

第24回 BIRD 脳科学セミナー

Long-term imaging of neural calcium dynamics reveals an increase in associative representations in the hippocampus of mice acquiring a bi-conditional learning task.

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日時: 2019年10月10日(木) 17:00 ~

場所: 野田キャンパス、7号館、7404室

Although the rodent perirhinal cortex and hippocampus have a key role in object recognition and spatial cognition respectively, their role in associative memory is less well understood. Previous studies have identified perirhinal neurons that represent objects and hippocampal neurons that represent conjunctions of spatial and sensory stimuli, but how these representations develop with learning and are evoked in contexts with conflicting information remains unknown. To study the role of neural ensembles in associative memory, we recorded perirhinal and hippocampal neural calcium dynamics using a miniature fluorescence microscope in freely behaving mice as they learned a task requiring mastery of a bi-conditional rule. This behavioral task involved two visuo-tactile stimuli that were independently presented in two contextually distinct tracks. On each track, only one of the two stimuli were rewarded, thus requiring the mouse to associate stimuli with context. Mice readily learned to perform this task well above chance even when rapidly alternating between the two contexts. Pharmacological inhibition of dorsal hippocampus and perirhinal cortex in trained mice impaired their performance of the task, consistent with a role of the medial temporal lobe in context-dependent associative memory retrieval. In trained mice, we found an increase in hippocampal cells that encoded stimulus-context associations, while in the perirhinal cortex stimulus representations were invariant to location, context and reward contingency. Together, the invariant coding in perirhinal cortex and the associative coding in hippocampus may jointly support an animal's ability to recognize stimuli reliably across different contexts while responding in a context specific manner.

本セミナーは学部生、大学院生の聴講も歓迎しますので積極的に参加してください。

主催: 脳学際研究部門 (Brain Interdisciplinary Research Division)
(東京理科大学における脳研究の学際的な連携基盤の構築を目指し2016年度に発足。
学内の理一・工一・基礎工・理工・薬学部・生命研および学外の研究機関から構成される。)

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