
EDITORIAL NOTES

Preface to the Special Issue “Genetic Technologies in Medicine, Agriculture, and Biotechnology”

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The development of genetic technologies has revolutionized various fields – from medicine to agriculture – opening unprecedented opportunities for addressing a range of global challenges. This special issue is dedicated to cutting-edge advancements in genetic technologies and demonstrates their potential applications in the diagnosis and prediction of the course and outcomes of various diseases, the development of new therapeutic approaches and vaccines based on genetic tools, as well as the creation of new pathogen-resistant plants and biotechnological production of proteins and peptides.

To date, hundreds of molecular tools have been developed that allow for the modulation, editing, and modification of the state of any molecules within the DNA–RNA–protein continuum, as well as alterations to their “tags” in the form of epigenetic, epitranscriptomic, and epiproteomic states. Conducting experiments aimed at the targeted modification of biomolecules has become routine in molecular biology and genetic engineering. Using genetic technologies, methods have been established for treating human diseases (infectious, oncological, hereditary, autoimmune, etc.). New plants are being created with enhanced nutritional value, resistance to pests, pathogens, or adverse weather conditions, reduced levels of harmful compounds,

or increased shelf life of fruits. In industrial biotechnology, approaches are being developed to enhance the beneficial properties of microbial strains – such as increased product yields, fermentation processes, bioremediation, and more. Many of these approaches have rapidly transitioned into practice.

It is noteworthy that this special issue covers nearly all key global trends in biomedicine and the development of gene therapeutic approaches, ranging from the use of new biomarkers for diagnosing and managing patients with various diseases to the development of therapeutic strategies and vaccines. The latter are represented by tools for which Nobel Prizes have been awarded in the last two iterations – based on CRISPR/Cas systems and mRNA. In addition to the canonical use of CRISPR/Cas for editing the human genome, this issue includes studies on the application of genetic technologies for treating viral infections and creating virus-resistant plants, thereby extending beyond the realm of biomedicine to address issues in agricultural biotechnology.

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