

# D1c1 Cas9-CKO Strategy

Designer: Jia Yu

Reviewer: Yanhua Shen

Design Date: 2023-11-1

# Overview

## Target Gene Name

- Dlc1

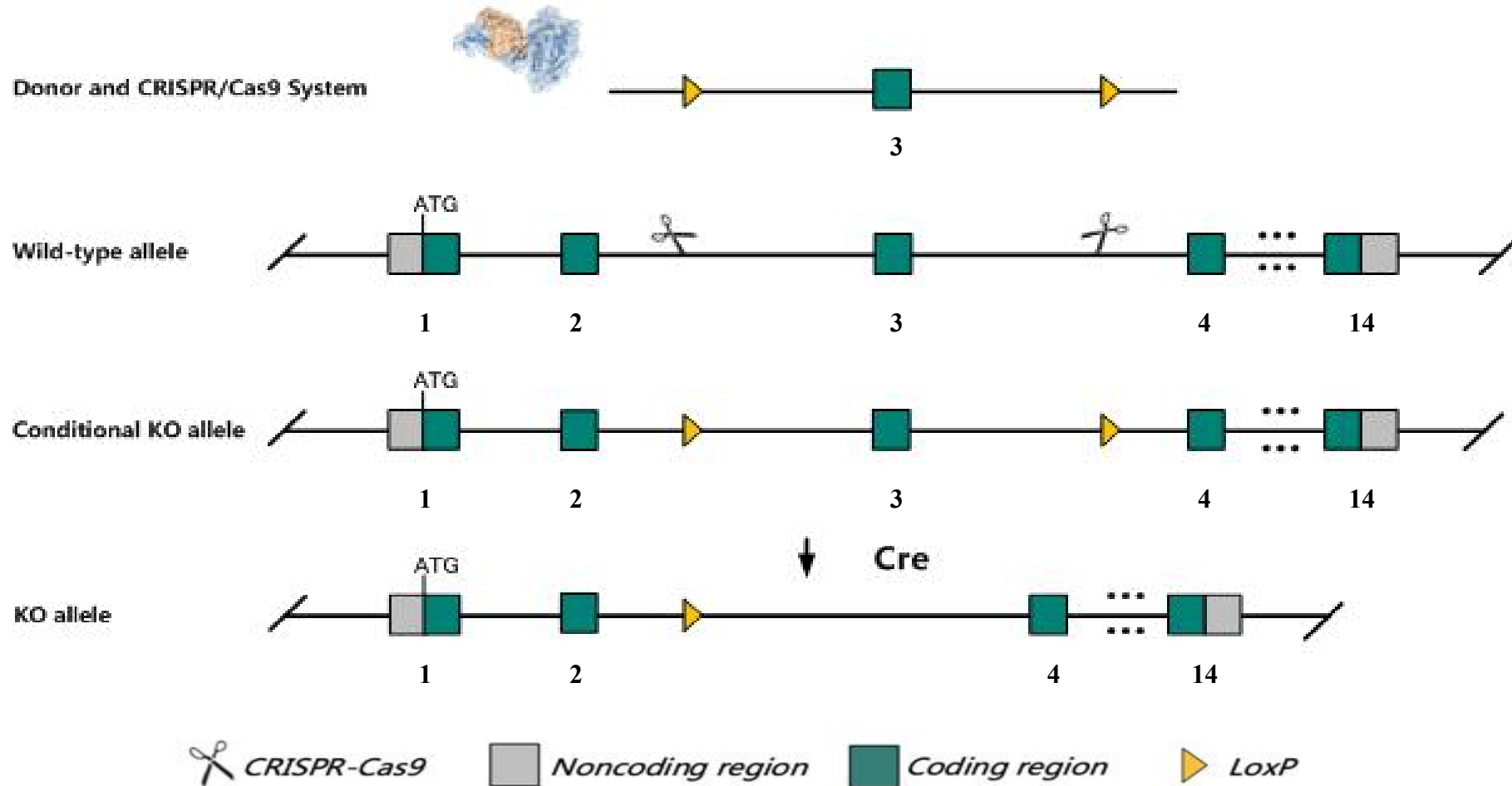
## Project Type

- Cas9-CKO

## Genetic Background

- C57BL/6JGpt

# Strain Strategy



Schematic representation of CRISPR-Cas9 engineering used to edit the *Dlc1* gene.

# Technical Information

- The *Dlc1* gene has 9 transcripts. According to the structure of *Dlc1* gene, exon3 of *Dlc1*-201 (ENSMUST00000033923.14) transcript is recommended as the knockout region. The region contains 82bp coding sequence. Knocking out the region will result in disruption of protein function.
- In this project we use CRISPR-Cas9 technology to modify *Dlc1* 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

## Dlc1 deleted in liver cancer 1 [ *Mus musculus* (house mouse) ]

Gene ID: 50768, updated on 15-Oct-2023

[Download Datasets](#)

### Summary

<b>Official Symbol</b>	Dlc1 provided by <a href="#">MGI</a>
<b>Official Full Name</b>	deleted in liver cancer 1 provided by <a href="#">MGI</a>
<b>Primary source</b>	<a href="#">MGI:MGI:1354949</a>
<b>See related</b>	<a href="#">Ensembl:ENSMUSG000000031523</a> <a href="#">AllianceGenome:MGI:1354949</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>	HP; dlc-1; Arhgap7; STARD12; A730069N07Rik
<b>Summary</b>	Predicted to enable several functions, including GTPase activator activity; SH2 domain binding activity; and phospholipase binding activity. Acts upstream of or within several processes, including actin cytoskeleton organization; focal adhesion assembly; and nervous system development. Predicted to be located in several cellular components, including caveola; cortical actin cytoskeleton; and ruffle membrane. Predicted to be active in focal adhesion and membrane raft. Predicted to colocalize with actin filament and stress fiber. Is expressed in several structures, including central nervous system; liver; mandible; placenta; and trigeminal nerve. Human ortholog(s) of this gene implicated in colorectal cancer. Orthologous to human DLC1 (DLC1 Rho GTPase activating protein). [provided by Alliance of Genome Resources, Apr 2022]
<b>Expression</b>	Broad expression in lung adult (RPKM 9.5), subcutaneous fat pad adult (RPKM 8.0) and 24 other tissues <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> Try the new <a href="#">Transcript table</a>

Source: <https://www.ncbi.nlm.nih.gov/>

# Transcript Information

The gene has 9 transcripts, all transcripts are shown below:

Transcript ID	Name	bp	Protein	Biotype	CCDS	UniProt Match	Flags
<a href="#">ENSMUST00000163663.3</a>	Dlc1-206	5113	<a href="#">1543aa</a>	Protein coding	<a href="#">CCDS57617</a>	<a href="#">E9PXD2</a>	Ensembl Canonical GENCODE basic TSL:5
<a href="#">ENSMUST00000098826.10</a>	Dlc1-203	6241	<a href="#">1126aa</a>	Protein coding	<a href="#">CCDS57616</a>	<a href="#">A0A0R4J171</a>	GENCODE basic TSL:1
<a href="#">ENSMUST00000033923.14</a>	Dlc1-201	6159	<a href="#">1092aa</a>	Protein coding	<a href="#">CCDS40322</a>	<a href="#">E9QKB1</a>	GENCODE basic APPRIS P1 TSL:1
<a href="#">ENSMUST00000179501.2</a>	Dlc1-208	403	<a href="#">26aa</a>	Protein coding		<a href="#">J3QPV2</a>	TSL:3 CDS 3' incomplete
<a href="#">ENSMUST00000179652.2</a>	Dlc1-209	3491	No protein	Retained intron		-	TSL:2
<a href="#">ENSMUST00000156312.2</a>	Dlc1-205	3423	No protein	Retained intron		-	TSL:2
<a href="#">ENSMUST00000036104.11</a>	Dlc1-202	2756	No protein	Retained intron		-	TSL:1
<a href="#">ENSMUST00000178717.2</a>	Dlc1-207	1866	No protein	Retained intron		-	TSL:1
<a href="#">ENSMUST00000145245.2</a>	Dlc1-204	616	No protein	Retained intron		-	TSL:1

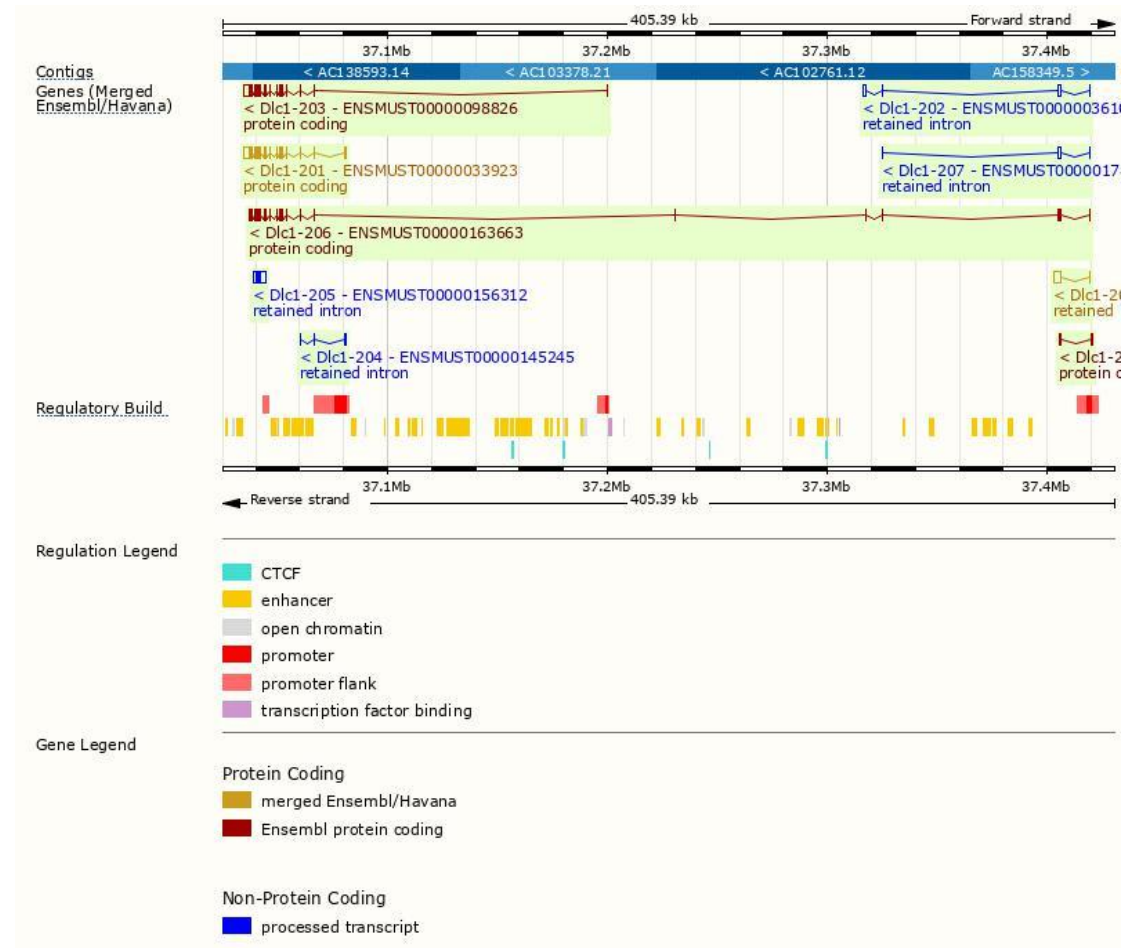
The strategy is based on the design of *Dlc1*-201 transcript, the transcription is shown below:



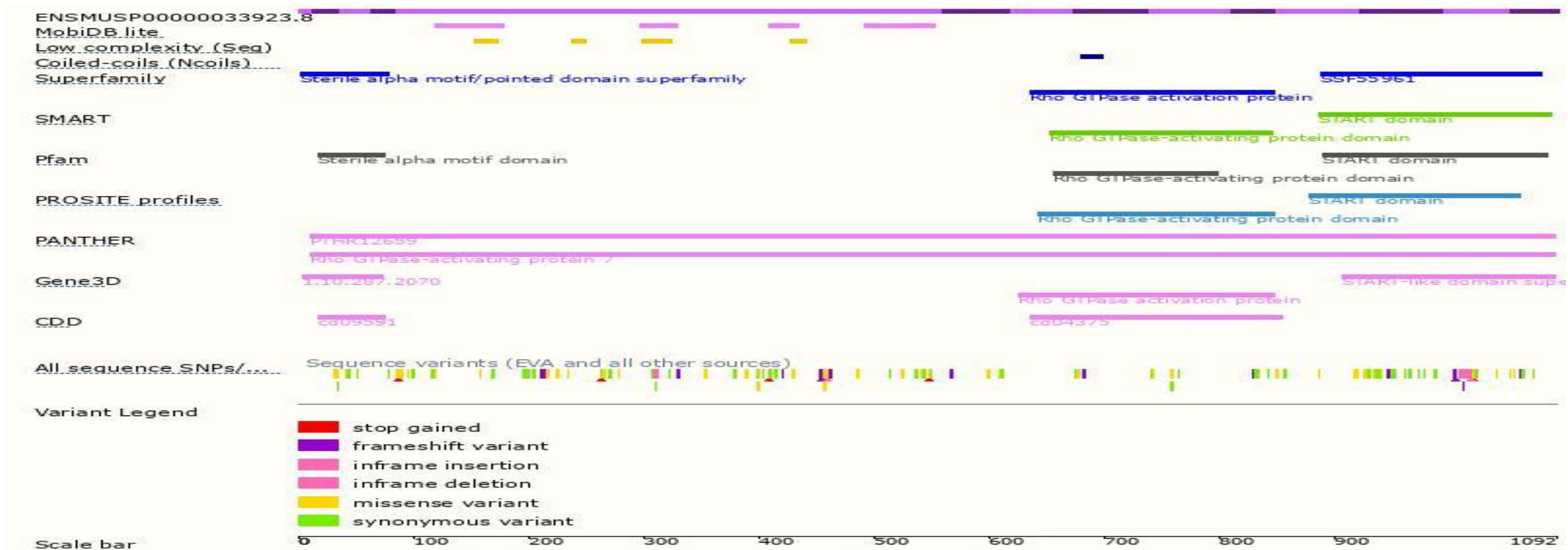
Source: <https://www.ensembl.org>



# Genomic Information



# Protein Information





# Mouse Phenotype Information (MGI)



- Homozygous mutants die by E10.5 with variable defects in the neural tube, heart, brain and placenta. Mouse embryonic fibroblasts homozygous for an activated conditional allele exhibit increased sensitivity to Ras-induced transformation.

# Important Information

- *Dlc1* is located on Chr8. 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.