

Healthy Newborn Microbiome

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Commentary

A microbiota is "the ecological community of commensal, symbiotic and pathogenic microorganisms that literally share our body space" [1]. The Human Microbiome (all of our microbes' genes) can be considered a counterpart to the human genome (all of our genes). The genes in our microbiome outnumber the genes in our genome by about 100 to 1 [1]. The human microbiota consists of the 10-100 trillion symbiotic microbial cells harbored by each person, primarily bacteria in the gut; and the human microbiome consists of the genes these cells harbor [2]. The microbiome may be considered a "new organ system," because its existence and contributions to human health and disease was uncovered by researchers between 15 and 20 years ago [3]. The composition and function of the microbiome of the human gut evolves during the first years of life and stabilize within the first 3 years of life [4]. Specifying the definition of the human microbiome has been complicated by confusion about terminology: for example, "microbiota" (the microbial taxa associated with humans) and "microbiome" (the catalog of these microbes and their genes) are often used interchangeably [1]. Microbial colonization of the infant occurs during a critical time window for immune and gastrointestinal development. Infant colonization sets the stage for the adult microbiome [5]. Major outcomes of colonization include the timing-dependent education of the neonatal immune system, which is interconnected with barrier function and metabolism. The infant is born not completely sterile, depending on mother state of health prenatally. As soon as the infant faces real environment "In a matter of thirty minutes" the colonization of the gut and the skin starts. The type and diversity of gut bacteria during the first hundred days of an infant's life has a profound influence on the developing immune system and on the risk of atopy, infection and inflammation. It dramatically influences this period of immune maturation. Manipulating an infant's "dysfunctional" microbiome might soon be a therapeutic approach for preventing atopy in a predisposed infant!!! Factors such as breastfeeding, mode of delivery, antibiotic exposure, and pet exposure, have been known to be factors affecting allergy and asthma, by influencing the infant microbiome. The microbiome affects the development of regulatory T-cells, immunoglobulin E responsiveness, and the development of atopy symptoms. The association between microbial diversity, in the infant gut and regulatory T-cell development, is crucial in prevention of allergy and other non-communicable diseases. With breast feeding, microbes in mother's breast milk seed the infant gut, [6] including those associated with beneficial effects, underscoring the importance of breastfeeding in maturation of the infant gut microbiome where the breast milk as bifido genic effect start colonization on the infant mucosa. The composition of breast milk with its oligosaccharide after being fermented to short chain fatty acid affect the diversity of infant microbiome and nutrition. It is very well recognized in establishment healthy state in developing infant mucosal immunity. From a very early stage in life, there is dysbiosis in the microbiome composition in the gut of infant who is prone to develop atopy.

Trials are under way in which the mother's microbiota is being

introduced to infants shortly after cesarean birth in an attempt to colonize the baby with the organisms he or she wasn't exposed to during cesarean delivery," [7]

This may be considered to be microbial transfer in order to insure a healthy gut colonization. We have to stress on the first hundred days which are critical for initiation infant mucosal formation and modulation [5]. Supporting this state of the mucosal immune modulation, the idea of probiotic introduction to the newborn infant which may open a new strategy in improving the overall defense state, although the probiotics are species specific they have many effects pathways on the infant gut [8]. Probiotics have a role in regulation of intestinal microbial homeostasis, interfere with the ability of pathogens to colonize and infect the mucosa, modulate of local and systemic immune responses, regulate Th1/Th2, produce anti-inflammatory cytokines, stabilize and maintain the gastrointestinal barrier function, induce of enzymatic activity that favors good nutrition and last but not least regulate symbiosis and improved microbial diversity [9].

Last word: Cross-talk between microbiome and intestinal homeostasis. The initial infant colonization as a result from genetics, microbial exposures such as delivery mode and antibiotic usage, and breast-feeding factors mentioned above) will sets in motion the cross-talk among the microbiome, nutrition, immunity, barrier function, metabolism, and gene expression.

This will represent a major avenue for the prevention and treatment of infection, atopy, inflammation. and metabolic disease.

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