THE 20th ANNNUAL RETREAT OF THE LSU NEUROSCIENCE CENTER OF EXCELLENCE

SATURDAY, MAY 10, 2008 (8:00 AM TO 2:00 PM)

8th Floor Neuroscience Center Conference Rm., Lion's Bldg., 2020 Gravier Street

(Posters will be presented, detail information to follow)

Keynote Speaker and Chancellor's Award Lecture in Neuroscience

Dr. Susumu Tonegawa

Nobel Laureate in Physiology or Medicine 1987

Director, The Picower Institute for Learning and Memory,
The RIKEN-MIT Center for Neuroscience, The Howard Hughes Medical Institute,
Massachusetts Institute of Technology,

GENERAL BACKGROUND ON DR. TONEGAWA'S CONTRIBUTIONS IN MEDICINE

"How does the body with its limited number of genes generate a diverse army of antibodies to attack virtually any virus, bacterium, and other microorganism, even before the body encounters an assault? Dr. Tonegawa was only in his 30s when he explained the mystery, demonstrating that the antibody diversity is achieved by the shuffling of genes that are used to produce specific antibodies". For this work, Tonegawa was the sole winner of the Nobel Prize in Physiology or Medicine in 1987.

"Tonegawa's scientific interest switched to neurobiology in the early 1990s, when he began exploring the effects of missing or altered genes on learning and memory in mice in his laboratory at MIT. In his earlier antibody studies, Tonegawa had often used genetically engineered "knockout" mice that lacked the gene for a particular protein. He has since pioneered a way to make the technology more specific, so that a gene can be turned off only in a highly restricted area of the brain and only in the adult animal—an achievement that has proved critical to studying learning and memory".

Keynote Lecture at 9:00 AM

"Roles of the Individual Hippocampal Circuits in Episodic and Spatial Memory"

The hippocampal formation plays a crucial role in episodic memory, a complex form of explicit memory composed of associations of a diverse set of objects in spatial and temporal domains. How the synaptic plasticity at the various subregions of the hippocampal and the entorhinal context, and the circuits connecting these brain areas each contributes to the overall function of the hippocampus in episodic learning and memory are fundamental questions in memory research. We have been addressing these questions by generating various conditional transgenic and knockout mouse lines and analyzing them with multifaceted technologies.

In this presentation, I will first describe a novel and potentially widely applicable transgenic technology (dubbed the DICE-K method) that permits an inducible and reversible blockade of transmission at one or a few selected synapses in vivo. We applied the DICE-K method to the hippocampal trisynaptic pathway (TSP; EC→DG→CA3→CA1→EC) while keeping the monosynaptic pathway (MSP; EC→CA1→EC) intact. Our behavioral and multi-tetrode recording data indicate that the TSP is dispensable and the short MSP is sufficient for slow incremental spatial learning like that for the Morris watermaze. By contrast, the full TSP including the CA3 is needed, and the MSP is insufficient for a rapid, one-trial acquisition of memories of a novel context and a novel relationship of an object and its location as well as for pattern completion-based memory recall.