

令和5年度  
**基盤医学特論 開講通知**  
Information on Special Lecture Tokuron AY2023

**Title: Understanding brain circuits and their modulation using connectomic and novel imaging approaches**

**Teaching Staff : Tianyi Mao, PhD**

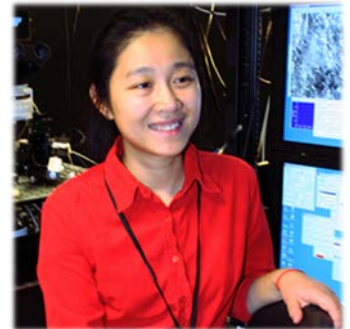
Associate Professor at Vollum Institute, Oregon Health and Science University

**Time and Date : 15:00-16:30, 8th August (Tue), 2023**

日時: 2023年8月8日(火) 15:00-16:30

**Room : Research Institute of Environmental Medicine, South Building, Seminar room 204 (Higashiyama Campus)**

場所: 環境医学研究所南館セミナー室(東山キャンパス)



**Lecture in English. No registration required. 使用言語 : 英語 事前連絡は不要です。**

My laboratory is interested in elucidating the structure-function relationship of brain circuitry underlying animal behaviors and how these circuits are changed and modulated by disease, brain state and behavioral context. We utilize cutting-edge technology including connectome, imaging, computation, genetics, and functional circuit mapping in the mouse model to examine the principles governing neuronal connectivity and their regulation. In parallel, my laboratory also develops and implements novel imaging tools and computational algorithms for monitoring and manipulation of these circuits. This talk will first focus on establishing comprehensive connectomic maps at the mesoscopic scales between the mouse cortex, thalamus, and striatum and the modulatory network. Connections across these brain structures are essential for motor control, affective pain sensation, decision making, and reward. Structural principles governing the neuronal connectivity will be discussed. The second part of the talk aims to address how to utilize such comprehensive structural connectomic maps together with novel in vivo cAMP/PKA imaging to further our understanding of circuit function and their modulation including dopamine, norepinephrine and opioids modulation.

**References:**

Ma, L., Day-Cooney, L., Benavides, O.P.J., Muniak, M.A., Qin, M., Ding, J.B., Mao, T., and Zhong, H. Locomotion activates PKA through dopamine and adenosine in striatal neurons. *Nature* (2022) Nov 9. doi: 10.1038/s41586-022-05407-4. Online ahead of print. PMID: 36352228

Massengill, C.I., Bayless-Edwards, L., Ceballos, C.C., Cebul, E.R., Qin, M., Whorton, M.R., Ye, B., Mao, T.\*, and Zhong, H.\* (\*, co-correspondence authors) (2022) Sensitive genetically encoded sensors for population and subcellular imaging of cAMP in vivo. *Nat. Methods* 2022 Nov;19(11):1461-1471. doi: 10.1038/s41592-022-01646-5. Epub 2022 Oct 27. PMID: 36303019

Birdsong, W.\*1, Jongbloets, B.C.1, Engeln, K.A., Wang, D., Scherrer, G., Mao, T\*. (1 equal contribution; \*, co-correspondence authors). (2019) Synapse-Specific Opioid Modulation of the Thalamo-Cortico-Striatal Circuits. *eLife*. 2019 May 17;8. pii: e45146. doi: 10.7554/eLife.45146.

Hunnicut, B.J., Jongbloets, B.C., Birdsong, W.T., Gertz, K.J., Zhong, H. and Mao, T. (2016) A Comprehensive Excitatory Input Diagram to the Striatum Reveals Novel Functional Organizations. *eLife*. 2016 Nov 28;5. pii: e19103. PMCID: PMC5207773

Hunnicut, B.J., Long, B., Kusefoglou, D., Gertz, K., Zhong, H. and Mao, T. (2014) A comprehensive thalamocortical projection map at the mesoscopic level. *Nat Neurosci*. 2014 Sep;17(9):1276-85. PMCID: PMC4152774

**Contact: Sayaka Takemoto (Ext. 3877 or 85-3877 from Tsurumai & Daiko campuses)**

連絡担当者: 環境医学研究所分子神経科学 竹本さやか (内線 3877 鶴舞・大幸地区からは 85-3877)