

1. How do we get parents' features as it is?

We inherit traits from our parents through genes, which are segments of DNA located on chromosomes. Each parent contributes half of their chromosomes to their offspring. This genetic material contains instructions for various characteristics. The specific combination of genes inherited from both parents determines our features. While some traits follow simple inheritance patterns (like eye color or blood type), others result from complex interactions between multiple genes and environmental factors.

2. Why are some diseases fast spreading?

Some diseases spread quickly due to several factors:

- **Mode of Transmission:** Diseases transmitted through the air, like the flu, can spread faster than those needing direct contact.
- **Contagiousness:** Highly contagious diseases, such as measles, infect a large number of people quickly.
- **Population Density:** Crowded living conditions facilitate faster disease spread.
- **Mobility:** Increased travel and movement of people can help spread diseases over large areas swiftly.
- **Asymptomatic Carriers:** People who carry the disease but do not show symptoms can unknowingly transmit it to others.

3. What is a PCR test?

A Polymerase Chain Reaction (PCR) test is a molecular technique used to amplify and detect specific DNA sequences. It involves:

Denaturation: Heating the DNA to separate its strands.

Annealing: Cooling to allow primers to bind to the DNA sequences of interest.

Extension: Using DNA polymerase to replicate the DNA strands.

PCR tests are widely used in medical diagnostics, including detecting pathogens like viruses and bacteria, genetic research, and forensic science.

4. What are genetic diseases?

Genetic diseases are disorders caused by abnormalities in an individual's DNA. These abnormalities can be:

- **Inherited:** Passed down from parents to offspring, such as cystic fibrosis or sickle cell anemia.

- **Mutations:** Changes in the DNA sequence that occur spontaneously or due to environmental factors, like certain cancers. Genetic diseases can be single-gene disorders, chromosomal disorders, or multifactorial disorders involving multiple genes and environmental factors.

5. Short Notes

a. DNA

Deoxyribonucleic Acid (DNA) is the molecule that carries the genetic instructions used in the growth, development, functioning, and reproduction of all known living organisms and many viruses. DNA is composed of two long strands forming a double helix, held together by base pairs: adenine (A) with thymine (T) and cytosine (C) with guanine (G).

b. RNA

Ribonucleic Acid (RNA) is a single-stranded molecule involved in various roles within the cell, primarily in the synthesis of proteins. RNA differs from DNA in having the sugar ribose instead of deoxyribose and uracil (U) in place of thymine. Types of RNA include messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA).

c. Protein

Proteins are large, complex molecules made up of amino acids and are essential for the structure, function, and regulation of the body's tissues and organs. Proteins perform a vast array of functions, including catalyzing metabolic reactions, DNA replication, responding to stimuli, and transporting molecules.

d. NCBI

The National Center for Biotechnology Information (NCBI) is a branch of the U.S. National Library of Medicine, a part of the National Institutes of Health. It provides access to biomedical and genomic information, including databases like GenBank for DNA sequences and PubMed for scientific publications.

e. Evolutionary Biology

Evolutionary Biology is the study of the processes that have given rise to the diversity of life on Earth. It involves the study of how organisms evolve and adapt through natural selection, genetic drift, mutations, and gene flow. It encompasses various disciplines, including paleontology, genetics, and ecology.

f. Molecular Biology

Molecular Biology focuses on the molecular basis of biological activity, including the interactions between different systems of a cell, including the interrelationship of DNA, RNA, and protein synthesis. Techniques used in molecular biology include cloning, PCR, gel electrophoresis, and sequencing.

g. Bioinformatics

Bioinformatics is an interdisciplinary field that combines biology, computer science, and information technology to analyze and interpret biological data. It involves the development of algorithms, software, and databases to understand biological data, such as genetic sequences and protein structures.