第 1540 回　**生物科学セミナー**

日時：　2025 年 7 月 28 日（月）16:00-18:00

場所：　理学部 2 号館　第 1 講義室(201 室)

担当：　東京大学大学院理学系研究科・生物科学専攻・睡眠生理学研究室

演者：Dr. Kyungchul Noh, Assistant Professor, Department of Pharmacology, Ajou University School of Medicine

演題：Astrocytes at Play: Shaping Dominance and Winning Memories

要旨：Winning often leads to future successes, commonly known as the “winner effect,” stemming from boosted confidence and memories of past victories. This seminar examines how astrocytes in the prefrontal cortex—a region tied to decision-making and social behavior—form these winning memories. By measuring astrocyte activity during social competition, we found that these cells become activated after a victory, helping lock in success memories. This activation depends on dopaminergic signals from the ventral tegmental area, reinforcing the experience of winning. Notably, enhancing astrocyte activity intensifies winning recollections, while suppressing it weakens them. These findings shed light on how the brain’s chemistry underpins the winner effect and shapes social hierarchies.

参考文献：

1) K Noh, W-H Cho, BH Lee, DW Kim, YS Kim, K Park, M Hwang, E Barcelon, YK Cho, CJ Lee, B-E Yoon, S-Y Choi, HY Park, SB Jun, SJ Lee. (2023). Cortical astrocytes modulate dominance behavior in male mice by regulating synaptic excitatory and inhibitory balance, Nature Neuroscience, 26(9):1541-1554.
2) W-H Cho*, K Noh*, BH Lee, E Barcelon, SB Jun, HY Park, SJ Lee. (2022). Hippocampal astrocytes modulate anxiety-like behavior, Nature Communications, 13(1):6536. *Equal contribution
3) K Noh*, H Lee*, TY Choi*, Y Joo, SJ Kim, H Kim, JY Kim, JW Jahng, S Lee, SY Choi, SJ Lee. (2019). Negr1 controls adult hippocampal neurogenesis and affective behaviors, Molecular Psychiatry, 24(8):1189-1205. *Equal contribution

演者：Dr. Min Xu, Senior Investigator, The Institute of Neuroscience, Center for Excellence in Brain Science and Intelligence Technology, Chinese Academy of Sciences

演題：Beyond the Brainstem: Unexpected Circuits Governing REM Sleep

要旨：For decades, the brainstem has been regarded as the central hub of REM sleep control. Yet, emerging evidence reveals that REM sleep is not simply a bottom-up process but is dynamically orchestrated by distributed neural circuits extending far beyond the brainstem.
In this talk, I will present our findings on cortical regulation of REM sleep, focusing on the occipital cortex. We discovered that this region is not only highly active during REM sleep but also plays a critical role in controlling REM sleep dynamics. Furthermore, I will propose that the sleeping brain oscillates between REM-like and REM-opponent states, creating distinct functional phases. Importantly, we identified a critical time window during REM-opponent states that is essential for memory consolidation, offering new insights into how sleep stages contribute to cognition. Finally, I will briefly highlight our recent work on preoptic area neurons and their role in REM sleep regulation, further expanding the landscape of non-brainstem REM control. Together, these discoveries redefine REM sleep as a complex, dynamically regulated process governed by widespread neural networks.

参考文献:

1)Z Deng*, X Fei*, S Zhang#, and M Xu# (2025) "A time window for memory consolidation during NREM sleep revealed by cAMP oscillation." Neuron 113, 1–15. https://doi.org/10.1016/j.neuron.2025.03.020
2)Wang, Z.*, X. Fei*, X. Liu*, Y. Wang*, Y. Hu, W. Peng, Y. W. Wang, S. Zhang#, and M. Xu# (2022) "REM sleep is associated with distinct global cortical dynamics and controlled by occipital cortex." Nature Communications 13(1): 6896. https://doi.org/10.1038/s41467-022-34720-9