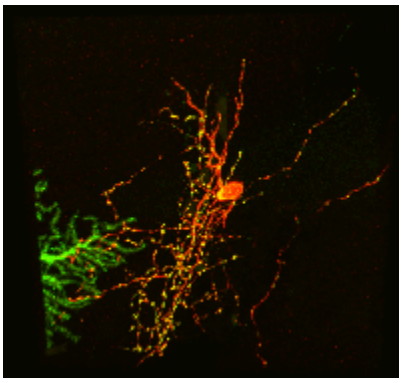
Docket #: S10-195

Mouse Model for Visualizing Synapses Jackson Lab stock 012266

Researchers in Prof. Liqun Luo's laboratory have developed a mouse model system for in vivo, non-invasive, spatially- and temporally-controlled labeling of individual synapses. These mice (ZtTA and TRE-bi-ST-T) combined with different Cre/CreER lines could label specific types of neurons or single neurons with a general cell marker and a presynaptic or postsynaptic marker. The mice can be used to study synaptogenesis, synaptic plasticity, and information flow in neural circuits.



A cerebellar stellate cell labeled with cytoplasmic tdT (red) and synapse-localized synaptophysin-GFP (green). This technology allows single cell resolution and manipulation in intact mice, and increased resolution to study neuronal connectivity.

Applications

- **In vivo studies of synapses, including:**
  - presynaptic and postsynaptic distributions in any neuron in the mouse brain
  - development and plasticity in any neuron in the mouse brain

    - general gene expression of TRE (tetracycline regulatory element) transgenes with spatial and temporal control

Advantages

- **Low basal expression** of TRE transgenes alone or in combination with one or both of the other transgenes without activation
- **Expression regulated with small molecules** (tetracycline or doxycycline)
- **Noninvasive** (unlike viral transduction or in utero electroporation)
- **Spatial and temporal control**, including
    - control over the types of labeled cells
    - control of labeling frequency
    - control of synaptic marker expression to bypass potential developmental defects

Publications

- Li L, Tasic B, Micheva KD, Ivanov VM, Spletter ML, Smith SJ and Luo L (2010), "Visualizing the distribution of synapses from individual neurons in the mouse brain." *PLoS ONE* 5(7): e11503

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