INTERPLAY BETWEEN THE GUT MICROBIOTA & ESSENTIAL MINERALS

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Introduction

Intestinal microbiota performs many functions that support human health. Minerals have a role to play in the formation of a gut microbial community. They are primarily absorbed in the small intestine and the intestinal microflora influences the bioavailability of minerals. The interrelation between the microbiota and individual minerals is rarely investigated.

Aims

The interactions between the gut microbiome and some of the most important minerals (Fe, Zn, Mg) is reviewed. Studies that evaluated the effect of microminerals on the composition of the gut microbiome using *in vitro*, *in vivo* models and human clinical trials are assessed. The 'special effects' of minerals on the human microbial flora are described together with the clarification of the functions of these minerals in relation to intestinal microbiota activity.

Major findings

Currently available evidence indicates that supplementation of Ca, Zn, and Mg stimulates the growth and colonization of beneficial gut bacteria *Lactobacillus, Bifidobacterium*, and *Ruminococcus*. Supplementation with Fe can have detrimental effects and could lead to an increased abundance of pathogenic bacteria. A reduction in beneficial microbes during Fe supplementation was observed while this negative effect was not present when animals were fed with Fe biofortified products. The route of administration and chemical form of Fe are prominent factors in shaping gut microbiome composition. The role of Mg is still puzzling as Mg deficiency modulates beneficial gut bacteria. Zinc has a strong positive effect on gut bacterial composition and function.

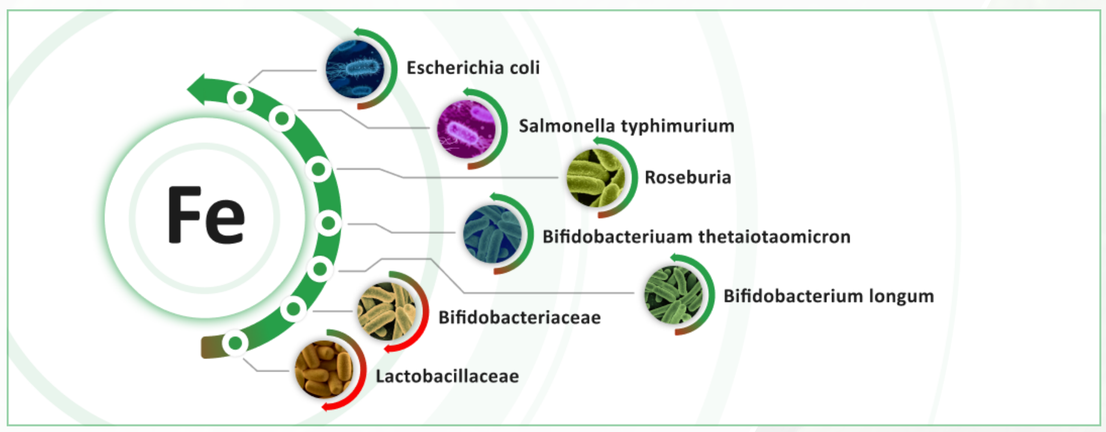

Figure 1. Fe supplementation promotes the growth of pathogenic while Fe depletion increases colonisation of beneficial bacteria under certain conditions

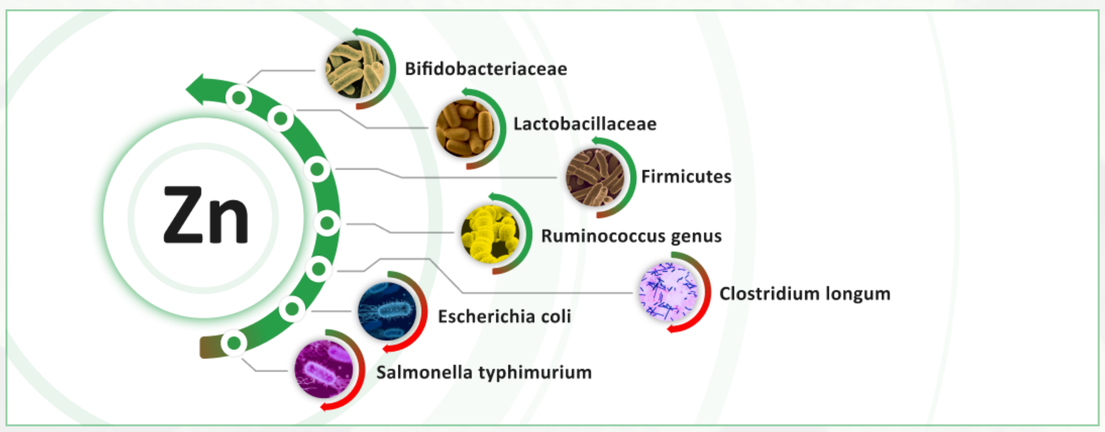

Figure 2. Zn supplementation stimulates the colonisation of commencial bacteria, whereas Zn deficiency causes inflammation and increases the abundance of pathogenic bacteria

Conclusions

An enhanced understanding of the gut microbiota-mineral interactions could help in the development of new strategies for combating many diseases (i.e., cancers, autoimmune and non-communicable diseases). Further clinical trials should investigate the effect of micronutrients on the microbiome and the consequential influence of these interactions on the host health. Finally, a better understanding of intra- and inter-individual variability is required as gut microbiomes of individuals may react differently under similar environmental circumstances.

Acknowledgments: This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia, Contract 451-03-9/2021-14/200015.

Publication: In press - Knez, M., Ranić, M., Stangoulis, J., Glibetić, M. The mineral intake and microbiota. In Reference Module in Food Science, Elsevier (2022). doi: 10.1016/B978-0-12-819265-8.00032-2.