The Jackson Laboratory

B6;SJL-Tg(Thy1-COP3/EYFP)4Gfng/J

Stock No: **012344**

Transgenic

Typically mice are recovered in 10-14 weeks. Contact Customer Service to place an order or for more information.

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mice can be used for *in vivo* optogenetic studies to map neural circuit connectivity and spatial distribution of neurons by addition or removal of light.

Donating Investigator

Guoping Feng, Massachusetts Institute of Technology

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GENETIC OVERVIEW

Genetic Background **Generation**

Tg(Thy1-COP3/EYFP)4Gfng

Allele Type

Transgenic (Reporter)

VIEW GENETICS

RESEARCH APPLICATIONS

Research Tools
Neurobiology Research
Sensorineural Research

VIEW ALL RESEARCH APPLICATIO

BASE PRICE

Starting at:

$2,854.50 Domestic price Cryo Recovery

VIEW PRICE LIST

Details

Detailed Description

Mice hemizygous for the Thy1-VChR1-EYFP transgene are viable and fertile with expression of the VChR1-EYFP fusion protein directed to neural cells by the modified murine *Thy1* promoter region.

Thy1-VChR1-EYFP mice derived from founder line 4 (Thy1-VChR1-EYFP line 4) exhibit high VChR1-EYFP expression in multiple regions of the brain, including cerebral cortex (layer 5 pyramidal neurons but not layer/3/5 interneurons), hippocampus (CA1, dentate gyrus and subiculum), amydagala, thalamus (laterodorsal thalamic nuclei), midbrain (superior colliculus), cerebellum (cerebellar nuclei and Purkinje layer), and pons (motor trigeminal, pontine and reticulotegmental nucleus). Moderate VChR1-EYFP expression levels are observed in CA3 of the hippocampus, ventral posteromedial thalamic nuclei, inferior culliculus and substantia nigra pars reticular of the midbrain and facial motor nucleus of the pons.

The VChR1-EYFP fusion protein is efficiently targeted to the plasma membrane and is largely free of unwanted aggregation/retention within the endoplasmic reticulum (some intracellular VChR1 aggregation is reported within the lateroposterior thalamic nuclei). Photoactivation is more effective with age at least out to 23 days of age. This age-dependent increase in the degree of photoactivation presumably results from higher levels of VChR1 expression during this time.

Photocurrents induce sufficient depolarization to fire action potentials in layer 5 pyramidal cell cortical slices from both Thy1-vChR1-EYFP line 4 (Stock No. 012344) and Thy1-vChR1-EYFP line 8 (Stock No. 012348), these cells were more readily photostimulated in Thy1-vChR1-EYFP line 8.

These Thy1-VChR1-EYFP line 4 transgenic mice may be useful for rapid control of motor behavior by addition or removal of light, for *ex vivo* and *in vivo* mapping of neural circuit connectivity and spatial distribution of neurons following illumination, or for fluorescent labeling of neural tissues.

The VChR1-EYFP fusion protein is composed of a synthetic, mammalian codon-optimized, red-shifted channelrhodopsin-1 derived from *Volvox carteri* (VChR1) fused in-frame with an enhanced yellow fluorescent protein (EYFP). Compared with ChR2, VChR1 is more light-sensitive and has a markedly (~70 nm) red-shifted action spectrum with a maximum at ~535 nm (green light). While VChR1 is quite effective in depolarizing and firing pyramidal neurons, its slow deactivation kinetics limit the ability to precisely control the timing of action potential firing. To accommodate the slower deactivation kinetics of VChR1, the time interval between photostimuli should be set to allow time for responses to fully recover between stimuli.

The bacterial opsins are retinal-binding proteins that provide light-dependent ion transport and sensory functions to a family of halophilic bacteria; and this VChR1 functions as a green light-driven cation channel that depolarizes the cell and causes action potentials. As such, illumination of VChR1-expressing neurons leads to rapid and reversible photostimulation of action potential firing/neural activity in these cells.

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 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),
ChAT-ChR2-YFP line 6 (Stock No. 014546),
VGAT-ChR2-YFP line 8 (Stock No. 014548),
and TpH2-ChR2-YFP line 5 (Stock No. 014555).

- Development
- Expression Data
- Control Suggestions

Genetics

- Tg(Thy1-COP3/EYFP)4Gfng

Disease/Phenotype

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

Technical Support

CONTACT TECHNICAL SUPPORT

Genotyping Protocols

Standard PCR:Tg(Thy1-COP3/EYFP)
Genotyping resources and troubleshooting

Breeding Considerations

When maintaining a live colony, hemizygous mice may be bred with wildtype (noncarrier) mice from the colony or with C57BL/6J inbred mice (Stock No. 000664).

Additional Breeding and Husbandry Support

Citation

When using the B6;SJL-Tg(Thy1-COP3/EYFP)4Gfng/J mouse strain in a publication, please cite the originating article(s) and include JAX stock #012344 in your Materials and Methods section.

Animal Health Reports

Facility Barrier Level Descriptions

Production of mice from cryopreserved embryos or sperm occurs in a maximum barrier room, G200

Pricing & Availability

Cryo Recovery

Typically mice are recovered in 10-14 weeks. Contact Customer Service to place an order or for more information.

Domestic | **Internatic**

Pricing effective for USA, Canada and Mexico shipping destinations

CRYORECOVERY - DOMESTIC PRICING

SERVICE/PRODUCT	DESCRIPTION	PRICE
Cryo Recovery	Hemizygous or Non carrier for Tg(Thy1-COP3/EYFP)4Gfng	$2,854.50

RELATED PRODUCTS AND SERVICES

Frozen Mouse Embryo	B6;SJL-Tg(Thy1-COP3/EYFP)4Gfng/J	$2595.00

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