GEPHE SUMMARY

Gephebase Gene

GLUD2 retrogene (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^GLUD2 retrogene^#gephebase-summary-title)

Entry Status

Published

GepheID

GP00000405

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

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

Trait

Gene expression change (novel expression domain in testicles and brain) (https://www.gephebase.org/search-criteria?/and+Trait=^Gene expression change (novel expression domain in testicles and brain)^#gephebase-summary-title)

Trait State in Taxon A

Hominoids

Trait State in Taxon B

other mammals

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

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

Common Name

mammals

Synonyms

mammals

Rank

class

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota

Parent

Amniota (amniotes) - (Rank: no rank) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 32524)

NCBI Taxonomy ID

40674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 40674)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

great apes

Synonyms

Pongidae; great apes; Hominidae Gray, 1825

Rank

family

Lineage

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

Parent

Hominoidea (apes) - (Rank: superfamily) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 314295)

NCBI Taxonomy ID

9604 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 9604)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

GLUD2

Synonyms

GDH2; GLUDP1

String

9606.ENSP00000327589 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 9606.ENSP00000327589)

Sequence Similarities

Belongs to the Glu/Leu/Phe/Val dehydrogenases family.

GO - Molecular Function

GO:0043531 : ADP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043531)
GO:0005525 : GTP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005525)
GO:0004352 : glutamate dehydrogenase (NAD+) activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004352)
GO:0004353 : glutamate dehydrogenase [NAD(P)+] activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004353)

UniProtKB Homo sapiens

P49448 (http://www.uniprot.org/uniprot/P49448)

GenebankID or UniProtKB

AAH05111 (https://www.ncbi.nlm.nih.gov/nuccore/AAH05111)

GO:0070728 : leucine binding (https://www.ebi.ac.uk/QuickGO/term/GO:0070728)

GO - Biological Process

GO:0055114 : oxidation-reduction process
(https://www.ebi.ac.uk/QuickGO/term/GO:0055114)
GO:0006537 : glutamate biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006537)
GO:0006538 : glutamate catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006538)
GO:0006536 : glutamate metabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006536)

GO - Cellular Component

GO:0005739 : mitochondrion (https://www.ebi.ac.uk/QuickGO/term/GO:0005739)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

Retroduplication; + E7K enhancing mitochondrial targeting

Experimental Evidence

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

Main Reference

Birth and adaptive evolution of a hominoid gene that supports high neurotransmitter flux. (2004) (https://pubmed.ncbi.nlm.nih.gov/15378063)

Authors

Burki F; Kaessmann H

Abstract

The enzyme glutamate dehydrogenase (GDH) is important for recycling the chief excitatory neurotransmitter, glutamate, during neurotransmission. Human GDH exists in housekeeping and brain-specific isotypes encoded by the genes GLUD1 and GLUD2, respectively. Here we show that GLUD2 originated by retroposition from GLUD1 in the hominoid ancestor less than 23 million years ago. The amino acid changes responsible for the unique brain-specific properties of the enzyme derived from GLUD2 occurred during a period of positive selection after the duplication event.

Additional References

Mitochondrial targeting adaptation of the hominoid-specific glutamate dehydrogenase driven by positive Darwinian selection. (2008) (https://pubmed.ncbi.nlm.nih.gov/18688271)

RELATED GEPHE

Related Genes

2 (FoxP2, Prolactin (deciduous Prolactin; dPRL)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^40674^/and+Trait=Gene expression change/or+Taxon ID=^9604^/and+Trait=Gene expression change/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS