Editorial

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# Editorial Note on Genome

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## Editorial

Deoxyribonucleic acid (DNA) is a chemical molecule that holds the instructions for practically all living creatures to develop and direct their activities. A double helix is a DNA molecule that is made up of two twisting, coupled strands.

The genetic "alphabet" is made up of four chemical units termed nucleotide bases, which are found in each DNA strand. Adenine (A), thymine (T), guanine (G), and cytosine (C) are the bases (C). Bases on opposite strands are always paired together: an A is always paired with a T, and a C is always paired with a G. The meaning of the information encoded in that region of the DNA molecule is determined by the order of the As, Ts, Cs, and Gs, much as the meaning of a word is determined by the order of letters.

The genome is an organism's complete set of DNA. The approximately 3 billion DNA base pairs, or letters, that make up the human genome are found in virtually every cell in the body. DNA is a four-letter language that includes all of the information needed to construct the human body. A gene is a piece of DNA that contains the instructions for producing a specific protein or group of proteins. Each of the 20,000 to 25,000 genes which are present in human genome codes for three proteins on average.

Genes, which are packed into the nucleus of a human cell on 23 pairs of chromosomes, direct the production of proteins with the help of enzymes and messenger molecules. An enzyme, in particular, transfers information from a gene's DNA into a molecule known as messenger ribonucleic acid (mRNA). The mRNA goes from the nucleus to the cytoplasm, where it is read by a ribosome, a tiny molecular machine that uses the information to link together small molecules called amino acids in the correct order to make a specific protein.

Proteins are responsible for the formation of body structures such as organs and tissue, as well as the control of chemical reactions and the transmission of signals between cells. When the DNA of a cell is mutated, an aberrant protein is created, which can disrupt the body's regular activities and lead to diseases like cancer. Proteins are involved in the creation of biological structures such as organs and tissue, as well as chemical reaction control and signal transmission between cells. When a cell's DNA is mutated, an abnormal protein is produced, which can impair the body's normal functions and lead to disorders such as cancer.

In the most popular method of sequencing used today, called sequencing by synthesis, DNA polymerase (the enzyme in organisms that synthesises DNA) is utilised to generate a new strand of DNA from a strand of interest. During the sequencing stage, individual nucleotides that have been chemically tagged with a fluorescent label are inserted into the new DNA strand. A light source excites the nucleotide, which causes a fluorescent signal to be released and measured. The signal varies depending on which of the four nucleotides was used. This method can generate 125 nucleotide 'reads' in a row and billions of reads all at the same time.

Researchers must read the sequence of overlapping segments to build the sequence of all the bases in a big piece of DNA, such as a gene. This makes it possible to piece together the longer sequence from lesser sections, similar to piecing together a linear jigsaw puzzle. To ensure accuracy, each base must be read at least numerous times in the overlapping portions during this operation.

DNA sequencing can be used to look for genetic variants and/or mutations that could play a role in the onset or progression of a disease. The disease-causing alteration could be as minor as a single base pair substitution, deletion, or insertion, or as vast as tens of thousands of bases loss.

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