



Network-to-single neuron dynamics for hypothalamic control of stress response

SEMINAR & VISITING SPEAKER SERIES

DATE Monday, April 15th, 2024
TIME 10:00 AM to 11:00 AM
LOCATION BSMB THEATRE B

SPEAKER

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BIO

BSc & MSc, Kyoto University (2001, 2003)

PhD, McGill University (2009)

Postdoctoral Fellow, University of Calgary (2009-2014)

Assistant Professor, Western University (2014-2020)

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ABSTRACT

Mounting an optimal stress response is critical for survival. This requires neural mechanisms that effectively switches vital physiological functions between homeostatic operation and emergency response. For example, the activation of the hypothalamic-pituitary-adrenal (HPA) axis elevates the systemic levels of glucocorticoids from their baseline to levels of elevated stress. Using a combination of in vivo and ex vivo electrophysiology with computational modeling, I will discuss a neural circuit mechanism that rapidly and bidirectionally transitions the activity states of the effector neurons of the HPA axis (corticotropin releasing hormone (CRH) neurons). I will discuss dominant roles of GABAergic afferents controlling the spiking activities and input responsiveness of CRH neurons. I will also discuss the relationship between CRH neuron activity and the hormonal release of CRH. Together, our work offers a circuit model for hypothalamic control of hormonal stress response that converts rapid neuronal signals into slow and lasting hormonal outputs.

OBJECTIVES

1. Discuss in vivo firing characteristics of hypothalamic neurons in discrete physiological and emotional states.
2. Discuss network mechanisms that control activity states of hypothalamic neurons
3. Discuss how single neuron properties dynamically change by interacting with the network they are in.

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