Cyp6d2* cause camptothecin sensitivity and synergize with loss of *Brc2*. (2013) (<https://pubmed.ncbi.nlm.nih.gov/23316441>)

Authors

Thomas AM; Hui C; South A; McVey M

Abstract

Many chemotherapeutic agents selectively target rapidly dividing cells, including cancer cells, by causing DNA damage that leads to genome instability and cell death. We used *Drosophila melanogaster* to study how mutations in key DNA repair genes affect an organism's response to chemotherapeutic drugs. In this study, we focused on camptothecin and its derivatives, topotecan and irinotecan, which are type I topoisomerase inhibitors that create DNA double-strand breaks in rapidly dividing cells. Here, we describe two polymorphisms in *Drosophila Cyp6d2* that result in extreme sensitivity to camptothecin but not topotecan or irinotecan. We confirmed that the sensitivity was due to mutations in *Cyp6d2* by rescuing the defect with a wild-type copy of *Cyp6d2*. In addition, we showed that combining a *cyp6d2* mutation with mutations in *Drosophila brc2* results in extreme sensitivity to camptothecin. Given the frequency of the *Cyp6d2* polymorphisms in publicly available *Drosophila* stocks, our study demonstrates the need for caution when interpreting results from drug sensitivity screens in *Drosophila* and other model organisms. Furthermore, our findings illustrate how genetic background effects can be important when determining the efficacy of chemotherapeutic agents in various DNA repair mutants.

Additional References

## RELATED GEPHE

Related Genes

19 (Acetylcholinesterase (Ace-2), alcohol dehydrogenase (Adh), Aldehyde dehydrogenase (Aldh), CG11699, Cyp12d1, Cyp28d1, Cyp28d1-Cyp28d2, cyp6g1, glutamate-gated chloride channel (GluCl), GSS (glutathione synthetase), GSTE1-E10 cluster, kin of irre (kire), para (kdr), PHGPx, resistance to dieldrin, RnrS, SOD1, Ugt86Dd, CHKov1) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=^7227^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^cyp6d2^/and+Taxon+ID=^7227^/or+Gene+Gephebase=^cyp6d2^/and+Taxon+ID=^7227^#gephebase-summary-title>)

## EXTERNAL LINKS

## COMMENTS

@Splicing - This polymorphism is present in multiple lines - <http://flybase.org/reports/FBal0282692>

