Gnl3 Cas9-KO Strategy

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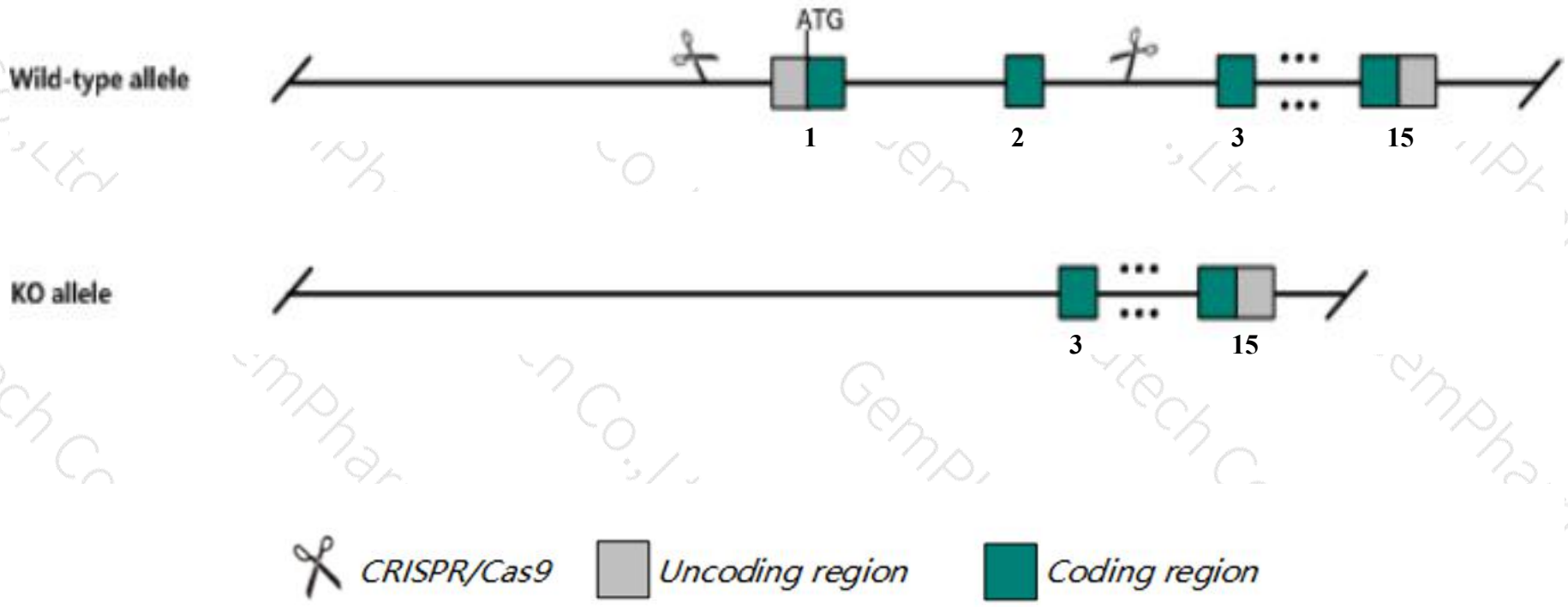
Project Overview

Project Name	***Gnl3***
Project type	**Cas9-KO**
Strain background	**C57BL/6JGpt**

Knockout strategy

This model will use CRISPR/Cas9 technology to edit the *Gnl3* gene. The schematic diagram is as follows:



Technical routes

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➢ The *Gnl3* gene has 14 transcripts. According to the structure of *Gnl3* gene, exon1-exon2 of *Gnl3-201*(ENSMUST00000037739.7) transcript is recommended as the knockout region.The region contains start codon ATG.Knock out the region will result in disruption of protein function.

➢ In this project we use CRISPR/Cas9 technology to modify *Gnl3* gene. The brief process is as follows: CRISPR/Cas9 system 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.

Notice

➢ According to the existing MGI data,homozygous disruption of this gene leads to early embryonic loss as blastocysts fail to enter the S phase. MEFs heterozygous for a gene trap allele have reduced proliferative capacity while MEFs heterozygous for a null allele show reduced doubling rates,increased apoptosis and premature senescence.

➢ Transcript *Gnl3*-203 may not be affected.

➢ The KO region contains functional region of the *Gm24916, Snord69* and *Snord19* gene.Knockout the region may affect the function of *Gm24916, Snord69* and *Snord19* gene.

➢ The KO region contains functional region of the *Pbrm1* gene.Knockout the region may affect the function of *Pbrm1* gene.

➢ The *Gnl3* gene is located on the Chr14. 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 the gene knockout on gene transcription, RNA splicing and protein translation cannot be predicted at the existing technology level.

Gene information （NCBI）

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Gnl3 guanine nucleotide binding protein-like 3 (nucleolar) [Mus musculus (house mouse)]

Gene ID: 30877, updated on 13-Mar-2020

Summary

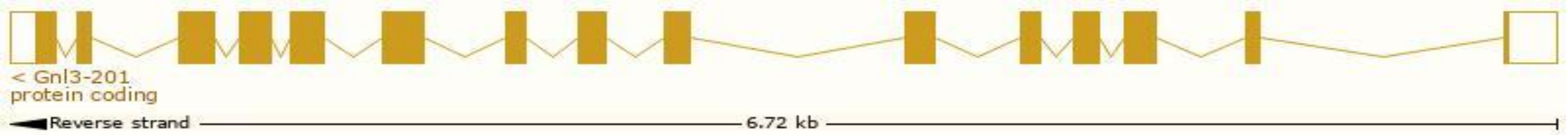
Official Symbol	Gnl3 provided by MGI
Official Full Name	guanine nucleotide binding protein-like 3 (nucleolar) provided byMGI
Primary source	MGI:MGI:1353651
See related	Ensembl:ENSMUSG00000042354
Gene type	protein coding
RefSeq status	VALIDATED
Organism	Mus musculus
Lineage	Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Muridae; Murinae; Mus; Mus
Also known as	Ns
Expression	Broad expression in liver E14 (RPKM 33.9), liver E14.5 (RPKM 25.2) and 22 other tissuesSee more
Orthologs	human all

Transcript information（Ensembl）

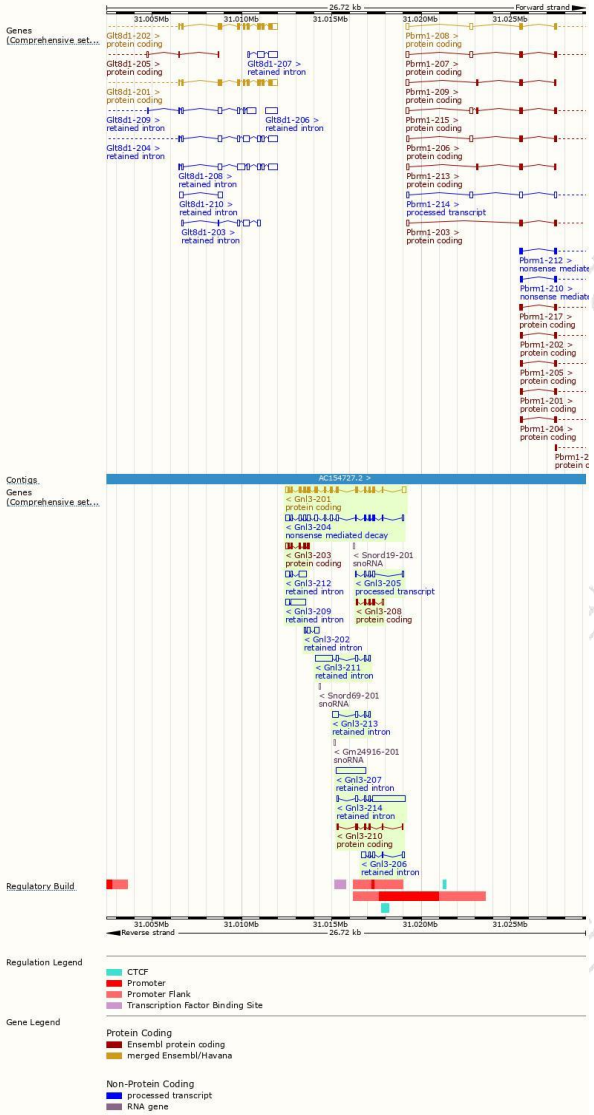
The gene has 14 transcripts,all transcripts are shown below:

Name	Transcript ID	bp	Protein	Biotype	CCDS	UniProt	Flags
Gnl3-201	ENSMUST00000037739.7	1947	538aa	Protein coding	CCDS26905	Q8CI11	TSL:1 GENCODE basic APPRIS P1
Gnl3-203	ENSMUST00000226379.1	597	159aa	Protein coding	-	A0A2I3BR32	CDS 5' incomplete
Gnl3-210	ENSMUST00000228341.1	516	156aa	Protein coding	-	A0A2I3BPZ6	CDS 3' incomplete
Gnl3-208	ENSMUST00000227467.1	494	146aa	Protein coding	-	A0A2I3BRV9	CDS 3' incomplete
Gnl3-204	ENSMUST00000226740.1	1765	136aa	Nonsense mediated decay	-	A0A2I3BR82	
Gnl3-205	ENSMUST00000227087.1	466	No protein	Processed transcript	-	-	
Gnl3-214	ENSMUST00000228774.1	2264	No protein	Retained intron	-	-	
Gnl3-207	ENSMUST00000227389.1	1656	No protein	Retained intron	-	-	
Gnl3-211	ENSMUST00000228427.1	1360	No protein	Retained intron	-	-	
Gnl3-209	ENSMUST00000227869.1	1033	No protein	Retained intron	-	-	
Gnl3-212	ENSMUST00000228713.1	718	No protein	Retained intron	-	-	
Gnl3-213	ENSMUST00000228739.1	693	No protein	Retained intron	-	-	
Gnl3-206	ENSMUST00000227170.1	666	No protein	Retained intron	-	-	
Gnl3-202	ENSMUST00000226220.1	508	No protein	Retained intron	-	-	

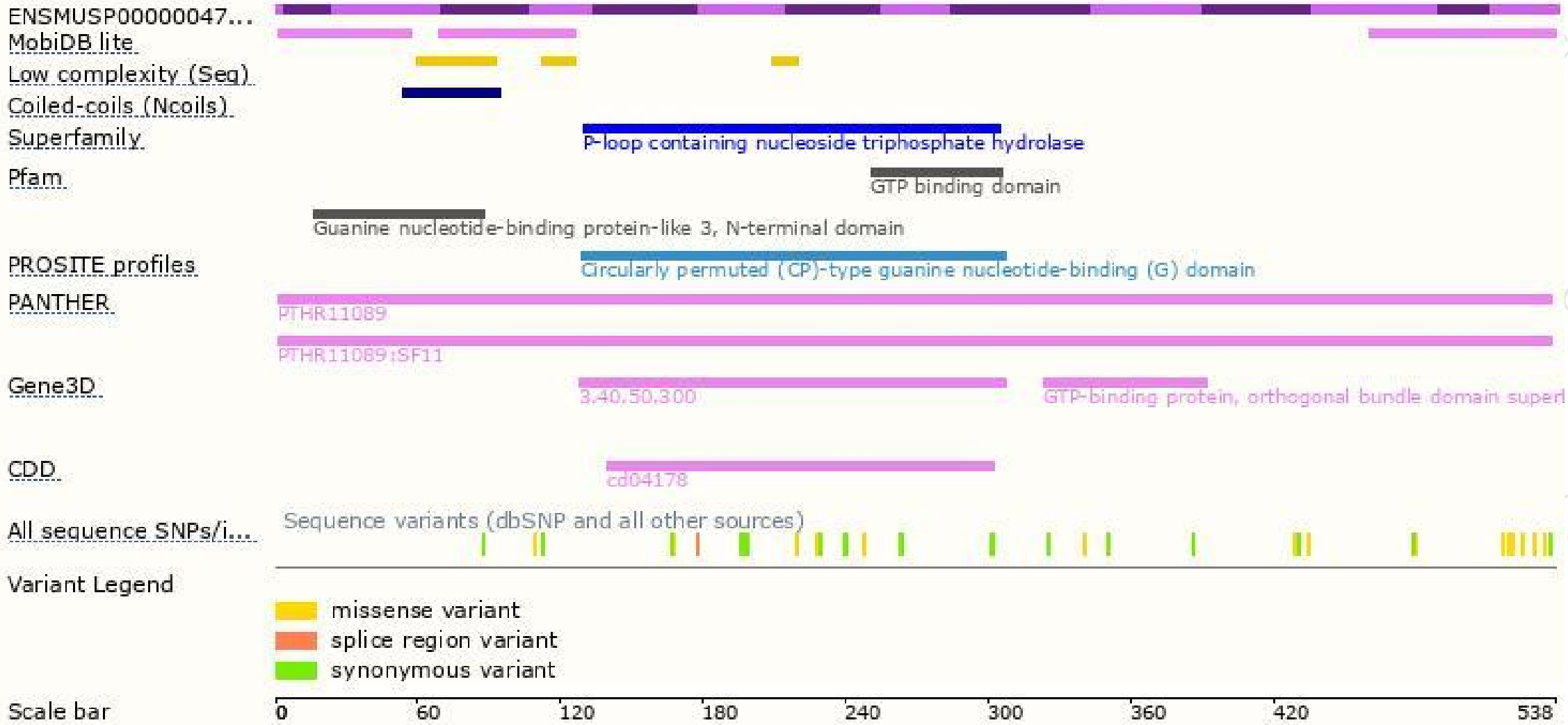
The strategy is based on the design of *Gnl3-201* transcript,the transcription is shown below:



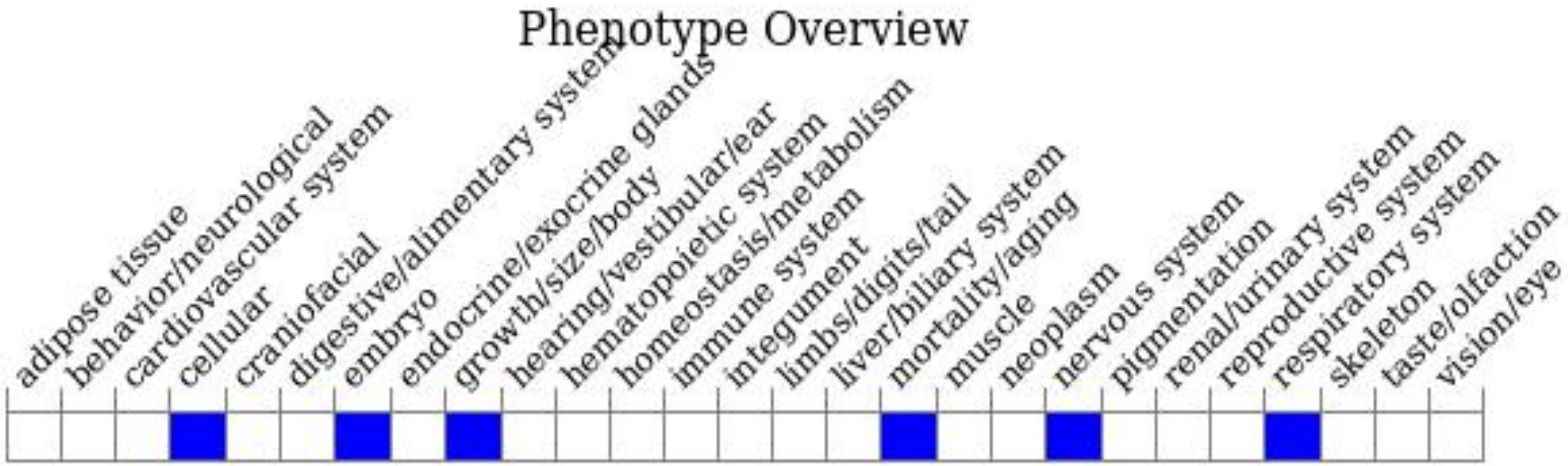
Genomic location distribution



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 disruption of this gene leads to early embryonic loss as blastocysts fail to enter the S phase. MEFs heterozygous for a gene trap allele have reduced proliferative capacity while MEFs heterozygous for a null allele show reduced doubling rates,increased apoptosis and premature senescence.

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