

IMMUNODEFICIENT MODELS

The breeding and maintenance of immunodeficient models in isolator colonies is a highly specialized and extremely important task. Charles River Laboratories has combined the technological advances made in the production of these important research models with the knowledge and experience of our staff to become experts in breeding immunodeficient models.

Health monitoring is stringent, and test results are made available to our customers on a regular and timely basis. Some of our procedures include:

- swabbing each isolator every other week for microbiological status;
- performing a full health monitoring every quarter on each isolator;
- including a health report with every immunodeficient model order.

Laminar flow hoods serve as the packing area for immunodeficient model orders. The staff responsible for packing immunodeficient models are dedicated solely to that task. All animals are shipped in Gnotosafe[®] shippers that have been irradiated prior to packing the animals. Animals also receive irradiated feed and sterile Transgel[®] as their shipping diet.

Our customers can rest assured that immunodeficient research models supplied by Charles River Laboratories undergo the most stringent, effective production processes possible from their conception to their delivery. Count on us to provide you with this important link in your research studies.

CD-1[®] Nude Mouse *Nomenclature:* Crl:CD-1[®]-Foxn1^{nu}

Origin: Developed from the transfer of the nude gene to a CD-1 mouse through a series of crosses and backcrosses. The model is athymic and T-cell deficient. *Characteristics:* outbred, albino background.

NU/NU Mouse *Nomenclature:* Crl:NU/NU-Foxn1^{nu}

Origin: This immunodeficient nude mouse originated from NIH and was originally thought to be a BALB/c congenic. It was later determined that it was not inbred. This model is therefore maintained as an outbred and not associated with any stock or strain. The model is athymic and T-cell deficient. *Characteristics:* outbred, albino background.

BALB/c Nude Mouse *Nomenclature:* CAnN.Cg-Foxn1^{nu}/Crl

Origin: Developed through crosses and backcrosses between CAnN.Bon-Foxn1^{nu} and CAnN.Cg-Foxn1^{nu}/CrlCrlj at Charles River Japan (CRJ). Pedigreed pregnant of CAnN.Cg-Foxn1^{nu}/CrlCrlj females were received from CRJ in 1985 and rederived. This model is athymic and T-cell deficient. *Characteristics:* inbred, albino background.

Production

The production environment ensures the highest level of biosecurity and the most humane surroundings for these models.

- Animals are produced in semi-rigid and flexible film isolators of varying sizes.
- Currently, more than 700 isolators are maintained throughout North America.
- Temperature and humidity are tightly controlled with 24-hour monitoring and backup.
- Feed and bedding are received in vacuum-packed, gamma irradiated packages.
- Sterilized water is supplied in special 1 gallon bags.
- Packages are sterilized with CLIDOX prior to introduction into the isolators.



NIH-III Mouse *Nomenclature:* CrI:NIH-Lyst^{bg} Foxn1^{nu} Btk^{xid}

Origin: Most commonly called the NIH-III, the model was developed at NIH. In addition to the T-cell deficiency, this model has two other mutations important in regulating the function of the immune system. A natural killer cell mutation, referred to as beige (*bg*), renders the animal devoid of NK cells. The x-linked immune defect (*xid*) affects the maturation of T-independent B lymphocytes. However, the extent of the T-independent B lymphocyte and NK cell deficiencies in the NIH-III has not been fully established.

Characteristics: outbred, light to dark gray pigmented skin.

Fox Chase SCID Mouse *Nomenclature:* CB-17/Icr-Prkdc^{scid}/CrI

Origin: SCID mice possess a genetic autosomal recessive mutation Prkdc^{scid}. Developed in 1980 by Bosma in C.B-17/Icr mice at Fox Chase Cancer Center, SCID mice show a severe combined immunodeficiency affecting both B and T lymphocytes. Caesarean derived in 1991 from an Iffa Credo foundation colony.

Characteristics: inbred, albino.

Fox Chase SCID Outbred Mouse *Nomenclature:* CrI:HA(ICR)-Prkdc^{scid}

Origin: In 1990, the scid mutation was placed on the Icr:HA(ICR) background by crossing to the CB-17/Icr-Prkdc^{scid} strain. Two additional backcrosses to Icr:HA(ICR) stock were completed in 1992. The resulting Fox Chase Icr:HA(ICR)-Prkdc^{scid} random bred colony is maintained by a modified version of Robertson's mating system. To Charles River Laboratories in 2002. *Characteristics:* outbred, albino.

Fox Chase SCID Beige Mouse *Nomenclature:* CB17/Icr.Cg- Prkdc^{scid}Lyst^{bg}/CrI

Origin: A congenic mouse that possesses both of the genetic autosomal recessive mutations scid and beige. This mouse was developed by Croy, *et al.*, at the University of Guelph by an intercross of CB-17-Cg Prkdc^{scid} to C57BL/6 Lyst^{bg} mice. *Characteristics:* inbred, albino.

NOD SCID Mouse *Nomenclature:* NOD/NCrCrI- Prkdc^{scid}

Origin: The Prkdc^{scid} mutation was transferred onto a non-obese diabetic background. Animals homozygous for the SCID mutation on the NOD background have impaired T and B cell lymphocyte function as well as lacking NK function and the ability to stimulate complement activity. This model does not develop Type 1 diabetes. To Charles River in 2005 from the Frederick Cancer Research and Development Center.

Characteristics: inbred, albino.

Nude Rat *Nomenclature:* CrI:NIH-Foxn1^{nu}

Origin: The NIH nude rat was developed in 1979-1980 through a series of matings in which the Rowett nude gene was added and backcrossed into eight inbred rat strains. To Charles River from the NIH Animal Genetic Resources and caesarean rederived in 2001. This athymic model shows depleted cell populations in thymus-dependent areas of peripheral lymphoid organs. *Characteristics:* outbred, albino, black, black & white.

Comparison of Immunodeficient Strains

	Hair	Thymus	T-Cells	B-Cells	NK Cells	Fix Complement
CD-1 Nude	-	-	-	+	+	+
Nu/Nu Nude	-	-	-	+	+	+
Balb/c Nude	-	-	-	+	+	+
NIH-III Nude	-	-	-	-	-	+
Fox Chase SCID	+	+	-	-	+	+
Fox Chase SCID Outbred	+	+	-	-	+	+
Fox Chase SCID Beige	+	+	-	-	-	+
NOD SCID	+	+	-	-	-	-
Nude Rat	-	-	-	+	+	+