

GEPHE SUMMARY

<p>GPRC6A (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=GPRC6A#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00001671</p> <p>Prigent</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=Physiology#gephebase-summary-title)</p> <p>Cell signaling (membrane receptor activity) (https://www.gephebase.org/search-criteria?/and+Trait=Cell signaling (membrane receptor activity)#gephebase-summary-title)</p> <p>WT</p> <p>Intracellular retention lacking signaling function</p> <p>Taxon A</p> <p>Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=Intraspecific#gephebase-summary-title)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	<p>Taxon A</p> <p>Latin Name</p> <p>Homo sapiens (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Homo sapiens#gephebase-summary-title)</p> <p>Common Name</p> <p>human</p> <p>Synonyms</p> <p>human; man; Homo sapiens Linnaeus, 1758; Home sapiens; Homo sapiens; Homo sapeins; Homo sapien; Homo sapiens; Homo sapience; Homo sapiense; Homo sapients; Homo sapines; Homo spaiens; Homo spiens; Humo sapiens</p> <p>Rank</p> <p>species</p> <p>Lineage</p> <p>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</p> <p>Parent</p> <p>Homo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9605)</p> <p>NCBI Taxonomy ID</p> <p>9606 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9606)</p> <p>is Taxon A an Intraspecies?</p> <p>Yes</p> <p>Taxon A Description</p> <p>Human. NCBI & 1000 Genomes phase III (1KG) & Inter99 datasets. 30% of African population 0.1-4% of other populations. (Also bonobo and mouse)</p>	<p>Taxon B</p> <p>Latin Name</p> <p>Homo sapiens (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Homo sapiens#gephebase-summary-title)</p> <p>Common Name</p> <p>human</p> <p>Synonyms</p> <p>human; man; Homo sapiens Linnaeus, 1758; Home sapiens; Homo sapiens; Homo sapeins; Homo sapien; Homo sapiens; Homo sapience; Homo sapiense; Homo sapients; Homo sapines; Homo spaiens; Homo spiens; Humo sapiens</p> <p>Rank</p> <p>species</p> <p>Lineage</p> <p>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</p> <p>Parent</p> <p>Homo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9605)</p> <p>NCBI Taxonomy ID</p> <p>9606 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9606)</p> <p>is Taxon B an Intraspecies?</p> <p>Yes</p> <p>Taxon B Description</p> <p>Human. 96-99% of American - European - East Asian and South Asian populations & 68% of African population</p>
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GENOTYPIC CHANGE

<p>GPRC6A</p> <p>GPCR; bA86F4.3</p> <p>9606.ENSPO0000309493 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=9606.ENSPO0000309493)</p> <p>Belongs to the G-protein coupled receptor 3 family.</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>Q5T6X5 (http://www.uniprot.org/uniprot/Q5T6X5)</p> <p>()</p>	<p>UniProtKB Homo sapiens</p> <p>GenebankID or UniProtKB</p>
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GO:0004930 : G protein-coupled receptor activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0004930>)

GO - Biological Process

GO:0007186 : G protein-coupled receptor signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007186>)

GO:0019722 : calcium-mediated signaling
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019722>)

GO:0043200 : response to amino acid
(<https://www.ebi.ac.uk/QuickGO/term/GO:0043200>)

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

Presumptive Null

Yes ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~Yes))

Molecular Type

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

Aberration Type

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

KGRKLP>KGG--Y in the third intracellular loop (ICL3) responsible for the intracellular retention and lack of function

Experimental Evidence

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

Main Reference

Genetic Variations in the Human G Protein-coupled Receptor Class C, Group 6, Member A (GPRC6A) Control Cell Surface Expression and Function. (2017)
(<https://pubmed.ncbi.nlm.nih.gov/27986810>)

Authors

JÃ,rgensen S; Have CT; Underwood CR; Johansen LD; Wellendorph P; Gjesing AP; JÃ,rgensen CV; Quan S; Rui G; Inoue A; Linneberg A; Grarup N; Jun W; Pedersen O; Hansen T; BrÃ,uner-Osborne H

Abstract

GPRC6A is a G protein-coupled receptor activated by l-amino acids, which, based on analyses of knock-out mice, has been suggested to have physiological functions in metabolism and testicular function. The human ortholog is, however, mostly retained intracellularly in contrast to the cell surface-expressed murine and goldfish orthologs. The latter orthologs are G-coupled and lead to intracellular accumulation of inositol phosphates and calcium release. In the present study we cloned the bonobo chimpanzee GPRC6A receptor, which is 99% identical to the human receptor, and show that it is cell surface-expressed and functional. By analyses of chimeric human/mouse and human/bonobo receptors, bonobo receptor mutants, and the single nucleotide polymorphism database at NCBI, we identify an insertion/deletion variation in the third intracellular loop responsible for the intracellular retention and lack of function of the human ortholog. Genetic analyses of the 1000 genome database and the Inter99 cohort of 6,000 Danes establish the distribution of genotypes among ethnic groups, showing that the cell surface-expressed and functional variant is much more prevalent in the African population than in European and Asian populations and that this variant is partly linked with a stop codon early in the receptor sequence (rs6907580, amino acid position 57). In conclusion, our data solve a more than decade-old question of why the cloned human GPRC6A receptor is not cell surface-expressed and functional and provide a genetic framework to study human phenotypic traits in large genome sequencing projects linked with physiological measurement and biomarkers.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

3 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~GPRC6A^/and+Taxon+ID=~9606^/or+Gene+Gephebase=~GPRC6A^/and+Taxon+ID=~9606^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS

The only physiological difference observed is in men cohort that differed for the 30-minute serum insulin and first-phase insulin response after oral glucose tolerance test (increase in KGRKLP carriers that are only few)

