

면역결핍 모델

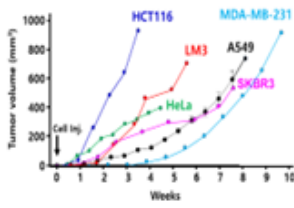
N2G

NOD-2 Gene deletion, NOD-Scid Il2rg^{null}

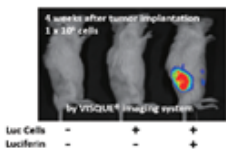


젬크로의 N2G 모델은 기존 NOD strain 마우스에서 Prkdc와 Il2rg 유전자 결손이 유도하던 중증 면역 결핍을 CRISPR/Cas9 기술로 전체 유전자를 제거하는 방법(knockout)으로 재현했습니다. N2G 모델은 면역결핍 정도가 높아 사람 세포 또는 조직 이식 시에 거부 반응 및 면역 반응이 적어, 사람 유래의 종양 및 줄기세포 이식 등 연구가 가능한 마우스입니다.

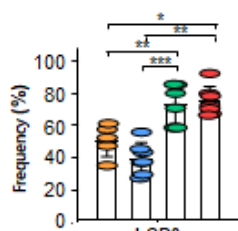
CDX 모델 종양 성장



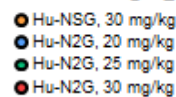
Luc 발현 세포 성장
(인간 유방암 MDA-MB-231-luc)



CD34+ 제대혈 세포 인간화



Busulfan 농도별



장점

- Whole gene deletion으로 돌연변이 단백질 발생 0%
- 국내 자체 기술로 맞춤 제작

특징

- CRISPR/Cas9 기술을 이용한 whole gene deletion
- T/B/NK 세포 결핍
- Macrophage 및 dendritic 세포의 기능 결여

활용

- Cell Line-Derived Xenograft (CDX)
- Patient-Derived Xenograft (PDX)
- Non-Clinical Study (비임상시험)
- Humanized Mouse 제작

N2G마우스와 면역결핍 마우스의 특성 비교

Name	Back ground	Mutant gene	T cells	B cells	NK cells	DC	Mφ	Cytokine signal	Leakiness	Lifespan (months)	Weakness	Targeting strategy
N2GTM (NSG*,NOG*)	NOD	Prkdc ^{scid} Il2rg ^{null}	X	X	X	Defect	Defect	X	-	~22	-	Whole gene deletion (*Partial deletion)
NOD	NOD	-	O	O	Defect	Defect	Defect	O	Leaky	~8	IDDM	Wild type
Nude	BALB/c	Foxn1 ^{null}	X	O	O	O	O	O	Leaky	~12	Late ovulation	Spontaneous mutation
SCID	CB17	Pdkdc ^{scid}	X	X	O	O	Defect	X	Leaky	~9	Thymic lymphoma	Spontaneous mutation
NOD-SCID	NOD	Pdkdc ^{scid}	X	X	Defect	Defect	Defect	X	Minimal	~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

Immuno-deficient models

N2G

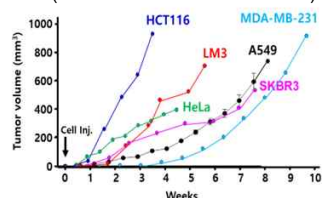
NOD-2-Gene-deletion mouse

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

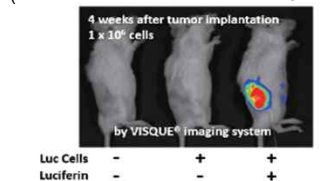


The **N2G mouse model**, developed by **GEMCRO**, is a highly immunodeficient strain based on the classical **NOD** background. Instead of conventional gene-targeting, it leverages **CRISPR/Cas9**-mediated knockouts of **Prkdc** and **Il2rg**, ensuring a more complete ablation of immune function. This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

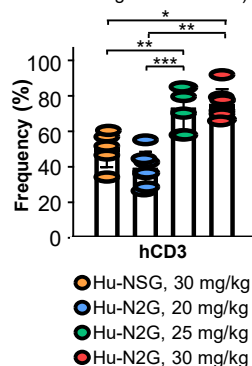
Tumor growth of CDX model
(human breast cancer cell lines)



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

GEMCRO for all GEMs

E-mail. contact@gemcro.com / Tel. 02 6677 6649