



Rag2/IL2RG Double Knockout (R2G2®)

B6;129-Rag2tm1Fwall2rgtm1Rsky/DwlHsd

Model characteristics

The R2G2 model is a double knockout mouse with an ultra immunodeficient phenotype. The model was created by backcrossing the *IL2RG* (common gamma chain) mutation on to a mixed background mouse (C57BL/6 and 129 mix) with a mutation in *Rag2*.

The recombination activating gene 2 (*Rag2*) interruption causes a deficiency in T and B cells.

The Common gamma chain gene (*IL2RG*) interruption results in a lack of functional receptors for IL-2, IL-4, IL-7, IL-9 and IL-15.

Envigo acquired from Fox Chase Cancer Center in 2016, where the model had been maintained since 2005.

Envigo was acquired by Inotiv in 2021. Harlan Laboratories Israel became an independent company in 2023

The model is a white-bellied, light chinchilla (light tan).

Research uses

- Oncology research
- Cancer cell transplantation
- Immunology
- Infectious disease

Features and advantages

R2G2 mice have several unique features that translate into unique benefits as compared to other immunodeficient model

Features	Advantages
Severe Immunodeficiency Deficient in T cells Deficient in B cells Lacks NK cells Decreased macrophage cells Decreased dendritic cells Decreased neutrophils	Ultra immunodeficient phenotype enhances tumor cell acceptance
Less radiosensitive	Higher tolerance for radiation as compared to models with the <i>scid</i> mutation
Reduced leakiness	Decreased leakiness as compared to SCID models

Clinical chemistry and complete blood counts

Clinical chemistry and CBC's were completed on a cohort of female R2G2 mice (7-8 weeks of age).

Specific lab results are listed in the table below.

Clinical chemistry n=30	Units	Mean	Std Dev
Glucose	mg/dL	144.3	41.3
Blood Urea Nitrogen (BUN)	mg/dL	15.9	5.6
Creatinine	mg/dL	0.1	0.0
BUN/Creatinine	Ratio	151.7	62.2
Cholesterol	mg/dL	148.5	16.2
Total Protein (TP)	g/dL	5.5	0.3
Albumin (Alb)	g/dL	3.1	0.2
Globulin (Glb)	g/dL	2.4	0.1
Alb/Glb	Ratio	1.3	0.1
Total Bilirubin	mg/dL	0.2	0.1
Alkaline Phosphatase (ALP)	U/L	123.2	46.5
Aspartate Aminotransferase (AST)	U/L	117.8	72.3
Alanine Aminotransferase (ALT)	U/L	68.1	55.2
AST/ALT	Ratio	2.0	0.9
Calcium (Ca)	mg/dL	10.8	0.4
Phosphorus (P)	mg/dL	8.9	1.5
Sodium (Na)	mmol/L	150.9	2.3
Potassium (K)	mmol/L	9.4	1.1
Chloride (Cl)	mmol/L	105.0	2.4
Triglycerides* (n=10)	mg/dL	136.7	26.0
Hematology n=20	Units	Mean	Std Dev
White Blood Cells (WBC)	$\times 10^3/\mu\text{L}$	1.1	0.4
Red Blood Cells (RBC)	$\times 10^6/\mu\text{L}$	10.8	0.4
Hemoglobin (Hgb)	g/dL	16.4	0.6
Hematocrit (Hct)	%	55.5	1.9
Mean Corpuscular Volume (MCV)	fL	51.3	1.3
Mean Corpuscular Hemoglobin (MCH)	pg	15.2	0.2
Mean Corpuscular Hemoglobin Concentration (MCHC)	g/dL	29.6	0.7
Lymphocytes	%	22.0	8.3
Monocytes	%	9.1	3.9
Eosinophils	%	1.8	1.3
Basophils	%	0.4	0.7
Neutrophils	%	66.7	9.5



Clinical chemistry and complete blood counts

Clinical chemistry and CBC's were completed on a cohort of male R2G2 mice (7-8 weeks of age).

Specific lab results are listed in the table below.

Clinical chemistry n=30	Units	Mean	Std Dev
Glucose	mg/dL	215.3	56.6
Blood Urea Nitrogen (BUN)	mg/dL	21.4	6.5
Creatinine	mg/dL	0.1	0.1
BUN/Creatinine	Ratio	165.2	41.5
Cholesterol	mg/dL	196.7	15.4
Total Protein (TP)	g/dL	6.0	0.3
Albumin (Alb)	g/dL	3.2	0.1
Globulin (Glb)	g/dL	2.8	0.2
Alb/Glb	Ratio	1.1	0.1
Total Bilirubin	mg/dL	0.1	0.1
Alkaline Phosphatase (ALP)	U/L	111.3	13.2
Aspartate Aminotransferase (AST)	U/L	96.2	39.3
Alanine Aminotransferase (ALT)	U/L	31.7	8.8
AST/ALT	Ratio	3.2	1.2
Calcium (Ca)	mg/dL	11.4	0.5
Phosphorus (P)	mg/dL	9.2	1.3
Sodium (Na)	mmol/L	152.5	1.6
Potassium (K)	mmol/L	9.8	1.0
Chloride (Cl)	mmol/L	106.5	1.6
Triglycerides* (n=10)	mg/dL	123.6	32.2
Hematology n=20	Units	Mean	Std Dev
White Blood Cells (WBC)	$\times 10^3/\mu\text{L}$	1.2	0.3
Red Blood Cells (RBC)	$\times 10^6/\mu\text{L}$	11.3	0.3
Hemoglobin (Hgb)	g/dL	16.8	0.4
Hematocrit (Hct)	%	57.9	1.7
Mean Corpuscular Volume (MCV)	fL	51.4	1.0
Mean Corpuscular Hemoglobin (MCH)	pg	14.9	0.2
Mean Corpuscular Hemoglobin Concentration (MCHC)	g/dL	29.0	0.5
Lymphocytes	%	16.9	8.2
Monocytes	%	8.9	3.5
Eosinophils	%	1.1	0.7
Basophils	%	0.1	0.3
Neutrophils	%	73.1	9.0