

GEPHE SUMMARY

stanniocalcin 2 (STC2) (https://www.gephebase.org/search-criteria?/and+GeneGephebase=~stanniocalcin 2 (STC2)^#gephebase-summary-title)	Gephebase Gene	GP00001478	GepheID
	Entry Status	Prigent	Main curator
	Published		

PHENOTYPIC CHANGE

Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=~Morphology^#gephebase-summary-title)		Trait Category	
Body size (weight) (https://www.gephebase.org/search-criteria?/and+Trait=~Body size (weight)^#gephebase-summary-title)		Trait	
Gray wolf of 38 to 66 kg		Trait State in Taxon A	
Dog of 6.2 kg on average		Trait State in Taxon B	
Taxon A		Ancestral State	
Domesticated (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Domesticated^#gephebase-summary-title)		Taxonomic Status	
Taxon A		Taxon B	
Canis lupus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Canis lupus^#gephebase-summary-title)		Homo sapiens (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Homo sapiens^#gephebase-summary-title)	
gray wolf		human	
gray wolf; grey wolf; Canis lupus Linnaeus, 1758		human; man; Homo sapiens Linnaeus, 1758; Home sapiens; Homo sapiens; Homo sapeins; Homo sapien; Homo sapians; Homo sapien; Homo sapience; Homo sapiense; Homo sapients; Homo sapines; Homo spaiens; Homo spiens; Humo sapiens	
species		species	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Laurasiatheria; Carnivora; Caniformia; Canidae; Canis		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria; Euarchontoglires; Primates; Haplorrhini; Simiiformes; Catarrhini; Hominoidea; Hominidae; Homininae; Homo	
Canis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9611)		Homo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9605)	
9612 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9612)		9606 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9606)	
No is Taxon A an Intraspecies?		No is Taxon B an Intraspecies?	

GENOTYPIC CHANGE

STC2		Generic Gene Name		UniProtKB Homo sapiens
STC-2; STCRP		Synonyms		GenebankID or UniProtKB
9606.ENSPP00000265087 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=9606.ENSPP00000265087)		String		XM_546230.5 (https://www.ncbi.nlm.nih.gov/nucore/XM_546230.5)
Belongs to the stanniocalcin family.		Sequence Similarities		
GO:0042803 : protein homodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0042803)		GO - Molecular Function		
GO:0019899 : enzyme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0019899)				
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)				

GO:0005179 : hormone activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0005179>)
GO - Biological Process

GO:0006874 : cellular calcium ion homeostasis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006874>)
GO:0044267 : cellular protein metabolic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0044267>)
GO:0010629 : negative regulation of gene expression
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010629>)
GO:0043687 : post-translational protein modification
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043687>)
GO:0071456 : cellular response to hypoxia
(<https://www.ebi.ac.uk/QuickGO/term/GO:0071456>)
GO:0040015 : negative regulation of multicellular organism growth
(<https://www.ebi.ac.uk/QuickGO/term/GO:0040015>)
GO:0030968 : endoplasmic reticulum unfolded protein response
(<https://www.ebi.ac.uk/QuickGO/term/GO:0030968>)
GO:0046697 : decidualization (<https://www.ebi.ac.uk/QuickGO/term/GO:0046697>)
GO:0043434 : response to peptide hormone
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043434>)
GO:0006979 : response to oxidative stress
(<https://www.ebi.ac.uk/QuickGO/term/GO:0006979>)
GO:0007566 : embryo implantation (<https://www.ebi.ac.uk/QuickGO/term/GO:0007566>)
GO:0033280 : response to vitamin D (<https://www.ebi.ac.uk/QuickGO/term/GO:0033280>)
GO:0046885 : regulation of hormone biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0046885>)
GO:2001256 : regulation of store-operated calcium entry
(<https://www.ebi.ac.uk/QuickGO/term/GO:2001256>)

GO - Cellular Component

GO:0005794 : Golgi apparatus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005794>)
GO:0005615 : extracellular space (<https://www.ebi.ac.uk/QuickGO/term/GO:0005615>)
GO:0005783 : endoplasmic reticulum
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005783>)
GO:0005788 : endoplasmic reticulum lumen
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005788>)
GO:0048471 : perinuclear region of cytoplasm
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048471>)

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title)	Presumptive Null
Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Cis-regulatory~#gephebase-summary-title)	Molecular Type
SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP~#gephebase-summary-title)	Aberration Type
T>A 20-kb downstream from coding region	Molecular Details of the Mutation
Association Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Association Mapping~#gephebase-summary-title)	Experimental Evidence
Derived variants at six genes explain nearly half of size reduction in dog breeds. (2013) (https://pubmed.ncbi.nlm.nih.gov/24026177)	Main Reference
Rimbault M; Beale HC; Schoenebeck JJ; Hoopes BC; Allen JJ; Kilroy-Glynn P; Wayne RK; Sutter NB; Ostrander EA	Authors

Abstract

Selective breeding of dogs by humans has generated extraordinary diversity in body size. A number of multibreed analyses have been undertaken to identify the genetic basis of this diversity. We analyzed four loci discovered in a previous genome-wide association study that used 60,968 SNPs to identify size-associated genomic intervals, which were too large to assign causative roles to genes. First, we performed fine-mapping to define critical intervals that included the candidate genes GHR, HMGA2, SMAD2, and STC2, identifying five highly associated markers at the four loci. We hypothesize that three of the variants are likely to be causative. We then genotyped each marker, together with previously reported size-associated variants in the IGF1 and IGF1R genes, on a panel of 500 domestic dogs from 93 breeds, and identified the ancestral allele by genotyping the same markers on 30 wild canids. We observed that the derived alleles at all markers correlated with reduced body size, and smaller dogs are more likely to carry derived alleles at multiple markers. However, breeds are not generally fixed at all markers; multiple combinations of genotypes are found within most breeds. Finally, we show that 46%-52.5% of the variance in body size of dog breeds can be explained by seven markers in proximity to exceptional candidate genes. Among breeds with standard weights <41 kg (90 lb), the genotypes accounted for 64.3% of variance in weight. This work advances our understanding of mammalian growth by describing genetic contributions to canine size determination in non-giant dog breeds.

Additional References

RELATED GEPHE

5 (growth hormone receptor (GHR), HMGA2, Insulin-like growth factor 1 (IGF1), Insulin-like growth factor receptor 1 (IGF1R), SMAD family member 2 (SMAD2)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=~9612~/and+Trait=Body size/or+Taxon ID=~9606~/and+Trait=Body size/and+groupHaplotypes=true#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS

each variant is potentially causal. STC2 a secreted glycoprotein hormone inhibits growth in mice