

Systems Pharmacology and Behavior

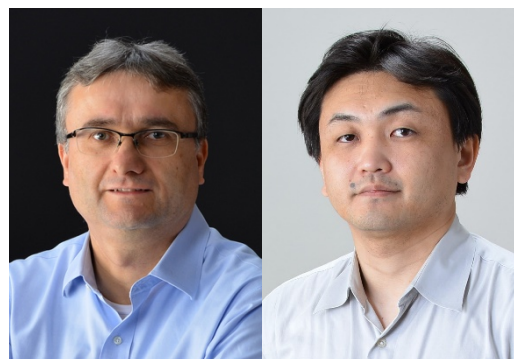
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Major Scientific Interests of the Group

- 1) Molecular and cellular links between sleep and motivation
- 2) Discovery of drugs to treat insomnia and schizophrenia
- 3) Elucidating sleep function and regulation by using short-sleeping mice

Projects for Regular Students in Doctoral or Master's Programs

- 1) Understanding the link between sleepiness and motivation by exploring mesolimbic glia-neuron interactions
- 2) Sleep circuits as potential therapeutic targets for insomnia
- 3) Exploring the anti-psychotic effects of hyperadenosinergic activity
- 4) Elucidation of neural mechanisms of short-sleep
- 5) Analysis of the effects of short-sleep on physiological functions

Study Programs for Short Stay Students (one week – one trimester)

- 1) EEG/EMG electrode implantation and recording in mice
- 2) Optogenetic/chemogenetic modulation of neural circuitry by using stereotaxic microinjections of viral vectors
- 3) Immunohistochemistry and in-situ hybridization of brain tissue
- 4) Single-cell RNA-seq

Selected Publications

- 1) Li Y, Luo Y, Xu W, Ge J, Cherasse Y, Wang Y, Lazarus M, Qu W, Huang Z. Ventral pallidal GABAergic neurons control wakefulness associated with motivation through the ventral tegmental pathway, *Molecular Psychiatry*, doi:10.1038/s41380-020-00906-0, 2020
- 2) Honda T, Takata Y, Cherasse Y, Mizuno S, Sugiyama F, Takahashi S, Funato H, Yanagisawa M, Lazarus M, Oishi Y. Ablation of Ventral Midbrain/Pons GABA Neurons Induces Mania-like Behaviors with Altered Sleep Homeostasis and Dopamine D2R-mediated Sleep Reduction. *iScience*, 23:101240, 2020
- 3) Korkutata M, Saitoh T, Cherasse Y, Ioka S, Duo F, Qin R, Murakoshi N, Fujii S, Zhou X, Sugiyama F, Chen JF, Kumagai H, Nagase H, Lazarus M. Enhancing endogenous adenosine A2A receptor signaling induces slow-wave sleep without affecting body temperature and cardiovascular function. *Neuropharmacology*, 144:122-132, 2019
- 4) Takata Y, Oishi Y, Zhou XZ, Hasegawa E, Takahashi K, Cherasse Y, Sakurai T, Lazarus M. Sleep and wakefulness are controlled by ventral medial midbrain/pons GABAergic neurons in mice. *J. Neurosci*, 38(47):10080-10092, 2018
- 5) Oishi Y, Xu Q, Wang L, Zhang BJ, Takahashi K, Takata Y, Luo YJ, Cherasse Y, Schiffmann SN, de Kerchove

d'Exaerde A, Urade Y, Qu WM, Huang ZL, Lazarus M. Slow-wave sleep is controlled by a subset of nucleus accumbens core neurons in mice. *Nat Commun*, 8:734, 2017

- 6) Lazarus M, Shen HY, Cherasse Y, Qu WM, Huang ZL, Bass C, Winsky-Sommerer R, Semba K, Fredholm B, Boison D, Hayaishi O, Urade Y, Chen JF. Arousal effect of caffeine depends on adenosine A2A receptors in the shell of the nucleus accumbens. *J Neurosci*, 31: 10067-10075, 2011
- 7) Lazarus M, Yoshida K, Coppari R, Bass CE, Mochizuki T, Lowell BB, Saper CB. EP3 prostaglandin receptors in the median preoptic nucleus are critical for fever responses. *Nat Neurosci*, 10, 1131-3, 2007