

# Spp1 Cas9-CKO Strategy

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# Overview

## Target Gene Name

- Spp1

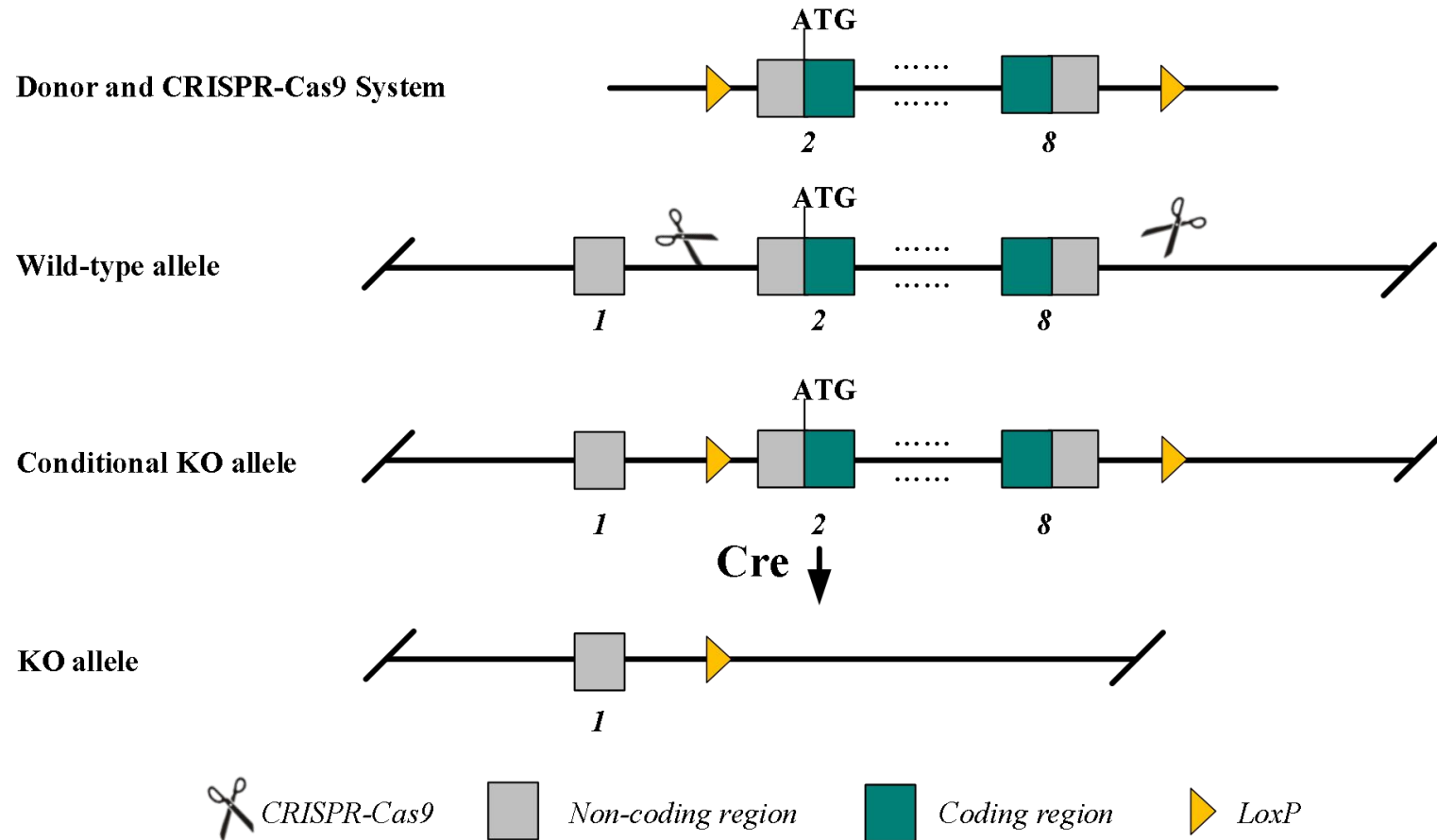
## Project Type

- Cas9-CKO

## Genetic Background

- C57BL/6JGpt

# Strain Strategy



Schematic representation of CRISPR-Cas9 engineering used to edit the *Spp1* gene.

# Technical Information

- The *Spp1* gene has 7 transcripts. According to the structure of *Spp1* gene, exon2-8 of *Spp1*-202 (ENSMUST00000086833.13) transcript is recommended as the knockout region. The region contains all of coding sequences. Knocking out the region will result in disruption of protein function.
- In this project we use CRISPR-Cas9 technology to modify *Spp1* 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 on-target amplicon sequencing. A stable F1-generation mouse strain was obtained by mating positive F0-generation mice with C57BL/6JGpt mice and confirmation of the desired mutant allele was carried out by PCR and on-target amplicon sequencing.
- 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.

# Gene Information

## Spp1 secreted phosphoprotein 1 [ *Mus musculus* (house mouse) ]

Gene ID: 20750, updated on 21-Dec-2023

[Download Datasets](#)

### Summary

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Official Symbol</b>    | Spp1 provided by <a href="#">MGI</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Official Full Name</b> | secreted phosphoprotein 1 provided by <a href="#">MGI</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Primary source</b>     | <a href="#">MGI:MGI-98389</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>See related</b>        | <a href="#">Ensembl:ENSMUSG00000029304</a> <a href="#">AllianceGenome:MGI:98389</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Gene type</b>          | protein coding                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>RefSeq status</b>      | VALIDATED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Organism</b>           | <a href="#">Mus musculus</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Lineage</b>            | Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi; Mammalia; Eutheria; Euarchontoglires; Glires; Rodentia; Myomorpha; Muroidea; Muridae; Murinae; Mus; Mus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Also known as</b>      | OP; 2AR; Bsp; Eta; Opn; Ric; BNSP; BSPI; Opnl; Apl-1; ETA-1; Spp-1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Summary</b>            | Enables extracellular matrix binding activity. Acts upstream of or within several processes, including cellular ion homeostasis; cellular response to leukemia inhibitory factor; and neutrophil chemotaxis. Located in apical part of cell and cytoplasm. Is expressed in several structures, including alimentary system; brain; metanephros; reproductive system; and skeleton. Human ortholog(s) of this gene implicated in several diseases, including autoimmune disease (multiple); biliary atresia; coronary artery disease (multiple); disease of cellular proliferation (multiple); and hepatitis. Orthologous to human SPP1 (secreted phosphoprotein 1). [provided by Alliance of Genome Resources, Apr 2022] |
| <b>Expression</b>         | Biased expression in kidney adult (RPKM 580.4), liver E18 (RPKM 36.2) and 1 other tissue <a href="#">See more</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Orthologs</b>          | <a href="#">human</a> <a href="#">all</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>NEW</b>                | Try the new <a href="#">Gene table</a><br>Try the new <a href="#">Transcript table</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Genomic context

**Location:** 5 E5; 5 50.68 cM

**Exon count:** 8

See Spp1 in [Genome Data Viewer](#)

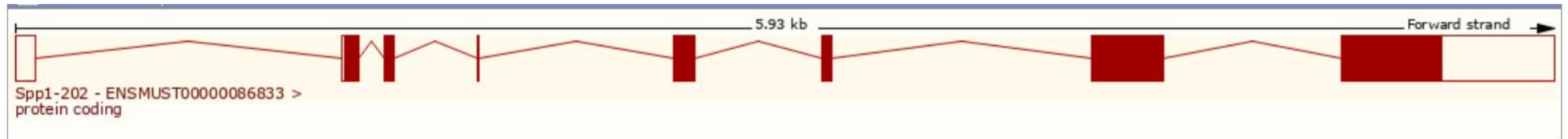
[.nlm.nih.gov/](https://www.ncbi.nlm.nih.gov/)

# Transcript Information

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

| Transcript ID                         | Name     | bp   | Protein               | Biotype        | CCDS                      | UniProt Match                                 | Flags                                             |
|---------------------------------------|----------|------|-----------------------|----------------|---------------------------|-----------------------------------------------|---------------------------------------------------|
| <a href="#">ENSMUST00000086833.13</a> | Spp1-202 | 1411 | <a href="#">295aa</a> | Protein coding | <a href="#">CCDS57367</a> | <a href="#">F8WIP8</a>                        | Ensembl Canonical GENCODE basic APPRIS ALT2 TSL:5 |
| <a href="#">ENSMUST00000112747.2</a>  | Spp1-204 | 1507 | <a href="#">294aa</a> | Protein coding | <a href="#">CCDS19486</a> | <a href="#">P10923</a> <a href="#">Q547B5</a> | GENCODE basic APPRIS P2 TSL:1                     |
| <a href="#">ENSMUST00000112748.8</a>  | Spp1-205 | 1456 | <a href="#">294aa</a> | Protein coding | <a href="#">CCDS19486</a> | <a href="#">P10923</a> <a href="#">Q547B5</a> | GENCODE basic APPRIS P2 TSL:1                     |
| <a href="#">ENSMUST00000031243.15</a> | Spp1-201 | 1410 | <a href="#">294aa</a> | Protein coding | <a href="#">CCDS19486</a> | <a href="#">P10923</a> <a href="#">Q547B5</a> | GENCODE basic APPRIS P2 TSL:1                     |
| <a href="#">ENSMUST00000112746.8</a>  | Spp1-203 | 669  | <a href="#">164aa</a> | Protein coding |                           | <a href="#">D3Z4N2</a>                        | TSL:5 CDS 3' incomplete                           |
| <a href="#">ENSMUST00000145084.8</a>  | Spp1-207 | 634  | <a href="#">152aa</a> | Protein coding |                           | <a href="#">D3Z513</a>                        | TSL:5 CDS 3' incomplete                           |
| <a href="#">ENSMUST00000132457.8</a>  | Spp1-206 | 354  | <a href="#">48aa</a>  | Protein coding |                           | <a href="#">D3Z116</a>                        | TSL:3 CDS 3' incomplete                           |

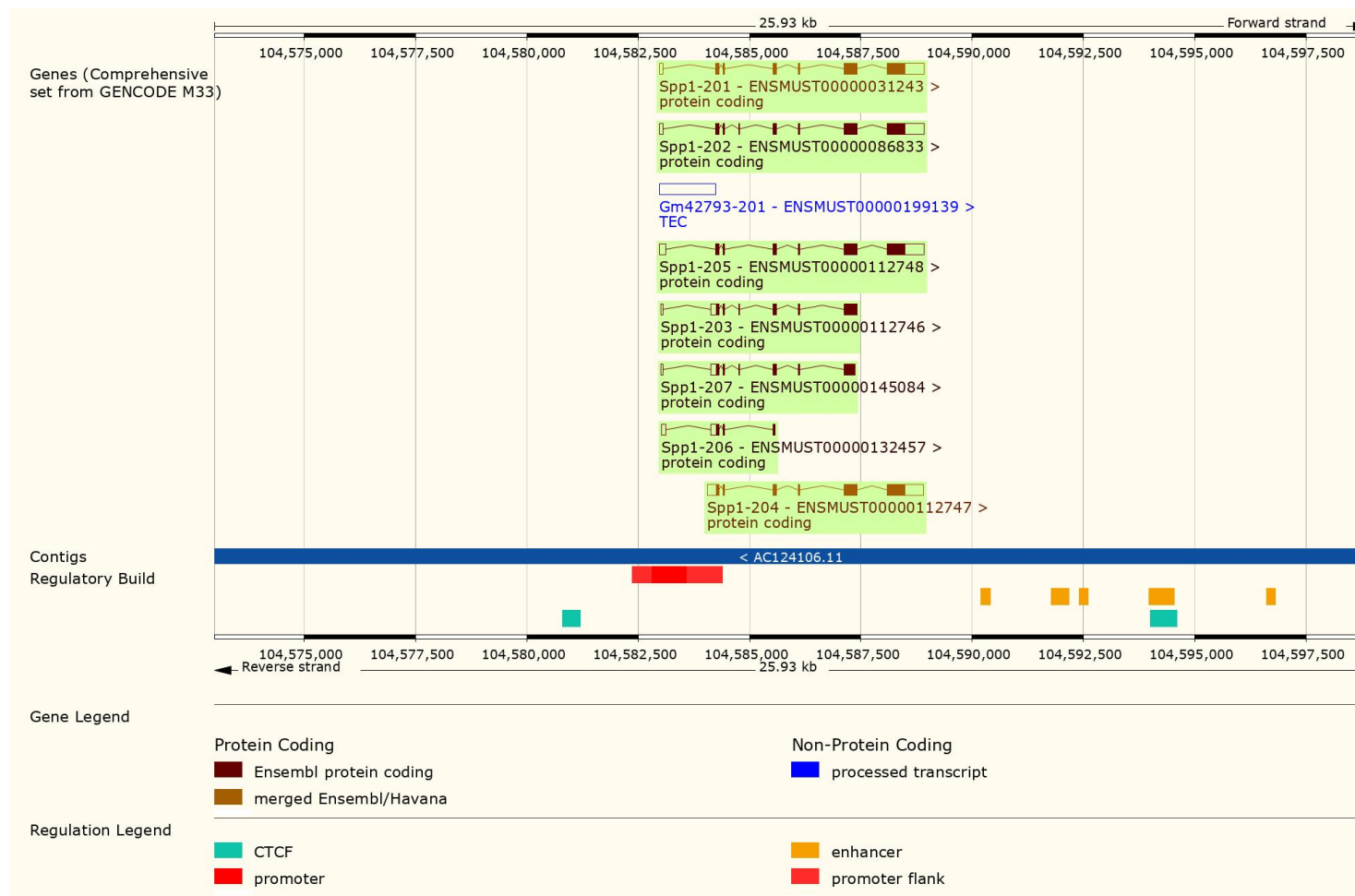
The strategy is based on the design of *Spp1-202* transcript, the transcription is shown below:



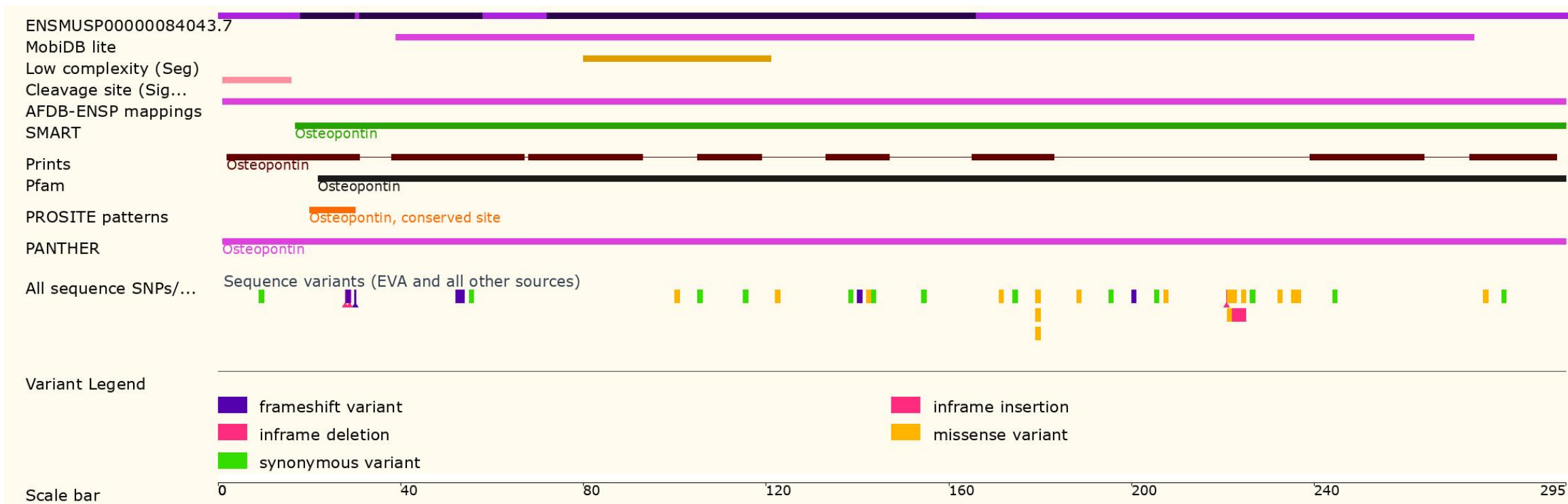
Source: <https://www.ensembl.org>



# Genomic Information



# Protein Information

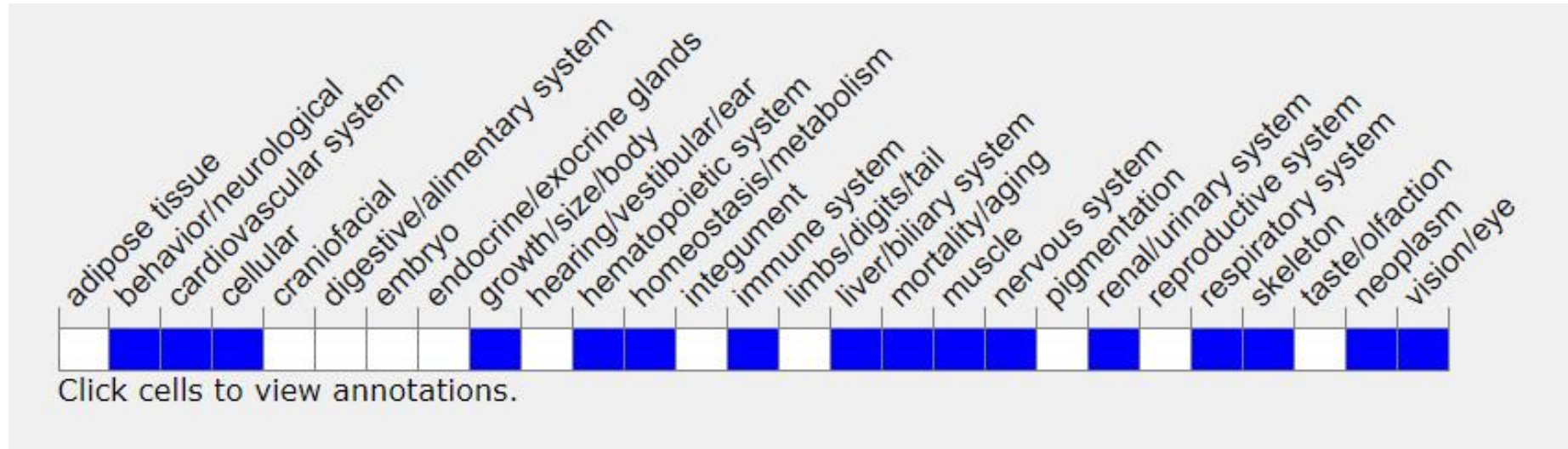




# Important Information

- According to the existing MGI data, two alleles determine natural resistance/susceptibility to the lethal effects of the Gilliam strain of *Rickettsia tsutsugamushi*. Mice homozygous for a knock-out allele exhibit abnormal osteoclast physiology, macrophage recruitment, wound healing, response to injury, and inflammatory response.
- Gm42793 gene will be deleted.
- Insertion of loxp at both ends may affect the regulation of this gene.
- *Spp1* is located on Chr5. If the knockout mice are crossed with other mouse strains to obtain double homozygous mutant offspring, please avoid the situation that the second gene is 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 the existing technology level.

# Mouse phenotype description(MGI )



Two alleles determine natural resistance/susceptibility to the lethal effects of the Gilliam strain of *Rickettsia tsutsugamushi*. Mice homozygous for a knock-out allele exhibit abnormal osteoclast physiology, macrophage recruitment, wound healing, response to injury, and inflammatory response.