Also Known As: Thy1-ChR2-YFP

Tg(Thy1-COP4/EYFP)9Gfng (or Thy1-ChR2-YFP) transgenic mice may be useful in optogenetic studies for rapid control of motor behavior by addition or removal of light, for ex vivo and in vivo studies of neural circuitry/connectivity following illumination, and for fluorescent labeling of Thy1-expressing cells throughout the brain (including cortex, hippocampus, thalamus, midbrain, brainstem, cerebellar mossy fibers and retinal ganglion cells).

Donating Investigator
Guoping Feng, Massachusetts Institute of Technology
Details

Detailed Description

These Thy1-ChR2-YFP founder line 9 transgenic mice express the light-activated ion channel, Channelrhodopsin-2 (from the green alga *Chlamydomonas reinhardtii*), fused to Yellow Fluorescent Protein (ChR2-YFP) under the control of the mouse thymus cell antigen 1 (*Thy1*) promoter. Hemizygotes are viable, fertile, normal in size and do not display any gross physical or behavioral abnormalities. Expression of the transgenic ChR2-YFP fusion protein is detected throughout the brain, including in the cortex, hippocampus, thalamus, midbrain, brainstem, cerebellar mossy fibers and retinal ganglion cells. Neurons expressing the transgene are morphologically and physiologically comparable to non-mutant neurons. This mutant mouse strain may be useful for *ex vivo* and *in vivo* neural circuitry mapping studies using light stimulation.

The ChR2-YFP fusion protein is composed of a *Chlamydomonas reinhardtii*-derived channelrhodopsin-2 (ChR2) fused in-frame with an enhanced yellow fluorescent protein (EYFP).

The bacterial opsins are retinal-binding proteins that combine a light-sensitive domain with an ion channel or pump; providing light-dependent ion transport, membrane potential alteration, and sensory functions to bacteria. ChR2 functions as a blue light-driven cation channel that depolarizes the cell and causes action potentials. As such, illuminating ChR2-expressing neurons with blue light (~470 nm) 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-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),
- 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).

View YFP fluorescence in sagittal brain sections for this strain.

Development

Expression Data
Genotyping Protocols
Probe: Fluorescent Proteins (Generic GFP)
Standard PCR: Fluorescent Proteins (Generic GFP)
Genotyping resources and troubleshooting

Dietary Information
LabDiet® 5K52 formulation (6% fat)

Breeding Considerations
When maintaining a live colony, these mice are bred as hemizygotes. The Donating Investigator has not attempted to make the strain homozygous.

Additional Breeding and Husbandry Support
Mating System
Noncarrier x Hemizygote
When using the Thy1-ChR2-YFP mouse strain in a publication, please cite the originating article(s) and include JAX stock #007615 in your Materials and Methods section.

**Animal Health Reports**

**Facility Barrier Level Descriptions**

- **AX10 (Standard)**

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**Pricing & Availability**

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

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### RELATED PRODUCTS AND SERVICES

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General Terms and Conditions

LICENSING INFORMATION

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

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