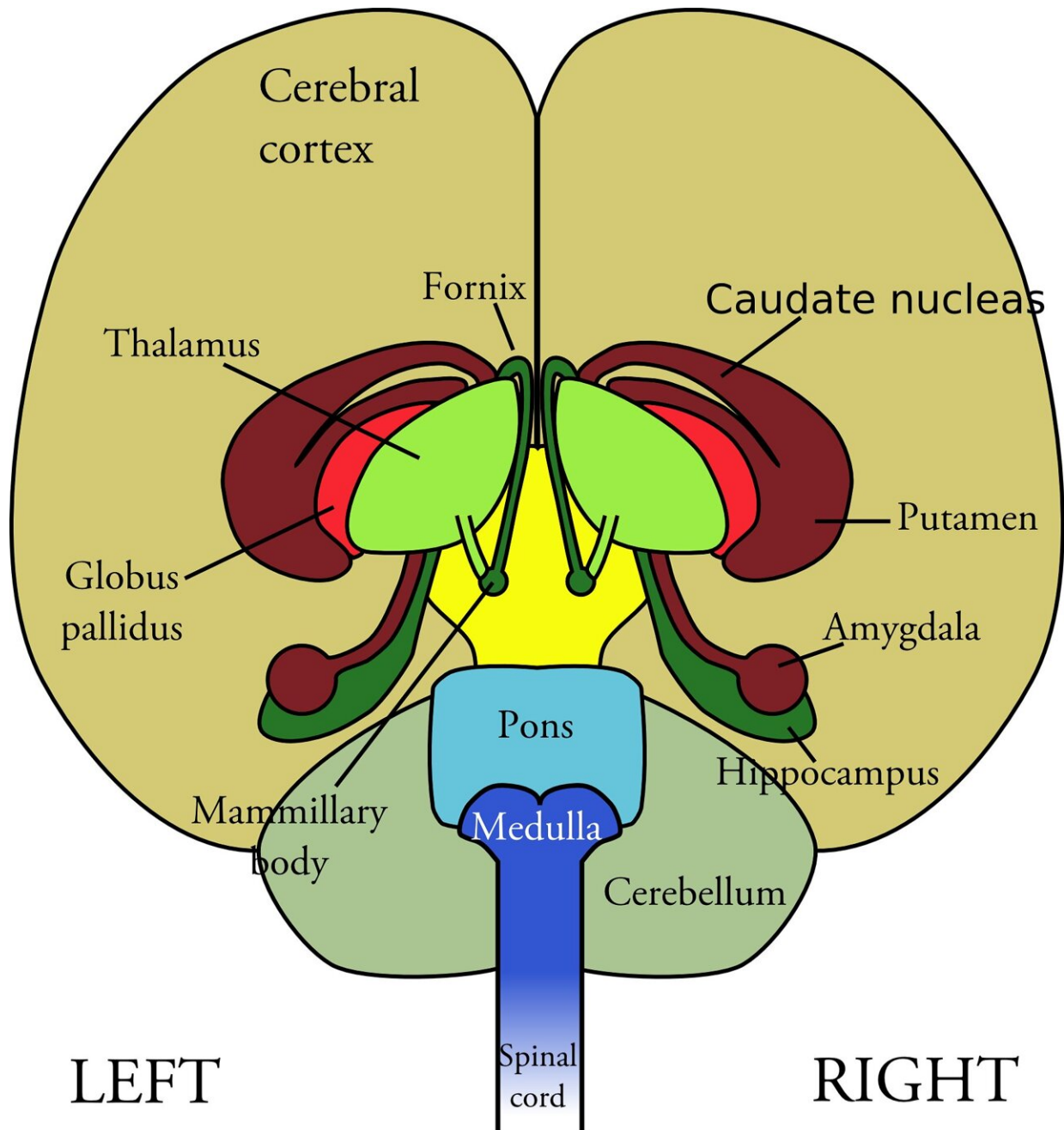


# **A novel function of the ventral lateral preoptic area of the hypothalamus in inducing arousal**

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Deep within the intricate realms of the brain, a crucial component called the hypothalamus serves as a vital regulator of homeostasis. Within this

remarkable structure, two distinct regions are found to be responsible for sleep and wakefulness: the preoptic area (POA) and the lateral hypothalamus (LHA), respectively.

Specifically, the ventral lateral preoptic area (VLPO) in the preoptic area houses [neurons](#) known as VLPO<sup>GABA</sup> and VLPO<sup>GAL</sup> neurons, which produce [gamma-aminobutyric acid](#) and galanin (GAL) to promote sleep. Alternatively, the LHA harbors orexin neurons that play a crucial role in sustaining wakefulness. Together, these interconnected regions within the hypothalamus delicately balance restful slumber and vigilant wakefulness.

In a study using mice, researchers made the following intriguing discovery: VLPO<sup>GABA</sup> and VLPO<sup>GAL</sup> neurons form direct connections, or synapses, with orexin neurons in the LHA. Additionally, they identified numerous groups of neurons that project to VLPO<sup>GABA</sup> and VLPO<sup>GAL</sup> neurons and are thought to regulate their activity. Notably, these neuron groups were most prominent in the preoptic area and LHA.

Furthermore, when researchers artificially stimulated only the [neural circuits](#) connecting VLPO<sup>GABA</sup> neurons to the LHA, they observed the induction of arousal instead of sleep, challenging previous assumptions. Their study sheds light on the role of the coupling between VLPO and LHA in regulating sleep and wakefulness, unveiling a previously unknown function of the neural circuit connecting these two regions in controlling [wakefulness](#).

The findings are published in *The Journal of Neuroscience*.

**More information:** Kseniia Prokofeva et al, Structure and Function of Neuronal Circuits Linking Ventrolateral Preoptic Nucleus and Lateral Hypothalamic Area, *The Journal of Neuroscience* (2023). [DOI: 10.1523/JNEUROSCI.1913-22.2023](#)

Provided by University of Tsukuba

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