

Hydrogen bond disruption in DNA

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Deoxyribonucleic acid (DNA) is present in every living organism and encodes the instruction and information to process and produce proteins that are required for the proper functioning of the body. DNA is a double helix molecule and consists of nucleotides composed of nitrogen bases, namely adenine, thymine, guanine and cytosine. These bases are complementary and form hydrogen bonds between them. Adenine pairs with thymine by forming 2 hydrogen bonds and guanine pairs with cytosine by forming 3 hydrogen bonds. Hydrogen bonds are responsible for maintaining the stability and structure of the DNA molecules, hence disruption in any of these bonds can change the DNA function and structure. Hydrogen bonds are non-covalent and form weak interactions, hence this property is essential for DNA replication. According to research, even if a single bond between the bases gets broken due to external factors such as radiation, it might trigger errors in the process of DNA replication and transcription. Studies have revealed that irradiation-induced mutation in DNA modifies hydrogen bonds causing genetic damage and resulting in the formation of tumours. Prevention of such mutations and genetic damage up to a certain limit can be done by avoiding exposure to carcinogenic chemicals and harmful radiation. However, chances of spontaneous hydrogen bond disruptions are very rare as DNA does not get mutated quickly but there are possibilities that are being researched.

Keywords: Genetic material, Hydrogen bonds, Bases, Mutation, DNA breakage, DNA replication, DNA transcription

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