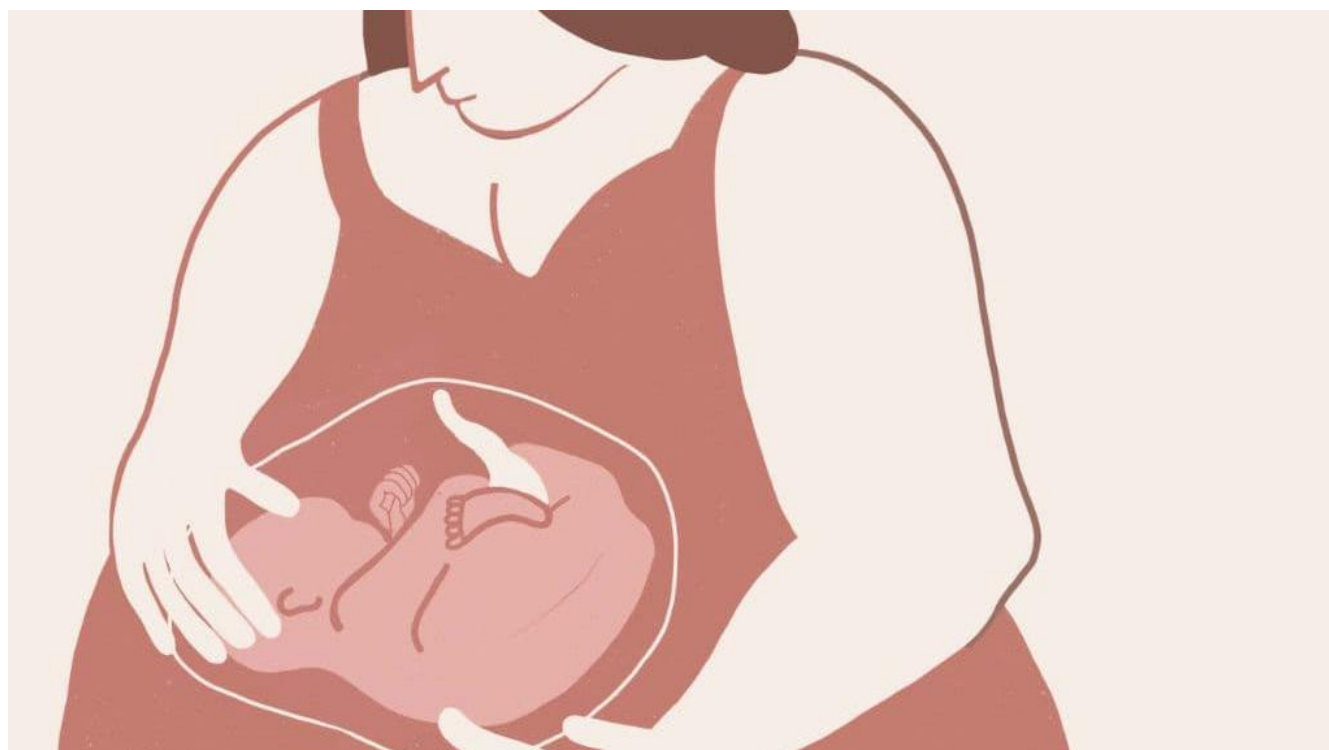


BEYOND BMI:

What the Placenta Reveals about Pregnancy Health

By Stella Li, MSc Candidate



Source: [Proactive for her](#)

***Note:** Jennifer is a fictional character used to illustrate the type of pregnancy discussed in this research.*

Jennifer knew one number would follow her into pregnancy. Before pregnancy, her body mass index, or BMI, was 32. In medical charts, that number placed her within the obesity range. She had heard plenty about how obesity can raise the risk of high blood pressure, diabetes, and other pregnancy complications. So when she reached seven months pregnant, she expected her doctor to be concerned.

To her surprise, every test came back normal. Blood pressure, normal. Blood sugar, normal. No gestational diabetes. No hypertension. Nothing on her chart raised a red flag. By every routine measure, Jennifer seemed to be in the clear. At least, that was the story her chart could tell.

In pregnancy, obesity is often discussed as a risk factor. Jennifer's situation matters on a much larger scale: [nearly three in ten Canadian women](#) aged 18 to 39, within their reproductive years, have a BMI in the obesity range. But not every pregnancy affected by obesity looks the same.

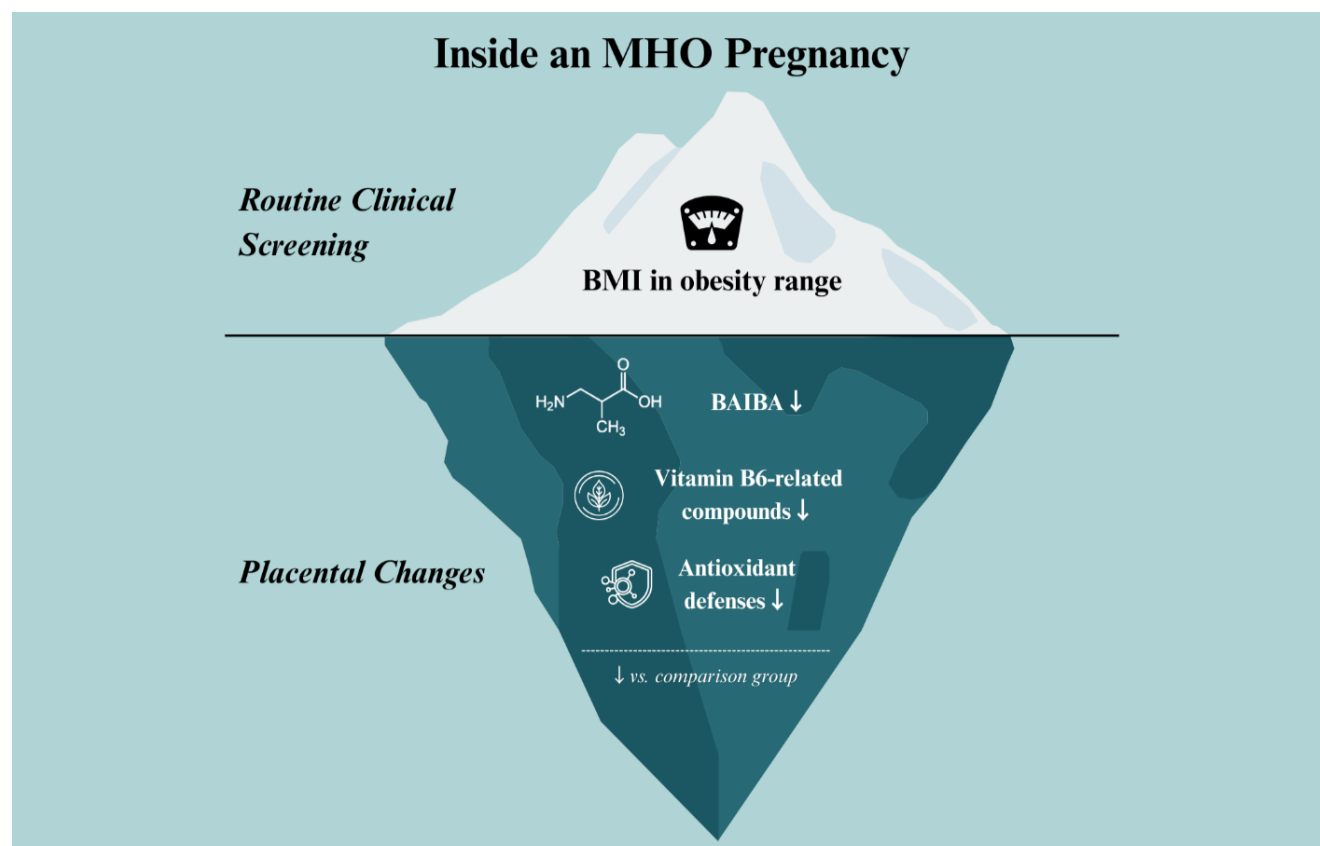
Some come with high blood pressure, diabetes, or other complications. This condition is known as metabolically unhealthy obesity (MUO). Others, like Jennifer's, appear healthy by routine clinical tests. These pregnancies fall into a different category: metabolically healthy obesity, or MHO. But MHO and MUO are rarely distinguished in clinical practice, and research suggests MHO may be an early, subclinical stage on the way to MUO. *So, are MHO pregnancies truly unaffected?*

That is what interested [Dr. Ousseynou Sarr](#), a research associate in the Department of Physiology and Pharmacology at Western University. He and colleagues turned to the placenta.

But why the placenta?

The placenta is a temporary organ that grows only during pregnancy, and its main function is to support the baby. It is often treated as medical waste and discarded soon after birth, but over nine months, it does more than we can see. Not only does it clear waste and deliver nutrients, oxygen, and hormones, but it also maintains the balance of the mother's immune system. Where mother and baby meet, it is exquisitely sensitive to the surrounding environment and acts as a bridge between them. If obesity was leaving a trace in MHO pregnancies, the placenta was the most likely place to find it.

To see what, if anything, had changed, the team collected placentas from 15 women with MHO and 15 women in the normal-weight range. Each placenta was measured and examined under a microscope. From the outside, there was a clear difference. Placentas from MHO pregnancies were larger, thicker, and heavier than those from the comparison group. Yet these physical differences were not accompanied by signs of damage or inflammation under the microscope. These findings suggest that the size changes may reflect adaptation to the increased demands of pregnancy.



In MHO pregnancies, routine screening may show no obvious health problems beyond a BMI in the obesity range. A closer look at the placenta, however, reveals changes hidden beneath the surface ([Sarr et al. 2025](#)). Created in Canva, Stella Li.

They then looked deeper using metabolomics, a method that measures many small molecules in tissue at once. This approach provides a chemical snapshot of what is happening inside the placenta. Here, the differences became harder to miss. The sharpest signal drop was found in a molecule called β -aminoisobutyric acid (BAIBA). When we exercise, our muscles naturally produce BAIBA, which signals fat cells to burn stored energy, keeps inflammation in check, and supports cells' energy production. This is especially notable because obesity is often associated with chronic, low-grade inflammation. Lower BAIBA has been observed in obesity before, yet previous studies rarely identified it specifically in the placenta.

Similarly, the team found reduced levels of two vitamin B6-related compounds in MHO placentas: pyridoxal and pyridoxal phosphate. Vitamin B6 is something we get from everyday foods like bananas, chicken, and potatoes. Beyond nutrition, it plays an essential role in the body's antioxidant system, helping cells repair damage, slow aging, and defend themselves against harmful byproducts of normal metabolism. Pyridoxal and pyridoxal phosphate are active forms of vitamin B6 that cells use to do this work. When their levels fall, that cellular protection starts to weaken.

Moreover, several other molecules involved in antioxidant protection were also reduced. These results suggest that the MHO placenta's internal defenses were operating below their usual level, with no outward sign that anything had changed.

Dr. Sarr and colleagues wrote: "Focusing on health markers, rather than relying solely on weight or BMI, is essential to fully capture the nuanced impact of maternal obesity on placental function and fetal development".

Because obesity is so common, it is important to understand what "healthy" really means in an MHO pregnancy. *Pregnant women with MHO might pass every routine test*, just like Jennifer. And yet, as this study suggests, *their placentas may already be carrying a different record* that standard clinical practice is not designed to read. Some of these changes may also point to long-term health risks for the child.

More studies and early markers for pregnancy monitoring are needed. The good news is molecules like BAIBA and vitamin B6-related compounds may be among them, and from there, we can identify pregnancies that may need closer attention before any complications arise. Yet the fundamental question remains open: what makes some obese pregnancies healthy while others develop comorbidities? Distinguishing MHO from MUO in clinical practice, rather than grouping pregnancies by BMI alone, could be the first step toward finding out.

Original Article: Sarr, O., Rajagopaul, A., Zhao, S., Wang, X., Gynspan, D., Eastabrook, G., Li, L., Regnault, T. R. H., & de Vrijer, B. (2025). Placental morphology and metabolomic profile in uncomplicated metabolically healthy obese pregnancy. *Biomedicines*, 13(9), 2149. <https://doi.org/10.3390/biomedicines13092149>