,,In the largest genomic investigation of baby microbiomes ever conducted researchers have affirmed there are significant differences in gut bacterial diversity between babies born by caesarean and those born vaginally. While the research adds weight to the evidence suggesting the mode of birth can fundamentally shape a baby's microbiome, the study notes these bacterial differences mostly even out after 12 months. One of the more fascinating unanswered questions in the field of microbiome research is exactly when, and how, a baby's gut microbiome forms. The general consensus for some time has been that the human womb is completely sterile, and a baby's microbiome begins to form during birth, initially due to bacterial exposure from the mother's birth canal.

Over the last few years this traditional assumption has been questioned by a number of scientists who suggest traces of bacteria can be found in the placenta and amniotic fluid. Debate still rages between researchers over the existence of a fetal microbiome, but this new study confirms, to a degree, how much influence the mode of birth has over the initial development of a baby's microbiome.

In this new study, scientists are offering the broadest insight yet into the microbiome differences between delivery methods. Nearly 600 babies were studied, and the differences between a vaginally delivered microbiome and a c-section microbiome were so stark, senior author Trevor Lawley claims he could detect how a baby was born just by studying a fecal sample.

“This is the largest genomic investigation of newborn babies’ microbiomes to date,” Lawley explains. “We discovered that the mode of delivery had a great impact on the gut bacteria of newborn babies, with transmission of bacteria from mother to baby occurring during vaginal birth.”

The research interestingly found a vaginally birthed baby’s microbiome comprised very little trace of a mother’s vaginal bacteria. This intriguingly suggests a baby’s microbiome is not significantly influenced by direct contact with a mother’s birth canal, and adds weight to the arguments against the practice of “swabbing” babies born by caesarean with vaginal fluids in an attempt to seed healthy bacteria.

Another compelling finding in the study was babies born by caesarean were found to acquire greater traces of bacteria found in hospitals. These babies were found to harbor higher levels of opportunistic bacteria with potential antimicrobial resistance.

The researchers do not hypothesize what potential health effects could result of these microbiome disparities, but the study does importantly note that these bacterial differences tended to mostly disappear after about 12 months.

“Our study showed that as the babies grow and take in bacteria when they feed and from everything around them, their gut microbiomes become more similar to each other,” says Nigel Field, another senior author on the new study. “After they have been weaned, the microbiome differences between babies born via caesarean and delivered vaginally have mainly evened out. We don’t yet know whether the initial differences we found will have any health implications.”

Prior research has uncovered potential mild health impacts from caesarean delivery. A 2015 metastudy confirmed caesarean delivery can be correlated with slightly higher rates of obesity, asthma and diabetes. But these increases are only mild, and there is substantial argument over what could be causing these health differences. It has been well-established that a number of factors are interconnected with women receiving caesareans. They tend to be older, and suffer from more preexisting pregnancy complications, so any subsequent health issues seen in their children cannot be necessarily connected to the mode of delivery.

Peter Brocklehurst, one of the authors of this new study, is part of an ongoing longitudinal research project called Baby Biome. The goal is to follow thousands of mother-baby pairs for several years from birth, to better understand what long-term health effects result from a child’s initial microbiome colonization.

“The first weeks of life are a critical window of development of the baby’s immune system, but we know very little about it,” says Brocklehurst. “We urgently need to follow up this study, looking at these babies as they grow to see if early differences in the microbiome lead to any health issues. Further studies will help us understand the role of gut bacteria in early life and could help us develop therapeutics to create a healthy microbiome.”

The new research was published in the journal Nature.

Source: Wellcome Sanger Institute