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A technological shift unveils the impact of gestational diabetes

Using new wearable devices, a team from UNIGE, CHUV, HUG, UNIL and EPFL identifies persistent dysfunctions in glucose regulation in women who have had gestational diabetes.

PRESS RELEASE

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A common complication linked with pregnancy, gestational diabetes increases the risk of developing metabolic disorders, such as type 2 diabetes. Yet, its effects after childbirth remain poorly understood. To fill this gap, a team from the University of Geneva (UNIGE), in collaboration with the Lausanne University Hospital (CHUV), the Geneva University Hospitals (HUG), the University of Lausanne (UNIL) and EPFL, used high-precision wearable devices to monitor continuous glucose dynamics, physical activity, sleep patterns and heart rate in women with and without a diagnosis of gestational diabetes. The results revealed persistent disturbances in glucose regulation after delivery in women who have had gestational diabetes, although their usual clinical measurements were comparable to normal. These findings, published in the journal *Diabetologia*, suggest the need for appropriate follow-up even after delivery.

Gestational diabetes mellitus (GDM) is a form of diabetes that occurs during pregnancy, affecting around 14% of pregnant women worldwide and 10% in Switzerland. It is characterized by increased blood sugar levels. “Contrary to the belief that GDM disappears after childbirth, we now know that it can increase the long-term risk of type 2 diabetes up to tenfold, as well as the onset of other cardio-metabolic conditions”, points out Tinh-Hai Collet, assistant professor in the Department of Medicine and Faculty Diabetes Centre at the UNIGE Faculty of Medicine, and attending physician in the Service of Endocrinology, Diabetology, Nutrition and Therapeutic Patient Education at the HUG.

Disrupted glucose dynamics

With a team of scientists from UNIGE, CHUV, HUG, UNIL and EPFL, the researcher aimed to better assess this risk by monitoring variations in physiological markers and behavioral habits of women during the postpartum period. The study shows that women who had GDM in the prior pregnancy have a higher body weight. Even when consuming fewer carbohydrates - bread, pasta, rice or added sugars all leading to glucose - their blood glucose levels take longer to return to baseline after meals. What’s more, their daily blood sugar rhythms are disrupted, suggesting a dysfunction of their internal clocks, or circadian rhythms.

“There are two aspects to the physiological glucose dynamics. After meals, a transient increase is generally observed. There is also an underlying 24-hour blood glucose cycle influenced by circadian rhythms. These two dynamics are disrupted in women who have had

High resolution pictures

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GDM”, explains Jardena Puder, an associate professor at the UNIL Faculty of Biology and Medicine, and an attending physician in the Gestational diabetes consultation in the Service of Obstetrics and at the CHUV Woman-Mother-Child Department, and co-author of the study.

Continuous monitoring

The researchers monitored CHUV participants, with or without gestational diabetes, using state-of-the-art wearable devices capable of continuously measuring – in real time – blood glucose levels, dietary habits, physical activity, sleep, and heart rate over a 24-hour period. “We integrated continuous glucose monitoring with a food diary smartphone app to analyze glucose dynamics after meals. It was really these new technologies that made the difference in this study,” says Charna Dibner, an associate professor and principal investigator in the Division of thoracic and endocrine surgery at the HUG Department of Surgery, in the Department of Cell Physiology and Metabolism and the Diabetes Center at the UNIGE Faculty of Medicine, co-author of the study.

These measurements were carried out over a two-week period, between one and two months after delivery, and then repeated six months later. The study included 22 women with GDM and compared them with 15 women with normal glucose metabolism during pregnancy.

New markers

Women who have had GDM therefore continue to show alterations in the regulation of their blood glucose levels, including those who had normal blood glucose values in their traditional blood tests. “Conventional techniques used today for clinical monitoring are adequate. However, our approach shows that GDM does not disappear completely after delivery. A disturbance in glucose regulation persists. This could have long-term consequences, even when standard blood glucose values are normal”, insists Tinh-Hai Collet.

In this context, the study suggests that monitoring blood glucose variability in the postpartum period could potentially identify women at risk. Those measurements could serve as markers of potential complications, even if these remain to be defined over the long term, in particular their link with the development of type 2 diabetes.