

## Cognitive and Behavioral Neuroscience

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### Other Faculty Members

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### Major Scientific Interests of the Group

The goal of our research is to understand neural mechanisms underlying cognition such as attention, memory, prediction, learning and decision-making. In particular, we are investigating the role of monoamine systems, such as dopamine and serotonin, in cognitive functions. Experiments in our laboratory center on the brain of awake behaving monkeys as a model for similar systems in the human brain. Using electrophysiological, pharmacological and optogenetic techniques, we examine what signals monoamine neurons convey while monkeys are performing cognitive tasks and how the signals, released monoamine, work in targeted brain areas to achieve the tasks. These studies will provide more mechanistic accounts of cognitive disorders.

### Projects for Regular Students in Doctoral or Master's Programs

- 1) Roles of monoamine systems in cognitive functions including attention, memory, response inhibition, and decision-making

### Selected Publications

- 1) Ogasawara T, Nejime M, Takada M, Matsumoto M, Primate nigrostriatal dopamine system regulates saccadic response inhibition. *Neuron*, 100, p1513-1526, 2018
- 2) McCairn KW, Nagai Y, Hori Y, Kikuchi E, Ninomiya T, Suhara T, Lee JY, Iriki A, Minamimoto M, Takada M, Isoda M, Matsumoto M, A primary role for nucleus accumbens and related limbic network in vocal tics. *Neuron*, 89, p300-307, 2016
- 3) Kawai T, Yamada H, Sato N, Takada M, Matsumoto M, Roles of the lateral habenula and anterior cingulate cortex in negative outcome monitoring and behavioral adjustment in nonhuman primates. *Neuron*, 88, p792-804, 2015
- 4) Inoue KI, Takada M, Matsumoto M, Neuronal and behavioural modulations by pathway-selective optogenetic stimulation of the primate oculomotor system. *Nature Communications*, 6, 8378, 2015
- 5) Matsumoto M, Takada M. Distinct representations of cognitive and motivational signals in midbrain dopamine neurons. *Neuron*, 79, p1011-1024, 2013
- 6) Matsumoto M, Hikosaka O, Two types of dopamine neuron distinctly convey positive and negative motivational signals. *Nature*, 459, p837-841, 2009
- 7) Matsumoto M, Hikosaka O, Lateral habenula as a source of negative reward signals in dopamine neurons. *Nature*, 447, p1111-1115, 2007