

Humanized ACE2 (hACE2) Knockin Rat



MODEL	Humanized ACE2 Knockin Rat
STRAIN	Hsd:SD-ACE2 ^{em1(ACE2)Env}
LOCATION	U.S.
AVAILABILITY	Live colony

CHARACTERISTICS/HUSBANDRY

- Background strain: Sprague Dawley

ZYGOSITY GENOTYPE

- Homozygous and Hemizygous (X-linked)

RESEARCH USE

- Infectious disease
- COVID-19
- SARS

ORIGIN

The humanized ACE2 (hACE2) knockin (KI) rat model was created at the Inotiv St. Louis, MO, model creation facility in 2020 and is maintained and distributed by Inotiv.

DESCRIPTION

Angiotensin-converting enzyme 2 (ACE2) is a key enzyme of the renin-angiotensin system, which regulates blood volume and arterial tone, and a target for the treatment of hypertension. It is highly expressed in several human tissues including the gastrointestinal tract, liver, gallbladder, kidney, urinary bladder, testes, placenta and fallopian tube, with lower expression levels in the lungs and pancreas. ACE2 also serves as the primary receptor for cell entry for the SARS-CoV and SARS-CoV-2 viruses. Binding of the coronavirus spike (S) protein to ACE2 initiates fusion of the cell and viral membranes for cell entry. ACE2-S protein binding is the critical initial step for coronavirus infection and is being investigated as a potential coronavirus drug target.

Rat *Ace2* gene is an X-linked gene with 19 exons. This model was generated by integrating a codon optimized human *ACE2* cDNA expression cassette into the rat *Ace2* gene locus through CRISPR-based technology. As a result, the rat *Ace2* gene promoter and other regulatory elements drive expression of the human ACE2 protein while terminating rat *Ace2* gene expression.

Figure 1. Relative human ACE2 mRNA expression in lung tissue from the hACE2 KI rat model. The expression of human ACE2 mRNA was measured in the lung tissue of heterozygous (Het; n=5) and homozygous (Homo; n=3) females, hemizygous (Hemi) males (n=6) and a wild type (WT) female (n=1) and male (n=1). $2^{-\Delta\Delta CT}$ was used to calculate relative expression, and then the data was then normalized to the group with highest expression. Error bars were calculated using STDEV/SQRT (numbers of sample).

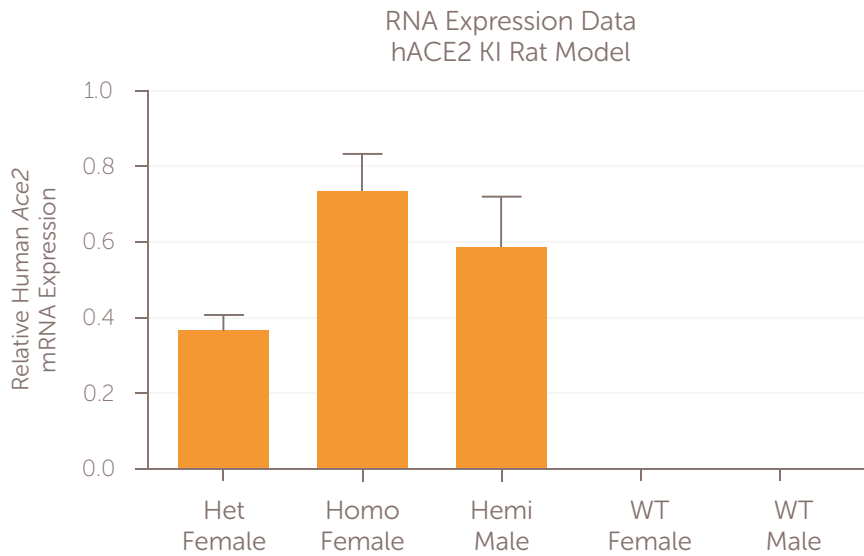


Figure 2. Relative rat Ace2 mRNA expression in lung tissue from the hACE2 KI rat model. The expression of rat Ace2 mRNA was measured in the lung tissue of heterozygous (Het; n=5) and homozygous (Homo; n=3) females, hemizygous (Hemi) males (n=6), and a wild type (WT) female (n=1) and male (n=1). $2^{-\Delta\Delta CT}$ was used to calculate relative expression, and the data was then normalized to the group with highest expression. Error bars were calculated using STDEV/SQRT (numbers of sample).

