Commonly Used Mouse Strains

DLAR

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Strain Highlights
BALB/cJ mice are frequently used for a variety of immunological studies, in part because they demonstrate TH2-biased immune responses. BALB/c mice are particularly well known for the production of plasmacytoma on injection with mineral oil, forming the basis for the production of monoclonal antibodies. Mammary tumor incidence is normally low, but infection with mammary tumor virus by fostering to MMTV+ C3H mice dramatically increases tumor number and age of onset. BALB/c mice develop other cancers later in life, including reticular neoplasm, primary lung tumors, and renal tumors. Rare spontaneous myoepitheliomas arising from myoepithelial cells of various exocrine glands have been observed in BALB/cJ mice.

JAX® Ready Strain™ BALB/cJ
Strain Common Name: BALB C *Type:* Inbred
Characteristics
• Commonly develops ulcerative blepharitis and periorbital abscess
• Exhibits incomplete penetrance of callosal agenesis
• Exhibits spontaneous dystrophic cardiac calcinosis
• Susceptible to pristane induced arthritis
• Exhibits TH-2-lymphocyte driven pulmonary inflammation, a model for asthma
• Susceptible to TMEV-induced demyelinating disease
• Relatively resistant to diet-induced atherosclerosis
• Male mice are resistant to multi-dose streptozotocin (STZ)-induced diabetes
• Resistant to the induction of experimental allergic encephalomyelitis (EAE)
• Useful in vaccine development and studies of infectious disease

BALB/cJ

Type: Inbred

Useful for a variety of immunological studies

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Strain Highlights
C57BL/6 is the most widely used inbred strain. Commonly used as a general purpose strain, C57BL/6 is also used for the generation of congenics carrying
both spontaneous and induced mutations. C57BL/6J was the DNA source for
the first high quality draft sequence of the mouse genome. C57BL/6J is part of
our unique Genetic Stability Program, which uses cryopreservation to limit
genetic drift . More than 90% of the world's published references to C57BL/6
sub-strains refer to the C57BL/6J substrain, which originates from The Jackson
Laboratory.

JAX® Ready Strain™ C57BL/6J
Strain Common Names: B6, Black 6, C57 Black *Type:* Inbred

Characteristics
- Low susceptibility to tumors
- High susceptibility to diet-induced obesity, moderate hyperglycemia and hyperinsulinemia
- High susceptibility to diet-induced atherosclerosis
- High incidence of hydrocephalus and malocclusion
- High incidence of microphthalmia and other eye defects
- Resistant to audiogenic seizures
- Low bone density
- Preference for alcohol and morphine
- Late-onset hearing loss

C57BL/6J

Type: Inbred

Most well characterized C57BL/6 sub-strain
- Genetically stable, ensuring reproducible results

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JAX® Ready Strain™ DBA/2J
Strain Common Name: D2 *Type:* Inbred

Strain Highlights

DBA/2J is a widely used inbred strain that is valuable in a number of research areas including cardiovascular biology, neurobiology, and sensorineural research. Its characteristics are often contrasted with those of the C57BL/6J inbred strain, due to their genetic disparity. DBA/2J is part of our unique Genetic Stability Program, which uses cryopreservation to limit genetic drift. Aging DBA/2J mice develop progressive eye abnormalities that closely mimic human hereditary glaucoma. Defects include iris pigment dispersion, iris atrophy, anterior synechia (adhesion of the iris to the cornea), and elevated intraocular pressure. Retinal histopathology reveals a loss of retinal ganglion cells as well as GABAergic and cholinergic amacrine cells. NK cells in DBA/2J mice are unique in that they lack surface expression of CD94/NKG2A receptors due to a deletion in the 3' end of the *Klrd1* gene. This ~2.4 kb deletion does not prevent transcription of the gene, but prevents translation and cell surface expression of the CD94 protein. The deletion, which occurred sometime between 1984 and 1989, is homozygous within our colonies, making DBA/2J mice naturally CD94 deficient.

Key Features

- Genetically disparate from C57BL/6J
- Genetically stable, ensuring reproducible results
- Readily available

Characteristics

- Severe high frequency hearing loss by 2-3 months of age
- Susceptibility to audiogenic seizures in young mice
- Hemolytic complement (C5) deficiency, due to *Hc0* mutation
- Extreme intolerance to alcohol and morphine
- Low susceptibility to developing atherosclerotic aortic lesions on an atherogenic diet

DBA/2J

Type: Inbred

Genetically disparate from C57BL/6J
• Genetically stable, ensuring reproducible results

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NOD.CB17-*Prkdcscid*/J

Type: Mutant Strain (Spontaneous Mutant)

Strain Highlights

These mice are homozygous for the severe combined immune deficiency spontaneous mutation (Prkdc*scid*). They are both insulitis- and diabetes-free throughout life and serve as a diabetes-free control for NOD/LtJ mice (Stock No. 001976). A high incidence of thymic lymphomas in this congenic
stock limits mean lifespan to only 8.5 months under specific pathogen free conditions. These mice are excellent hosts for xenografts, may be useful for delineation of the role of T cell subsets in autoimmune diabetes, and can serve as a source for insulitis-free islets.

JAX® Ready Strain™ NOD.CB17-*Prkdcscid*/J

Strain Common Name: NOD *scid Type:* Mutant Strain (Spontaneous Mutant)

Characteristics

- Lack functional T cells and B cells (exhibit general lymphopenia)
- Defects in myeloid cell development
- Poor antigen presenting cell (APC)

Genetically stable, ensuring reproducible results

- Lack functional B cells and T cells and have low NK cell activity
- H2 Haplotype: *g7*

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B6.129P2-*Apoetm1Unc*/J

Strain Common Names:

ApoE-KO; apoE-; apoE0; epsilon-

Strain Highlights

Knockout mice homozygous for the Apoe*tm1Unc* mutation show a marked increase in total plasma cholesterol and triglyceride levels, as well as a decrease in high density lipoproteins (HDL). ApoE is a component of low density lipoprotein (LDL) and a subclass of HDL, and mediates high affinity binding to the LDL receptors. ApoE is important in lipid metabolism due to its involvement in transport into cells, particularly the liver.

The hypercholesterolemia exhibited by this mutation causes development of vascular atherosclerotic lesions in animals fed a “normal” fat diet (4.5% fat, 0.022% cholesterol).

Vascular disease is progressive, beginning with localized accumulation of foam cells causing vascular lesions (fatty streaks) in the aortic sinus by 3 months of age.

By 9-10 months of age, vascular lesions are large, confluent plaques that progress to the proximal ascending aorta, carotid arteries, abdominal aorta, and iliac arteries. B6.129P2-Apoe*tm1Unc*/J animals fed an artherogenic diet (15.8% fat, 1.25% cholesterol) for 12 weeks have a significantly accelerated progression of disease. For example, cholesterol cleft s and calcification occur at 5-7 months, versus 10 months in animals fed normal chow.

JAX® Ready Strain™ B6.129P2-*Apoetm1Unc*/J

Model system for studying the progression and pathogenesis of atherosclerosis

- ***In vivo*** **model to study lipid metabolism**

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NOD.Cg-*Prkdcscid Il2rgtm1Wjl*/SzJ

Strain Highlights

These mutant mice have severe combined immunodeficiency (*Prkdcscid*) and due to a knockout of *Il2rg*, lack the common gamma chain (gamma c) receptor associated with multiple lymphoid-related cytokines. Histological examination of lymphoid tissues reveals absence of lymphoid cells and some cystic structures in the thymus, an absence of follicles in the spleen and markedly diminished celluarity of lymph nodes. Double mutants are deficient in mature lymphocytes, serum Ig is not detectable and natural killer (NK) cell cytotoxic activity is extremely low. These mice are resistant to lymphoma development, even after sublethal irradiation. They have been shown to readily support engraftment of human CD34+ hematopoietic stem cells and represent a superior, long-lived model suitable for studies employing long-term xenotransplantation.

Type: Congenic

JAX® Mice Strain NOD.Cg-*Prkdcscid Il2rgtm1Wjl*/SzJ

Strain Common Name: NOD-*scid IL2Rγnull Type:* Congenic

Characteristics

- Lacks mature lymphocytes (B and T cells) without leakiness
- Lacks IL2R-γ (gamma c) expression
- Does not produce detectable serum immunoglobulin
- Significantly diminished NK cell activity
- Resistance to lymphoma leads to longer lifespan than that of NOD.Cg-*Prkdcscid* mice
- Supports adoptive transfer of diabetic T cells without irradiation
- Superior ability to be humanized through engraftment and differentiation of human hematopoietic stem cells into mature human lymphoid and myeloid cells
- Superior for HIV and other infectious disease research because of improved lymphoid expansion
- Superior human hematopoietic engraftment
- Significant human lymphoid expansion
- Newborn recipients do not require IL-7 for thymopoiesis
- Lack of NK activity improves quality and duration of xenografts

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ICR
Outbred Mouse

- Good reproductive performance and fast growth rate
- Often used as an embryo donor and/or recipient mother in transgenic mouse labs
- It has been used extensively in toxicology and pharmacology studies and is often used for product safety testing
- **Origin:** The ICR outbred model was developed by Dr. T. S. Hauschka of Fox Chase Cancer Center in 1948. Dr. Hauschka left Fox Chase a portion of his colony. Taconic received breeder stock from Fox Chase in 1993. The mice were derived by hysterectomy into IBU? colonies and are maintained by Poiley rotational bred mice.
- **Color:** Albino

B6.SJL
TRADITIONAL CONGENIC MICE

- Genetically similar to the C57BL/6Boy strain except that it carries the Ptprca allele (protein-tyrosine phosphatase, receptor type c locus previously known as CD45.1, Ly5.1) and the Pep3b allele from the SJL/J strain
- The unique lymphocyte cell surface antigen produced by Ptprca makes this strain useful for immunological adoptive transfer experiments and useful as a background for transgenic and knockout models used in adoptive transfer studies
- **Origin:** The B6.SJL Congenic model was developed by Boyse et al in 1975 by intercrossing C57BL/6Boy mice to SJL/J mice. Taconic received stock from the NIAID in 1995. The mice were derived by embryo transfer into the NIAID Transgenic Mouse Repository. The mice were backcrossed by Boyse to a C57BL/6Boy inbred background to select for SJL antigen type (now referred to as Ptprca or Ly5.1). Refreshed in 2007 from NIAID stock.

BALB/c nude
SPONTANEOUS MUTANT T-CELL DEFICIENT MICE

- Foxn1nu mutation backcrossed to the BALB/cAnN inbred strain for nine generations
- Taconic maintains this valuable model at two health designations, Defined Flora from gnotobiotic isolators (model #BALBNU) and Restricted Flora from Isolated Barrier UnitsTM (model #BALBNURF) utilizing special husbandry and gowning procedures to protect the animals from opportunistic organisms frequently carried by humans
- The deficiency in T cell function allows athymic mice to accept and grow xenografts as well as allografts of normal and malignant tissues. Tissues from the BALB/c Nude can be transplanted onto normal BALB/c mice.
- The autosomal recessive nude gene in homozygous (nu/nu) mice causes the lack of fur and an abnormal thymus. Heterozygous (nu/+) animals carry the recessive nude gene on one chromosome only and therefore have a normal thymus triggered immune system
- **Origin:** Taconic received the BALB/c Nude Spontaneous Mutant model from the NIH Animal Genetic Resource in 1980. The mice were backcrossed eighteen generations. The mice are maintained by incrossing non-brother x sister mice.
- **Color:** Albino

Strain Highlights

This widely used general purpose strain is the only CBA substrain that carries the *Pde6brd1* mutation, which causes blindness by wean age. Renal tubulointerstitial lesions have been observed in this strain at a high frequency. Some CBA/J mice spontaneously develop exocrine pancreatic insuffi ciency syndrome.

JAX® Ready Strain™ CBA/J

Type: Inbred

Characteristics

• Used to study granulomatous experimental autoimmune thyroiditis (G-EAT)

• Relatively resistant to diet-induced atherosclerosis

• Develop a mild hearing loss late in life, with most of the hearing loss occurring in the higher frequencies

CBA/J

Type: Inbred

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Swiss Webster

TRADITIONAL OUTBRED MICE

- Extensively used for decades as an all-purpose stock for research and drug safety testing
- Often used as recipient mother in transgenic labs due to its superior nurturing ability
- Swiss Webster females are also ideal pseudopregnant recipients for embryo transfers of black and agouti mouse lines
- **Origin:** Taconic received the Swiss Webster outbred model from the Rockefeller Institue through Rockland Farms Inc in 1940. The mice have been maintained as a closed colony since 1951. The mice were derived by caesarean from randomly chosen breeders and reintroduced into a Barrier Nucleus Expansion Colony in 1965-1969. The mice were derived by caesarian in 1983 from randomly chosen breeders from all Taconic's barrier units.
- **Color:** Albino

NMRI
TRADITIONAL OUTBRED MICE

- Extensively used as an experimental animal in many fields of general biology as well as in pharmacology and toxicology
- Commonly used as a control for selection experiments
- Develops a wide variety of spontaneous tumors and an increasing incidence of renal disease with age
- **Origin:** The NMRI outbred model was developed by Lynch et al. Poiley of the National Institutes of Health received stock from Lynch in 1937. The mice were inbred as NIH/P1. The Naval Medical Research Institute (NMRI) received stock from Lynch. Zentralinstitut für Versuchstierzucht in Hannover Germany (Han) received stock from NMRI. The mice were random bred. M&B A/S (now Taconic Europe) received stock from Han in 1961 and again in 1985. The mice are maintained as an outbred stock.

Color: Albino

Physiologic Data for Mice

MICE

Care and Feeding

	Number of Adults	Number of Young	Cage Dimensions* Length	Width	Height
Breeding/Lactation	1 pair	12	30 cm	15 cm	15 cm
Growing	10-15		45 cm	30 cm	15 cm
Experimental	3-5		Variable		

	Daily Feed Usage	Water Requirement	Begin Dry Food Consumption
Feeding Recommendations	4-5 gm. Feed free choice. No supplemental feeding necessary	Ad libitum	10 days

	Room Temp.	Humidity	Light	Litter Material
Environmental Data	25 °C	45-55%	10-12 hrs/day	Treated corn cobs, shredded beet pulp, wood shavings, or commercial beddings

Biological Values

Blood Chemical Composition	**Water** 92-94 gm/100ml	**Calcium** 4.2 mEq/L	**Sodium** —	**Chloride** —	**Phosphorus** 5.6 mg/100ml	**Potassium** —
Values are for plasma, except where noted	**Magnesium** 1.3 mg/100ml	**Cholesterol** 132-244(B) mg/100ml	**Glucose** 174 mg/100 ml (whole blood)	**Serum Protein** 4.0 gm/100ml	**Albumin** 3.4 gm/100ml	**Globulin** 0.6 gm/100ml
Oxygen Consumption and Body Temperature	**Observed Weight** 20 gm	**Temperature** 36.5 °C	**Oxygen Consumption** 1.69 $mlO_2/gm/hr$	**Breathing Rate** 163/minute (84-230)	**Heart Rate Adult** 600/minute (328-780)	
Hematological Values	**Whole Blood Volume (T-1824 dye)** 78 ml/kg	**Clotting Time** 14 sec.	**RBC Life Span** 20-30 days	**RBC Diameter** 6.6 microns	**RBC Rate of Sedimentation** —	
	Blood pH —	**RBC** 7.7-12.5 $10^6/mm^3$	**Hematocrit** 41.5 ml/100ml	**Platelets** 246-339 $10^3/mm^3$	**Hb** 14.8 gm/100ml	
Total and Differential White Blood Cell Counts	**Leucocytes** 8.0 $10^3/mm^3$	**Neutros** 2.0 $10^3/mm^3$	**Eosinos** 0.15 $10^3/mm^3$	**Basos** 0.05 $10^3/mm^3$	**Lymphos** 5.5 $10^3/mm^3$	**Monos** 0.30 $10^3/mm^3$

Life Cycle Information

	Weight Adult Male 20-40 gm	**Weight Adult Female** 25-40 gm	**Weight at Birth** 1.5 gm	**Breeding Age Male** 50 days 20-35 gm	**Breeding Age Female** 50-60 days 20-30 gm	**Estrus Cycle** 4-5 days
	Gestation 17-21 days 19 days avg.	**Weaning Age** 16-21 days 10-12 gm	**Litter Size** 1-23 10-12 avg.	**Rebreed After Parturition** Immediately	**Breeding Life Male** 18 months	**Breeding Life Female** 6-10 litters

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