

*Dear Friends and Colleagues,*

*The twentieth century is often called the atomic and space age. Humankind made a gigantic leap in understanding the innermost secrets of the macro- and microworld. However, since the second half of the century, life sciences, which embrace the most diverse fields of biology and medicine, have been coming to the fore. Thus, the current century can be called the age of biotechnology, which is understood in the broadest sense—as a link between all life sciences.*

*This is a logical choice of priorities. The huge population growth on our planet has shifted the focus of attention to the immediate needs of people, such as food, clean environment, accessible and effective health care, etc. The increase in life expectancy necessitates strategies to provide healthy and active life for elderly people, whose number is steadily growing. On the other hand, some regions are faced with overpopulation and increased migration, which have provoked new health issues related to the spread of “old” and new dangerous infectious agents such as viruses, parasites, etc. Therefore, the explosive development of biomedical technology, which began when scientists discovered DNA and decoded the human genome, is not only an outcome of the accumulation of knowledge but also a response to the most pressing issues of our time.*

*It is true to say that the time is past to collect the information; now it is time to reap the fruits, i.e., develop the science and technology directly linked to practical applications.*

*First, these are studies focused on “taming” viruses, i.e., living organisms that are, in essence, simple and mobile sets of genetic information, which parasitize in the cells of higher organisms. In fact, this is why many virus species are pathogenic or even lethal to humans. However, with the development of fundamental research in biology, viruses have now become the core of genetic engineering. Researchers use viruses to create safe and specific anticancer drugs since the rapidly dividing tumor cells devoid of antiviral defense are a perfect target for these tiniest organisms, which have no reproduction system of their own.*

*Perhaps, the most inventive way to use viruses is phage therapy. The bacteriophages are viruses able to devour bacteria, many of which being our foes. Therefore, phages can serve as a safe and effective biological weapon designed not only to combat specific pathogenic microorganisms but also address the needs of a specific patient. Moreover, unlike antibiotics, phage preparations do not cause drug resistance.*

*However, we should not necessarily look for effective and, importantly, mild treatment strategies outside the human body. Researchers discover substances with antitumor activity*



*in most surprising sources, e.g., in breast milk. A genetically engineered analogue of one of these proteins can provoke the “suicide” of cancer cells, interfering with the development of metastases in malignant breast tumors, which is one of the main causes of death from breast cancer. Moreover, the human body can be forced to not only kill pathological cells but also stimulate the replication of nondifferentiated cells from the body’s “strategic reserve.” Special stem cell modifiers can be used to regenerate tissue and organs even in such incurable cases as liver cirrhosis.*

*If the body itself cannot regenerate an organ, high-tech implants are available. For example, electrohydrodynamic spraying of polymers is used to create prosthetic blood vessels from fibers with a width of tens of nanometers to several microns. In terms of functional properties, these prostheses are virtually indistinguishable from (and, in some aspects, even better than) natural blood vessels. These are, as a rule, interdisciplinary studies capitalizing on the knowledge and experience of physicists, chemists, bioinformatics researchers, etc., as well as biomedical scientists. They develop new tools to diagnose parasitoses caused by liver flukes and conduct an integrated thermal imaging examination of patients. Last, but not least, researchers design unique computer games helping people learn how to control their physiological parameters to free the hidden reserves of their bodies.*

*Again, it should be noted that despite the most promising results, many of the pioneering works presented in this special issue are in an early stage of development and it is too soon to make predictions about their future. Nonetheless, it is apparent that the future of healthcare lies with the implementation of new medical technology and the responsibility for this future lies with all of us.*

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