

## **Dessert on your mind? Your muscles may be getting the message**

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Even the anticipation of sweets may cause our muscles to start taking up more blood sugar, say researchers reporting in the December issue of *Cell Metabolism*. That message is delivered via neurons in the brain's hypothalamus containing the chemical known as orexin and the sympathetic nervous system, the studies in mice and rats suggest.

Orexin neurons are known to switch on when we are motivated to eat or seek other rewards. They also play a role in active wakefulness.

"Our results show that good taste, a pleasant meal, and its expectation stimulate muscle glucose utilization and thereby decrease <u>blood glucose</u> <u>level</u> during feeding," said Yasuhiko Minokoshi of the National Institute for Physiological Sciences in Japan. "Thus, blood glucose level after feeding is controlled by hedonic as well as homeostatic regulatory systems."

Minokoshi's team earlier showed that the fat <u>hormone leptin</u> activates glucose uptake and fat burning in muscle. Those effects depend on signals from the hypothalamus, a brain region that is critical for maintaining energy balance.

"However, an important role of the brain is to control the internal environment in our body by responding to and by anticipating external stimuli," Minokoshi said. That led him to suspect that the brain might control <u>glucose metabolism</u> in muscle based on expectations, and orexin seemed a prime candidate to mediate such an effect.



Indeed, Minokoshi and colleague Tetsuya Shiuchi now show that injection of orexin-A into the ventromedial hypothalamus (VMH) of mice or rats increased glucose uptake and storage in skeletal muscle. These effects of orexin were blunted in mice lacking receptors of the sympathetic <u>nervous system</u>.

When mice were conditioned to expect the sweet taste of saccharin, it activated their orexin-MH-sympathetic nervous system to promote insulin-induced glucose uptake, they found. Mice that were allowed to taste and lick a glucose solution for a few consecutive days and were then treated with an orexin-receptor blocker showed higher blood sugar levels than those injected with saline.

"The most important finding is that hedonic feeding affects muscle glucose utilization and that orexin is involved in the regulation," Minokoshi said. Orexin has been shown to stimulate feeding, he added, and in fact, they confirmed that mice lacking the orexin gene were less interested than normal <u>mice</u> in sweets. He concludes that orexin may be responsible for controlling and coordinating both feeding behavior and muscle <u>glucose</u> metabolism.

Minokoshi wonders whether this system may kick in under other conditions as well -- for instance, in athletes before a competition. He says it's an idea his team would like to explore through further studies.

Source: Cell Press (<u>news</u> : <u>web</u>)

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