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Opinion Article

Genetic Characterization and Modification of Probiotics

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DESCRIPTION

The human microbiota is composed of the trillions of bacteria that exist within the human body. These bacteria develop complex, organ-specific, and adaptable habitats that continuously affect the physiology of the host. The microbiota and all of its genetic material (the micro biome) are made up of different types of bacteria, fungi, viruses, and parasites (parasitome). Together, they have a significant impact on digestion, immunological development, vitamin production, as well as behavior and mental health in both humans and animals. The term "probiotics" refers to live microorganisms that, "when administered in adequate amounts, provide a health advantage on the host," and "prebiotics" refers to certain microbial substrates that can be selectively consumed by hosts and microorganisms thereby conferring a health benefit. By supplementing with the proper probiotics and/or prebiotics, it is possible to enhance the benefits to human health. Probiotics, prebiotics, and related microbiome studies have made significant strides in recent years. Alternatives to standard *in vitro* and in vivo models are now available in the form of novel techniques, which make it possible to generate the mode of action of probiotics and prebiotics, and their impact on the microbiome, and the clinical health outcomes that follow more rapidly. Probiotic and prebiotic advantages for a variety of health issues, including diarrhea, vaginal dysbiosis, respiratory infections, bowel function, body weight, and bone mineralization, are demonstrated in numerous clinical trials. All of this requires a discussion on probiotics and prebiotics and their use in science, and how they interact with the host microbiome. In order to understand the mechanisms of action of probiotics, potentially develop strains, genetic modification is a crucial technique. The development of the study is constrained by the shortage of appropriate genetic tools for some probiotic species, particularly food-grade systems for bifidobacteria, and by the lack of a regulatory regime for the use of genetically modified/enhanced organisms. Transferring genetic components to biological repositories is not yet a common practice, in addition to ethical and legal concerns. The considerable effort it takes to make these constructs and regulations and are probably the main reasons to keep this genetic material for a better sharing of genetic modification by providing the material to the scientific community through existing repositories (eg: Add Gene, European Nucleotide Archive). Significant time and money investment that will help to expand the genetic tools for probiotics. A significant stage in genetically modifying probiotic strains for industrial and medicinal applications, including specialised probiotics that transmit bioactive substances to more efficiently target particular diseases and it is the production of safe vectors (for example, food-grade vectors). An effort in genetic components and a better knowledge of their action mechanism and specialization might be beneficial for both basic and practical probiotics development. The probiotics sector, genetic and bioinformatics knowledge and experience in these interdisciplinary fields will be crucial.

CONCLUSION

Genetic modification is a crucial technique to understand the mechanisms of action in the modification of probiotics and potentially develop strains. Transferring genetic components to biological repositories is not yet a common practise. A significant stage in genetically modifying probiotic strains for industrial and medicinal applications is the production of safe vectors.

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