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Perspective

Research Areas and Applications for Genomics

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DESCRIPTION

Genomics is the study of human genes and chromosomes. The human genome typically consists of 23 pairs of chromosomes and 24,000 genes. In medicine, genome and DNA sequencing determining the exact structure of a DNA molecule are done to learn more about a patient's molecular biology. Human genomics is not the only part of genomics relevant to human health. The human genome interacts with those of a myriad other organisms, including plants, vectors and pathogens. Genomics is considered across all organisms, as relevant to public health in human populations. In addition to genomics knowledge, also considers technologies that make use of genomics knowledge. Genomics is distinct from genetics. While genetics is the study of heredity, genomics is defined as the study of genes and their functions, and related techniques. The main difference between genomics and genetics is that genetics scrutinizes the functioning and composition of the single gene whereas genomics addresses all genes and their inter relationships in order to identify their combined influence on the growth and development of the organism.

Structural genomics

Aims to determine the structure of every protein encoded by the genome. Structural genomics seeks to describe the 3-dimensional structure of every protein encoded by a given genome. This genome-based approach allows for a high-throughput method of structure determination by a combination of experimental and modeling approaches.

Functional genomics

Aims to collect and use data from sequencing for describing gene and protein functions. Functional genomics is a field of molecular biology that attempts to make use of the vast wealth of data produced by genomic projects (such as genome sequencing projects) to describe gene (and protein) functions and interactions. Functional genomics focuses on the dynamic aspects such as gene transcription, translation, and protein-protein interactions, as opposed to the static aspects of the genomic information such as DNA sequence or structures.

Comparative genomics

Aims to compare genomic features between different species. The major principle of comparative genomics is that common features of two organisms will often be encoded within the DNA that is evolutionarily conserved between them.

Mutation genomics

Studies the genome in terms of mutations that occur in a person's DNA or genome. Mutations may or may not produce detectable changes in the observable characteristics (phenotype) of an organism. Mutations play a part in both normal and abnormal biological processes including: evolution, cancer, and the development of the immune system, including junctional diversity. Different applications of genomics

Medical application

Anti-malarial drugs: The chemicals fosmidomycin and FR-900098 are being tested for their targeted effects in inhibiting DOX reductoisomerase in the body, which is involved in the lifecycle of P. falciparum, the most dangerous of the parasites that can cause malaria.

Oral immunization plants and Oral plant vaccines, which use DNA and transgenes to create surface antigens that stimulate immunity when consumed, show promise in the quest to immunize humans against hepatitis B. The genome of Mycoplasma genitalium was used to synthesize the bacterium Mycoplasma laboratorium, which has distinct characteristics from the original bacteria. The genetic diversity of a population or the heterogeneity of an individual for a hereditary condition with a recessive inheritance pattern can be used to predict the health and conservation of the population.

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