Smells shown to influence metabolism and aging in mice

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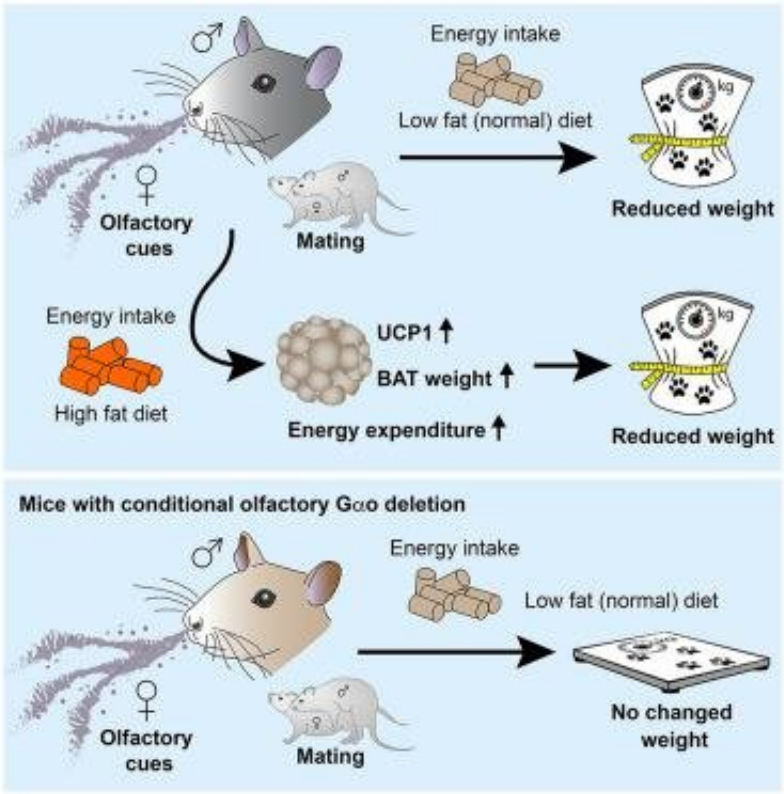

Graphical abstract. Credit: *iScience* (2023). DOI: 10.1016/j.isci.2023.106455

Exposure to female odors and pheromones causes weight loss and extends the life spans of mice, which may have implications for humans, University of Otago researchers have found.

Lead researcher Dr. Michael Garratt, of the Department of Anatomy,

says while it was already known that sensory cues in humans and animals influence the release of sex hormones, this study shows that these cues could have more wide-spread physiological effects on metabolism and aging.

"Our studies show that female odors slow the sexual development of female mice, but consequently extends their lifespan. And we also show that the smell of females can increase male mouse energy expenditure, which subsequently influences their body weight and body fat levels," he says.

The study has been published in *eLife* and another study is forthcoming in *iScience*.

Newborn mice were exposed to odors from adult females until they were 60 days old. Those females exposed to the odors reached sexual maturity later and lived an average 8% longer than those not exposed.

There was no effect of male odors on female mouse lifespan, or changes in lifespan in males in response to odors from either sex.

"As far as we know, this is the first observation that lifespan can be increased in a mammal by olfactory signals, or indeed secreted factors found in soiled bedding and urine," Dr. Garratt says.

"More generally, the work hints that sensory cues from our social environment can cause changes to our physiology and development, which may have long-term effects that extend to influence how we age."

While male mice did not directly benefit in terms of longevity from female odors during development, when they are exposed to female odors as adults, their weight and metabolism was substantially affected, he says.

"We have found that exposing male mice to female odors increases their energy expenditure for several hours after exposure.

"These effects are sufficient to induce weight loss and protect against males getting very fat when they are fed a diet that has an excess of energy."

Regardless of the cause for improved metabolic health and longevity with female pheromones, the results suggest olfactory cues from other individuals may induce more widespread changes across the body.

"We would now like to understand how information received by the olfactory system is capable of inducing widespread effects. It is also possible that exposing male mice to female odors when they are adults may influence their lifespans and that's a question we are currently pursuing," Dr. Garratt says.

More information: Michael Garratt et al, Sensory detection of female olfactory cues as a central regulator of energy metabolism and body weight in male mice, *iScience* (2023). DOI: 10.1016/j.isci.2023.106455

Michael Garratt et al, Lifespan extension in female mice by early, transient exposure to adult female olfactory cues, *eLife* (2022). DOI: 10.7554/eLife.84060

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