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Gut Microbes in Infants

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Description

Microbes in the gut play an important role in the digestion and metabolism of food, the development and activation of the immune system, and the creation of neurotransmitters that regulate behavior and cognitive function, all of which begin before birth. The gut microbiota has an impact on immunological, endocrine, and neurological pathways, as well as newborn development. The colonization of the baby gut microbiome is influenced by several variables. Vaginal versus surgical delivery, antibiotic exposure, and infant feeding practices are all linked to different microbial colonization patterns. Infant microbial colonization patterns can affect physical and neurocognitive development, as well as disease risk throughout time, due to their vast physiological influence. Understanding these factors will help parents and caregivers better care for their newborns. The gut microbiota is thought to play a key role in maintaining and supporting human health, and any changes in its composition, known as intestinal dysbiosis, are thought to facilitate the onset of and/or exacerbate certain diseases, such as autoimmune and allergic diseases, colorectal cancer, metabolic diseases, and bacterial infections. To re-establish/maintain normal homeostasis of the gut microbiota, indigestible dietary components, such as prebiotics, as well as the usage of health-promoting live microorganisms, such as probiotics, are frequently utilized as biotherapeutic agents.

Firmicutes, Bacteroidetes, Actinobacteria, Proteobacteria, Tenericutes, and Fusobacteria are the six phyla that make up the gut microbiota. Firmicutes and Bacteroidetes are the most common phyla in the adult microbiota, accounting for up to 90% of the total gut microbiota. However, these figures differ in the newborn gut, where Actinobacteria, particularly the genus Bifidobacterium, are widely found. The gut microbiota plays three important roles beginning at birth: protective, metabolic, and trophic. Against begin with, gut bacteria act as a barrier to the spread of pathogenic organisms. Second, they help in the digestion and metabolism of colostrum, breast milk, formula, and weaning foods in newborns, as well as a wide range of foods in adults; the breakdown of poisons and pharmaceuticals; vitamin production; and ion absorption. Trophic activities include epithelial cell proliferation and differentiation lining the intestinal lumen, as well as immune system homeostasis, including tolerance to dietary antigens [1-3].

The gut microbiota of a baby is less varied than that of an adult. The gut-brain axis (as previously defined) and maternal and neonatal exposures, such as mode of birth, antibiotic exposure, and feeding patterns, all influence the formation of the gut microbiome throughout the first three years of life. The infant gut microbiome has assumed the variety and composition of the adult gut microbiome by the conclusion of this time period and is generally characterized by organisms from four phyla: Actinobacteria, Bacteroidetes, Firmicutes, and Proteobacteria. The technique of delivery at birth is a major contributor to diversity in the baby microbiota. The gut microbiota of infants born vaginally is extremely similar to the vaginal and fecal flora of their mothers. As the newborn travels through the birth canal, the mother's vaginal-perianal bacteria are vertically transferred. *Lactobacillus*, *Prevotella*, or *Sneathia* spp. predominate in the gut of vaginally born newborns, although *Bifidobacterium* and Bacteroides become more prevalent after a few months. Other investigations have detected species of *Atopobium*, *Streptococcus*, *Enterococcus*, and *Enterobacteriaceae* within the first six weeks of development in vaginally delivered newborns, in addition to these genera of microorganisms.

In addition to bacterial species, the gut microbiome of surgically delivered infants has less variety than that of vaginally delivered infants. This could be significant because higher gut microbiota diversity is thought to be beneficial, whereas low diversity has been associated to a range of human illnesses, including inflammatory bowel disease and obesity. Variations in bacterial composition between surgically born newborns and those born vaginally appear to persist in children for up to seven years. In addition, because of the numerous complications involved with surgical birth, establishing a stable gut microbiota in a surgically born neonate might take months. Because surgically born infants miss out on the unique opportunity to be inoculated with their mother's vaginal microbiome via the birth canal, delivery style appears to be an essential determinant in the establishment of the infant gut microbiota. Additionally, if they are isolated from their mothers for an extended amount of time after delivery, they may miss out on the opportunity to colonize the maternal skin microbiome right away. Antibiotic medication and its modulatory effects on the human microbiome can start in the womb and last through important growth and developmental stages [4,5].

Conflict of Interest

None.

References

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