Gut Microbiota: No Longer the Forgotten Organ

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While the gut microbiota was once called “the forgotten organ” [1], it is no longer forgotten. On the contrary, it is a hot topic for research, as documented by the rapidly increasing number of scientific papers on this subject as well as coverage in the lay press, TV/radio programs, and social media.

The aim of this new series is to highlight recent developments and hot topics in gut microbiome/microbiota research. These two terms are often used interchangeably. However, there is a subtle difference between them [2]. The term *microbiome* refers to all the microorganisms (and their genes) living in a specific environment such as the gut. These microorganisms include bacteria, archaea, eukaryotes, and viruses. The term *microbiota*, in principle, refers to the microbes themselves. If only the genes are of interest, the term *metagenome* is used.

Regardless of the terminology, a balanced gut microbiota is crucial for health. Conversely, dysbiosis, which refers to altered gut microbiota diversity and composition (i.e., changes at the level of phylum, genus, or species) [3], contributes to the development of gastrointestinal and extraintestinal diseases. Among others, the microbiota mediates colonization resistance and influences susceptibility to infectious diseases. The first paper, by Colin Hill [4] from the APC Microbiome Ireland and School of Microbiology, University College Cork, Ireland, reviews advances in the research on infections and the microbiome, which provides a barrier to infection but can also serve as a source of novel antimicrobials. He also introduces

the concept of “selective depletion,” where pathogens can be reduced by narrow-spectrum inhibitors, such as bacteriocins or bacteriophages (phages). The microbiome is protected and can play a role in reducing the spread of infection by suppressing the growth of pathogens.

The mode of delivery affects the gut microbiome. The World Health Organization estimates the cesarean section rate as 10–15% of all births if only used when medically necessary. However, cesarean delivery is increasing in prevalence worldwide. Based on data from 169 countries that included over 98% of births worldwide, cesarean section almost doubled in 2015 compared with 2000 (21.1% vs. 12.1%, respectively) [5]. The second paper by Katri Korpela [6] from the University of Helsinki, Finland, discusses the impact of delivery mode on the infant gut microbiota, its consequences, and the interventions to restore the microbial dysbiosis created by cesarean section.

Diet is a key factor that has a substantial impact on the composition and function of the gut microbiota. The third paper, written by Martin Laursen [7] from the National Food Institute, Technical University of Denmark, covers the most important factors controlling the succession and establishment of the gut microbiota in infants after birth. Considering how the early-life gut microbiota impacts our immunity, a better understanding of the process could potentially lead to strategies modifying the risk of diseases later in life.

Some children have too little to eat, while others consume too many calories via junk food and beverages. Consequently, malnutrition consisting of undernutrition, overweight, and obesity is a major public health concern affecting all countries – low-, middle-, and high-income – although in different proportions [8, 9]. In the fourth paper written by Michelle McGuire and Mark McGuire [10] from the University of Idaho, Moscow, ID, USA, the authors discuss data linking the com-

position of the gut microbiota and the regulation of body weight.

In summary, gut microbiome/microbiota research is a hot topic and is booming. This series also documents that the gut microbiota is indeed no longer forgotten and is increasingly recognized as a potential key player in the pathogenesis of several diseases.

References

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