Immuno-deficient models

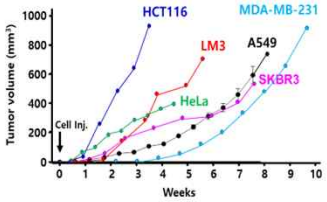
N2G

NOD-2-Gene-deletion mouse

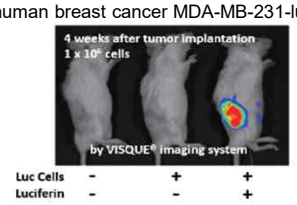
NOD-Prkdc^{em1Gmcr} Il2rg^{em1Gmcr}

The **N2G mouse model**, developed by **GEMCRO**, is a highly immunodeficient strain based on the classical **NOD** background. Instead of conventional gene-targeting, it leverages **CRISPR/Cas9**-mediated knockouts of **Prkdc** and **Il2rg**, ensuring a more complete ablation of immune function. This enhances an **ideal platform for human cell and tissue transplantation**, as well as other translational research applications (Gemcro, ***Transgenic Research***, 2025).

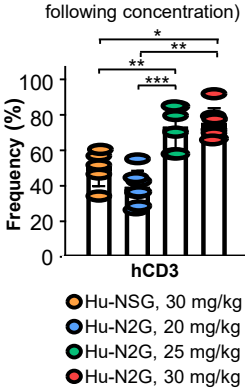
Tumor growth of CDX model
(human breast cancer cell lines)



Growth of Luc-expressing cells
(human breast cancer MDA-MB-231-luc)



Humanization with CD34+ cord blood cells
(after busulfan treatment of following concentration)



Advantage	• **Best transplantation of human cells.** • **0% of possibility of mutant protein expression.**
Features	• **Whole gene deletion** by CRISPR/Cas9. • T, B, and NK cell deficiency. • Deficiency of Macrophage and Dendritic cell function.
Applications	• **Cell line-derived xenograft (CDX).** • **Patient-derived xenograft (PDX).** • Generation of **humanized mice**.

Comparison of N2G mice with other immunodeficient mouse models

Name	Back ground	Mutant	T cells	B cells	NK cells	DC	MΦ	Cytokine signal	Lifespan (months)	Weakness	Targeting strategy
N2G™	NOD	Prkdc^{null} Il2rg^{null}	X	X	X	Defect	Defect	X	-	~22	-	**Whole gene deletion**
NSG NOG	NOD	Prkdc^{scid} Il2rg^{null}	X	X	X	Defect	Defect	X	-	~22	-	Substitution & partial deletion
NOD	NOD	Slc11a1, C1q, etc	O	O	Defect	Defect	Defect	O	Leaky	~8	IDDM	Spontaneous mutations
Nude	Balb/c	Foxn1^{null}	X	O	O	O	O	O	Leaky	~12	Late ovulation	Spontaneous mutation
SCID	CB17	Prkdc^{scid}	X	X	O	O	Defect	X	Leaky	~9	Thymic lymphoma	Spontaneous mutation
Rag2 KO	C57BL/6	Rag2^{null}	X	X	O	Defect	O	X	-	~12	Pre-B cell lymphoma	Targeted mutation
BRG	Balb/c	Rag2^{null} Il2rg^{null}	X	X	X	Defect	O	X	-	~12	-	Targeted mutation
NRG	NOD	Rag2^{null} Il2rg^{null}	X	X	X	Defect	Defect	X	-	~12	-	Targeted mutation

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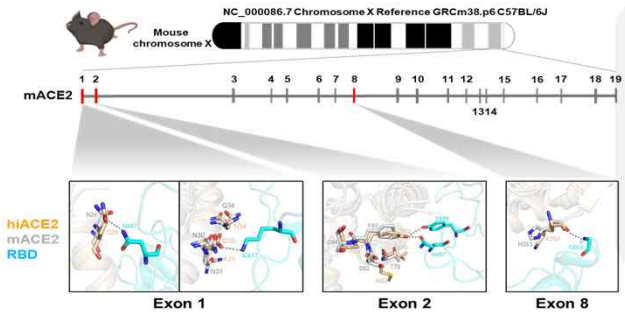
COVID-19 infection model

hiACE2

humanized Knock-in ACE2 mouse

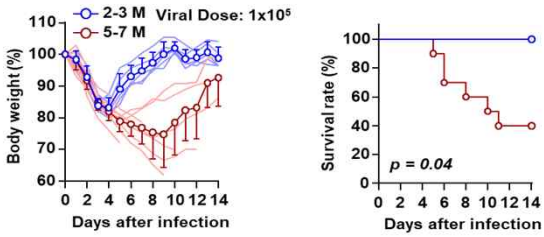
B6-Ace2^{em5Gmcr}

Standard mice are resistant to coronavirus infection, prompting researchers to rely on transgenic mice that overexpress human ACE2 (hACE2). However, these models often exhibit premature lethality not seen in human patients. In response, GEMCRO developed a novel hACE2 mouse model (hiACE2) by using CRISPR/Cas9 to **precisely modify only nine critical amino acids required for binding of coronavirus' spike protein**. This targeted approach yields a novel humanized ACE2 mouse that more faithfully replicates the infection patterns seen in humans.



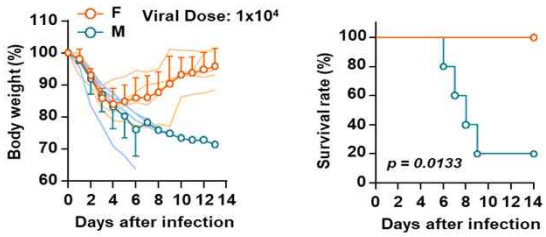
- **Precise humanization of only those amino acids in the ACE2 gene required for coronavirus binding.**
- **Reference:** YM Kim, et al. A humanized ACE2 mouse model recapitulating age- and sex-dependent immunopathogenesis of COVID-19 (Gemcro, ***J. Med. Virol.***, 2024).

Age-dependent Infection in hiACE2



- Marked weight loss is consistently observed following coronavirus infection.
- As the animals age, mortality rates increase significantly, reflecting **higher susceptibility in older mice** and **mimicking humans.**

Sex-dependent infection in hiACE2 mice



- **Males display greater vulnerability** to infection than females.
- Mirroring the sex-based differences in mortality seen in humans.

Advantage	• Clinical, epidemiological, and even gene expression features that **closely parallel those observed in human populations**.
Features	• Humanized model by CRISPR/Cas9. • Protein structure mimicking hACE2 receptor. • Very similar gene expression patterns to human COVID-19 - infected patients.
Applications	• COVID-19 research including **Long COVID**. • Testing of various ACE2-dependent coronavirus infections. • Evaluation of vaccines and antiviral drugs. • Human-like respiratory infection w/o CNS involvement.

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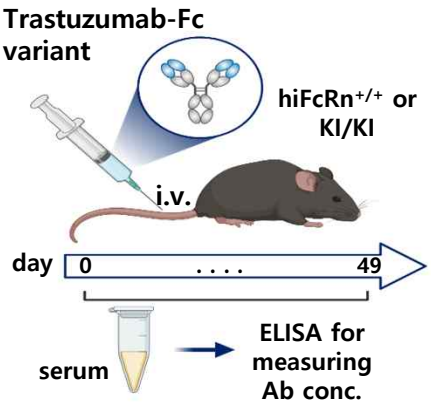
Antibody Drug Evaluation

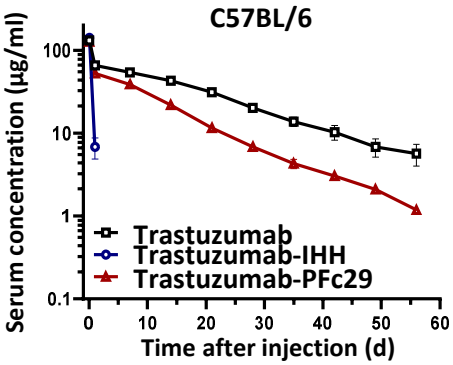
hiFcRn

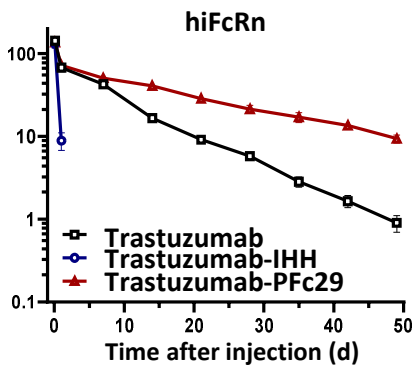
humanized Knock-in FcRn mouse

B6-Fcgrt$^{em1(FCGRT)Gmcr}$

The **hiFcRn** mouse model is a next-generation **humanized knock-in FcRn model**, engineered using CRISPR/Cas9 on the C57BL/6 genetic background. In this model, the **murine FcRn** gene has been precisely **replaced** with the **human FcRn** gene, enabling **more accurate preclinical *in vivo* testing** of antibody-based therapeutics. This model is particularly valuable in the rapidly expanding fields of antibody-drug conjugates (ADCs) and therapeutic antibodies, providing a robust platform for ***in vivo* pharmacokinetic (PK) and pharmacodynamic (PD) studies** to accelerate novel drug development (Gemcro, ***Scientific Reports***, 2025).







*IHH: A triple mutation (Ile-His-His) in the Fc region that completely abolishes its interaction with FcRn, serving as a control.

*PFc29: An engineered modification in the Fc region designed to enhance interaction between human IgG & human FcRn.

The hiFcRn mouse model **expresses human neonatal FcRn** under the control of the **endogenous mouse promoter**, maintaining physiological expression levels. This design overcomes interspecies differences in FcRn-IgG binding affinity that limit translational relevance in conventional models. Trastuzumab pharmacokinetic studies revealed a human-like serum half-life, confirming **effective FcRn-mediated recycling**.

Advantage	• Complete absence of murine FcRn protein expression, ensuring exclusive human FcRn expression.
Features	• A humanized model engineered using CRISPR/Cas9. • Murine FcRn gene precisely replaced with the humans. • Optimized for evaluating the half-life of antibody therapeutics.
Applications	• PK/PD test for Antibody-based drugs. • Preclinical study for Antibody-drug conjugates (ADCs). • Comparison of Fc-engineered antibodies.

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Mouse Models for Human Diseases

Methods	Representative Models	Supply Features
Short-term Carcinogenicity Assessment	B6-p53 KO (+/–) (c.55del) FVB-p53 KO (+/–) (c.54_60del)	Upon order, animals are supplied as litters born through IVF (in vitro fertilization) services. Supply includes *heterozygotes (+/–)* and wild-type (WT). Standard supply: 4-week-old mice after order; approx. 2~3 months required. Supply timeline and quantity can be adjusted through consultation. * Disease-model animals developed at the Ministry of Food and Drug Safety are transferred to us through technology transfer and supplied domestically to researchers. For model details, please refer to the link: www.nifds.go.kr/brd/m_360/list.do
Colorectal Cancer	Apc^{Min} (Δ850/+) Apc^{Min} (Δ716/+)	
Dementia/ Alzheimer	Tg(NSE-hAPPsw) Tg(NSE-hTau23)	
Atherosclerosis	Apoe KO (+/–) (c.1_936del) Ldlr KO (+/–) (c.1266_1335del)	
Obesity	ob model – Lep KO (+/–) (c.11_89del)	
Type 2 Diabetes	db model – Lepr KO (+/–) (c.723_727del)	
Cre Mice	• Tg(Alb-ERT2-Cre-ERT2) (hepatocytes) • Tg(Vipr2-ERT2-Cre-ERT2) (SCN, hypothalamus, retinal ganglion cells) • Tg(Defa6-ERT2-Cre-ERT2) (Paneth cells) • Tg(Dclk1-ERT2-Cre-ERT2) (neural progenitors) • Tg(Cdh16-cre)91Igr (kidney tubular epithelial cells) • Tg(NPHS2-Cre)295Lbh (podocytes)	

※ Please visit **GEMCRO.COM** for more models. If you cannot find the model you need, contact us — we will **custom-generate the required models** for researchers in Korea.

Supply Method

in vitro fertilization

Using frozen resources, mice are generated through **in vitro fertilization (IVF)** and directly supplied.

Mass production available

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