

Principal Researcher	Haruo Kasai			Number of Reserchers	1	
Research Institution • Department • Title	Professor, National Institute for Physiological Sciences, Okazaki National Research Institutes			Location of Institution	Okazaki	
Title of Project	Investigation of synapse and exocytosis using the two-photon excitation microscope					
Abstract of Research Project	<p>The two-photon excitation microscope enables visualization of phenomena deep in living tissues, and is the first methodology to quantify dynamics of synapses in the brain. Based on the two-photon microscope, we have developed an optical technique for reading and writing memory traces in the neuronal networks of cerebral cortex. Namely, we have established a two-photon uncaging technique for caged-glutamate compounds, which can measure functions of single synapse, and which can induce synaptic plasticity with the resolution of single synapse. By further exploring this technique, we will investigate structure-stability-function relationships of central synapses that underlie synaptic plasticity, and relate them with learning and memory of behaving animals. We have also found that the two-photon excitation microscope greatly promotes simultaneous multicolor fluorescent imaging, and that it enables fluorescent cross-correlation analysis, with which molecular interactions can be analyzed in detail. We will apply this approach to elucidate molecular and cellular mechanisms of exocytosis in the central synapses as well as in secretory tissues.</p>					
References	<p>1) Takahashi,N.,Kishimoto,T.,Nemoto,T.,Kadowaki,T. and Kasai,H. Fusion pore dynamics and insulin granule exocytosis in the pancreatic islet. Science 297,1349-52 (2002).</p> <p>2) Matsuzaki,M.,G.C.R. Ellis-Davies,Nemoto,T.,Miyashita,Y.,Iino,M. & Kasai,H. Dendritic spine geometry is critical for AMPA receptors expression in hippocampal CA1 pyramidal neurons. Nature Neurosci. 4,1086-1092 (2001).</p>					
Term of Project	Fiscal years 2003-2006 . (4years)					
Budget Allocation (in thousand of yen)	FY2003	FY2004	FY2005	FY2006	FY2007	TOTAL
	24,700	16,700	16,700	16,700	-	74,800
Homepage Address	http://www.nips.ac.jp/membrane/en/					