# Bioinformatics
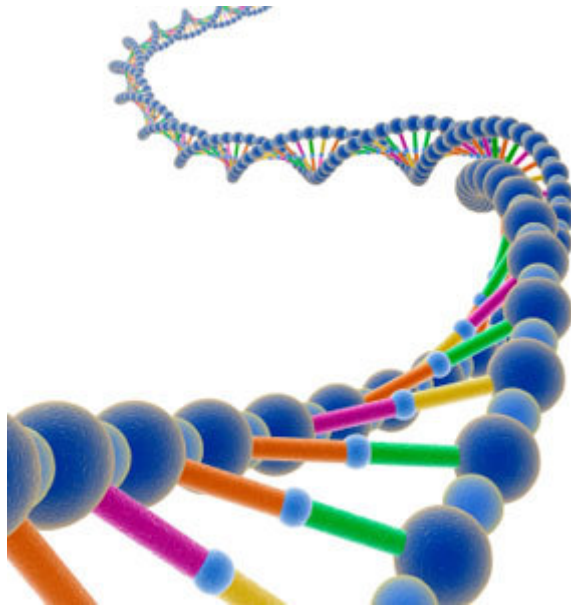


ioinformatics is a hybrid science that links biological data with techniques for information storage, distribution, and analysis to support multiple areas of scientific research, including biomedicine. Bioinformatics is fed by high-throughput data-generating experiments, including genomic sequence determinations and measurements of gene expression patterns. Database projects curate and annotate the data and then distribute it via the World Wide Web. Mining these data leads to scientific discoveries and to the identification of new clinical applications.

In the field of medicine in particular, a number of important applications for bioinformatics have been discovered. For example, it is used to identify correlations between gene sequences and diseases, to predict protein structures from amino acid sequences, to aid in the design of novel drugs, and to tailor treatments to individual patients based on their DNA sequences (pharmacogenomics).

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[1] "[Helix]", ill. under ''Bioinformatics'', **S [&] T: Dependable Solutions**,
www.stcorp.nl/step/bioinformatics

The goal of bioinformatics is the extension of experimental data by predictions. A fundamental goal of computational biology is the prediction of protein structure from an amino acid sequence. The spontaneous folding of proteins shows that this should be possible. Progress in the development of methods to predict protein folding is measured by biennial Critical Assessment of Structure Prediction (CASP) programs, which involve blind tests of structure prediction methods.

Bioinformatics is also used to predict interactions between proteins, given individual structures of the partners. This is known as the "docking problem." Protein-protein complexes show good complementarity in surface shape and polarity and are stabilized largely by weak interactions, such as burial of hydrophobic surface, hydrogen bonds, and van der Waals forces.

Computer programs simulate these interactions to predict the optimal spatial relationship between binding partners. A particular challenge, one that could have important therapeutic applications, is to design an antibody that binds with high affinity to a target protein.

Initially, much bioinformatics research has had a relatively narrow focus, concentrating on devising algorithms for analyzing particular types of data, such as gene sequences or protein structures. Now, however, the goals of bioinformatics are integrative and are aimed at figuring out how combinations of different types of data can be used to understand natural phenomena, including organisms and disease.[2]

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[2] "Bioinformatics", **Encyclopedia Britannica**,
www.britannica.com/EBchecked/topic/1334661/bioinformatics

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