IN THE LAB:

Recovery Act Stories

SOCIETY FOR NEUROSCIENCE

The historic investment in research through the American Recovery and Reinvestment Act is funding promising science that is improving health, while contributing to the economy. View more stories at www.sfn.org/recovery.

Drug Addiction and Abuse:

"Local Connections and *In Vivo* Physiology of Inhibitory Cortical Neurons"

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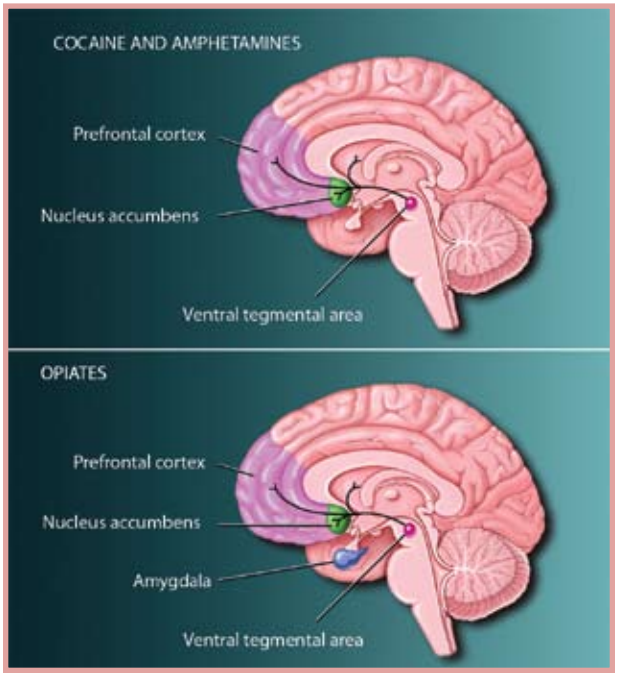
Supported by the National Institute on Drug Abuse, National Institutes of Health

Grant Description

This research focuses on understanding functional organization of cortical circuits, with a particular emphasis on identified neuronal types and their microcircuits, using advanced approaches such as electrophysiology, laser scanning photostimulation, optical imaging and transgenic mice. Recently, this lab developed a new technique combining laser scanning photostimulation with fast functional imaging for high resolution and rapid mapping of *in vitro* functional circuits. This novel approach is an all-optical approach for brain circuit mapping, and can provide important applications in cortical circuitry studies. The major goals of the proposed research are (1) to further improve and refine the new technique and (2) to extend such technology toward elucidating cortical circuitry in transgenic mice recapitulating specific neurological and neuropsychiatric diseases. This ARRA grant support enabled the lab to purchase additional equipment and train one minority graduate student.



Brain Reward Drug Systems. Scientists are not certain about all the structures involved in the human brain reward system. However, studies of rat and monkey brains, and brain imaging studies in humans, have provided many clues. These illustrations show what areas are most likely part of the reward systems in the human brain.

Science and Health Implications

These studies of the detailed organization of cortical circuits are necessary for understanding cortical function. These studies have important implications for human health, as these cell types and their activities are involved in many disease models and can mediate the cortical mechanisms related to

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drug addiction and abuse. Specifically, the technical development can have important applications in the field of cortical circuitry as it enables high-resolution and fast functional mapping of neuronal circuits. Future investigation using this technique can be effectively extended for screening circuit alterations in transgenic animal models recapitulating specific neurological diseases. The technique can be further developed as a methodology for identification and monitoring of real-time responses *in vitro* (e.g., cell cultures and slice preparations) to drugs or therapeutic interventions.

Research Impact: In Their Words

"With the ARRA support, the PI was able to recruit a graduate student in the Department of Anatomy and Neurobiology to assist him in the revised studies. He is an excellent student with a Hispanic heritage. This support will not just advance the objective of the Recovery Act by hiring additional staff, but also achieve the goal of training more minority scientists in the U.S."

–Xu Xiangmin, Primary Investigator

The Society for Neuroscience (SfN) is the world's largest organization of scientists and physicians devoted to advancing understanding of the brain and nervous system. Since its inception in 1969, the Society has grown from 500 members to more than 40,000.