ENVIGO

Genetically engineered models (GEMS)

# BDNF knockout rat

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| Model | BDNF knockout rat |
| Strain | HsdSage: SD-*Bdnf*$^{tm1Sage}$ |
| Location | U.S. |
| Availability | Cryopreserved |

## Characteristics/husbandry

+ Background strain: Sprague Dawley
+ Homozygous knockout rats exhibit complete loss of BDNF protein and have a lifespan of 2-3 days
+ Heterozygous Bdnf knockout rats (+/-) display lower total and peripheral activity, suggestive of reduced exploratory behavior
+ Heterozygous Bdnf knockout rats (+/-) show decrease in freezing behavior in contextual fear conditioning assay, suggestive of emotional learning and memory deficits
+ *In Vivo* Model for CNS Disorders

## Zygosity genotype

+ Cryopreserved as heterozygous embryos

## Research use

+ Alzheimer's disease
+ Schizophrenia
+ Depression
+ Memory loss
+ Pain
+ Huntington's disease
+ Nerve growth and development
+ Post-traumatic stress disorder

## Origin

The BDNF KO 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

This model contains a monoallelic deletion of the Bdnf gene, encoding for the nerve growth factor protein BDNF. Homozygous animals carrying the Bdnf deletion are postnatal lethal. Reductions of BDNF have been observed in patients with Alzheimer's disease (AD), and this model may be useful for understanding the role of BDNF in AD.

Bdnf is one of the most active and essential of the neurotophins, contributing to the growth and differentiation of neurons in the hippocampus, cortex and forebrain. These areas are key for cognition, learning and memory. Deficiency in Bdnf levels have been linked to a host of neurological diseases, including Alzheimer's, depression, schizophrenia and dementia, making this an important model for studying the central nervous system.

## Citations


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**Figure 1: Heterozygous Bdnf knockout rats (+/-) display lower total and peripheral activity compared to wild type 1A. As determined by a baseline locomotor activity test, Bdnf (+/-) rats tend to exhibit lower total activity and a significantly faster rate of habituation to a novel environment, suggestive of reduced exploratory behavior. 1B. Heterozygous Bdnf knockout rats (+/-) show decrease in freezing behavior in a contextual fear conditioning assay, suggestive of emotional learning & memory deficits.**

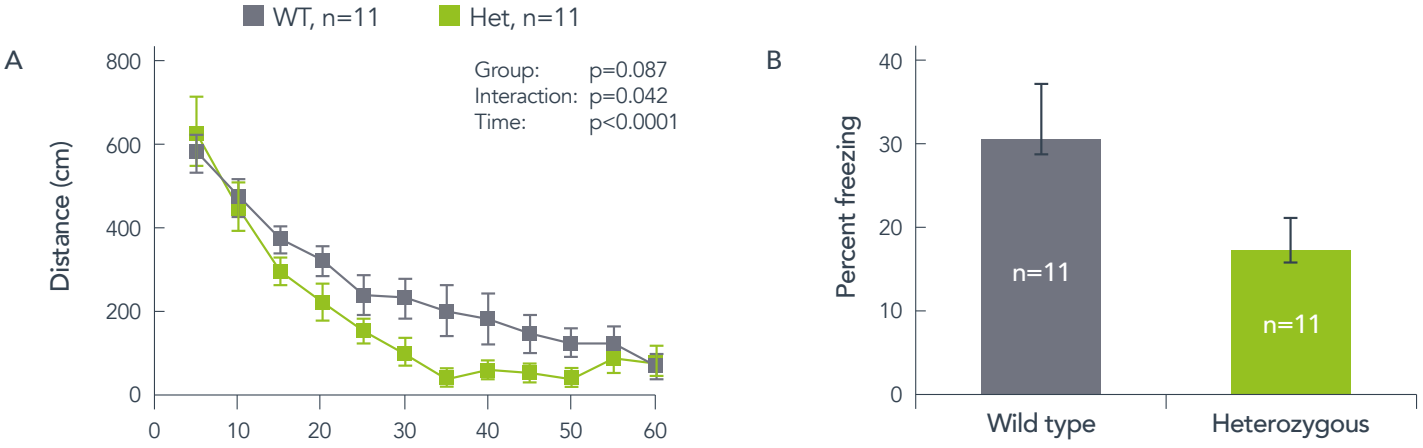
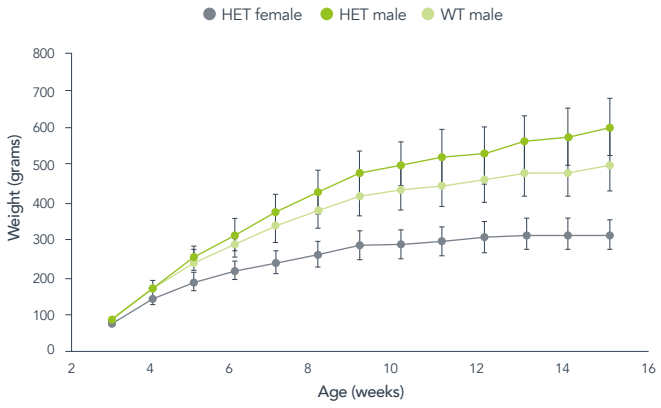



**Figure 2. Homozygous Bdnf knockout rats exhibit complete loss of BDNF protein. Western blot analysis of brain tissue shows a lower level of BDNF in the heterozygous rats and a complete absence of BDNF in homozygous knockout rats (KO=homozygous knockout, Het=heterozygous, WT=wild type).**


**Figure 3. Weight and age comparison chart**

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