



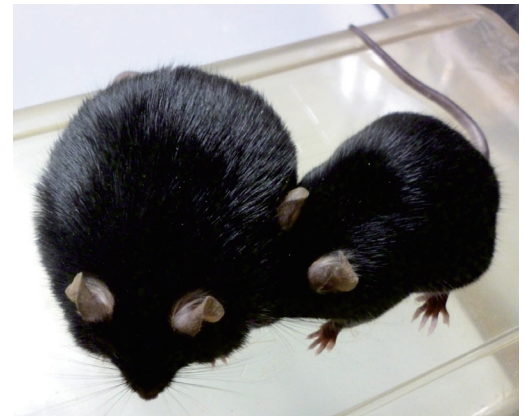
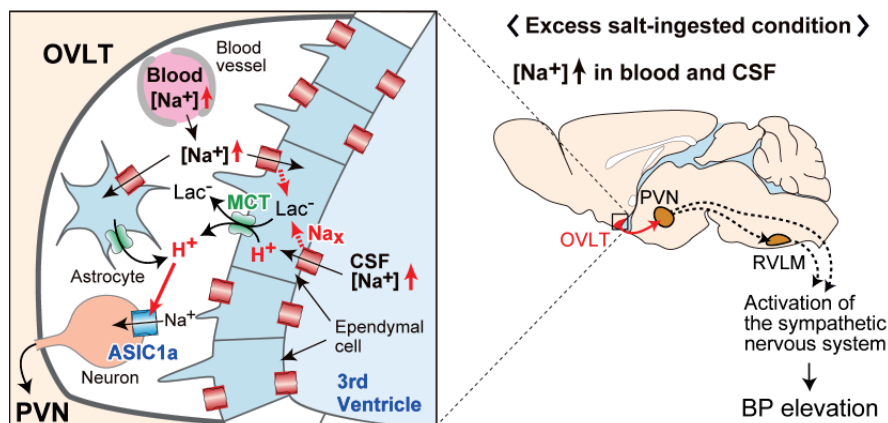
Neural mechanisms for biological homeostasis

Homeostatic Mechanism Research Unit

<http://nodalab.rcb.iir.titech.ac.jp/>

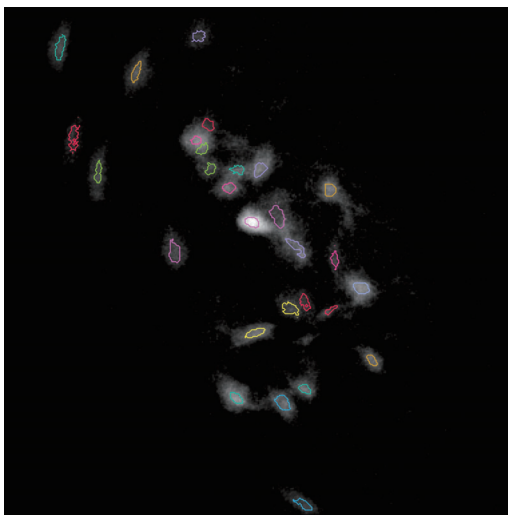
- Control of blood pressure by salt, stress, and obesity
- Control of water/salt-intake behaviors according to body fluid conditions
- Control of obesity and lipid accumulation

Terrestrial animals including human have the ability to keep the internal environment (biological homeostasis), although they are exposed to changes in the external environment. This ability is essential for life, but the mechanism is still not fully understood. This research unit aims to elucidate the mechanisms of the central nervous system that control the homeostasis of blood pressure, salt concentration in body fluids, and lipid accumulation.



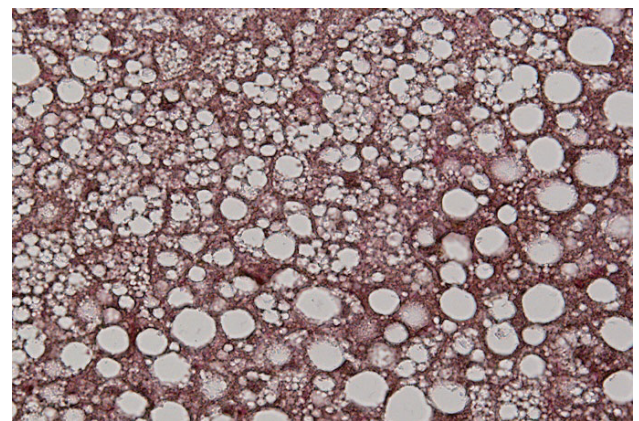
Central mechanisms responsible for salt-induced hypertension

Increases in Na^+ concentration in body fluids are detected by Na_x channels in the brain, and activation of neurons in the organum vasculosum lamina terminalis (OVLT) is transmitted to the control center of sympathetic nervous system which causes an increase in blood pressure through its activation.



Analysis of neural activities by *in vivo* calcium imaging

Calcium (Ca^{2+}) indicators were expressed in "water neurons" in the subfornical organ which drive drinking behavior, and changes of Ca^{2+} concentration associated with their neural activities were measured by a small fluorescent microscope.



Obese mouse and liver cells

showing advanced lipid accumulation

Obese mouse due to a gene deletion (upper, left).

In mice fed a high-fat diet every day, lipids are generally accumulated as oil droplets (white part) in liver cells (lower).