These transgenic mice express the light-activated ion channel, Channelrhodopsin-2, fused to Yellow Fluorescent Protein under the control of the mouse thymus cell antigen 1 (Thy1) promoter. These 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.

Donating Investigator

Guoping Feng, Massachusetts Institute of Technology
These Thy1-ChR2-YFP founder line 18 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 in layer 5 cortical neurons, CA1 and CA3 pyramidal neurons of the hippocampus, cerebellar mossy fibers, neurons in the thalamus, midbrain and brainstem, and the olfactory bulb mitral cells. Neurons expressing the transgene are morphologically and physiologically comparable to non-mutant neurons.

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 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), 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.
Genotyping Protocols
QPCR: Tg(Thy1-COP4/EYFP)18Gfng alt1
Standard PCR: Tg(Thy1-COP4/EYFP)18Gfng
Genotyping resources and troubleshooting
Dietary Information
LabDiet® 5K52 formulation (6% fat)
Breeding Considerations

When maintaining a live colony, homozygous mice may be bred.

Additional Breeding and Husbandry Support
Mating System
Homozygote x Homozygote

Citation
When using the Thy1-ChR2-YFP mouse strain in a publication, please cite the originating article(s) and include JAX stock #007612 in your Materials and Methods section.

Animal Health Reports
Facility Barrier Level Descriptions

Ax10 (Standard)

Pricing & Availability

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

Available

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RELATED PRODUCTS AND SERVICES

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General Terms and Conditions

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

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**Related Strains**

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- **By Allele**
- **By Gene**
- **By Collection**