HOW YOUR **GUT BACTERIA** INTERPLAYS WITH MATERNAL FACTORS

Environmental microbes start colonization of the sterile gastrointestinal tract of the newborn immediately after birth in animals and humans.[1,2] Initially the microbes come from the mother and they are of the same origin as her vaginal and intestinal microbes; usually, if the baby is born vaginally. [1,2]

Infants born by Cesarean section (C-section) experience a delayed microbial colonization. C-section babies acquire bacterial members resembling those of the skin.[1] These variations and altered microbial diversity associated with delivery mode have been detected in children up to seven years of age. Children born by C-section are at increased risk for the development of immune disorders from somewhat impaired immune regulation. Not all autoimmune conditions, but especially those with a certain relation to the gut, are influenced by C-section.[1]

Scientists theorize that the infant's first contacts with pioneer bacteria could influence subsequent gut maturation, metabolic and immunologic programming, and consequently, short- and long-term health status. A number of maternal factors are responsible for the establishment and colonization of gut microbiota in infants: the conditions surrounding the prenatal period, time and mode of delivery, diet, mother's age, smoking status, household milieu, socioeconomic status, breastfeeding, antibiotic use and other environmental factors. Early exposure impacting the intestinal microbiota is associated with the development of childhood diseases that may persist into adulthood—such as asthma, allergic disorders (atopic dermatitis or itchy skin, rhinitis or runny nose), chronic immune-mediated inflammatory diseases, blood sugar irregularity, obesity and eczema.[1]

HOW YOUR GUT MICROBES HELP YOU

The maturation of the human immune system and its regulation after birth is largely driven by exposure to microbes. The gastrointestinal tract is the largest source of microbial exposure, as the human gut microbiome contains more than 10 trillion bacteria, which is 10 times the number of cells in the human body.[1] Several studies in recent years have shown differences in the composition of the gut microbiota in children who are exposed to different conditions before, during, and early after birth.[1]

The gut bacteria play an important role in human health by promoting intestinal homeostasis, stimulating the development and maturation of the immune system, protecting against pathogens, digesting fibrous food materials through fermentation and harvesting nutrients. An alteration in the gut microbiota has been associated with inflammation of the bowel, leaky gut, bowel disorders, obesity, blood sugar regulation, respiratory difficulties, wheezing and allergies. Although there are discrepancies in the literature, data analysis over time has suggested an association between the nature of the initial gut microbiota colonization or microbial dysbiosis (colonization by bad bacteria) and a number of disease conditions in infancy and later in life.[1]

AFFECTING GUT MICROBIOTA FACTORS IN INFANTS OR CHILDREN

FACTOR	OBSERVED EFFECT ON MICROBIOTA	SPECIFIC HEALTH CONDITION
Stress during pregnancy	• Low counts of beneficial bacteria (e.g. *Bifidobacteria*, *Lactobacillus*)	Allergic reactions
Probiotic use of mother	• Increased colonization of beneficial bacteria • Increased bacterial diversity	Reduced incidence of allergic reactions
Antibiotic use of mother	• Delayed colonization or reduced abundance of beneficial bacteria	Increased allergic reactions (asthma, allergic sensitization, allergic rhinitis), bowel disorders.
Cesarean delivery	• Reduced bacterial richness and diversity • Reduced colonization by beneficial bacteria • Increased colonization by potential pathogens	Increased risk of asthma, allergic reactions, early onset blood sugar issues, atopic eczema, obesity, lower levels of immune regulators
Vaginal delivery	• Increased microbial diversity	Decreased risk of respiratory issues, wheezing, decreased allergic reactions
Child's exposure to livestock or pets, especially dogs	• Microbiome increased in *Lactobacillus johnsonii*	Decreased risk for wheezing and respiratory conditions, and or allergic reactions

Until more studies are done in this new area of microbiology, scientists debate whether an altered microbiome causes particular health issues or alternatively, the health issue affects the microbiome. There are numerous factors that can affect both. This is an exciting area of science with so much being discovered and to learn. Meanwhile, like our ancestors from many cultures, we take in microbes in the form of fermented vegetables (pickles, kimchee, sauerkraut) and fermented milk and soy products (cheese, yogurt, tofu, miso). Before industrialization and pasteurization, many of these fermented vegetable products were healthy sources of microbiota to inhabit our microbiome.

HOW TO IMPROVE YOUR GUT MICROBIOTA

No matter how we originated (via regular delivery or C-section), we can help ensure that our gastrointestinal tracts stay healthy. We can eat naturally fermented foods and maintain healthy lifestyles. Realistically in today's environment, we all need help to keep a balanced diet. DIGESTIVE^{+++} provides an effective and convenient solution.

DIGESTIVE^{+++} contains probiotics, which are described by the World Health Organization (WHO) as microbes that when consumed show benefit to health. Prebiotics, as stated by the same organization, are ingredients which remain undigested until they reach the colon and then provide the right nutrition for beneficial microbes in the colon. DIGESTIVE^{+++} contains effective microbes and true prebiotics, as well as the full range of enzymes to break down proteins, carbohydrates and fats for optimal assimilation and absorption. Some of the bacteria in the gut also use food nutrients to grow and colonize in harmony with the body. Since our gut microbiome works in harmony or disharmony (called dysbiosis) with our body and affect so many physiological systems, taking DIGESTIVE^{+++} is the sensible and cost-effective way to maintain GI and overall health.

These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

REFERENCES

1. CHF Hansen, Anderson LSF, Krych L, Metzdorff SB, Hasselby JP. et al. Mode of Delivery Shapes Gut Colonization Pattern and Modulates Regulatory Immunity in Mice. *The Journal of Immunology*, 2014,193 1213-1222
2. Munyaka PM, Khafipour E, Ghia JE. External influence of early childhood establishment of gut microbiotia and subsequent health implications. *Frontiers in Pediatrics/Neonatology.* 2014, Oct. Vol.2, Article 109.