

Masayoshi Murakami
University of Yamanashi
mmurakami@yamanashi.ac.jp



Talk Title:

Neural substrates for deciding timing of self-initiated locomotion

Abstract:

Decision-making involves the selection of goals or actions, but it also requires determination of the timing of action. Action timing is especially important when there are no immediate sensory stimuli to trigger an action and timing must therefore rely on internal processes. How does the brain decide the timing of such self-initiated actions?

We set out to investigate this issue using a combination of behavior, pharmacology and electrophysiology in rats performing a waiting task in which a rat frequently gave up waiting for a delayed large reward and locomote toward a reward port for a smaller reward in a self-initiated manner.

Single-unit recordings from the frontal motor cortex during this task identified neural activities that predicted the timing of self-initiated locomotion, including activities that ramped up during waiting and reached a threshold just before the action. The results reinforce the generality of ramp-to-threshold mechanism for decision-making.

We are currently investigating how the decision signals in the frontal cortex influence downstream locomotion circuits and eventually affect final choice using a head-restrained mouse model.