GEPHE SUMMARY

Gephebase Gene
glutamate-gated chloride channel (GluCl) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^glutamate-gated chloride channel (GluCl)^#gephebase-summary-title)

GepheID
GP00002603

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

Trait State in Taxon A
Cooperia onchophora - sensitive

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

Common Name
-

Synonyms
-

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Strongylida; Trichostrongyloidea; Cooperiidae; Cooperia

Parent
Cooperia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 27827)

NCBI Taxonomy ID
27828 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 27828)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
-

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Nematoda; Chromadorea; Strongylida; Trichostrongyloidea; Cooperiidae; Cooperia

Parent
Cooperia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 27827)

NCBI Taxonomy ID
27828 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 27828)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
GluClalpha

Synonyms
BcDNA:HL07853; CG7535; CT23049; dGluCl-alpha; Dm-GluCl; Dmel\CG7535; DmGlu; DmGluClalpha; DrosGlu-Cl-alpha; DrosGluCl; DrosGluCl-alpha; DrosGluCl-alpha1; glc; glu; GluCl; GLUCL; GluCla; gluClalpha; GluClalpha1

String
7227.FBpp0099473 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0099473)

Sequence Similarities
Belongs to the ligand-gated ion channel (TC 1.A.9) family. Glutamate-gated chloride channel (TC 1.A.9.4) subfamily.

GO - Molecular Function
GO:0004888 : transmembrane signaling receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004888)
GO:1904315 : transmitter-gated ion channel activity involved in regulation of postsynaptic

UniProtKB Drosophila melanogaster
Q94900 (http://www.uniprot.org/uniprot/Q94900)

GenebankID or UniProtKB
()

membrane potential (https://www.ebi.ac.uk/QuickGO/term/GO:1904315)
GO:0005231 : excitatory extracellular ligand-gated ion channel activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0005231)
GO:0008068 : extracellularly glutamate-gated chloride channel activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0008068)
GO:0030594 : neurotransmitter receptor activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0030594)

GO - Biological Process

GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)
GO:0007268 : chemical synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0034220 : ion transmembrane transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0034220)
GO:0050877 : nervous system process
(https://www.ebi.ac.uk/QuickGO/term/GO:0050877)
GO:0042391 : regulation of membrane potential
(https://www.ebi.ac.uk/QuickGO/term/GO:0042391)
GO:1902476 : chloride transmembrane transport
(https://www.ebi.ac.uk/QuickGO/term/GO:1902476)
GO:0006821 : chloride transport (https://www.ebi.ac.uk/QuickGO/term/GO:0006821)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0043005 : neuron projection (https://www.ebi.ac.uk/QuickGO/term/GO:0043005)
GO:0045211 : postsynaptic membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0045211)
GO:0045202 : synapse (https://www.ebi.ac.uk/QuickGO/term/GO:0045202)
GO:0034707 : chloride channel complex
(https://www.ebi.ac.uk/QuickGO/term/GO:0034707)
GO:0070161 : anchoring junction (https://www.ebi.ac.uk/QuickGO/term/GO:0070161)

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

E114G V235A L256F in the GluCla3 ortholog and V60A R101Hin the GluClb ortholog.

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

Mutations in the extracellular domains of glutamate-gated chloride channel alpha3 and beta subunits from ivermectin-resistant Cooperia oncophora affect agonist sensitivity. (2004)
(https://pubmed.ncbi.nlm.nih.gov/15147506)

Authors

Njue AI; Hayashi J; Kinne L; Feng XP; Prichard RK

Abstract

Two full-length glutamate-gated chloride channel (GluCl) cDNAs, encoding GluClalpha3 and GluClbeta subunits, were cloned from ivermectin-susceptible (IVS) and -resistant (IVR) Cooperia oncophora adult worms. The IVS and IVR GluClalpha3 subunits differ at three amino acid positions, while the IVS and IVR GluClbeta subunits differ at two amino acid positions. The aim of this study was to determine whether mutations in the IVR subunits affect agonist sensitivity. The subunits were expressed singly and in combination in Xenopus laevis oocytes. Electrophysiological whole-cell voltage-clamp recordings showed that mutations in the IVR GluClalpha3 caused a modest but significant threefold loss of sensitivity to glutamate, the natural ligand for GluCl receptors. As well, a significant decrease in sensitivity to the anthelmintics ivermectin and moxidectin was observed in the IVR GluClalpha3 receptor. Mutations in the IVR GluClbeta subunit abolished glutamate sensitivity. Co-expressing the IVS GluClalpha3 and GluClbeta subunits resulted in heteromeric channels that were more sensitive to glutamate than the respective homomeric channels, demonstrating co-assembly of the subunits. In contrast, the heteromeric IVR channels were less sensitive to glutamate than the homomeric IVR GluClalpha3 channels. The heteromeric IVS channels were significantly more sensitive to glutamate than the heteromeric IVR channels. Of the three amino acids distinguishing the IVS and IVR GluClalpha3 subunits, only one of them, L256F, accounted for the differences in response between the IVS and IVR GluClalpha3 homomeric channels.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS