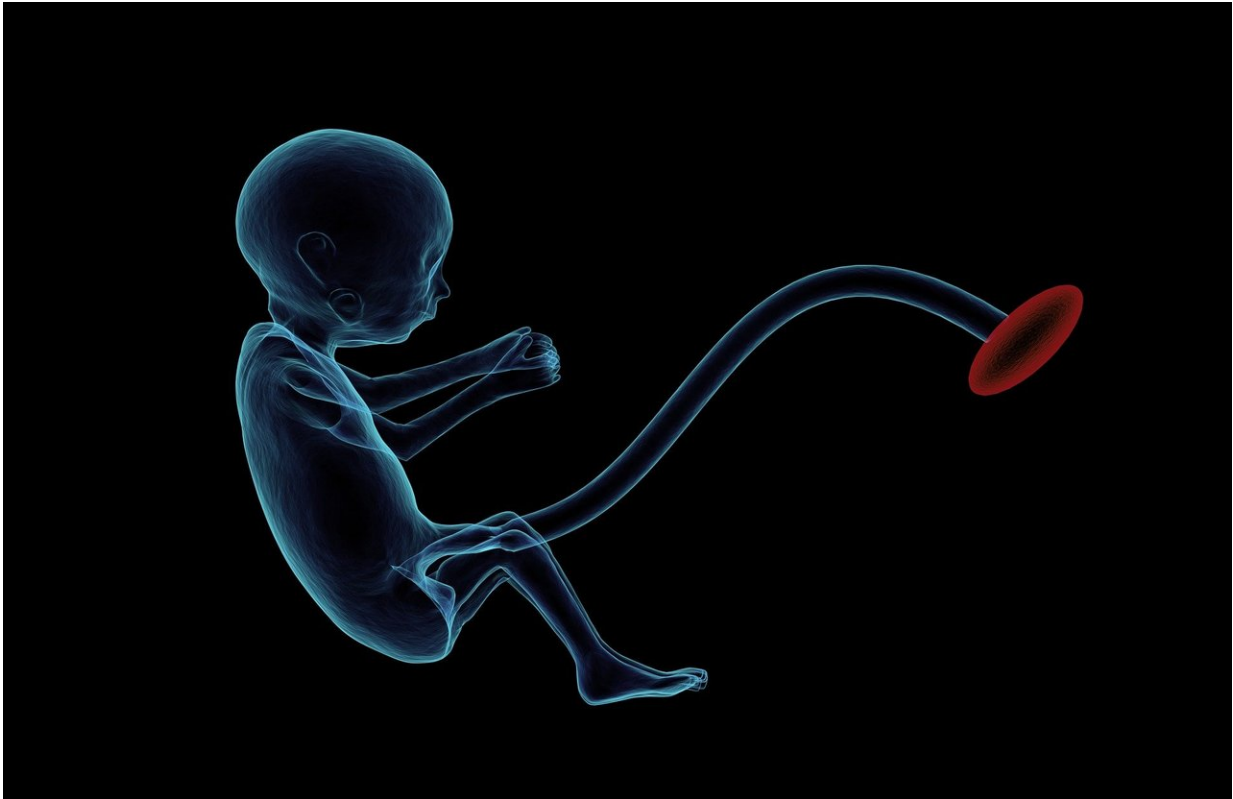


Gut health benefits begin in utero

October 7 2020, by Brita Belli



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The gut's microbiome—a complex, dense mixture of bacteria, fungi, and other microbes—plays an integral role in human health. A new Yale study reveals just how early the microbiome is formed and begins delivering this benefit.

For the first time, Yale scientists report that components of the gut [microbiome](#) begin to mature in utero, much earlier than previously known. They suspect that the bacterial byproducts they detected at this early stage are transferred from mother to baby via the placenta. Their findings appear in the Oct. 1 issue of the journal JCI Insight.

For years, Dr. Liza Konnikova, assistant professor of pediatrics and obstetrics, gynecology and reproductive sciences, and her team have studied immune system development in the human gastrointestinal tract. In their earlier research, they found evidence of mature adaptive immune cells in fetuses in utero.

"It led us to ask: How are those immune cells maturing?" Konnikova said. "What is educating them?"

The new paper provides the first clues. The scientists studied 31 intestinal samples from humans at three different phases of development: the fetal stage, infancy, and later childhood. To their surprise, they found bacterial byproducts in all the samples, suggesting that the microbial components may be present prior to delivery.

While it's uncertain whether these bacterial-derived metabolites are transferred to fetuses via the placenta, Konnikova said that seems likely. In the fetal samples, they detected numerous food metabolites, including vitamins B1 and B5, which likely come from the mother's prenatal vitamins.

This transfer of maternal microbiome to support the growing [fetus](#) would have important evolutionary value, Konnikova said.

"Exposure to bacterial byproducts is priming your immune system to be educated about 'good bugs' or beneficial bacteria," she said. "Later, when infants are exposed to these bacteria, they won't react with an

inflammation storm."

She and her team are already engaged in a follow-up study to definitively answer whether moms are passing on this immune system support.

In the meantime, the discovery that fetuses contain a robust bacterial metabolome (a complete set of metabolites) might suggest the potential for vaccines to be delivered in utero, among other benefits, Konnikova said. "We know some infants don't respond to vaccines," she said. "There may be a possibility to target some vaccines earlier."

And if the mother is providing the [bacteria](#) needed to boost the baby's immunity, she added, there might also be an opportunity to build up her microbiome to confer better immunity to the growing baby.

More information: Yujia Li et al. In utero human intestine harbors unique metabolomic features including bacterial metabolites, *JCI Insight* (2020). [DOI: 10.1172/jci.insight.138751](https://doi.org/10.1172/jci.insight.138751)

Provided by Yale University

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