GEPHE SUMMARY

Gephebase Gene
Sulfotransferase-OXA-Resistance (SULT-OR) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Sulfotransferase-OXA-Resistance (SULT-OR)^#gephebase-summary-title)

Entry Status
Published

GepheID
GP00001472

Main curator
Prigent

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Human blood fluke S. mansoni OXA-sensitive (wild-type)

Trait State in Taxon B
Human blood fluke S. haematobium naturally OXA-resistant (wild-type)

Ancestral State
Unknown

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

Taxon A

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

Common Name
-

Synonyms
-

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Platyhelminthes; Trematoda; Digenea; Strigeidida; Schistosomatoidea; Schistosomatidae; Schistosoma

Parent
Schistosoma () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6181)

NCBI Taxonomy ID
6183 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6183)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
-

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Platyhelminthes; Trematoda; Digenea; Strigeidida; Schistosomatoidea; Schistosomatidae; Schistosoma

Parent
Schistosoma () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6181)

NCBI Taxonomy ID
6183 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 6183)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
SULT-OR

Synonyms
Smp_089320

String
-

Sequence Similarities
-

GO - Molecular Function
GO:0016740 : transferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016740)

GO - Biological Process
-

GO - Cellular Component
-

UniProtKB Schistosoma mansoni
G4VLE5 (http://www.uniprot.org/uniprot/G4VLE5)

GenebankID or UniProtKB
()

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

F39 Sm > Y54 Sh (T>A) TTT>TAT

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

Genetic and molecular basis of drug resistance and species-specific drug action in schistosome parasites. (2013) (https://pubmed.ncbi.nlm.nih.gov/24263136)

Authors

Valentim CL; Cioli D; Chevalier FD; Cao X; Taylor AB; Holloway SP; Pica-Mattoccia L; Guidi A; Basso A; Tsai IJ; Berriman M; Carvalho-Queiroz C; Almeida M; Aguilar H; Frantz DE; Hart PJ; LoVerde PT; Anderson TJ

Abstract

Oxamniquine resistance evolved in the human blood fluke (Schistosoma mansoni) in Brazil in the 1970s. We crossed parental parasites differing ~500-fold in drug response, determined drug sensitivity and marker segregation in clonally derived second-generation progeny, and identified a single quantitative trait locus (logarithm of odds = 31) on chromosome 6. A sulfotransferase was identified as the causative gene by using RNA interference knockdown and biochemical complementation assays, and we subsequently demonstrated independent origins of loss-of-function mutations in field-derived and laboratory-selected resistant parasites. These results demonstrate the utility of linkage mapping in a human helminth parasite, while crystallographic analyses of protein-drug interactions illuminate the mode of drug action and provide a framework for rational design of oxamniquine derivatives that kill both S. mansoni and S. haematobium, the two species responsible for >99% of schistosomiasis cases worldwide.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

2 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Sulfotransferase-OXA-Resistance (SULT-OR)^/and+Taxon ID=^6183^/or+Gene Gephebase=^Sulfotransferase-OXA-Resistance (SULT-OR)^/and+Taxon ID=^6183^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

a change in aa polarity and size that is predicted to negatively impact OXA binding