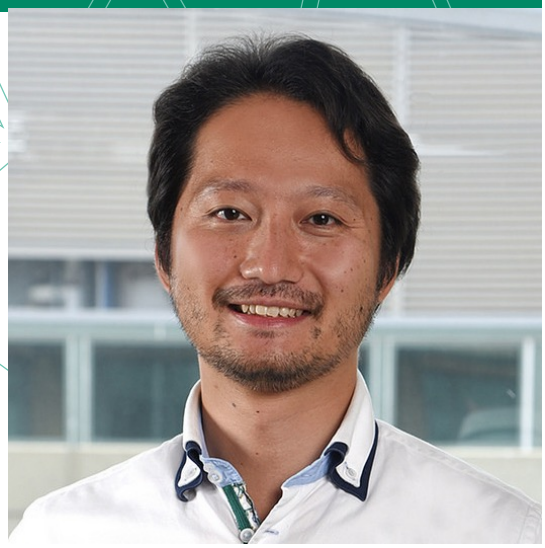
NEURO GLOBAL Seminar



Speaker

Kei M IGARASHI,
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Department of Anatomy and Neurobiology,
School of Medicine,
University of California, Irvine

Date:

10 December 2024 (Tue) 16:00-17:30

Title:

Circuit mechanisms of item memory and its disruption in Alzheimer's disease

Format: **Hybrid (Onsite：NGP Students/Online: Other Participants)**

Venue: Medicinal Hub, Seiryo Campus, School of Medicine Building 5, 2F
【MAP] https://www.tohoku.ac.jp/map/en/?f=SR_B04 (NGP students ONLY)

Registration: Send a message to NGP Office (neuroglobal@grp.tohoku.ac.jp)

Related Website: www.igarashilab.org

●Neuro Globalプログラム生(Neuro Global Program Students)
【脳科学セミナーシリーズEx】/【先進脳科学セミナーシリーズEx】セミナー1ポイント
【Brain Science Seminar Series Ex】/【Advanced brain science seminar series Ex】 1 point
●医学系研究科(Graduate School of Medicine)
【医学履修課程】国際交流セミナー (アドバンスド講義科目)」 (出席1回分)
【Medical Science Doctoral Course】 International Interchange Seminar (Advanced Lecture course)1 attendance will be granted.
●生命科学研究科(Graduate School of Life Sciences)
【単位認定セミナー】 単位認定セミナーとして2ポイントを付与します。
【Credit-granted seminar】 2 point will be granted to the students who will attend this seminar.

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Seminar

Abstract:

Memory has multiple components: “what” memory (item/object), “when” memory (time) and “where” memory (space). Research in the past decades revealed neurons involved in spatial memory, including place cells in the hippocampus and grid cells in the medial entorhinal cortex (MEC). However, circuit mechanisms of memory about item and time remain largely unclear. Our lab focuses on identifying mechanisms for item memory, and how these circuits become impaired in the disease of memory Alzheimer’s disease. We previously reported the encoding of item-outcome associative memory by layer 2a neurons of the lateral entorhinal cortex (LEC), and this encoding is controlled by dopamine signals from the ventral tegmental area (Lee et al., Nature, 2021). We recently found that neuronal populations of both the LEC (layer 5/6) and their major target, the medial prefrontal cortex, formed an internal map of pre-learned and novel items, classified into dichotomic rewarded vs. punished groups (Jun et al., Nature 2024). The formation of this internal map was mutually dependent. Our result suggests that the LEC and mPFC encodes a cognitive map of item-outcome rules.
In the second part of the talk, I will share our recent finding of dysfunctional dopamine in the LEC of Alzheimer’s disease mouse models (Nakagawa et al., bioRxiv 2024), which suggests the critical role of dopamine in Alzheimer’s disease.

Reference:

Nakagawa T, Xie JL, Savadkohighodjanaki M, Zhang YJ, Jun H, Cao K, Ichii A, Lee JY, Soma S, Medhat YK, Saido TC, Igarashi KM (2024)
Early disruption of entorhinal dopamine in a knock-in model of Alzheimer's disease
bioRxiv

Jun H, Lee JY, Bleza, N, Ichii A, Donohue JD, and Igarashi KM (2024)
Prefrontal and entorhinal neurons co-dependently learn item-outcome rules.
Nature 633: 864-871
I
garashi KM (2023)
Entorhinal cortex dysfunction in Alzheimer's disease
Trends in Neuroscience, 46:124-136

Igarashi KM, Lee JY, Jun H (2022)
Reconciling neuronal representations of schema, abstract task structure, and categorization under cognitive maps in the entorhinal-hippocampal-frontal circuits
Curr Opin Neurobiol. 77:102641

Lee JY, Jun H, Soma S, Nakazono T, Shiraiwa K, Dasgupta A, Nakagawa T, Xie JL, Chavez J, Romo R, Yungblut Y, Hagihara M, Murata K, and Igarashi KM (2021)
Dopamine facilitates associative memory encoding in the entorhinal cortex
Nature, 598:321-326

Jun H, Bramian A, Soma S, Saito T, Saido TC, Igarashi KM (2020)
Disrupted Place Cell Remapping and Impaired Grid Cells in a Knockin Model of Alzheimer's Disease
Neuron, 107:1095-1112

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