



Old Friends Hypothesis: The Concept of Human Superorganism

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The Concept of 'Superorganism'

The 21st century witnessed the innovative research in the field of gut microbiota that led to the initiation of the concept called 'superorganism'. The concept of superorganism states that the human being is a superorganism hauling billions of microorganisms that embraces fungus, virus, bacteria, protozoa, and archaea [1-3]. The total number of microorganisms are about 10^{14} which includes 300–3,000 diverse species of microbiota. It is about 10 times the total count of human cells. These microorganisms survive on the exterior of skin, nasal cavity, lungs, gastrointestinal tract, urinary tract and reproductive system of human beings. In general, the human gastrointestinal tract is inhabited by more than a kilogram of such microorganisms. They are termed as gut microbiota. These microorganisms play a major role in maintenance of homeostasis in the human body [4].

Genetic Influence of Microbiota

There are about 5 million genes that encodes the commensal microbiota. This is about 200 times more than the number of human genes. Research shows that the microbiota genes has a positive influence on the growth and development of human beings. The human beings provide the living space and nutrition for the microbiota, and also controls their number and composition. Whereas the microbiota controls the function and maturation of their human host [5].

Embryonic Development

Maternal gut microbiota plays a major role in development, maturation and function of most mammalian systems. This control will later be handed over to their individual commensal microbiota after birth [6].

Immune System

Gut microbiota has a significant role in maturation of the immune system and has the effect only during a critical period, during which the colonization works [7,8].

Role of Gut Microbiota in Metabolism

The Gut microbiome plays a major role in the normal metabolism of carbohydrates, proteins and fats. It helps in digestion of complex carbohydrates and denaturation of proteins. It is also involved in bile acid degradation. Absorption of nutrients requires the action of microbiome. Synthesis of various vitamins and bioactive complexes require the involvement of gut microbiota [8].

Respiratory Tract

The growth, development, maturation and functioning of the respiratory system is critically influenced by the gut microbiota. But the deviant microbiota leads to development of various types of respiratory tract disorders [9].

Neuroendocrine System

The action of gut microbiota has a more or less similar effect as that of immune system development. It has a significant role in maturation of neural and endocrine system within a critical period. Gut microbiota influences the maturation and functioning of the brain [4].

Skin

The primary defence mechanism or the biological barrier in the human body is formed by the skin microbiota. This also plays a major role in immunological function. Dysfunction of skin

microbiota leads to skin disorders such as psoriasis and eczema [10].

Reproductive System

Healthy vaginal microbiota is indispensable for normal health of females and it plays a key role in the growth and development of commensal microorganisms in offspring [4].

The “Old Friends” Hypothesis

Grounded on Strachan’s hygiene hypothesis, Graham Rook proposed the ‘early immune challenge hypothesis’ it elucidates the symbiotic affiliation amongst commensal microbiota and human beings. According to the hypothesis, the commensal microbiota has endured an evolution for millions of years to become amended and reliant on to the hunter-gatherer life. The microorganisms and helminths instigate in pollution-free water, soil, and food and are well-thought-out as “old friends,” of human beings. But the modernisation and lifestyle vagaries, has led to radical drop in interaction with these old friends, that has led to several aberrations in growth and development of human beings [11]. Nobel laureate Elie Metchnikoff recommended that the microbial colonies that resides in the human gastro intestinal tract has a prominent influence on the health of the individual. Metchnikoff detected that there is an upsurge in life expectancy of people in Bulgaria and Eastern Europe due to preeminent ingestion of fermented dairy products with high levels of lactic acid bacteria [12,13].

Conclusion

Assimilating adequate microbiota is essential for happy and healthy human life. The malfunctioning of microbiota leads to ailments of immune system, nervous system, endocrine system, digestive system, cognition and behaviour of the individual. Research in animal studies has established that pro and pre-biotics intercessions have a most important role in cognition and behaviour by altering the inflammatory and endocrine functions in a positive way. It is clearly evident that growth, development and effective functioning of central nervous system are reliant on the edifice and

diversity of the gut microbiota, affecting the mental status of the individual. Further research and thorough understanding of the exact fundamental mechanism behind the action of microbiota is required to develop a clear rationale.

References

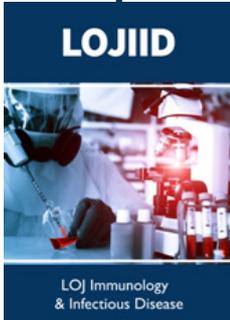
1. Limon JJ, Skalski JH, Underhill DM (2017) Commensal fungi in health and disease. *Cell Host Microbe* 22: 156-165.
2. Manrique P, Dills M, Young MJ (2017) The human gut phage community and its implications for health and disease. *Viruses* 9(6): 141.
3. Wampach L, Heintz Buschart A, Hogan A, Muller EEL, Narayanasamy S, et al. (2017) Colonization and succession within the human gut microbiome by archaea, bacteria, and microeukaryotes during the first year of life. *Front Microbiol* 8: 738.
4. Shan L, Xiaoli W, Feng J (2018) Gut-Brain Psychology: Rethinking Psychology from the Microbiota-Gut-Brain Axis. *Front Integr Neurosci* 12: 33.
5. Ulvestad E (2009) Cooperation and conflict in host-microbe relations. *APMIS* 117: 311-322.
6. Manco M (2012) Gut microbiota and developmental programming of the brain: from evidence in behavioral endophenotypes to novel perspective in obesity. *Front. Cell Infect Microbiol* 2: 109.
7. Gensollen T, Iyer SS, Kasper DL, Blumberg RS (2016) How colonization by microbiota in early life shapes the immune system. *Science* 352: 539-544.
8. Knoop KA, Gustafsson JK, McDonald KG, Kulkarni DH, Coughlin PE, et al. (2017) Microbial antigen encounter during a preweaning interval is critical for tolerance to gut bacteria. *Sci Immunol* 2: 1314.
9. Man WH, de Steenhuisen Pijters WA, Bogaert D (2015) The microbiota of the respiratory tract: gatekeeper to respiratory health. *Nat Rev Microbiol* 15: 259-270.
10. Egert M, Simmering R, Riedel CU (2017) The association of the skin microbiota with health, immunity, and disease. *Clin Pharmacol Ther* 102(1): 62-69.
11. Strachan DP (1989) Hay fever, hygiene, and household size. *Br Med J* 299: 1259-1260.
12. Stambler IS (2015) Elie Metchnikoff-The Founder of Longevity Science and A Founder of Modern Medicine: In Honor of The 170th Anniversary. *Adv Gerontol* 28: 207-217.
13. Maria C, Yolanda S, Pilar C (2017) Influence of gut microbiota on neuropsychiatric disorders. *World J Gastroenterol* 23(30): 5486-5498.



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