

A novel neuronal circuit: Tanycytes mediate defensive metabolic responses following acute high-temperature exposure

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The core body temperature, plays a vital role in influencing metabolic rate, enzyme activity, and various other physiological processes.^[1] Significant progress has been achieved in unraveling the neural mechanisms responsible for lowering body temperature during illness, commonly observed in conditions like fever.^[2] It has been established that populations of neurons in the ventral medial preoptic area of the hypothalamus are activated after systemic inflammation. They respond to locally secreted immune molecules such as prostaglandin E₂, interleukin-1 β (IL-1 β), and C-C motif ligand 2 (CCL2), and form connections with other brain areas, some of which known to control pain sensation, thirst or social interactions, contributing to survival during infection.^[2] However, little is known about how the brain orchestrates responses to dissipate excess heat in response to acute thermal challenges encompassing unavoidable environmental exposure (e.g. air-conditioned environments) and elective exposure (e.g. sauna).

A recent study titled “A brainstem–hypothalamus neuronal circuit reduces feeding upon heat exposure” reveals the neural circuitry mechanism by which tanycytes mediate defensive metabolic responses following acute exposure to high temperatures.^[3] Tanycytes, brain cells contacting CSF, have synaptic connections with neurons and are divided into α and β types, though their full significance remains unclear. Viral tracer technology was used to demonstrate tanycytes in the arcuate nucleus of the hypothalamus (ARC) receiving excitatory synaptic input. Despite lacking depolarizing activity, tanycytes show excitatory postsynaptic currents, responding to neuronal activity, as evidenced by calcium increases blocked by AMPA antagonists. Acute exposure of mice to 40°C significantly reduced feeding within 24 h and activated pontine parabrachial nucleus (PBN) brain area and α -tanycytes within an hour. Glutamatergic neurons in the PBN directly innervate tanycytes. Interestingly, to further clarify whether vascular

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ETHICS STATEMENT

Ethics approval was not needed in this study.

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