

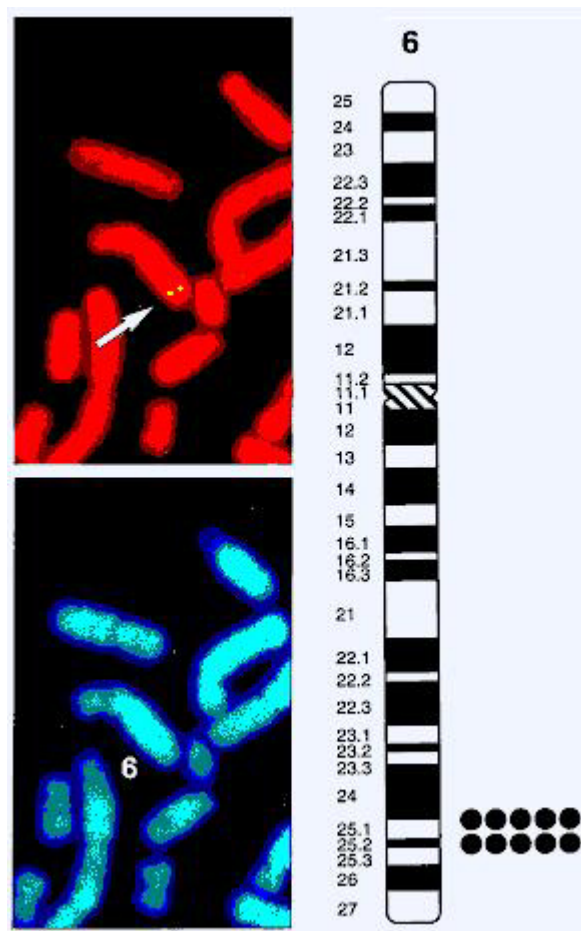
AKAP12 (A kinase (PRKA) anchor protein 1)

Identity

Other names **Gravin**
SSeCKS
AKAP250
DKFZp686M0430
DKFZp686O0331

Hugo [AKAP12](#)

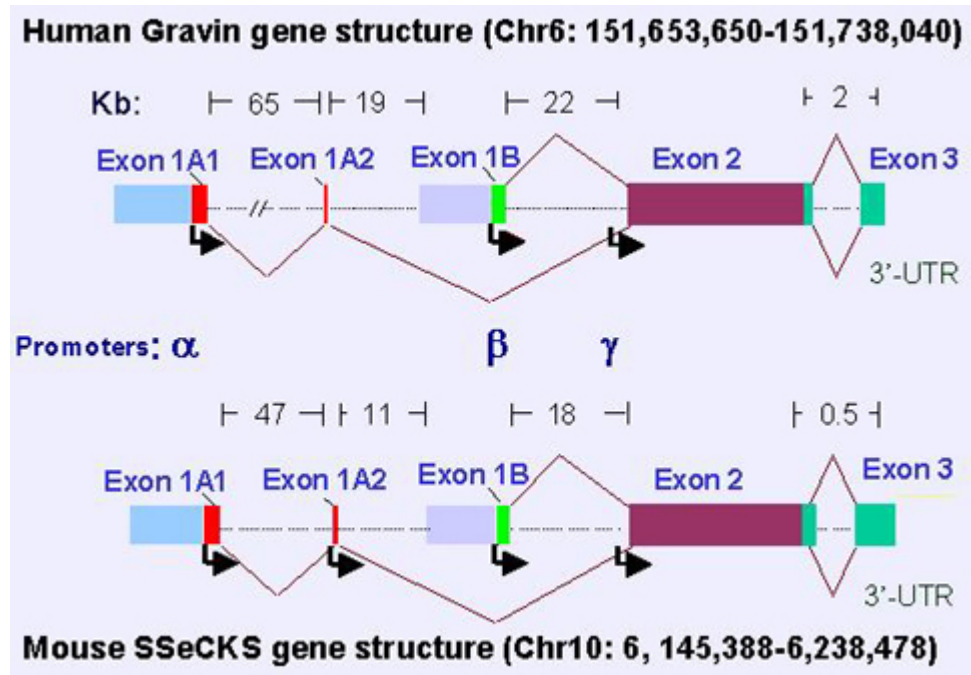
Location 6q25



AKAP12 (6q24-25.2) in normal cells probed with a about 5Kb human AKAP12 probe. Courtesy of Irwin Gelman; adapted from Xia et al., Cancer Res.61:5644-5651, 2001.

DNA/RNA

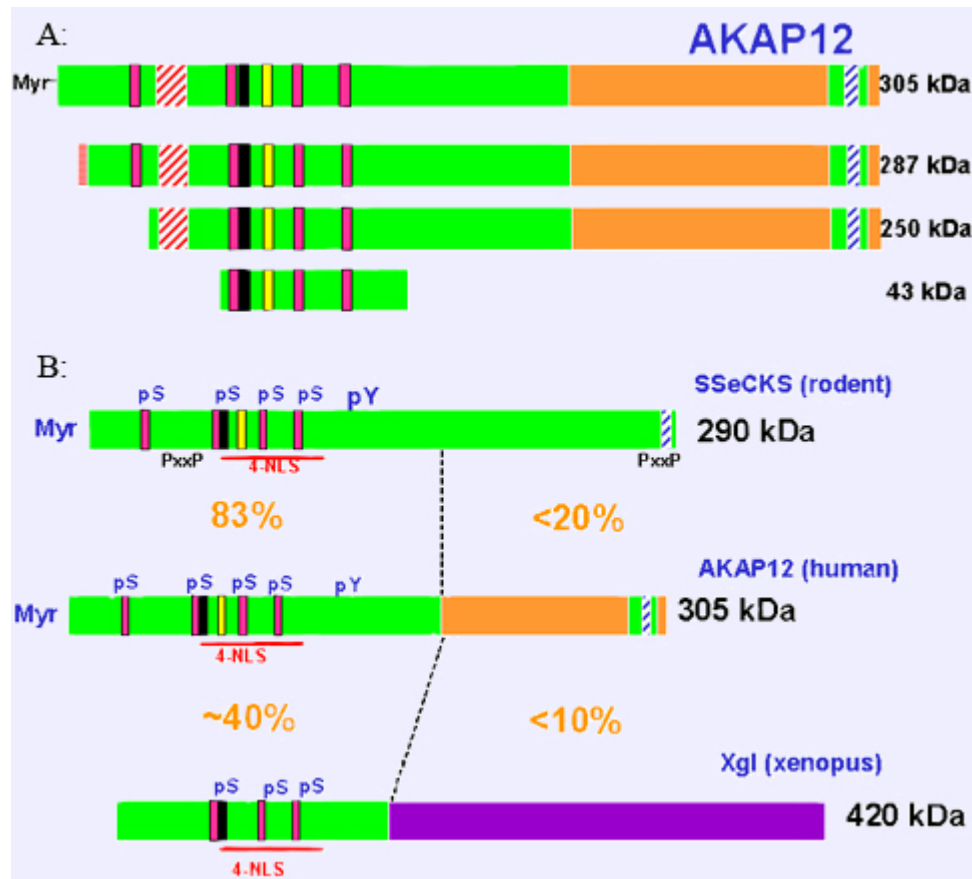
Note The AKAP12 gene is strongly conserved from fish to humans, including syntenic regions conserved in the mouse (chrom. 10) and rat (chrom. 1).



Human and mouse cells have similar exon/intron usage and spacing. AKAP12 has three independent promoters, alpha, beta, and gamma. The gamma promoter is active only in the testes while the alpha and beta are co-active in most cells and tissues studied. Exons 1A1 and 1A2 combine to then splice to a common splice acceptor on Exon 2 used by Exon 1B. Exons 1A1 and 1A2 produce the N-terminal 103 amino acids of "AKAP12alpha" whereas Exon 1B encodes the N-terminal 8 amino acids of "AKAP12beta"; the remaining amino acids are encoded in Exon 2. "AKAP12gamma" is encoded by a read-through transcript starting in the intron upstream of Exon 2, utilizing an in-frame ATG in Exon 2. Therefore, the alpha, beta, and gamma transcripts encode proteins that only differ in their N-termini.

Pseudogene None.

Protein



A: Except for testes, most cells express four major isoforms of AKAP12 protein. The 305 kDa isoforms is the myristylated AKAP12alpha whereas the 287 kDa isoforms is AKAP12beta. The 250 kDa and 43 kDa isoforms are proteolytic cleavage products common to the AKAP12alpha and beta isoforms.

B: Human AKAP12alpha encodes a 1,780 amino acids full-length protein. The first about 1,000 amino acids of human and rodent AKAP12 share 83% identity followed by about 600 amino acids with less than 20% identity. The N-terminal homology domain (green) shows about 40% identity to the Xgl (Xenopus gravin-like) gene in Xenopus. Both human and rodent AKAP12 share a shorter C-terminal domain containing the PKA-RII binding (AKAP) domain (green box in human AKAP12).

Expression	AKAP12 isoforms are expressed in most tissue and organ types, with high expression levels in the testes, ovary, brain, lung and heart. Most mesenchyme, smooth muscle and some epithelial cells (breast, prostate, lung, ovary) express significant AKAP12 levels. Lower levels of AKAP12 are found in endothelial cells, although express in these cells is usually associated with wounding and/or inflammation.
Localisation	Most cell types display a cortical cytoskeletal staining pattern for AKAP12, with enrichment at the plasma membrane (presumably, the myristylated isoforms) and in the perinucleus. However, some staining has been observed in cell nuclei, probably directed by 4 SV40 Tag-like nuclear localization signals (NLS) found in the N-terminal third of the protein.
Function	<ol style="list-style-type: none"> 1) Facilitates the sensitization/resensitization reaction of beta-adrenergic receptors. 2) Scaffolds protein kinase (PK) A and PKC. 3) Autoantigen in some cases of myasthenia gravis. 4) Anti-angiogenic factor. The rodent orthologue has been shown to inhibit brain angiogenesis and induce the blood-brain barrier, and to inhibit VEGF-mediated metastasis. 5) Potential tumor suppressor. The rodent orthologue has been shown to suppress Src- and Ras-induced oncogenic proliferation in vitro and metastatic

potential in vivo.

Homology Southern blotting analysis as well as analysis of sequenced genomes indicates that vertebrates encode single AKAP12 orthologues, with no gene family members. Thus, the protein diversity of this gene stems from promoter choice, alternative splicing, proteolytic maturation and post-translational modification. AKAP12 has limited sequence homology based on short domains. For example, the C-terminal AKAP domain is homologous to the analogous domain in AKP79. Also, AKAP12 shares some so-called MARCKS protein-like effector domains- positively charged stretches of amino acids involved in plasma membrane targeting.

Mutations

Note No known mutations are associated with AKAP12. However, there are at least 539 single nucleotide polymorphisms (SNP) as described.

External links

Nomenclature

[Hugo](#) [AKAP12](#)
[GDB](#) [AKAP12](#)
[Entrez_Gene](#) [AKAP12_9590](#) A kinase (PRKA) anchor protein (gravin) 12

Cards

[Atlas](#) [AKAP12ID607ch6q25](#)
[GeneCards](#) [AKAP12](#)
[Ensembl](#) [AKAP12](#)
[Genatlas](#) [AKAP12](#)
[GeneLynx](#) [AKAP12](#)
[eGenome](#) [AKAP12](#)
[euGene](#) [9590](#)

Genomic and cartography

[GoldenPath](#) [AKAP12 - 6q25 chr6:151603202-151719601 + 6q24-q25](#) (hg18-Mar_2006)
[Ensembl](#) [AKAP12 - 6q24-q25 \[CytoView\]](#)
[NCBI](#) [Genes Cyto](#) [Gene Seq](#) [Map View - NCBI]
[OMIM](#) [Disease map \[OMIM\]](#)
[HomoloGene](#) [AKAP12](#)

Gene and transcription

[Genbank](#) [AB003476](#) [ENTREZ]
[Genbank](#) [AB210003](#) [ENTREZ]
[Genbank](#) [AF001504](#) [ENTREZ]
[Genbank](#) [AF086250](#) [ENTREZ]
[Genbank](#) [BC000188](#) [ENTREZ]
[RefSeq](#) [NM_005100](#) [SRS] [NM_005100](#) [ENTREZ]
[RefSeq](#) [NM_144497](#) [SRS] [NM_144497](#) [ENTREZ]
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[RefSeq](#) [NC_000006](#) [SRS] [NC_000006](#) [ENTREZ]
[RefSeq](#) [NT_025741](#) [SRS] [NT_025741](#) [ENTREZ]
[RefSeq](#) [NW_923184](#) [SRS] [NW_923184](#) [ENTREZ]
[AceView](#) [AKAP12](#) AceView - NCBI
[Unigene](#) [Hs.371240](#) [SRS] [Hs.371240](#) [NCBI] [HS371240](#) [spliceNest]

Protein : pattern, domain, 3D structure

SwissProt	O43572 [SRS] O43572 [EXPASY] O43572 [INTERPRO]
Prosite	PS50132 RGS [SRS] PS50132 RGS [Expasy]
Interpro	IPR000342 RGS [SRS] IPR000342 RGS [EBI]
CluSTr	O43572
Smart	SM00315 RGS [EMBL]
Blocks	O43572
HPRD	O43572

Protein Interaction databases

DIP	O43572
IntAct	O43572

Polymorphism : SNP, mutations, diseases

OMIM	604698 [map]
GENECLINICS	604698
SNP	AKAP12 [dbSNP-NCBI]
SNP	NM_005100 [SNP-NCI]
SNP	NM_144497 [SNP-NCI]
SNP	AKAP12 [GeneSNPs - Utah] AKAP12 [HGBASE - SRS]
HAPMAP	AKAP12 [HAPMAP]

General knowledge

Family Browser	AKAP12 [UCSC Family Browser]
SOURCE	NM_005100
SOURCE	NM_144497
SMD	Hs.371240
SAGE	Hs.371240
GO	protein binding [Amigo] protein binding
GO	cytoplasm [Amigo] cytoplasm
GO	protein targeting [Amigo] protein targeting
GO	signal transduction [Amigo] signal transduction
GO	G-protein coupled receptor protein signaling pathway [Amigo] G-protein coupled receptor protein signaling pathway
GO	protein kinase A binding [Amigo] protein kinase A binding
PubGene	AKAP12

Other databases

Probes

Probe	AKAP12 Related clones (RZPD - Berlin)
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PubMed

PubMed	20 Pubmed reference(s) in LocusLink
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Medline [16740695](#)

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Contributor(s)

Written 11-2006 Irwin H Gelman

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