

DESCRIPTION OF BINDING OF PROTEINS AND DRUG COMPOUNDS TO DNA BY MEANS OF STATISTICAL THERMODYNAMICS

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The report demonstrates the possibility of application of statistical thermodynamics for analysis of the binding of proteins, antibiotics, and oligonucleotides with DNA and RNA in solution and on the platforms of biochips. Reversible binding of different kinds of ligands with nucleic acids is reviewed on the basis of the theory of adsorption. The various stages of the analysis of the experimental data is shown: from the building of a thermodynamic model of adsorption, using a mathematical model to the development of data analysis methods. With a single point of view a set of models of adsorption were considered and the classification of models of adsorption was done. This classification allows on the basis of the experimental data to find out the energy and geometric parameters of the model of adsorption. The developed methods allow to describe the results of the experiments of binding biologically active compounds to DNA in solution and to shed light on the nature of the mechanisms underlying the protein binding with nucleic acids in a living cell. The basis of the report is a monograph, which presents a wide variety of mathematical models describing the binding of ligands to DNA and are not included in the guide to molecular Biophysics.

References

Nechipurenko Yu.D. Analysis of binding biologically active compounds to nucleic acids. Moscow-Izhevsk, ICI, 2015. ISBN 978-5-4344-0295-8 <http://shop.rcd.ru/catalog/385/18492/>