

# main points

- Amino acids all share the same basic chemical structure, including an amino group and a carboxylic acid group.
- Proteins are polymers of amino acids.
- Proteins have primary, secondary, and tertiary levels of structure. Multisubunit proteins have quaternary structure.
- Enzymes are the protein molecules that catalyze most of the chemical reactions of life.
- Many of the key structural and functional parts of living things are made largely of protein.
- Proteins have a variety of functions including enzymatic, transport, and structural.
- A DNA molecule consists of a repeating “backbone” of alternating sugar and phosphate groups, with the bases attached to this backbone.
- DNA normally exists in the form of two strands intertwined in a spiral formation, known as a double helix. The strands are held together by hydrogen bonds between the bases.
- The DNA of human cells is found within 46 distinct structures in the cell nucleus known as chromosomes. Within the chromosomes, we find a total of around 50,000 specific regions of DNA known as genes.
- A gene is a long section of a DNA strand that contains a particular sequence of bases able to direct the manufacture of a particular protein.
- Ribonucleic acid, RNA, transfers genetic material to ribosomes as part of the process of protein synthesis.
- The chemical process of DNA replication underpins the ability of humans to have children, of plants to release seeds that can grow into other plants, and of all cells to multiply by splitting in two.
- Carbohydrates are compounds of carbon, hydrogen, and oxygen in which the ratio of H to O is 2 to 1. Carbohydrate is needed principally as a source of body energy.
- Many fats and oils are triglycerides composed of carbon, hydrogen, and oxygen but each fat molecule has only six oxygen atoms. They are examples of lipids.
- ATP is the “energy currency” of life.
- All organisms are made up of cells. Complex multicellular organisms such as humans contain many billions of individual cells, whereas the simplest organisms are single free-living cells.
- Genetic engineering is the artificial manipulation of DNA and genes.