Chemical instruments in molecular biology

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Biology as an experimental science needs constant improvement of methods for studying the subtle processes underlying life activity. The most complex uniquely constructed substances are pro-teins and nucleic acids. To work with these molecules we need tools that have too small size. Such size has oligonucleotides. These are individual molecules that can enter the chemical interactions with selected biopolymer elements. In addition, it is now known that individual diseases, as well as predisposition to diseases, are directly related to specific genomic sequences, and studies are being conducted on the possibility of influencing these sequences.

The methods of using chemical tools in molecular biology on the example of antisense influence the genetic structures and the prospects for their use in genetic engineering and medicine were found.

RNA interference is the process of suppressing gene expression in the stage of transcription, translation, deadenylation or degradation of mRNA by siRNA molecules. The selective and powerful nature of the influence of RNA interference on gene expression makes it possible to use this method as a convenient tool for biological research, both in cell cultures and in living organisms. The use of this path is also promising for biotechnology and medicine, in particular for the development and implementation of a new generation of drugs.

Two drugs approved by US Food and Drug Administration based on modified antisense oligo-nucleotides have been clinically tested and applied: Fomivirsen (trade name Vitravene) and Mipomersen (trade name Kynamro).

Chemical instruments of molecular biology, in particular, oligonucleotides can be successfully used in modern medicine, for example, by influencing the mechanism of RNA interference. Oligonu-cleotides are the basis for new gene therapy direction - antisense therapy. Thus, medications can be created with the possibility to cure or substantially alleviate many diseases, both hereditary and viral, such as hepatitis A, B, influenza, HIV, and malignant tumors.

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