

GEPHE SUMMARY

CHRNA1 (<https://www.gephebase.org/search-criteria?/and+GeneGephebase=^CHRNA1^#gephebase-summary-title>)

Gephebase Gene GP00001721 GepheID

Entry Status Courtier Main curator

Published

PHENOTYPIC CHANGE

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

Trait Category

Xenobiotic resistance (snake venom) ([https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance \(snake venom\)^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (snake venom)^#gephebase-summary-title))

Trait

Other Carnivora

Trait State in Taxon A

Trait State in Taxon B

domestic pig - looks like resistant to venom - domestic pigs can prey on a variety of venomous snakes and survive snakebite

Ancestral State

Taxon A

Taxonomic Status

Intergeneric or Higher (<https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Intergeneric or Higher^#gephebase-summary-title>)

Taxon A	Latin Name	Taxon B	Latin Name
Carnivora (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Carnivora^#gephebase-summary-title)		Sus scrofa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Sus scrofa^#gephebase-summary-title)	
carnivores	Common Name	pig	Common Name
carnivores	Synonyms	pig; pigs; swine; wild boar; Sus scrofa Linnaeus, 1758; Sus scrofa	Synonyms
order	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Cetartiodactyla; Suina; Suidae; Sus	Lineage
Laurasiatheria () - (Rank: superorder) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=314145)	Parent	Sus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9822)	Parent
33554 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=33554)	NCBI Taxonomy ID	9823 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9823)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

CHRNA1

Generic Gene Name P02708 (<http://www.uniprot.org/uniprot/P02708>) UniProtKB Homo sapiens

ACHRA; ACHRD; CHRNA; CMS1A; CMS1B; CMS2A; FCCMS; SCCMS; CHNRA

Synonyms () GenebankID or UniProtKB

String

9606.ENSP00000261007
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSP00000261007)

Sequence Similarities

Belongs to the ligand-gated ion channel (TC 1.A.9) family. Acetylcholine receptor (TC 1.A.9.1) subfamily. Alpha-1/CHRNA1 sub-subfamily.

GO - Molecular Function

GO:0042166 : acetylcholine binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0042166>)

GO:0015464 : acetylcholine receptor activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0015464>)

GO:0022848 : acetylcholine-gated cation-selective channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0022848>)

GO:0005216 : ion channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0005216>)

GO:1904315 : transmitter-gated ion channel activity involved in regulation of postsynaptic membrane potential (<https://www.ebi.ac.uk/QuickGO/term/GO:1904315>)

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:0007271 : synaptic transmission, cholinergic
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007271>)

GO:0034220 : ion transmembrane transport
(<https://www.ebi.ac.uk/QuickGO/term/GO:0034220>)

GO:0046716 : muscle cell cellular homeostasis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0046716>)

GO:0050881 : musculoskeletal movement
(<https://www.ebi.ac.uk/QuickGO/term/GO:0050881>)

GO:0050877 : nervous system process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0050877>)

GO:0007528 : neuromuscular junction development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007528>)

GO:0050905 : neuromuscular process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0050905>)

GO:0007274 : neuromuscular synaptic transmission
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007274>)

GO:0070050 : neuron cellular homeostasis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0070050>)

GO:0019228 : neuronal action potential
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019228>)

GO:0042391 : regulation of membrane potential
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042391>)

GO:0035094 : response to nicotine (<https://www.ebi.ac.uk/QuickGO/term/GO:0035094>)

GO:0003009 : skeletal muscle contraction
(<https://www.ebi.ac.uk/QuickGO/term/GO:0003009>)

GO:0048630 : skeletal muscle tissue growth
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048630>)

GO - Cellular Component

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

GO:0005887 : integral component of plasma membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

GO:0030054 : cell junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0030054>)

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:0005892 : acetylcholine-gated channel complex
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005892>)

GO:0009986 : cell surface (<https://www.ebi.ac.uk/QuickGO/term/GO:0009986>)

GO:0099060 : integral component of postsynaptic specialization membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0099060>)

GO:0031594 : neuromuscular junction
(<https://www.ebi.ac.uk/QuickGO/term/GO:0031594>)

Mutation #1

Presumptive Null

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title](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](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](https://www.gephebase.org/search-criteria?/and+Aberration+Type=~SNP^#gephebase-summary-title))

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

W187R

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Trp	Arg	187

Main Reference

Why the honey badger don't care: Convergent evolution of venom-targeted nicotinic acetylcholine receptors in mammals that survive venomous snake bites. (2015)
(<https://pubmed.ncbi.nlm.nih.gov/25796346>)

Authors

Drabeck DH; Dean AM; Jansa SA

Abstract

Honey badgers (*Mellivora capensis*) prey upon and survive bites from venomous snakes (Family: Elapidae), but the molecular basis of their venom resistance is unknown. The muscular nicotinic cholinergic receptor (nAChR), targeted by snake δ -neurotoxins, has evolved in some venom-resistant mammals to no longer bind these toxins. Through phylogenetic analysis of mammalian nAChR sequences, we show that honey badgers, hedgehogs, and pigs have independently acquired functionally equivalent amino acid replacements in the toxin-binding site of this receptor. These convergent amino acid changes impede toxin binding by introducing a positively charged amino acid in place of an uncharged aromatic residue. In venom-resistant mongooses, different replacements at these same sites are glycosylated, which is thought to disrupt binding through steric effects. Thus, it appears that resistance to snake venom δ -neurotoxin has evolved at least four times among mammals through two distinct biochemical mechanisms operating at the same sites on the same receptor.

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Additional References

Mutation #2

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

Presumptive Null

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

Molecular Type

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

Aberration Type

Nonsynonymous

SNP Coding Change

F189L

Molecular Details of the Mutation

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

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Phe	Leu	189

Main Reference

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Additional References

RELATED GEPHE

No matches found.

Related Genes

4 ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase+CHRNA1+/and+Taxon+ID+33554+/or+Gene+Gephebase+CHRNA1+/and+Taxon+ID+9823))

Related Haplotypes

EXTERNAL LINKS

COMMENTS

