2022 年度　第1回　生命科学技術国際卓越講義

World-leading Innovative Lectures in Life Science & Technology The University of Tokyo

東京大学 THE UNIVERSITY OF TOKYO

WINGS LST Life Science & Technology

Neuron-glial interactions in health and disease : from cognition to cancer

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Stanford University
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Date: Tuesday, 10th, May, 2022
Time: 10:30AM ～ 12:30AM
Venue: Zoom (meeting URL will be sent after registering)
Participants: Up to 500 participants

Please register by this QR code or clicking the following link
Registration Form

Abstract: In the central nervous system, neuronal activity is a critical regulator of development and plasticity. Activity-dependent proliferation of healthy glial progenitors, oligodendrocyte precursor cells (OPCs), and the consequent generation of new oligodendrocytes contributes to adaptive myelination. This plasticity of myelin tunes neural circuit function and contributes to healthy cognition. The robust mitogenic effect of neuronal activity on normal oligodendroglial precursor cells, a putative cellular origin for many forms of glioma, suggests that dysregulated or "hijacked" mechanisms of myelin plasticity might similarly promote malignant cell proliferation in this devastating group of brain cancers. Indeed, neuronal activity promotes progression of both high-grade and low-grade glioma subtypes in preclinical models. Crucial mechanisms mediating activity-regulated glioma growth include paracrine secretion of BDNF and the synaptic protein neuroligin-3 (NLGN3). NLGN3 induces multiple oncogenic signaling pathways in the cancer cell, and also promotes glutamatergic synapse formation between neurons and glioma cells. Glioma cells integrate into neural circuits synaptically through neuron-to-glioma synapses, and electrically through potassium-evoked currents that are amplified through gap-junctional coupling between tumor cells This synaptic and electrical integration of glioma into neural circuits is central to tumor progression in preclinical models. Thus, neuron-glial interactions not only modulate neural circuit structure and function in the healthy brain, but paracrine and synaptic neuron-glioma interactions also play important roles in the pathogenesis of glial cancers. The mechanistic parallels between normal and malignant neuron-glial interactions underscores the extent to which mechanisms of neurodevelopment and plasticity are subverted by malignant gliomas, and the importance of understanding the neuroscience of cancer.

Gibson EM, Purger D, Mount CW, Goldstein AK, Lin GL, Inema I, Miller SE, Bieri G, Zuchero JB, Barres BA, Woo PJ, Vogel H, Monje M (2014) Neuronal activity promotes adaptive oligodendrogenesis and myelination in the mammalian brain. *Science*, 344 (6183):487; 344:1252304.

<Recent Publications>
Cell, **2015**, 161(4):803-16; *Nature*, **2017**, 549: 533-537; *Nature*, **2019**, 573: 539-545; *Nature*, **2021**, 594(7862):277-282.

Organizer:　World-leading Innovative Graduate Study Program for Life Science and Technology
Cooperation:　Graduate Program for Leaders in Life Innovation, The University of Tokyo

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