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Smo Cas9-CKO Strategy

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Reviewer: Daohua Xu

Design Date: 2022-12-14

Overview

Target Gene Name

- Smo

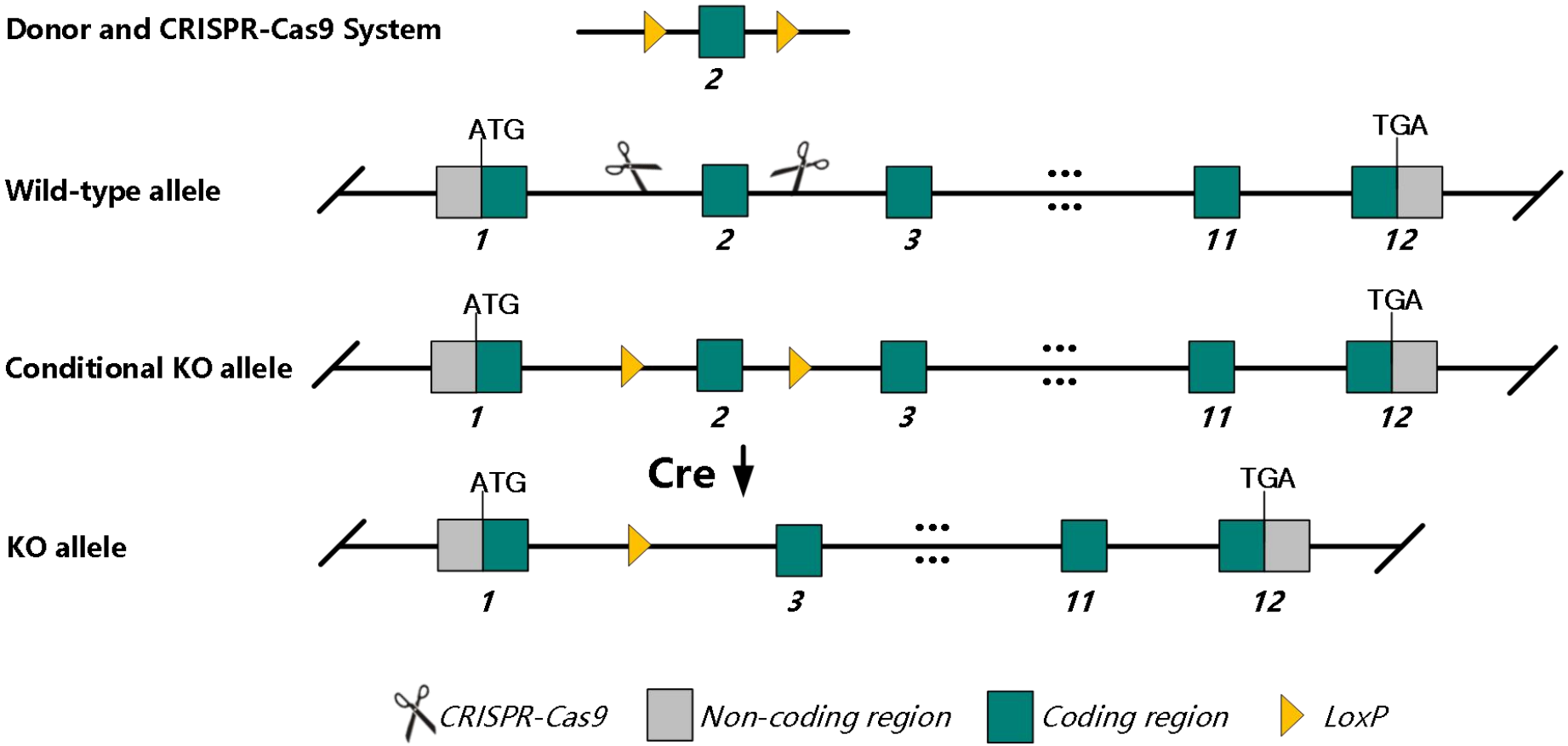
Project Type

- Cas9-CKO

Genetic Background

- C57BL/6JGpt

Strain Strategy

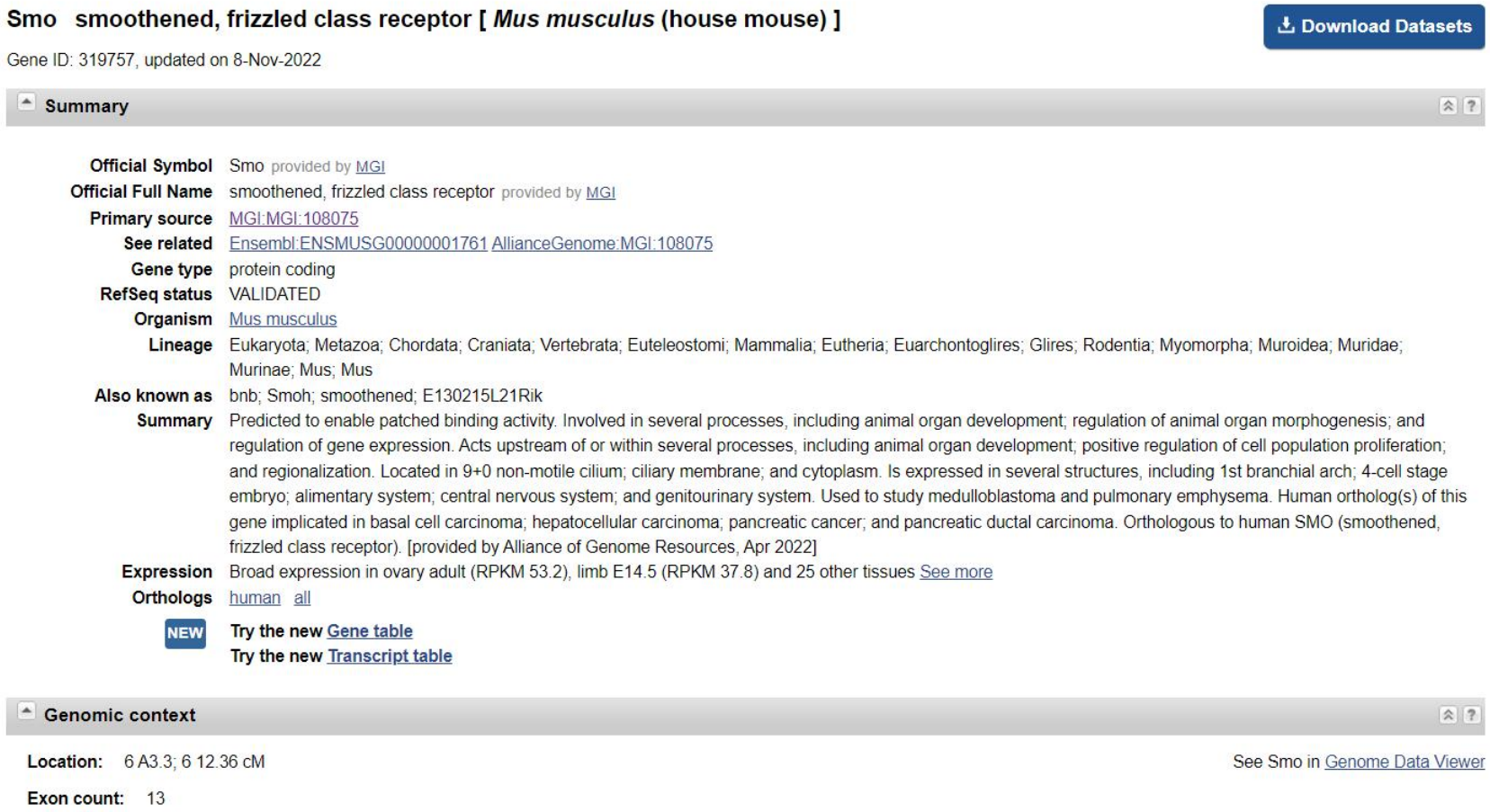


Schematic representation of CRISPR-Cas9 engineering used to edit the *Smo* gene.

Technical Information

- The *Smo* gene has 2 transcripts. According to the structure of *Smo* gene, exon2 of *Smo*-201 (ENSMUST00000001812.5) transcript is recommended as the knockout region. The region contains 206 bp of coding sequences. Knocking out the region will result in disruption of protein function.
- In this project we use CRISPR-Cas9 technology to modify *Smo* 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



Smo smoothened, frizzled class receptor [*Mus musculus* (house mouse)]

Download Datasets

Gene ID: 319757, updated on 8-Nov-2022

Summary

Official Symbol	Smo provided by MGI
Official Full Name	smoothened, frizzled class receptor provided by MGI
Primary source	MGI:MGI:108075
See related	Ensembl:ENSMUSG00000001761 AllianceGenome:MGI:108075
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	bnb; Smoh; smoothened; E130215L21Rik
Summary	Predicted to enable patched binding activity. Involved in several processes, including animal organ development; regulation of animal organ morphogenesis; and regulation of gene expression. Acts upstream of or within several processes, including animal organ development; positive regulation of cell population proliferation; and regionalization. Located in 9+0 non-motile cilium; ciliary membrane; and cytoplasm. Is expressed in several structures, including 1st branchial arch; 4-cell stage embryo; alimentary system; central nervous system; and genitourinary system. Used to study medulloblastoma and pulmonary emphysema. Human ortholog(s) of this gene implicated in basal cell carcinoma; hepatocellular carcinoma; pancreatic cancer; and pancreatic ductal carcinoma. Orthologous to human SMO (smoothened, frizzled class receptor). [provided by Alliance of Genome Resources, Apr 2022]
Expression	Broad expression in ovary adult (RPKM 53.2), limb E14.5 (RPKM 37.8) and 25 other tissues See more
Orthologs	human all

NEW Try the new Gene table
Try the new Transcript table

Genomic context

Location: 6 A3.3; 6 12.36 cM — See Smo in Genome Data Viewer

Exon count: 13

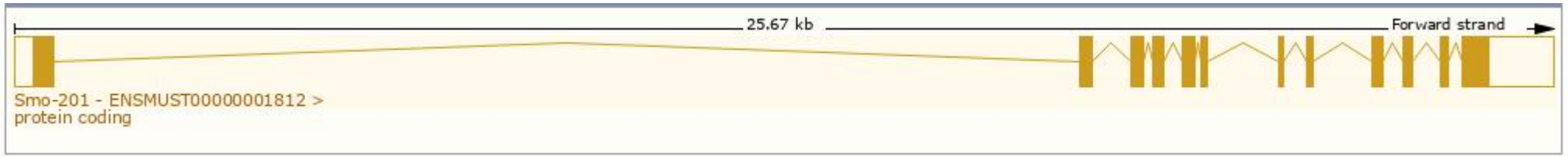
Source: https://www.ncbi.nlm.nih.gov/

Transcript Information

The gene has 2 transcripts, all transcripts are shown below:

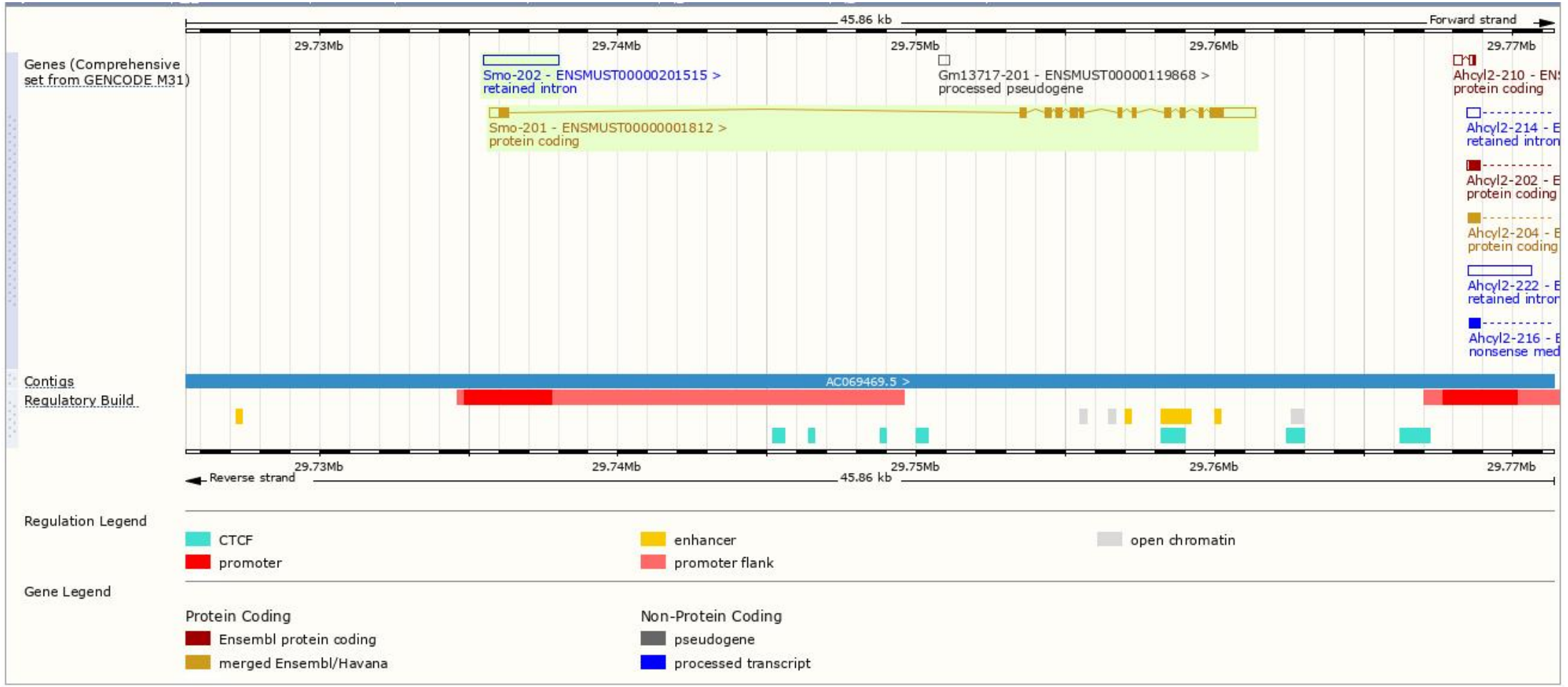
Transcript ID	Name	bp	Protein	Biotype	CCDS	UniProt Match	Flags
ENSMUST00000001812.5	Smo-201	3779	793aa	Protein coding	CCDS19965	P56726 Q4VBD5	Ensembl Canonical GENCODE basic APPRIS P1 TSL:1
ENSMUST00000201515.2	Smo-202	2502	No protein	Retained intron		-	TSL:NA

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



Source: https://www.ensembl.org

Genomic Information



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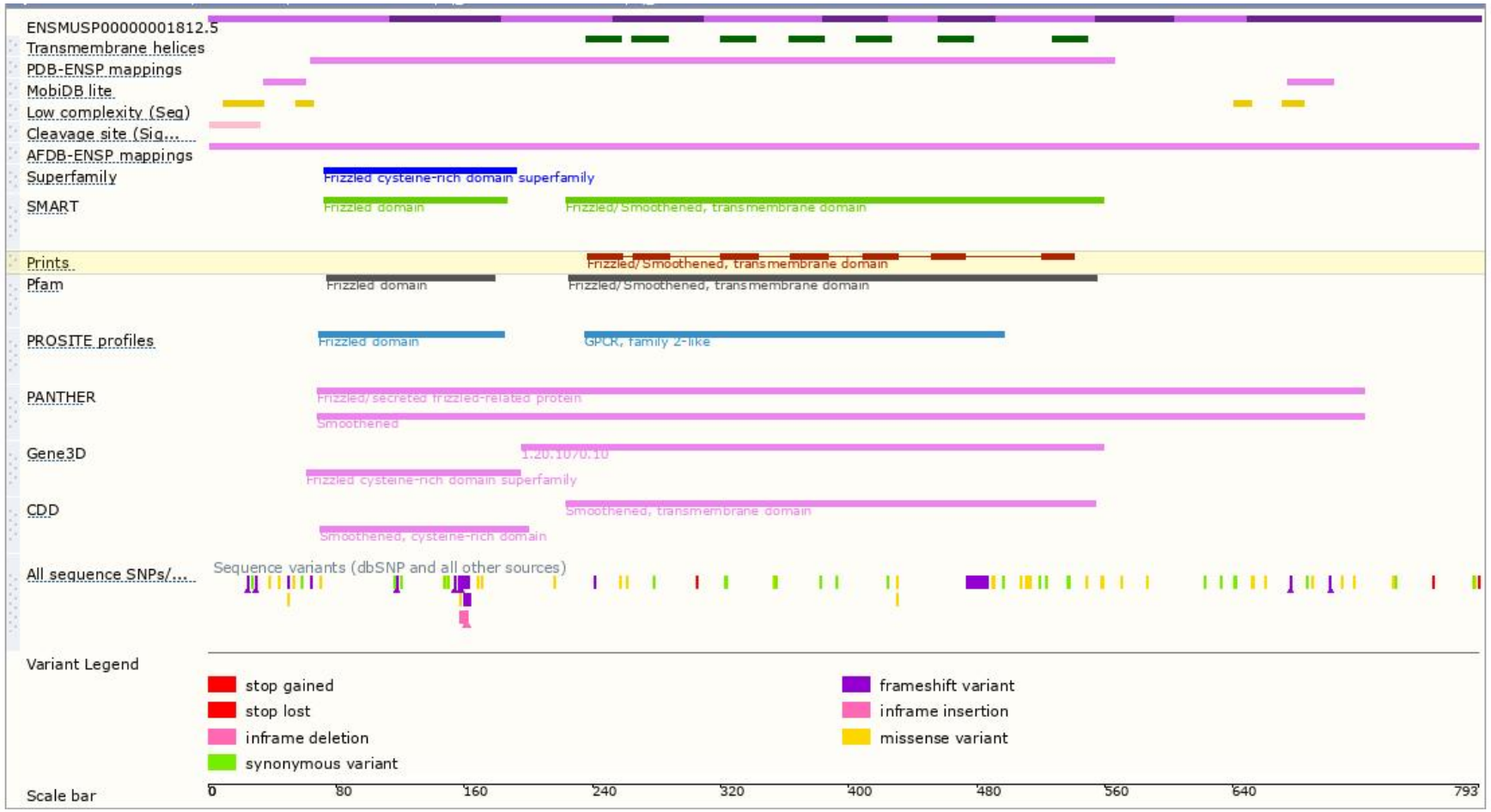
Source: : https://www.ensembl.org

Protein Information



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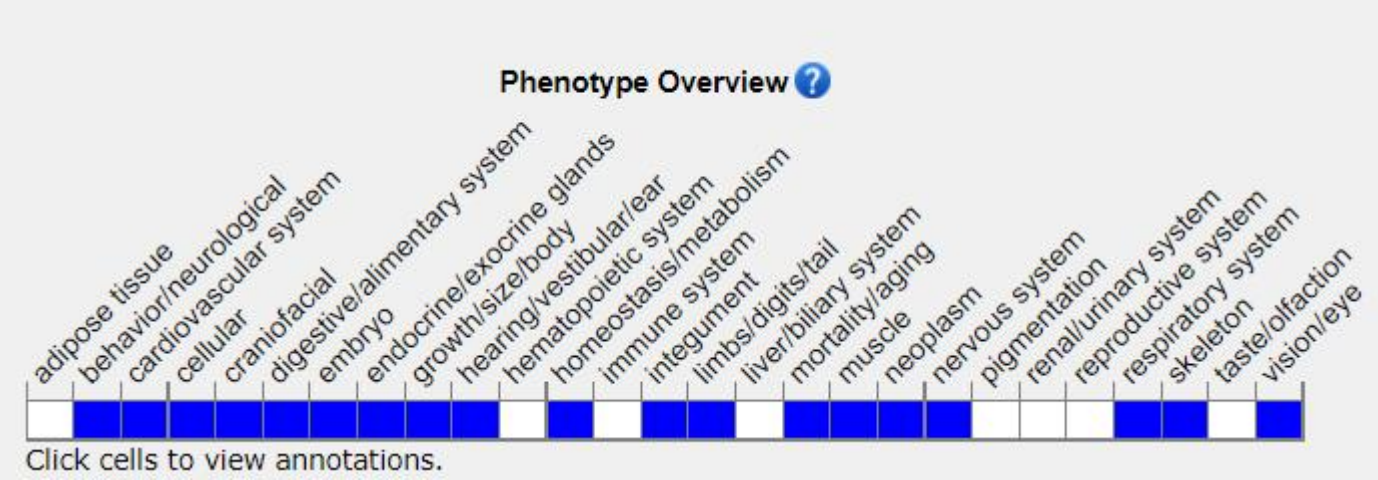
Source: : https://www.ensembl.org

Mouse Phenotype Information (MGI)



- Both an ENU-induced mutation and a null mutation are midgestation lethal. Observed defects include failure of neural tube closure and heart and gut defects. Conditional knockouts in chondrocytes and dental epithelium result in short long bones and dentalepithelium derivative defects, respectively.

Source: https://www.informatics.jax.org

Important Information

- According to the existing MGI data,both an enu-induced mutation and a null mutation are midgestation lethal. observed defects include failure of neural tube closure and heart and gut defects. conditional knockouts in chondrocytes and dental epithelium result in short long bones and dentalepithelium derivative defects,respectively.
- The insertion site of loxp sequence has an unkown effect on the *Gm13717* .
- Smo is located on Chr6. 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.