GEPHE SUMMARY

Gephebase Gene
TMEM154 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^TMEM154^#gephebase-summary-title)

GepheID
GP00002242

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Susceptible to ovine progressive pneumonia virus (OPPV)

Trait State in Taxon B
Resistant to ovine progressive pneumonia virus (OPPV)

Ancestral State
Taxon A

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

Taxon A

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

Common Name
sheep

Synonyms
Ovis ammon aries; Ovis orientalis aries; Ovis ovis; sheep; domestic sheep; lambs; wild sheep; Ovis aries Linnaeus, 1758

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Artiodactyla; Ruminantia; Pecora; Bovidae; Caprinae; Ovis

Parent
Ovis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9935)

NCBI Taxonomy ID
9940 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9940)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
sheep

Synonyms
Ovis ammon aries; Ovis orientalis aries; Ovis ovis; sheep; domestic sheep; lambs; wild sheep; Ovis aries Linnaeus, 1758

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Artiodactyla; Ruminantia; Pecora; Bovidae; Caprinae; Ovis

Parent
Ovis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9935)

NCBI Taxonomy ID
9940 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9940)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
TMEM154

Synonyms
-

String
9606.ENSP00000302144 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSP00000302144)

Sequence Similarities
-

GO - Molecular Function
-

GO - Biological Process
-

GO - Cellular Component
GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)

UniProtKB Homo sapiens
Q6P9G4 (http://www.uniprot.org/uniprot/Q6P9G4)

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

Mutation at conserved position associated to resistance in homozygous state

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Glu	Lys	35

Main Reference

Reduced lentivirus susceptibility in sheep with TMEM154 mutations. (2012) (https://pubmed.ncbi.nlm.nih.gov/22291605)

Authors

Heaton MP; Clawson ML; Chitko-Mckown CG; Leymaster KA; Smith TP; Harhay GP; White SN; Herrmann-Hoesing LM; Mousel MR; Lewis GS; Kalbfleisch TS; Keen JE; Laegreid WW

Abstract

Visna/Maedi, or ovine progressive pneumonia (OPP) as it is known in the United States, is an incurable slow-acting disease of sheep caused by persistent lentivirus infection. This disease affects multiple tissues, including those of the respiratory and central nervous systems. Our aim was to identify ovine genetic risk factors for lentivirus infection. Sixty-nine matched pairs of infected cases and uninfected controls were identified among 736 naturally exposed sheep older than five years of age. These pairs were used in a genome-wide association study with 50,614 markers. A single SNP was identified in the ovine transmembrane protein (TMEM154) that exceeded genome-wide significance (unadjusted p-value 3Ã—10(-9)). Sanger sequencing of the ovine TMEM154 coding region identified six missense and two frameshift deletion mutations in the predicted signal peptide and extracellular domain. Two TMEM154 haplotypes encoding glutamate (E) at position 35 were associated with infection while a third haplotype with lysine (K) at position 35 was not. Haplotypes encoding full-length E35 isoforms were analyzed together as genetic risk factors in a multi-breed, matched case-control design, with 61 pairs of 4-year-old ewes. The odds of infection for ewes with one copy of a full-length TMEM154 E35 allele were 28 times greater than the odds for those without (p-value<0.0001, 95% CI 5-1,100). In a combined analysis of nine cohorts with 2,705 sheep from Nebraska, Idaho, and Iowa, the relative risk of infection was 2.85 times greater for sheep with a full-length TMEM154 E35 allele (p-value<0.0001, 95% CI 2.36-3.43). Although rare, some sheep were homozygous for TMEM154 deletion mutations and remained uninfected despite a lifetime of significant exposure. Together, these findings indicate that TMEM154 may play a central role in ovine lentivirus infection and removing sheep with the most susceptible genotypes may help eradicate OPP and protect flocks from reinfection.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@AllelicSeries : two deletion - frameshift haplotypes exist in populations but were not tested for association with resistance. https://omia.org/OMIA001694/9940/