How periods may affect sensitivity to insulin

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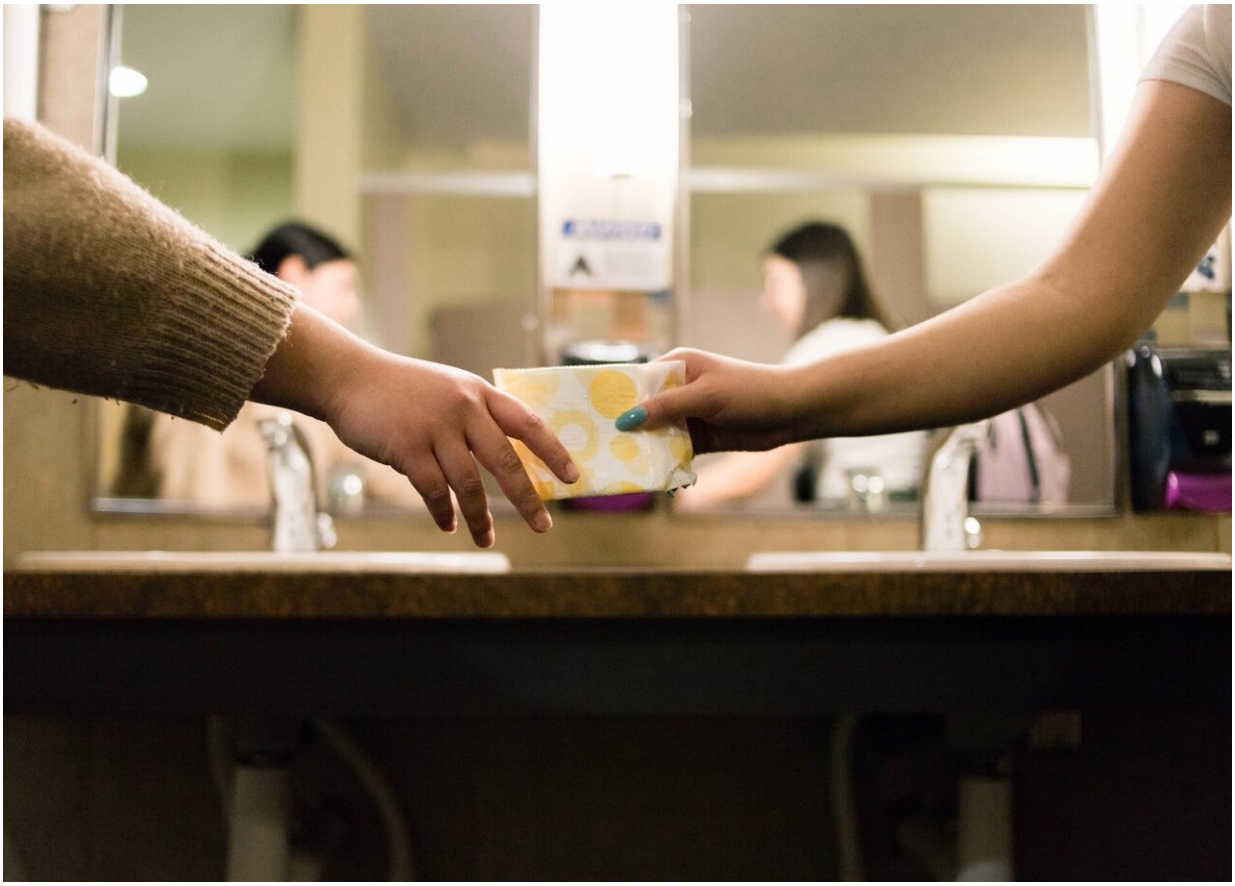

Credit: Annika Gordon/Unsplash

The sensitivity of the brain to insulin may be modulated by menstrual cycle phase, a paper published in *Nature Metabolism* suggests. The findings are based on a randomized clinical trial involving 11 women.

Previous research has demonstrated that the brain is sensitive to insulin and that insulin affects specialized neurons in the brain. Insulin has been shown to affect the modulation of eating behaviors and whole-body metabolism. It has also been suggested that there may be sex differences in the regulation of whole-body metabolism by brain insulin, however this research has mostly been conducted in men.

Martin Heni and colleagues investigated the influence of brain insulin activity in 11 women during both the follicular (first day of cycle to ovulation) and the luteal phase (post-ovulation to last day of cycle) of the menstrual cycle. The women underwent four hyperinsulinemic-euglycemic clamps, a procedure that allowed for the measuring of insulin sensitivity. Brain insulin activity was measured via intranasal insulin administration and compared to a non-insulin placebo spray.

The authors found that during the follicular phase of the menstrual cycle, there was increased insulin sensitivity in the brain, which was not observed during the luteal phase. They conducted functional MRI scans in an additional 15 women to assess insulin sensitivity in a specific brain region, the hypothalamus, and observed similar insulin sensitivity during the follicular but not luteal phase of the menstrual cycle.

The authors suggest that the brain's sensitivity to insulin is higher during the follicular phase of the menstrual cycle, and that brain insulin resistance could contribute to whole-body insulin resistance in the luteal phase.

In an accompanying News & Views article in the same journal issue, Nils Kroemer writes, "The current study provides evidence for the crucial role of insulin in the brain in regulating whole-body insulin sensitivity during the menstrual cycle.

"Flanked by the observed increase in hypothalamic insulin sensitivity, it

is plausible that altered hypothalamic projections to motivational circuits could help to explain associated changes in body weight regulation, appetite and food craving that are often reported in a premenstrual (that is, late luteal) phase when central insulin sensitivity is lower."

More information: Julia Hummel et al, Brain insulin action on peripheral insulin sensitivity in women depends on menstrual cycle phase, *Nature Metabolism* (2023). DOI: 10.1038/s42255-023-00869-w

Nils B. Kroemer, Metabolic tuning during the menstrual cycle, *Nature Metabolism* (2023). DOI: 10.1038/s42255-023-00867-y

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