

## Gene Expression Literature Search

GXD maintains an extensive, up-to-date and searchable index of publications with mouse developmental expression data.

For each reference, the records include:

- all genes examined for expression
- assay types
- ages analyzed
- bibliographic information

Age	E11.5	E12.5	E15.5
In situ RNA (section)			<a href="#">4</a>
In situ RNA (whole mount)	<a href="#">3</a>	<a href="#">10</a>	<a href="#">2</a>
RT-PCR	<a href="#">3</a>		

## Mouse Anatomy Browser

Anatomical information is annotated using terms from the developmental mouse anatomy ontology (EMAPA)

The anatomy browser enables text-based searches for anatomical terms, as well as hierarchical views of the anatomy

### Anatomy Search

embryo

12 terms, sorted by best match

embryo T54-26

### Anatomical Term Detail

Term: **embryo**

Present at: Theiler Stages 4-26

ID: EMAPA:16039

Parent: part-of **conceptus**

Terms: part-of **mouse**

### Anatomical Tree View

All Theiler Stages

- mouse
  - body fluid or substance
  - body region
  - cavity or lining
  - conceptus
  - early embryo
  - embryo (1,232,725 expression results)**
  - extraembryonic component
  - germ layer
  - organ
  - organ system
  - tissue
  - umbilical or vitelline vessel

Anatomy terms are directly linked to expression result summaries

## The Gene Expression Database for Mouse Development



GXD is a freely available community resource that:

- collects and stores extensive mouse expression data, including images
- contains data curated from journal articles and large-scale projects
- is integrated with other data within Mouse Genome Informatics (MGI)
- provides effective search and display capabilities
- enables interactive data summaries and iterative query refinement

## Expression Data Acquisition and Curation

- GXD systematically curates mouse gene expression data from published literature and large-scale data projects
- GXD provides detailed records of expression assays and assay results

## Expression Image Details

Reference: 1:54909 Xavier-Neto J, et al., Development. 1999 Jun;126(12):2677-87

Figure ID: MGI:5694495

Image

Copyright: This image is from Xavier-Neto J, et al., Development. 1999 Jun;126(12):2677-87. The Company of Biologists

Image Detail pages display figures from original publications along with links to data curated by GXD.

Label	Assay & Result Details (Gene Symbol)
A	<a href="#">MGI:5694574 (Gata4)</a>
B	<a href="#">MGI:5694580 (Aldh1a2)</a> <a href="#">MGI:5694575 (Nkx2-5)</a>
C	<a href="#">MGI:5694580 (Aldh1a2)</a>

## Detailed Expression Results

Reference: 1:71432 Beverdam A, et al., Expression patterns of group-1 aristaeless-related genes during craniofacial and limb development. Mech Dev. 2001 Sep;107(1-2):163-7

Assay type: RNA in situ

MGI Accession ID: MGI:3039023

Gene symbol: [Alx3](#)

Gene name: aristaeless-like homeobox 3

Modification date: 05/08/2004

Probe: [Alx3 cDNA](#)

1A Specimen 1A: embryonic day 9.5 (more ...)

Structure	Level	Pattern
TS15: fronto-nasal process (mesenchyme)	Strong	Regionally restricted

1B Specimen 1B: embryonic day 10.5 (more ...)

Structure	Level	Pattern
TS17: latero-nasal process (mesenchyme)	Present	
TS17: medio-nasal process (mesenchyme)	Present	
TS17: 1st branchial arch	Present	Regional

Assay Results pages provide:

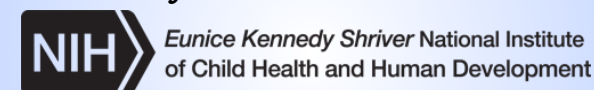
- genetic/allelic background and age of specimens
- anatomical structures
- strength and pattern of expression
- experimental conditions, including description of probe or antibody used
- primary expression images when available

MouseMine

Allows searching for and analyzing expression results with customized and iterative queries, enrichment analysis and programmatic access.

[www.informatics.jax.org/expression.shtml](http://www.informatics.jax.org/expression.shtml)

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## Gene Expression Data Query enables basic and complex searches using one or multiple parameters

Find expression data for...

One gene e.g., *Shh* or *kit* oncogene  
Genes with similar nomenclature e.g., *Hoxa\**  
List of genes e.g., *Wnt1*, *Bmp7*, *En1*, *Isl1*...

A set of genes defined by

- Function e.g., cell-cell signalling
- Phenotype e.g., obese
- Disease e.g., DiGeorge Syndrome

Find assay results where expression is

☒ detected in ☐ not detected in ☐ either

Anatomical Structures: AND / OR Developmental Stages:

other parameters

Find expression data in ...

- ☐ Specimens mutated in gene:
- ☐ Wild type specimens only
- ☒ All specimens

Find expression data in any assay type

- ☒ Immunohistochemistry
- ☐ In situ reporter (knock in)
- ☐ Northern blot
- ☐ Nuclease S1
- ☒ RNA in situ
- ☐ RNase protection
- ☐ RT-PCR
- ☐ Western blot

GXD also enables:

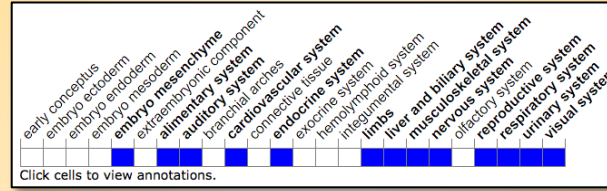
### Differential Expression Searches

- Search for genes expressed in some **anatomical structures** but not others.
- Search for genes expressed at some **developmental stages** but not others.
- Search for genes expressed in **some anatomical structures and stages** but not others.

### Batch Searches for expression data using lists of gene symbols or IDs

GXD provides multiple interactive search summaries and iterative query refinement

## Overview of Gene Expression on Gene Detail pages



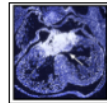
Assay Results 114

Tissues 85

cDNA Data 21

Literature Summary 33

Images



Tissue x Stage Matrix



## Expression Data Summaries for Genes, Assays and Assay Results

You searched for:

**Assayed in choroid plexus TS20-28** includes synonyms & substructures

Genes (4462)

Assays (5513)

Assay results(14686)

Gene	Result Details	Assay Type	Age	Structure	Detected?	Images	Mutant Allele(s)	Reference
Ear	<a href="#">View</a>	RNA in situ	E12.5	TS20: lateral ventricle choroid plexus	Yes	2A		3.9164 Girono L, et al., Gene Expr Patterns. 2004 Oct;4(5):749-54
Ear	<a href="#">View</a>	RNA in situ	E12.5	TS20: lateral ventricle choroid plexus	Yes	2C		3.9164 Girono L, et al., Gene Expr Patterns. 2004 Oct;4(5):749-54
Ear	<a href="#">View</a>	RNA in situ	E12.5	TS20: lateral ventricle choroid plexus	Yes	2B		3.9164 Girono L, et al., Gene Expr Patterns. 2004 Oct;4(5):749-54
Foxf1	<a href="#">View</a>	In situ reporter (knock in)	E12.0	TS20: choroid plexus	Yes	1L	<i>Foxf1<sup>lacZ</sup></i>	3.8324 Katsichenko VG, et al., Gene Expr Patterns. 2003 Mar;3(2):133-8
Lip4	<a href="#">View</a>	Immunohistochemistry	E12.0	TS20: choroid plexus	Yes	4b		3.2350 Du H, et al., J Lipid Res. 1996 May;37(5):937-49
Rap1c1	<a href="#">View</a>	RNA in situ	E12.0	TS20: choroid plexus	Yes			3.7254 Kamada T, et al., Biochim Biophys Acta. 2004 Jan 5;1676(1):51-62
Rap1c1	<a href="#">View</a>	RNA in situ	E12.0	TS20: choroid plexus	Yes			3.7254 Kamada T, et al., Biochim Biophys Acta. 2004 Jan 5;1676(1):51-62
Rap1c1	<a href="#">View</a>	RNA in situ	E12.0	TS20: choroid plexus	Yes			3.7254 Kamada T, et al., Biochim Biophys Acta. 2004 Jan 5;1676(1):51-62
Smad5	<a href="#">View</a>	RNA in situ	E12.0	TS20: choroid plexus	Yes	2C		3.2810 Luukko K, et al., Mech Dev. 2001 Mar;101(1-2):209-12
Smad7	<a href="#">View</a>	RNA in situ	E12.0	TS20: choroid plexus	Yes	2C		3.2810 Luukko K, et al., Mech Dev. 2001 Mar;101(1-2):209-12
Tacc1	<a href="#">View</a>	Immunohistochemistry	E12.0	TS20: choroid plexus	Yes	2E		3.108781 Lauffen B, et al., Dev Dyn. 2006 Jun;235(6):1308-17

filter options

Filter expression by:

Anatomical System  Assay Type   
Detected?  Theiler Stage   
Wild type?

## Image Summaries

Images (15475)

Gene	Assay Type	Specimen Type	Result Details
<i>Vegfa</i>	In situ reporter (knock in)	section	68
<i>Tyfrt1</i>	In situ reporter (knock in)	section	Mouse 328752 - Image 99216499
<i>Spre2</i>	In situ reporter (knock in)	section from whole mount	85

## Interactive Matrix Views

Tissue x Stage Matrix

Tissue x Gene Matrix

