The Jackson Laboratory

B6.Cg-Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng/J

Stock No: **014546** | ChAT-ChR2-EYFP line 6

Congenic, Transgenic

Live mice available in varying quantities. Ask Customer Service for details.

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of cholinergic neuronal populations, or for studying the consequences of overactive cholinergic signaling in information processing, memory, behavior and physical fitness.

Donating Investigator

Guoping Feng, Massachusetts Institute of Technology

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GENETIC OVERVIEW

Genetic Background

Generation

N6+N3F2
(2019-06-17 00:00:00)

Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng

Allele Type

Transgenic (Reporter)

VIEW GENETICS

RESEARCH APPLICATIONS

Neurobiology Research
Sensorineural Research
Research Tools

VIEW ALL RESEARCH APPLICATIO

BASE PRICE

Starting at:

$255.00 Domestic price for female 4-week

333.51 Domestic price for breeder pair

VIEW PRICE LIST

Details

Important Note

Because the vesicular acetylcholine transporter gene (*Slc18a3* or VAChT) within the *Chat* locus on the BAC transgene was not disrupted, ChAT-mhChR2-YFP BAC transgenic mice also have increased VAChT expression in hippocampus and brainstem. VAChT overexpression results in increased cholinergic tone; the functional consequence of which is increased physical endurance but severe cognitive deficits in attention, working memory and spatial memory.

Detailed Description

ChAT-ChR2-YFP BAC transgenic mice have expression of the mhChR2::YFP fusion protein directed to cholinergic neuronal populations by the mouse choline acetyltransferase (*Chat* or ChAT) promoter/enhancer regions on the BAC transgene. The mhChR2::YFP fusion protein is composed of a mammalian codon-optimized *Chlamydomonas reinhardtii*-derived channelrhodopsin-2 that was modified to harbor a gain-of-function H134R substitution (mhChR2; also called hChR2-H134R) fused in-frame with an enhanced yellow fluorescent protein (EYFP). The mhChR2 is designed to cause larger stationary photocurrents compared to ChR2. The bacterial opsins are retinal-binding proteins that provide light-dependent ion transport and sensory functions to a family of halophilic bacteria; and this mhChR2 functions as a blue light-driven cation channel that depolarizes the cell and causes action potentials. As such, illuminating mhChR2-expressing neurons with blue light (450-490 nm) leads to rapid and reversible photostimulation of action potential firing/neural activity in these cells. Hemizygous mice are viable and fertile with normal life expectancy, regardless of maternal or paternal inheritance of the transgene.

The donating investigator reports that EYFP expression is visible by direct fluorescence (epifluorescence microscope). ChAT-mhChR2-YFP mice derived from founder line 6 (ChAT-ChR2-YFP line 6) exhibit strong EYFP expression in striatum and basal forebrain, trochlear nucleus, medial habenula, interpeduncular nucleus and various brainstem motor neuron nuclei. Lower EYFP expression is found in cortex, hippocampus, and other brain regions. ChAT co-staining shows precise co-localization with mhChR2-EYFP expression neurons; suggesting mhChR2-EYFP labeled neurons in this line are cholinergic neurons. High EYFP fluorescence is also observed in the ventral gray horn in transverse section of the spinal cord. The donating investigator also reports that these ChAT-mhChR2-YFP line 6 mice exhibit a similar expression pattern as ChAT-mhChR2-YFP line 5 (Stock No. 014545), but line 6 mice have brighter EYFP expression.

Because the vesicular acetylcholine transporter gene (*Slc18a3* or VAChT) within the *Chat* locus on the BAC transgene was not disrupted, VAChT protein is increased more than 5-fold in hippocampus and more than 3-fold in brainstem of ChAT-ChR2-YFP line 6 mice. This VAChT overexpression results in increased cholinergic tone; the functional consequence of which is increased physical endurance but severe cognitive deficits in attention, working memory and spatial memory. ChAT-ChR2-EYFP line 6 mice also consume more food and water during the dark cycle compared to control mice. Compared to wildtype animals, ChAT-ChR2-EYFP line 6 mice show no changes in metabolic profile, locomotor activity in a novel environment, anxiety-like behavior, depression-like behavior, gross sensorimotor function, and ability to use cues to learn a task.

This optogenetic strain is one of many from the same transgene creator/donating investigator with light-inducible neurobiology applications; including
Thy1-ChR2-YFP line 18 (Stock No. 007612),
Thy1-ChR2-YFP line 9 (Stock No. 007615),
Thy1-eNpHR-YFP line 2 (Stock No. 012332),

Thy1-eNpHR-YFP line 4 (Stock No. 012334),
Thy1-vChR1-YFP line 1 (Stock No. 012341),
Thy1-vChR1-YFP line 4 (Stock No. 012344),
Thy1-vChR1-YFP line 8 (Stock No. 012348),
Thy1-mhChR2-YFP Line 20 (Stock No. 012350),
Prv-mhChR2-YFP Line 15 (Stock No. 012355),
ChAT-ChR2-YFP line 5 (Stock No. 014545),
VGAT-ChR2-YFP line 8 (Stock No. 014548),
and TpH2-ChR2-YFP line 5 (Stock No. 014555).

- Development
- Expression Data
- Control Suggestions
- Selected References

Genetics

- Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng

Disease/Phenotype

- Disease Terms
- Research Areas By Phenotype
- Mammalian Phenotype Terms by Genotype
- References

Technical Support

CONTACT TECHNICAL SUPPORT

Genotyping Protocols

Standard PCR:Tg(Chat-COP4*H134R/EYFP)
Standard PCR:Tg(Chat-COP4*H134R/EYFP)
Genotyping resources and troubleshooting

Breeding Considerations

Hemizygous mice are viable and fertile with normal life expectancy, regardless of maternal or paternal inheritance of the transgene. When maintaining a live colony, hemizygous females may be bred with wildtype (noncarrier) males from the colony or with C57BL/6J inbred male mice (Stock No. 000664).

Additional Breeding and Husbandry Support

Mating System

Hemizygote x Noncarrier
Noncarrier x Hemizygote

Citation

When using the ChAT-ChR2-EYFP line 6 mouse strain in a publication, please cite the originating article(s) and include JAX stock #014546 in your Materials and Methods section.

Animal Health Reports

Facility Barrier Level Descriptions

AX11 (Maximum)

Pricing & Availability

Available

Live mice available in varying quantities. Ask Customer Service for details.

Domestic **International**

Pricing effective for USA, Canada and Mexico shipping destinations

LIVE MOUSE

AGE	SEX	GENOTYPE	PRICE
4 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
4 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
5 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
5 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
6 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
6 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
7 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00

	SEX		
		Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
7 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
8 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
8 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
9 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
9 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
10 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
10 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
11 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
11 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51
12 weeks	Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
	Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$255.00
12 weeks	Female	Noncarrier	$78.51
	Male	Noncarrier	$78.51

BREEDER PAIR

SEX	GENOTYPE	PRICE
Female	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	$333.51
Male	Noncarrier	
Female	Noncarrier	$333.51
Male	Hemizygous for Tg(Chat-COP4*H134R/EYFP,Slc18a3)6Gfng	

RELATED PRODUCTS AND SERVICES

Frozen Mouse Embryo	B6.Cg-Tg(Chat-COP4*H134R/EYFP Slc18a3)6Gfng/J	$2595.00

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QUESTIONS ABOUT TERMS OF USE

LICENSING INFORMATION

Phone: 207-288-6470
Email: TechTran@jax.org

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By Gene

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