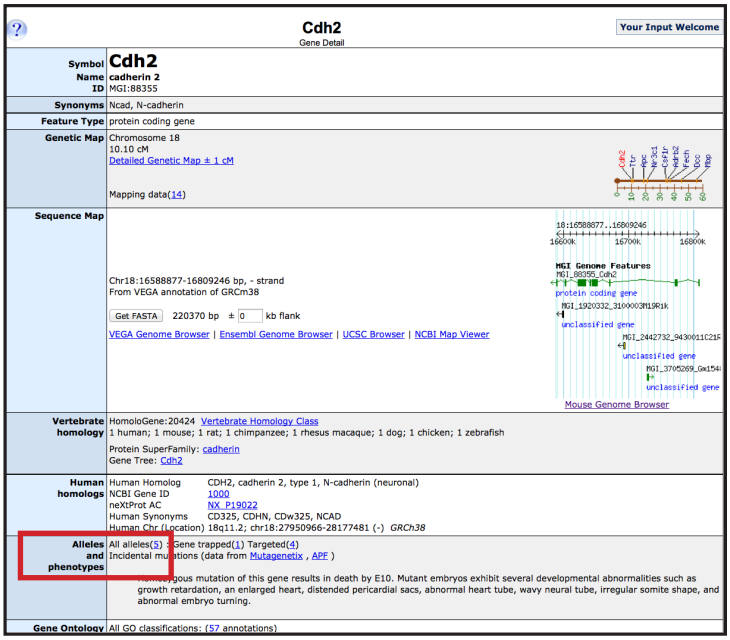
Cre Module

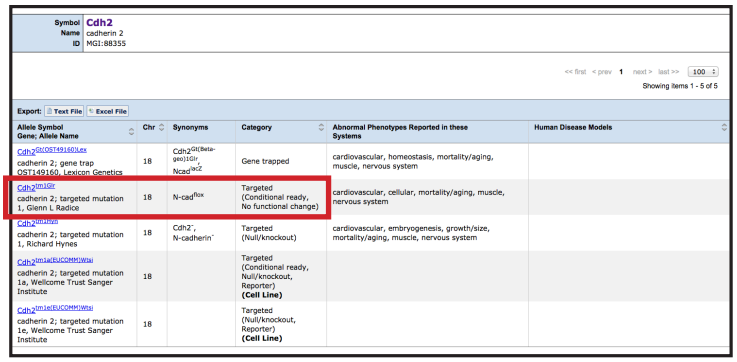
You want to design an experiment where you study the effects of removing **cadherin 2** (***Cdh2***) from mouse *stomach glandular epithelium*, but NOT the respiratory system.

To do this requires use of a cre-lox strategy, where you have (1) a mouse with a targeted conditional allele of *Cdh2*, with loxP recombinase recognition sites used to flank some portion of the *Cdh2* gene, and (2) a mouse carrying a cre transgene with recombinase activity detected in the stomach glandular epithelium along with no activity in the respiratory system.

8. Of the following, which allele of *Cdh2* would be most appropriate?
   a) $Cdh2^{Gt(OST49160)Lex}$ (MGI:3525642)
   → b) $Cdh2^{tm1Glr}$ (MGI:3522469)
   c) $Cdh2^{tm1Hyn}$ (MGI:1861181)
   d) $Cdh2^{tm1e(EUCOMM)Wtsi}$ (MGI:4433958)
   e) None of the above



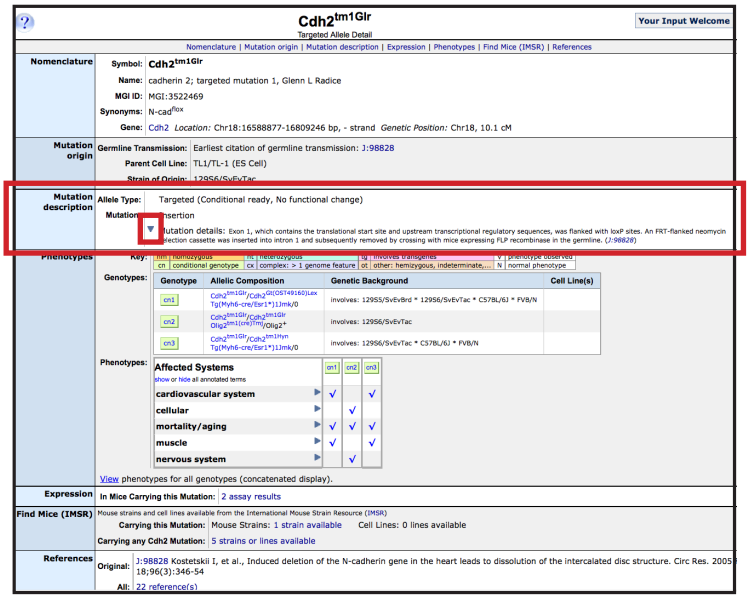
Type "Cdh2" into the **Quick Search** and navigate to the Gene Detail page for cadherin 2. There, scroll to the **Alleles and phenotypes** row which indicates "All alleles (5)". Click the hyperlink to view on the **Phenotypes, Alleles and Disease Models Summary** page.
Use the **Category** column to determine the Generation Method and Allele Attributes.



To do tissue-specific gene manipulation requires a *conditional ready* targeted allele. Introduction of the recombinase recognition sites in the absense of recombinase co-expression is expected to have no functional impact, and the gene product should be expressed at normal levels, with normal function.

The $Cdh2^{tm1Glr}$ allele has the **Category** of "**Targeted (Conditional ready, no functional change)**". Click on the **Allele Symbol** to go to the Allele Detail page, which has more specific and detailed information about the allele generation and/or characterization, along with a reference in the **Mutation Details** row.

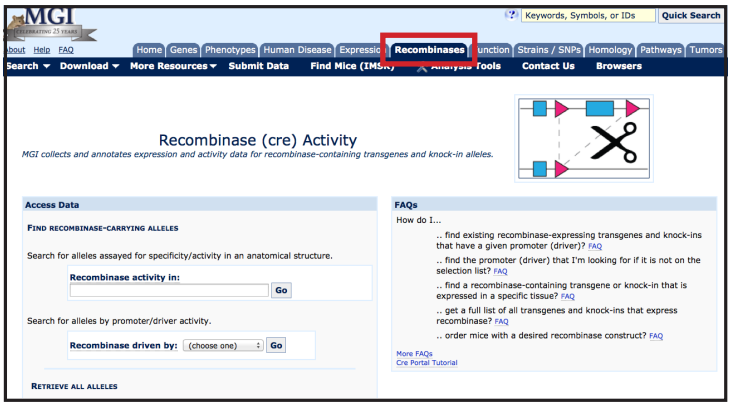
9. Which exon(s) of the *Cdh2* gene are flanked by loxP (floxed) in $Cdh2^{tm1Glr}$?
   a) The entire gene
   → b) Exon 1 and upstream transcriptional regulatory sequences
   c) Exon 3
   d) Exons 4&5
   e) It is not specified

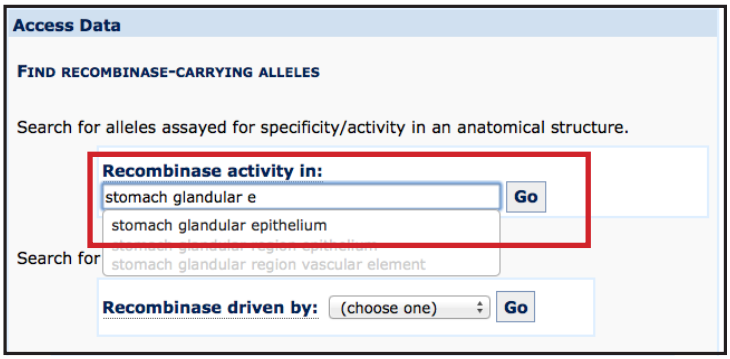


On the **Allele Detail** page, click the triangle toggle ( ) next to **Mutation details** in the **Mutation description** row. The text there describes flanking of exon 1.

10. How many cre alleles have recombinase activity results annotated to "stomach glandular epithelium"?
    a) none
    b) 6
    c) 61
    d) 122
    e) It is impossible to tell

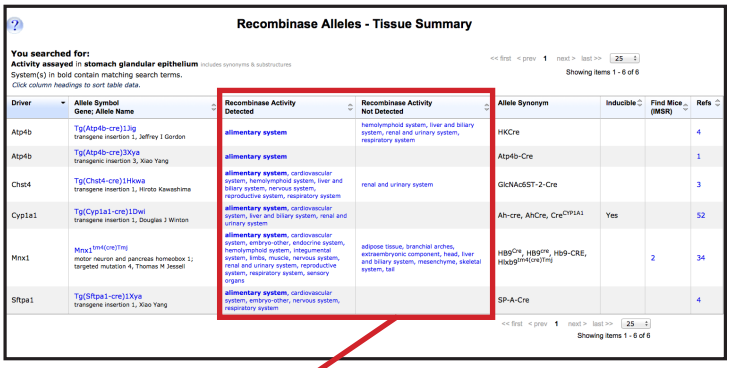
To search for recombinase alleles, use the **Recombinase** tab along the top, or click on the "**Recombinases (cre)**" button on MGI's home page.
In the **Access Data** section, begin typing "*stomach glandular epithelium*" in the box beneath "**Recombinase activity in:**" and select the term when it appears.
Structures in black text have at least one recombinase activity annotation, while structures in grey text do not have any activity annotations.
Six rows, corresponding to six transgenes will be returned after running the query.

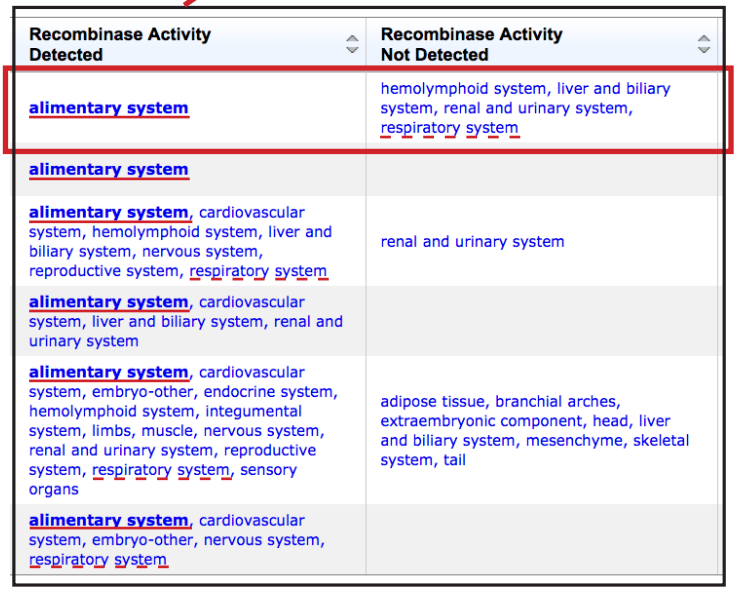




11. Of the following, which transgene is the best match for recombinase activity "**detected in: alimentary system**" (which contains *stomach glandular epithelium*) and also has recombinase activity known to be "**not detected in: respiratory system**"?
    a) *Tg(Atp4b-cre)1Jig* (MGI:3040892)
    b) *Mnx1*$^{tm4(cre)Tmj}$ (MGI:2447793)
    c) *Tg(Chst4-cre)1Hkwa* (MGI:3842784)
    d) Any/all of the above
    e) None of the above

The query from question 10 will return all transgenes that have a recombinase activity result reported in *stomach glandular epithelium* (whether examined and detected, or examined and not detected).
Alimentary system is bolded to indicate that this system contains the structure "*stomach glandular epithelium*" which was originally searched. It is additionally underlined with a solid line in the image on the right.
In each case here, the transgene satisfies the "**detected in: alimentary system**" requirement.
Examining both columns for respiratory system (underlined with a dashed line on the right) shows three alleles (*Tg(Chst4-cre)1Hkwa*, *Mnx1*$^{tm4(cre)Tmj}$, and *Tg(Sftpa1-cre)1Xya*) where recombinase activity was detected in some structure of the respiratory system, two transgenes (*Tg(Atp4b-cre)3Xya* and *Tg(Cyp1a1-cre)1Dwi*) with no information reported on recombinase activity in the respiratory system, with only one (*Tg(Atp4b-cre)1Jig*) where respiratory system is reported, and classed as not detected.



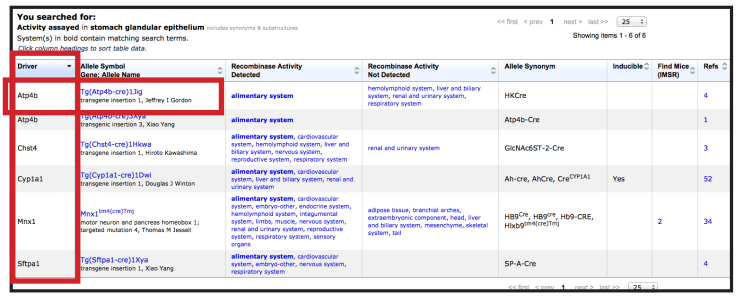


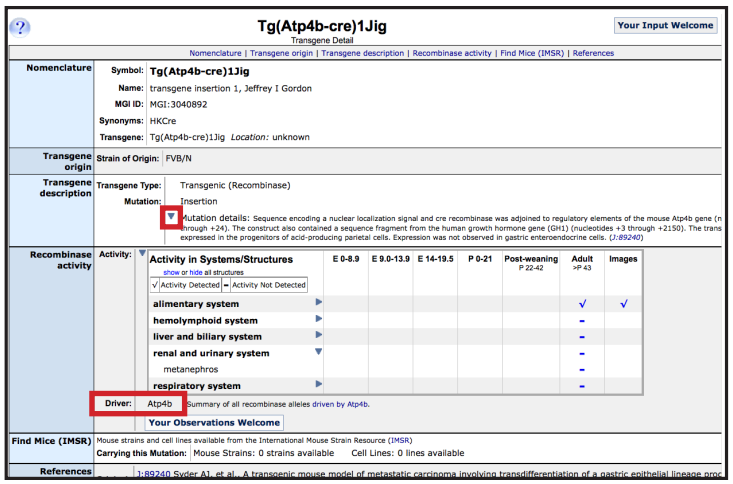
12. Which is the driver of the cre recombinase transgene *Tg(Atp4b-cre)1Jig*?
    a) cre
    b) CMV
    c) Thyroglobulin
    d) Atp4b
    e) There is no driver

Drivers - aka promoters controlling expression of the cre expressed sequence - are listed in the first column of the results table. As well, all transgenes follow the standard naming convention of:

Transgene	= Tg
(Driver -	= Atp4b
Expressed sequence)	= cre
Serial or line number	= 1
Lab code	= Jig for Jeffrey I Gordon

This information also appears on transgene detail page, which can be accessed by clicking on the Allele symbol.

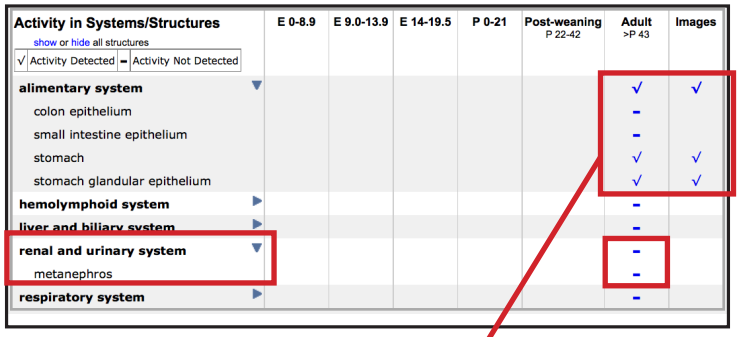




13. Which tissues, structures or substructures of the renal and urinary system were examined for cre recombinase activity in *Tg(Atp4b-cre)1Jig*? Was recombinase activity noted as detected (√) or not detected (-)?
    a) bladder (-)
    b) renal tubule (√) and renal corpuscle (-)
    c) kidney (√)
    d) kidney (-)
    e) metanephros (-)

Click on the triangle toggles ( ) in the **Activity** table within the **Recombinase activity** row to expand more detailed structures. Columns indicate specimen age, with E0-19.5 for embryonic developmental ages.

Within the renal and urinary system, adult metanephros is the only tissue with activity data, and recombinase activity was not detected (-).



14. What is the level (present/absent) and pattern of cre recombinase activity detected in the stomach of mice aged post-natal week 7 (adult)?
    a) Not reported
    b) absent, not applicable
    c) present, not specified
    d) present, strong
    e) present, regionally restricted

Click the check mark next to **stomach** on the **Activity** table to access a systems level recombinase activity detail page. Locate data and more information in the table.