

C57BL/6-*Ins2*^{Akita} /J

Stock No: 003548 | Akita

 Spontaneous Mutation

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Also Known As: Akita

The Akita strain is a monogenic model for phenotypes associated with type 1 diabetes. A spontaneous mutation in the insulin 2 gene leads to incorrect folding of the insulin protein producing toxicity in pancreatic β cells, reduced β cell mass and reduced insulin secretion. Heterozygous *Ins2*^{Akita} mice develop insulin dependent diabetes, including hyperglycemia, hypoinsulinemia, polydipsia, and polyuria by 3-4 weeks. The phenotype is more severe in males than females. Obesity and insulinitis do not accompany diabetes. Akita mice may be useful for testing islet transplantation and studying diabetic complications such as nephropathy, sympathetic autonomic neuropathy, and macrovascular disease.

Due to progression of the diabetic phenotype and subsequent increased fragility in heterozygous males, shipment of heterozygous male mice of this strain is restricted to four to six weeks of age [February 2020].

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GENETIC OVERVIEW

Genetic Background

Generation

N25pN15
(2020-01-08 00:00:00)

Ins2^{Akita}

Alele Type	Gene Symbol	Gene Name
Spontaneous	<i>Ins2</i>	insulin II

[VIEW GENETICS](#)

RESEARCH APPLICATIONS

Diabetes and Obesity Research
Cell Biology Research
Endocrine Deficiency Research

[VIEW ALL RESEARCH APPLICATIONS](#)

BASE PRICE

Starting at:

\$218.00 Domestic price for female 4-week

244.83 Domestic price for breeder pair

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[Details](#)

[Detailed Description](#)

Mice heterozygous for the Akita spontaneous mutation (*Ins2^{Akita}*) are viable and fertile. Symptoms in heterozygous mutant mice include hyperglycemia, hypoinsulinemia, polydipsia, and polyuria, beginning around 3-4 weeks of age. The diabetic phenotype is more severe and progressive in the male than in the female. Obesity or insulinitis does not accompany diabetes.

Expression of glutathione S-transferase mRNA is increased in epithelial cells in proximal tubules of hyperglycemic mutants (Fujita et al., 2001). As well, plasma concentrations of valine, leucine, isoleucine, as well as the total branched chain amino acids, alanine, citrulline and proline, were significantly higher in the Akita mice (Mochida et al., 2011). Sphingosine-1-phosphate is elevated and diabetic animals demonstrated reductions in plasma levels of omega-9 24:1 (nervonic acid)-containing ceramide, sphingomyelin, and cerebroside. Reduction of 24:1-esterified sphingolipids was also observed in liver and heart (Fox et al., 2011).

Aged mice exhibit gait disturbance and decreased sensory nerve conduction velocity, but do not exhibit learning or memory deficits (Choeiri C et al., 2005). They do, however, exhibit hyperphagia and anxiety behavior (Asakawa et al., 2007).

Progressive retinal abnormalities begin as early as 12 weeks after the onset of hyperglycemia. Retinal complications include increased vascular permeability, alterations in the morphology of astrocytes and microglia, increased apoptosis and

thing of the inner layers of the retina (Barber AJ, et al., 2005).

The mean lifespan of diabetic male mice on the C57BL/NJcl background (305 days) was significantly shorter than that of nondiabetic males in another colony of the same strain (690 days). Mortality rates of diabetic and nondiabetic female mice of this strain did not differ significantly. Islets from *Ins2^{Akita}* mice are depleted of beta cells and those remaining release very little mature insulin. This, and the finding that mutant mice respond to exogenously administered insulin, indicate that *Ins2^{Akita}* mice will serve as an excellent substitute for mice made insulin dependent diabetic by treatment with alloxan or streptozotocin. Heterozygous *Ins2^{Akita}* mice are also ideally suited to allogeneic or xenogeneic islet transplantation protocols because the investigator does not need to treat the mice with a diabetogen to induce the hyperglycemic state. Untreated homozygotes rarely survive beyond 12 weeks of age.

Metabolic phenotype data may be found on the Diabetic Complications Consortium ([DiaComp](#)) website.

+ Development

+ Control Suggestions

+ Selected References

- Genetics

+ *Ins2^{Akita}*

- Disease/Phenotype

+ Disease Terms

+ Research Areas By Phenotype

+ Mammalian Phenotype Terms by Genotype

+ References

- Technical Support

Genotyping Protocols

Restriction Enzyme Digest:[Ins2](#)

Pyrosequencing:[Ins2](#)

End Point Analysis:[Ins2](#)

[Genotyping resources and troubleshooting](#)

Dietary Information

LabDiet® 5K52 formulation (6% fat)

Breeding Considerations

Mice are currently maintained by breeding a C57BL/6J inbred female with a heterozygous male. After onset of diabetes, when cages become very wet (due to diabetes-associated polyuria), the health of heterozygotes is best maintained by housing them individually in cages containing a mixture of regular litter and Alpha-Dri, changed twice weekly. Due to progression of the diabetic phenotype and subsequent increased fragility in heterozygous males, shipment of heterozygous male mice of this strain is restricted to four to six weeks of age [February 2020].

Additional Breeding and Husbandry Support

Mating System

C57BL/6J (000664) x Heterozygote

Breeding Summary: C57BL/6J (000664) female x Heterozygous male

Appearance

black

Related Genotype: *a/a*

Citation

When using the Akita mouse strain in a publication, please [cite the originating article\(s\)](#) and include JAX stock #003548 in your Materials and Methods section.

Animal Health Reports

[Facility Barrier Level Descriptions](#)

 [AX12 \(Maximum\)](#)

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	Male	Heterozygous for Ins2 ^{Akita}	\$218.00
4 weeks	Female	Wild-type for Ins2 ^{Akita}	\$78.51
	Male	Wild-type for Ins2 ^{Akita}	\$78.51
5 weeks	Female	Heterozygous for Ins2 ^{Akita}	\$218.00
	Male	Heterozygous for Ins2 ^{Akita}	\$218.00

Akita

5 weeks	SEX	Wild-type for Ins2 ^{Akita}	\$78.51
	Female	Wild-type for Ins2 ^{Akita}	\$78.51
	Male	Wild-type for Ins2 ^{Akita}	\$78.51
6 weeks	Female	Heterozygous for Ins2 ^{Akita}	\$218.00
	Male	Heterozygous for Ins2 ^{Akita}	\$218.00
6 weeks	Female	Wild-type for Ins2 ^{Akita}	\$78.51
	Male	Wild-type for Ins2 ^{Akita}	\$78.51
7 weeks	Female	Heterozygous for Ins2 ^{Akita}	\$218.00
7 weeks	Female	Wild-type for Ins2 ^{Akita}	\$78.51
8 weeks	Female	Heterozygous for Ins2 ^{Akita}	\$218.00
8 weeks	Female	Wild-type for Ins2 ^{Akita}	\$78.51

BREEDER PAIR			
SEX	GENOTYPE		PRICE
Female	C57BL/6J (000664)		\$244.83
Male	Heterozygous for Ins2 ^{Akita}		

RELATED PRODUCTS AND SERVICES		
Frozen Mouse Embryo	C57BL/6-Ins2<Akita>/J	\$2595.00

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