ENVIGO

Genetically engineered models (GEMS)

Leptin knockout rat

Model	Leptin knockout rat
Strain	HsdSage:SD- Lep^{tm1Sage}
Location	U.S.
Availability	Cryopreserved

Characteristics/husbandry

+ This model possesses a 151 bp deletion within Exon 1 on chromosome 4
+ Homozygous knockout rats display loss of Leptin protein via Western blot
+ Homozygous knockout rats demonstrate significant weight gain compared to wild type littermates
+ Homozygous knockout rats demonstrate insulin resistance
+ Homozygous knockout rats show greatly elevated serum cholesterol levels
+ Background Strain: Sprague-Dawley

Zygosity genotype

+ Cryopreserved as heterozygous embryos

Research use

+ Obesity
+ Type II diabetes
+ Atherogenesis
+ Atherosclerosis
+ Hypertension
+ Insulin resistance
+ Lipoprotein/Cholesterol transportation
+ Metabolism (Triglyceride/Cholesterol)

Origin

The Leptin knockout rat model was originally created at SAGE Labs, Inc. in St. Louis, MO and distributed out of the Boyertown, PA facility. The line continues to be maintained through the original SAGE Labs animal inventory acquired by Envigo.

Description

Leptin is essential for energy intake and expenditure. It is one of the most important adipose-derived hormones, being primarily expressed in adipocytes of white adipose tissue. Loss of function of Leptin creates an uncontrolled appetite leading to severe obesity and abnormal metabolism, making this a useful model for the study of lifestyle diseases, such as obesity, diabetes, atherosclerosis, high cholesterol, and high blood pressure.

Citations

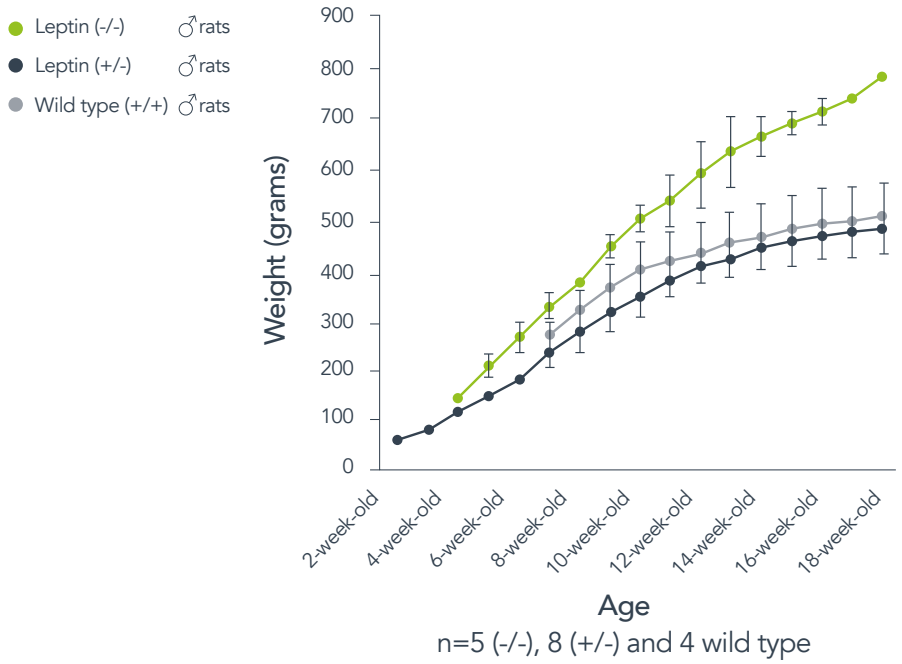
Adams WK, D'souza AM, Sussman JL, Kaur S, Kieffer TJ, Winstanley CA. Enhanced amphetamine-induced motor impulsivity and mild attentional impairment in the leptin-deficient rat model of obesity. Physiol Behav. 2018 Aug 1;192:134-144

Ciriello J, Moreau JM, McCoy A, Jones DL. Effect of intermittent hypoxia on arcuate nucleus in the leptin-deficient rat. Neurosci Lett. 2016 Jul 28;626:112-8

Ciriello J, Moreau JM, McCoy AM, Jones DL. Leptin dependent changes in the expression of tropomyosin receptor kinase B protein in nucleus of the solitary tract to acute intermittent hypoxia. Neurosci Lett. 2015 Aug 18;602:115-9.

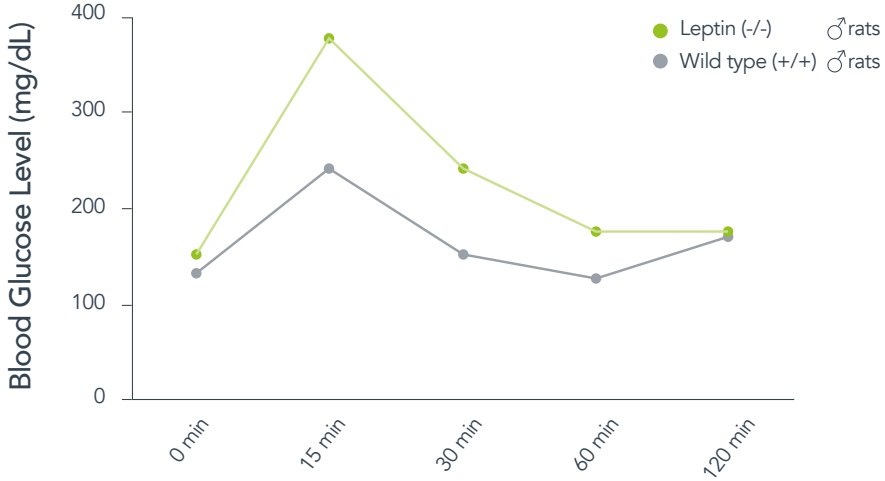
Vaira S, Yang C, McCoy A, Keys K, Xue S, Weinstein EJ, Novack DV, Cui X. Creation and preliminary characterization of a leptin knockout rat. Endocrinology. 2012 Nov;153(11):5622-8.

Figure 1: Homozygous knockout rats demonstrate significant weight gain compared to wild type. Leptin homozygous knockout rats demonstrate significant weight gain relative to their wild type and heterozygous littermates.



n=5 (-/-), 8 (+/-) and 4 wild type

Figure 2. Homozygous knockout rats demonstrate insulin resistance. Insulin resistance was assessed in 5-week-old Leptin knockout rats by glucose tolerance test. Serum glucose levels remained elevated relative to wild type following IP injection of glucose at 2 g/kg body weight. Animals were fasted 16 hours prior to glucose challenge.



n=5, 5-week-old Leptin (-/-) and wild type Sprague-Dawley males

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