

The 7th Brain Science Seminar 第7回 埼玉大学脳科学セミナー

Host: Saitama University Brain Science Institute

Representation of object images in monkey inferior temporal (IT) cortex revealed by optical imaging technology

What we learned about object vision and potentials of the optical
technology for future cognitive studies and for clinical fields

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RIKEN Brain Science Institute Unit Leader

Date: May 29th, 2009 (Friday)

Time: 16:00 ~ 17:00

Place: Daigaku Kaikan 2F meeting room

**Please join the get-together with Dr. Semyanov after the seminar.
(Donation 300 yen; Students free)**

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We will have the Brain Science Seminar once a month. Come out and join us.

Abstract

Glutamatergic synaptic transmission underlies the bulk of rapid excitatory signaling in the brain. Outside synapses, high-affinity N-methyl-D-aspartate receptors (NMDARs) can also sense glutamate molecules which either escape the synaptic cleft or are released extrasynaptically. However, in resting conditions these receptors are blocked by Mg^{2+} , and the extent and role of their activation is poorly understood. We show that NMDARs in dendritic shafts of hippocampal pyramidal cells contribute substantially to dendritic Ca^{2+} transients generated by backpropagating action potentials (bAPs). In contrast, NMDARs on dendritic spines show no such contribution unless glutamate uptake is blocked. Local transient rises of extracellular glutamate through two-photon spot-uncaging or synaptic activation enhance bAP-evoked Ca^{2+} entry in dendritic shafts. Our results suggest that extrasynaptic NMDARs unblocked by bAPs could act as detectors of ambient glutamate elevation and thus report excitatory activity in the local network.