White paper

Impact of Microbiome on Gut Health – The Second Brain

The term Microbiome represents the entire microbial population in human gut. This paper focuses on microbiome population in human gut and its effect on human health, research trends and how companies are approaching to meet the consumers demand for healthy products such as prebiotics and probiotics.

Gut Health

Gut health has become a major concern in the contemporary society. Considered as the second brain of the human body, this organ is associated with various body functions associated with wellbeing. A large amount of neurons are located in the gut, which control digestion from the moment food is swallowed, through its breakdown and eventually elimination. Thus, ensuring its smooth operation must be a vital aspect in everyone's checklist. When it comes to caring for one's gut health, the first thing that comes to mind is to eat good food and drink lots of water. This being true, the exact purpose of this practice is to adequately enrich the microbiome present in the gut.

What Is Microbiome?

The microbiome is a collective term used in representing the entire microbial population present in the gut of the human body.

According to a recent report, the microbial cells outnumber the somatic cells in a ratio of 3:1. The microbes are located along the mucus lining of the colon forming a biofilm. It develops from the colonization of bacterium in the newborn's digestive tract from the maternal environment. Its further development is then dependent on the nutrition available to the child. A very interesting fact about the microbiome is that, like the fingerprints, one's microbiome composition is unique to the individual. This composition may be based on a person's age, diet, gender or even occupation. It governs the health sectors like chronic sickness, nutrition and most importantly, gut health. It is principally associated with limiting the risk of inflammation within the gut. It minimizes the chances of getting an infection by overwhelming the invading pathogens. The metabolites produced by the bacterium regulate the nutrition and metabolic pathways. The food we eat, the quantity of water we drink, all affects the organization of the microbiome. The microbiome along with the human body forms an intriguing ecosystem. Home to trillions of neurons, the human gut is linked to the brain activity and thereby behavioral patterns too.

How Does It Affect Gut Health?

Having a bidirectional interaction, these organisms play a vital role in human health. Governed by millions of bacterial genes, the microbiome interacts with the body in a subtle manner. Most of these organisms are harmless, they aid in the digestion of food and extraction of vitamins. However, there are few species which can be offensive should they proliferate beyond control. Multiple notions on the effect microbes have on our health are emerging, and also with various applications. The microbiome is perceived to be a distinct organ owing to its unique organization in each human being. Reports indicate that the alteration of microbiome is associated with the development and progression of chronic illnesses, immunological and metabolic disorders. Considering these reports paves the way for numerous opportunities in the development of disease treatment procedures, medical solutions and health based food products. It becomes extremely important that these products are manufactured only after thorough researches have been conducted, as the microbiome though diverse, is very specie specific and therefore, the slightest error may result in the proliferation of harmful bacterium, causing a disease progression.

How Does the Food and Beverage Company Contribute To Microbiome?

Irritable bowel syndrome can be found in 11% of the global population and still rising. Individuals diagnosed with chronic gut disorders are also on the rise. Owing to this, the importance of gut health is gaining a lot of attention. The awareness of the symbiotic relationship between the gut microbiome and human health has had more than 30% of the global population preferring products that are in accordance with their nutritional and health requirements. Reports indicate that children born into this contemporary society do not possess the same microbiome as those born 9-10 decades ago. This may result in the development of allergies, diabetes and childhood obesity rising an alarming issue concerning infant health and development. In order to cope with the rising needs for these products, the food and beverage industry has launched an investigation into the development of probiotics and prebiotics. Probiotics are micro-organisms that supply health benefits when consumed. Prebiotics, on the other hand, are food substances that induce the growth of beneficial microbial species in the microbiome. Despite the hurdles in existence, the food and beverage industry has successfully developed products that aid in the improvement of the gut as well as the overall health of the human body so as to earn consumer loyalty and for market development.

Who Are the Active Players?

Danone has amassed an approximate of 4000 lactic bacteria strains. Bifidobacterium animalis DN 173 010 and Lactobacillus casei DN114 001 are being used in the development process of their products Activia and DanActive.

Yakult's central institute is dedicated to clearly elucidate the connection between human health and the microbiome. The YIF scan, Yakult's state of the art technology, is used for quantifying bacterium in the microbiome based on the sequence of their unique gene. Yakult is now working on symbiotic treatments which make use of both prebiotics and probiotics to achieve the desired results.

DuPont nutrition and health has built strategic partnerships with the French National Institute for Agricultural Research's metagenomics expertise to strengthen its microbiome venture set-up in 2017. This is the third collaboration DuPont has established since 2017. DuPont's agreement with Centre of Food and Fermentation Technologies, Estonia, is directed towards the optimized development of novel bacterium for nutrition and health.

OptiBiotix has filed three new patents related to sweet fibers and natural high intensity sweeteners, adding a greater value to its SweetBiotix product. This product is calorie free and is capable of modulating the microbiome. OptiBiotix stated that the filing of patents paves way for product application and partnering opportunities.

What Are Microbiome Research Trends?

Lux research, a Boston based research company released a trend indicating the need for personalized nutrition to be considered as a necessity rather than a choice.

A recent Thai study brought to light that a symbiotic mixture developed by Danone, takes advantage of the plasticity of the gut microbiome in early life paving way for its alteration by guiding the nutritional composition.

In-silico studies have led to the development of computer models which identify the pathways of Livaux, a power ingredient from Anagenix's golden kiwi fruit and detail the effect it has on gut health by studying its gut motility action. The supplementation evidently increased the population of bacteria, which curbs gut inflammation.

A team of German researchers led by Dr Mario Zaiss, Friedrich-Alexander-University, reported from a mouse study, that a diet with high fiber is capable of causing intestinal bacteria to secrete metabolites helpful in the production of short chained fatty acids as well as the improvement of bone density. The presence of short chained fatty acids creates an anti-inflammatory environment in the gut. On a concluding note, they revealed that the benefits obtained from the microbiome are not from the microbial species, but from the secreted metabolites. This can initiate the development of bacterial free products in the treatment of inflammation and bone homeostasis.

A study led by Dr Justin Sonnenburg, Stanford University School of Medicine, states that the incorporation of nori seaweed in one's diet, can help engraft different bacterial genus in the microbiome which are capable of breaking down complex carbohydrates like porphyran.

Recent researches indicate that the incorporation of mung bean protein isolate results in the functional alteration of gut microbiota leading to suppression of lipogenesis, thus being a potential treatment for obesity.

OptiBiotix Health revealed the development of a low calorie sweetener in the form of an oligosaccharide which can be easily broken down by gut microbiome. Besides from being easily decomposed, it also paves way for the beneficial changes in the microbiome diversity.

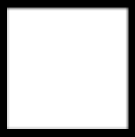
Dr Andrew Gewirtz, Georgia State University, along with his team of researchers, reported on how the consumption of fermentable inulin reduces the microbiome intrusion and helps in minimizing the risks of metabolic disorders. Based on a mouse study, it was discovered that high inulin based diets not only improved the gut microbiome, but also negated the effects of a high fat diet.

Regulations on Microbiome Directed Foods and Beverages

Microbiome directed foods (MDF's) and beverages are those which have the potential to alter the surroundings of a person's gut. In 1994, when the Dietary Supplement Health and Education act was signed, insights on how the microbiome affects the gut health were restricted. It must be properly understood that the biomolecules secreted by the bacterial species cannot be produced by the human cell lineages. Thus, the current regulatory framework raises barriers on the classification of MDF's. Also, a fundamental question is: if a MDF is supposed to provide nutritional or health benefits to the consumer, is it the food itself or the effect it has on the microbiome that brings about the desired end result? In a case where it alters the gut surroundings to bring about a nutritional effect, will it still be considered a food?

FDA commissioner, Scott Gottlieb declared the agency's consideration to make clear information on supplement facts accessible. He made mention that there is the need for more researches to be conducted before probiotics can be considered a viable treatment.

The human microbiome exists within the human body as an elegant ecosystem. Like a remotely controlled machine, one can control its composition and thereby regulate their gut health. This feature paves way for multiple applications by the food and beverage industry. The development of probiotics and prebiotics as modulatory foods is on the rise. Also, the awareness of the symbiosis occurring within the human body is on the rise today. With the aim of meeting the demands of the population, companies in the food and beverage industry are in a state of constant competition in terms of research and development of novel products that are beneficial to the microbiome.



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