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VIRUSES

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We used to think of viruses as something deadly, especially now, after the coronavirus pandemic. However, almost any virus, including SARS-CoV-2, can be turned from a sworn enemy into the best health defender by removing dangerous genes from its DNA or RNA and replacing them with the necessary transgenes; their protein products are so needed for malfunctioning cells. Recombinant viral vectors, therefore, represent the gene therapy basis. They are the only effective way to introduce genes into human cells, thanks to the penetration mechanisms and the virus spread in the cell honed by millions of evolution years.

New treatment methods based on the functional genes introduction (or even full-fledged genome editing) can radically change existing therapeutic strategies and provide effective care for many now "hopeless" diseases such as Parkinson's disease, Huntington's disease, Alzheimer's disease, spinal muscular atrophy, hemophilia A and B, familial hypercholesterolemia, ornithine transcarbamylase deficiency, mucopolysaccharidosis-III A and Kriegler—Nayyar syndrome and even oncology.

Actually, according to some researchers' opinion, the virus is not only an enemy for humans. Having tamed the virus, we have received an important mechanism allowing to carry out gene therapy and treat people whose diagnosis has been considered a verdict recently.

The medicine future may be behind the dangerous viruses transformation into useful and safe medicines that will save the world from incurable diseases. Perhaps, in the nearest future, SARS-CoV-2 will also be used as a recombinant vector, e.g., for the lung diseases treatment. Probably, biology and medicine will achieve significant results in taming viruses soon and dangerous infectious agents guard the mankind health.

Technologies do not stand still, and now scientists are obtaining vectors that are actively used in optogenetics, in the study of connections between neurons, gene expression, and even in viral therapy.