

Prenatal Microbiome

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Agar Art - Information

We chose the design of a fetus that is surrounded by microbes. This depiction is consistent with understanding of evidences suggesting that fetus are not sterile and that we may have already been exposed to in utero which could also affect the physiological aspects of a fetus development (D'Argenio, 2018). Our agar plate itself is a representation of the fetus in the uterus, which would suggest that the mothers microbiota has been in transverse with the fetus and that the placenta and umbilical cord is not a sterile environment. The importance of advancing the field of prenatal bacterium can improve medical care for both the mother and the developing fetus. Understanding the connections of the prenatal microbiome to the adult microbiome would better allow healthcare professionals to address certain ailments that can be traced back to prenatal microbiome.

Prenatal Microbiome Controversy

- Evidence In Support:

- The existence of the prenatal microbiome relies on the evidence of non-sterile meconium. Studies have established that the meconium (an infant's first fecal movement) is non-sterile (D'Argenio, 2018). Through 16s RNA gene sequencing, they found microbial features of the meconium are similar to the microbial features of the amniotic fluid a fetus swallows during the second and third trimesters. This correlation suggests the establishment of the intestinal microbiome and the meconium microbiota during the second and third trimester of pregnancy through the swallowing of non-sterile amniotic fluid. The microbiota of the meconium is used to study the effects of the prenatal microbiome on health (Ardissone, A. N, 2014).

- Evidence for a Sterile Enviorment:

- However, other microbiologists believe that the prenatal enviorment is actually sterile. There has been inconsistent levels of bacterial DNA found across various studies, and studies that found a larger presence of bacteria in the prenatal microbiome had less strict standards for preventing contamination during the study. The presence of the bacteria in the prenatal microbiome may also be from other parts of the body such as the vaginal microbiome of the mother. The bacterial DNA found would then not be from the specific niche of the prenatal microbiome but rather just of bacteria transported into the prenatal enviorment (Blase, 2021).



Description of Agar Art Image

Agar Art is of a fetus surrounded by bacteria. This is to depict the non-sterile environment the fetus is in. The parental microbiomes affect the prenatal microbiome and ultimately the health of offspring. The agar art drawing was created using the cultures *M. luteus* (yellow) and *S. saprophyticus* (white) on a Trypticase Soy agar plate. The cultures were applied using standard aseptic technique was applied for creating the agar art using the above cultures.

Role of Prenatal Microbiome in Health

- Studies have established the link between prenatal exposure to farm environments and farm animal species and the absence of allergies by observing the immune system receptors and the presence of atopy (an overresponse from the immune system against harmless triggers). When the mother worked on a farm during pregnancy, increased prenatal exposure to the farm microbial environment was correlated with a decreased prevalence of allergic responses such as seasonal rhinoconjunctivitis in childhood. Prenatal exposure to microbial-rich environments thus affects the health of the fetus into childhood, which supports the existence of the prenatal microbiome (Ege et al., 2006)
- Studies done in other animals have shown a link to the prenatal microbiome and brain development. A study using Sprague-Dawley dams have shown evidence presented that prenatal stress can affect the prenatal gut microbiome which has effects on behavioral development in the long term (De Cillis et al., 2024).

References

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