Camk2a Cas9-CKO Strategy

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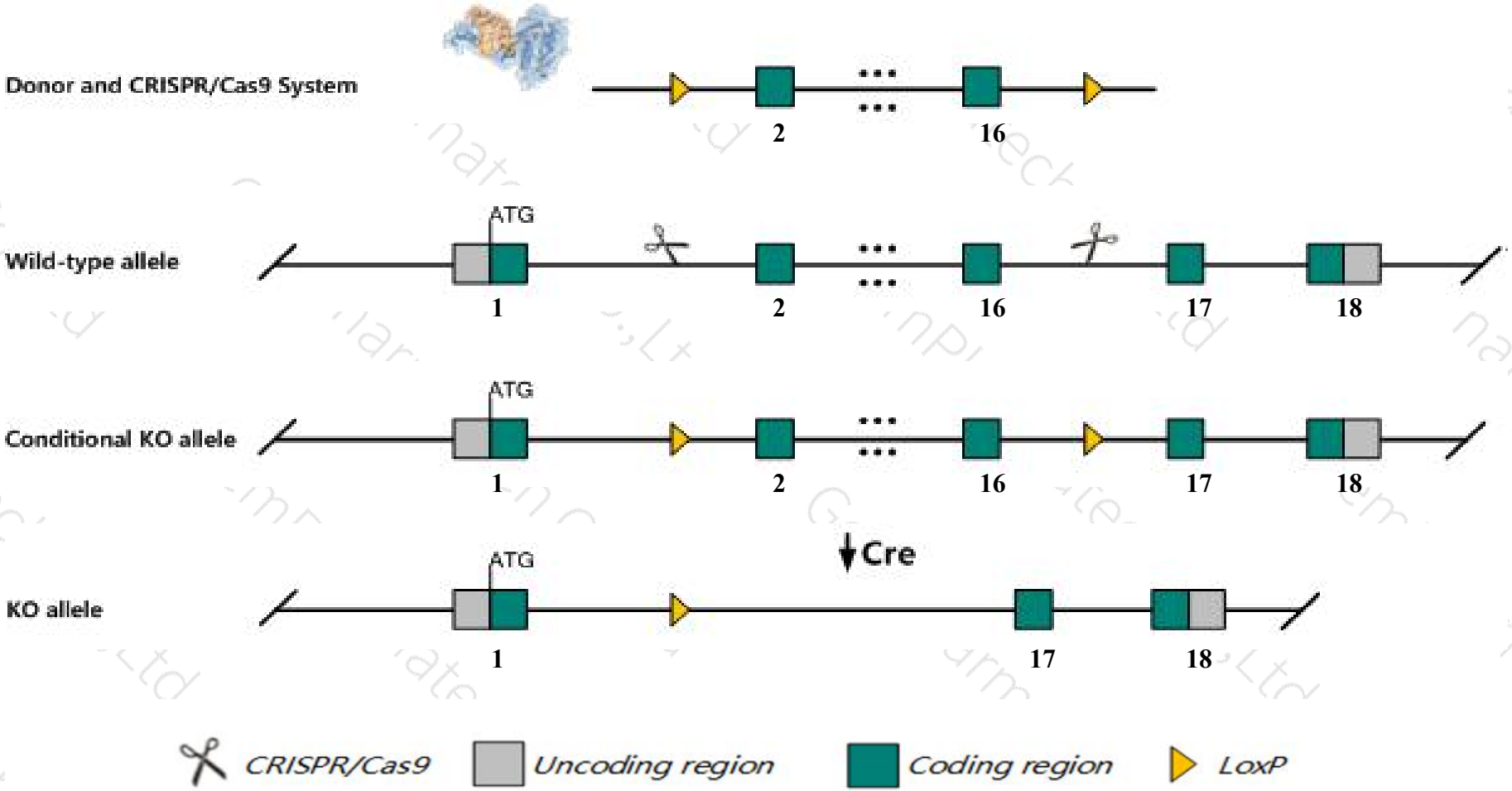
Project Overview

Project Name	***Camk2a***
Project type	**Cas9-CKO**
Strain background	**C57BL/6JGpt**

Conditional Knockout strategy

This model will use CRISPR/Cas9 technology to edit the *Camk2a* gene. The schematic diagram is as follows:



Technical routes

- The *Camk2a* gene has 7 transcripts. According to the structure of *Camk2a* gene, exon2-exon16 of *Camk2a-203* (ENSMUST00000102888.9) transcript is recommended as the knockout region.The region contains 1142bp coding sequence. Knock out the region will result in disruption of protein function.

- In this project we use CRISPR/Cas9 technology to modify *Camk2a* gene. The brief process is as follows:CRISPR/Cas9 system and Donor were microinjected into the fertilized eggs of C57BL/6JGpt mice.Fertilized eggs were transplanted to obtain positive F0 mice which were confirmed by PCR and sequencing. A stable F1 generation mouse model was obtained by mating positive F0 generation mice with C57BL/6JGpt mice.

- The flox mice will be knocked out after mating with mice expressing Cre recombinase, resulting in the loss of function of the target gene in specific tissues and cell types.

Notice

- According to the existing MGI data,Homozygous targeted mutants display deficient long-term hippocampal potentiation (LTP) and specific impairment in spatial learning; heterozygotes show decreased fear response and increased defensive aggression, which is more pronounced in homozygotes.

- The *Camk2a* gene is located on the Chr18. If the knockout mice are crossed with other mice strains to obtain double gene positive homozygous mouse offspring, please avoid the two genes on the same chromosome.

- This Strategy is designed based on genetic information in existing databases.Due to the complexity of biological processes, all risk of loxp insertion on gene transcription, RNA splicing and protein translation cannot be predicted at existing technological level.

Gene information （NCBI）

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Camk2a calcium/calmodulin-dependent protein kinase II alpha [Mus musculus (house mouse)]

Gene ID: 12322, updated on 9-Apr-2019

Summary

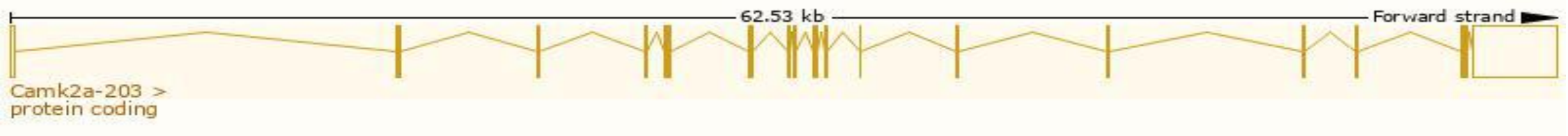
Official Symbol	Camk2a provided by MGI
Official Full Name	calcium/calmodulin-dependent protein kinase II alpha provided byMGI
Primary source	MGI:MGI:88256
See related	Ensembl:ENSMUSG00000024617
Gene type	protein coding
RefSeq status	VALIDATED
Organism	Mus musculus
Lineage	Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Muridae; Murinae; Mus; Mus
Also known as	CaMKII, R74975, mKIAA0968
Expression	Biased expression in cortex adult (RPKM 365.9) and frontal lobe adult (RPKM 310.4)See more
Orthologs	human all

Transcript information（Ensembl）

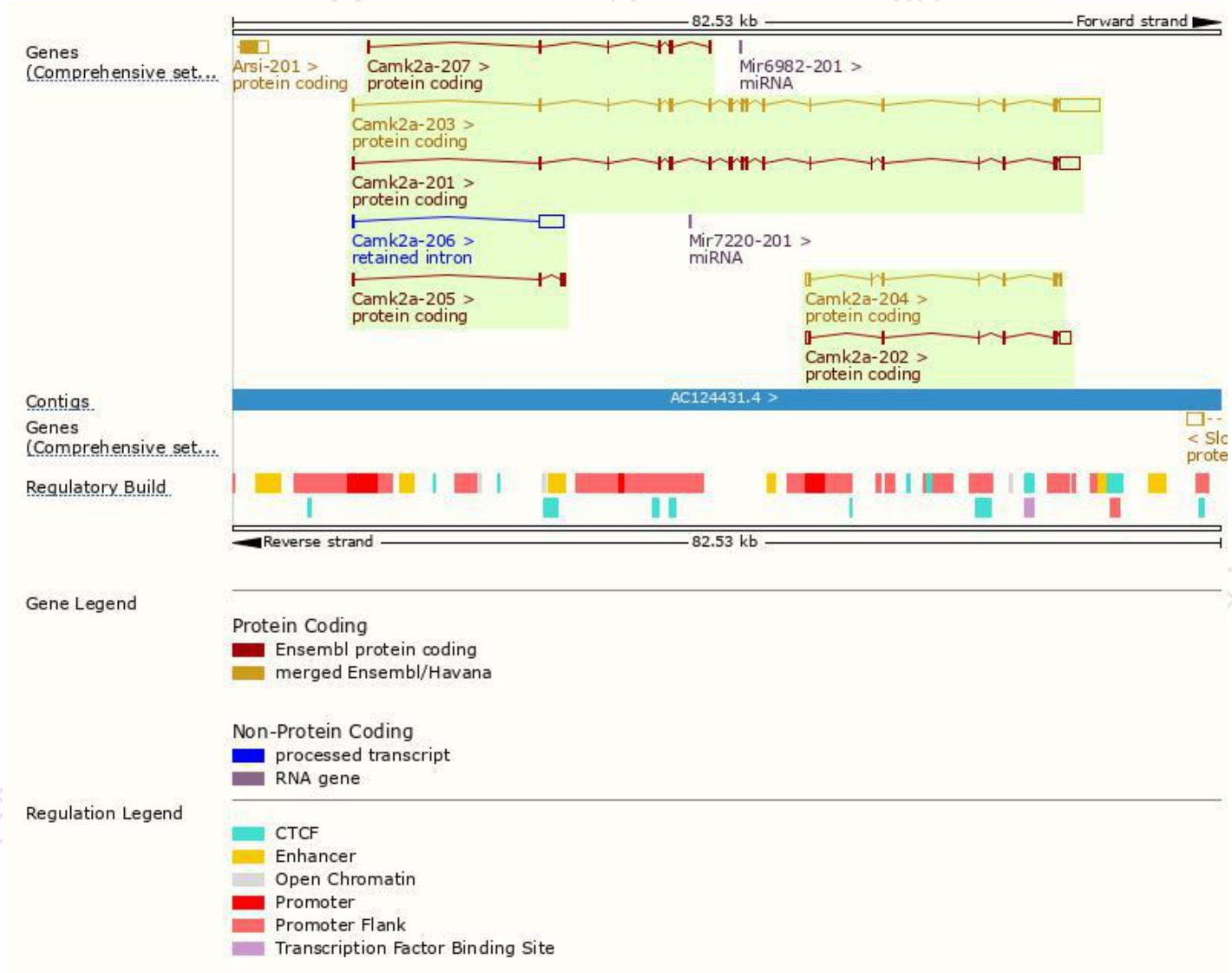
The gene has 7 transcripts,all transcripts are shown below:

Name	Transcript ID	bp	Protein	Biotype	CCDS	UniProt	Flags
Camk2a-203	ENSMUST00000102888.9	4970	478aa	Protein coding	CCDS29276	P11798	TSL:1 GENCODE basic APPRIS P2
Camk2a-202	ENSMUST00000039904.6	1734	189aa	Protein coding	CCDS70898	F8WHB5	TSL:5 GENCODE basic
Camk2a-204	ENSMUST00000115295.8	979	200aa	Protein coding	CCDS29277	P11798	TSL:1 GENCODE basic
Camk2a-201	ENSMUST00000025519.10	3244	489aa	Protein coding	-	F8WIS9	TSL:5 GENCODE basic APPRIS ALT1
Camk2a-207	ENSMUST00000137805.2	530	177aa	Protein coding	-	F6WHR9	5' and 3' truncations in transcript evidence prevent annotation of the start and the end of the CDS. CDS 5' and 3' incomplete TSL:3
Camk2a-205	ENSMUST00000115297.7	499	108aa	Protein coding	-	D3Z7K9	TSL:2 GENCODE basic
Camk2a-206	ENSMUST00000134496.1	2301	No protein	Retained intron	-	-	TSL:2

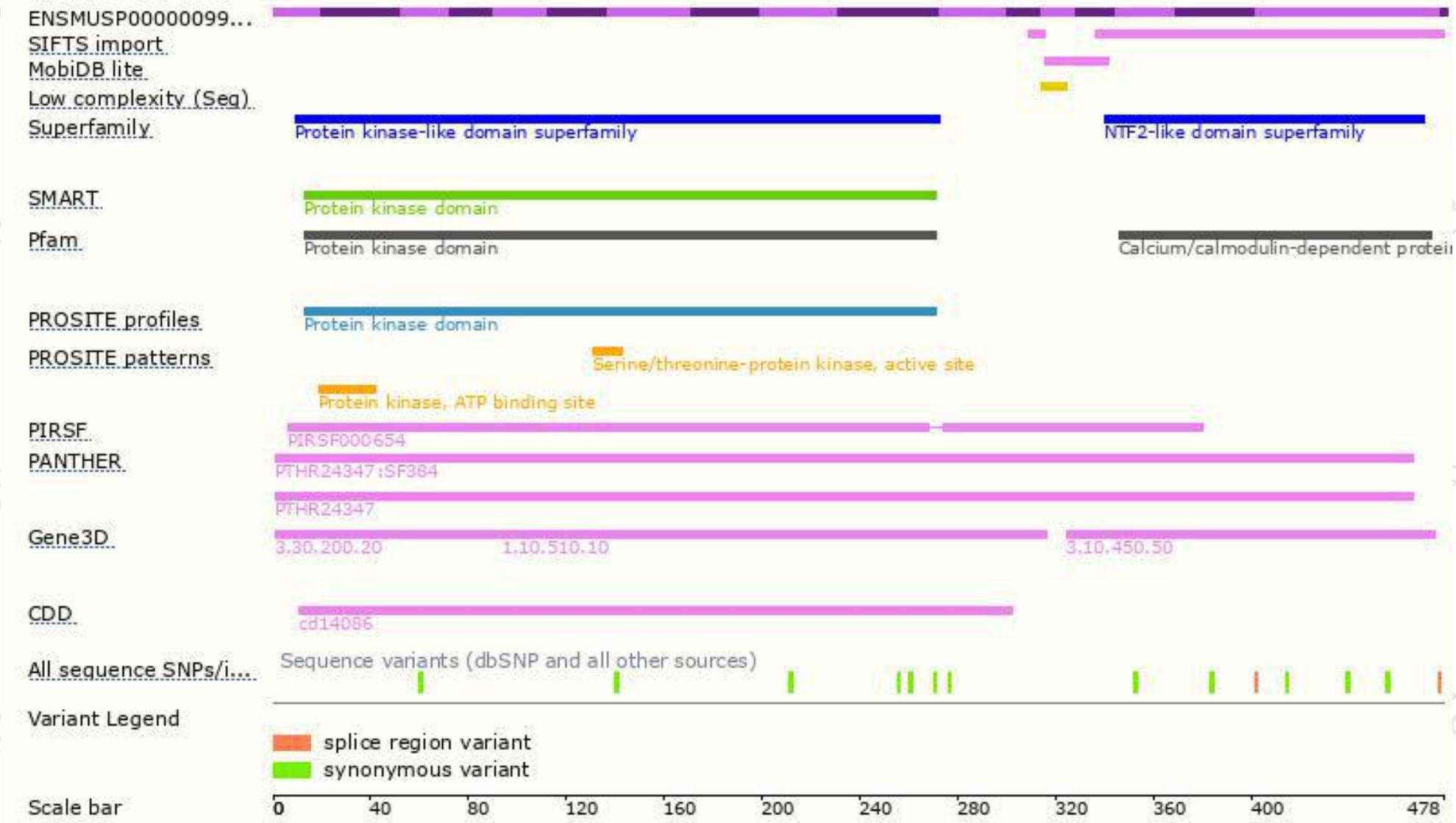
The strategy is based on the design of *Camk2a-203* transcript,The transcription is shown below



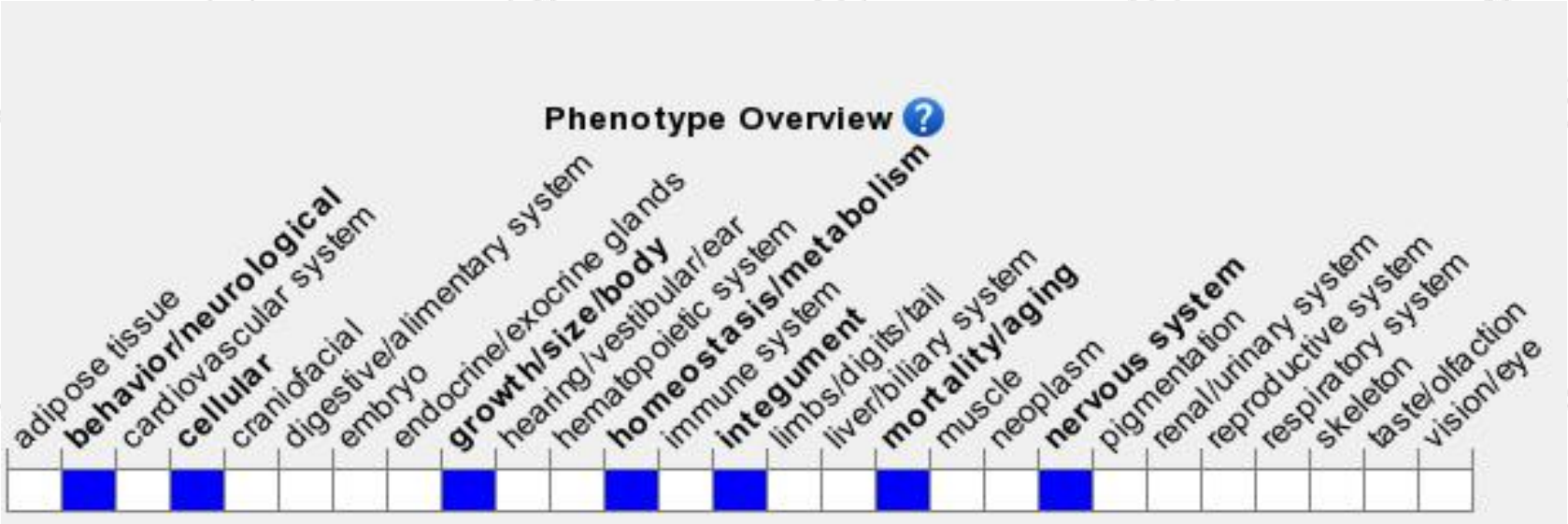
Genomic location distribution



Protein domain



Mouse phenotype description(MGI)



Phenotypes affected by the gene are marked in blue.Data quoted from MGI database(http://www.informatics.jax.org/).

According to the existing MGI data,Homozygous targeted mutants display deficient long-term hippocampal potentiation (LTP) and specific impairment in spatial learning; heterozygotes show decreased fear response and increased defensive aggression, which is more pronounced in homozygotes.

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If you have any questions, you are welcome to inquire.

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