

Al- Mustaqbal University
College of Science
Medical Physics Department
First Stage



General biology

Lecture : 3

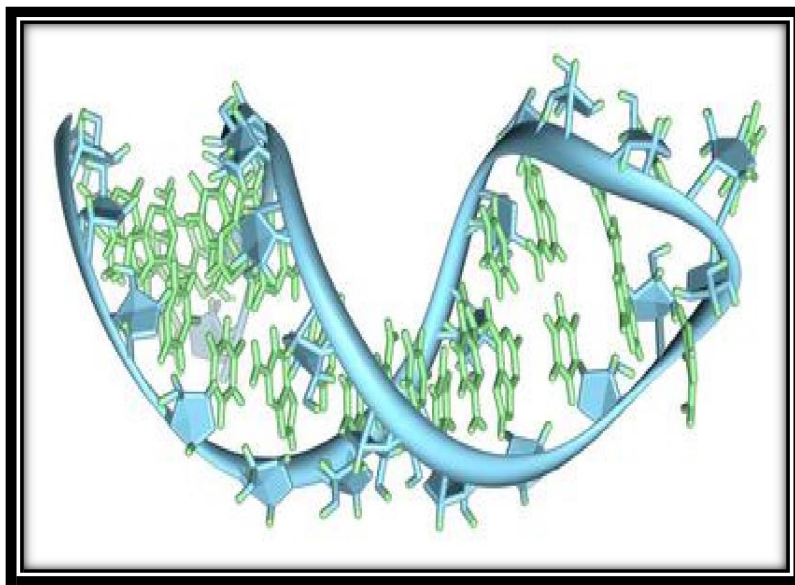
RNA



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RNA

Ribonucleic acid (RNA) is a polymeric molecule that is essential for most biological functions, either by performing the function itself (Non-coding RNA) or by forming a template for the production of proteins (messenger RNA). RNA and deoxyribonucleic acid (DNA) are nucleic acids. The nucleic acids constitute one of the four major macromolecules essential for all known forms of life



single strand of RNA

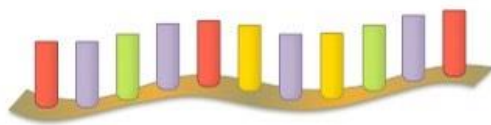


Let's Start!

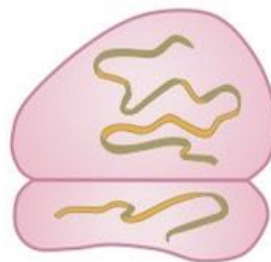
Types of RNA

RNA stands for ***ribonucleic acid***. Its function is to carry out the instructions encoded in DNA. There are three types of RNA, each with a different function. These are:

- 1- **Messenger RNA (mRNA)** – mRNA carries information for protein synthesis from the DNA molecules in the nucleus to the ***ribosomes***
- 2- **ribosomal RNA (rRNA)** – rRNA is a structural component of ***ribosomes*** (the organelles that perform protein synthesis)
- 3- **Transfer RNA (tRNA)** – tRNA transfers amino acids to the ribosome. These amino acids are used to assemble a new ***polypeptide chain***



Messenger RNA (mRNA)



Ribosomal RNA (rRNA)

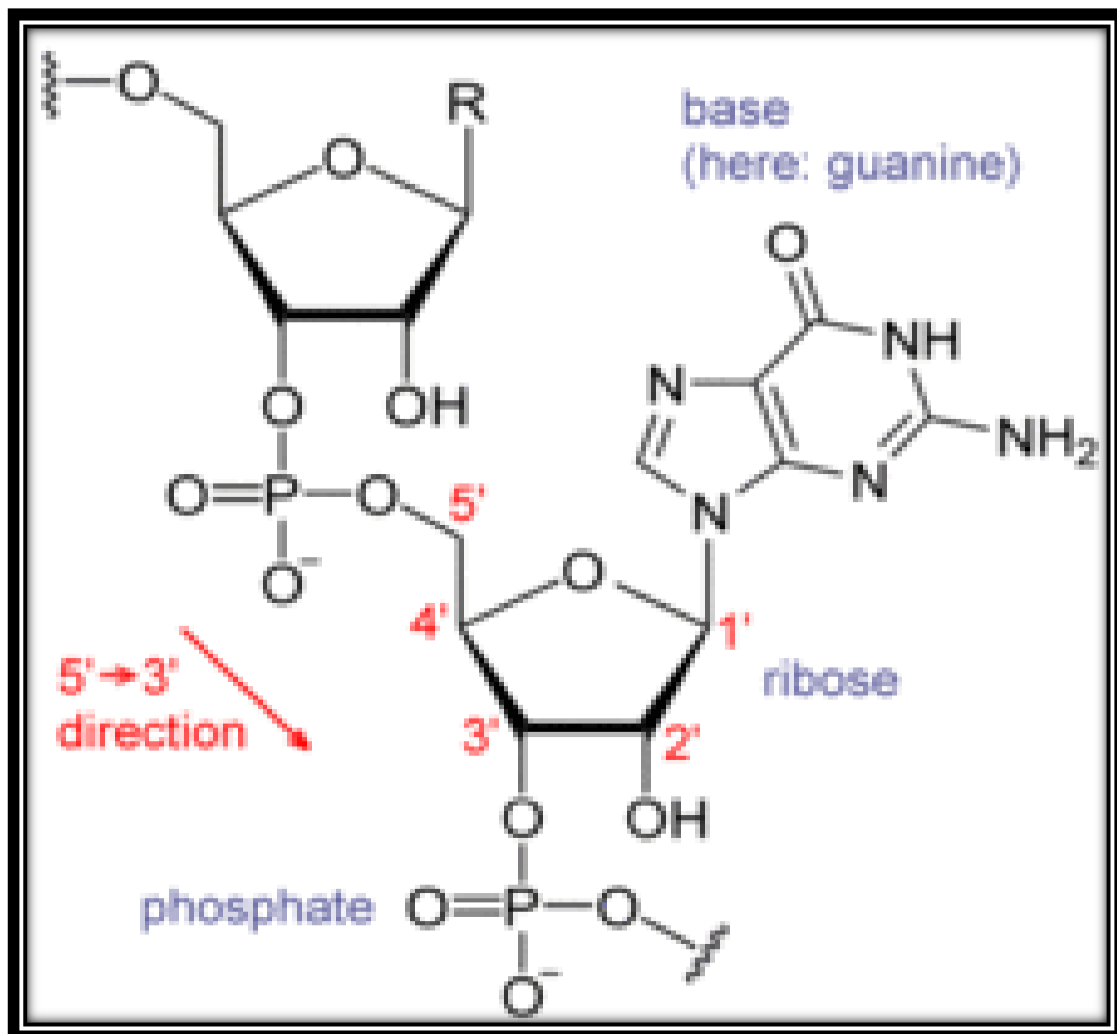


Transfer RNA (tRNA)

Structures of RNA

- 1- Each nucleotide in RNA contains a ribose sugar, with carbons numbered 1' through 5'.
- 2- in general, adenine (A), cytosine (C), guanine (G), or uracil (U). Adenine and guanine are purines, cytosine and uracil are pyrimidines. A phosphate group is attached to the 3' position of one ribose and the 5' position of the next.

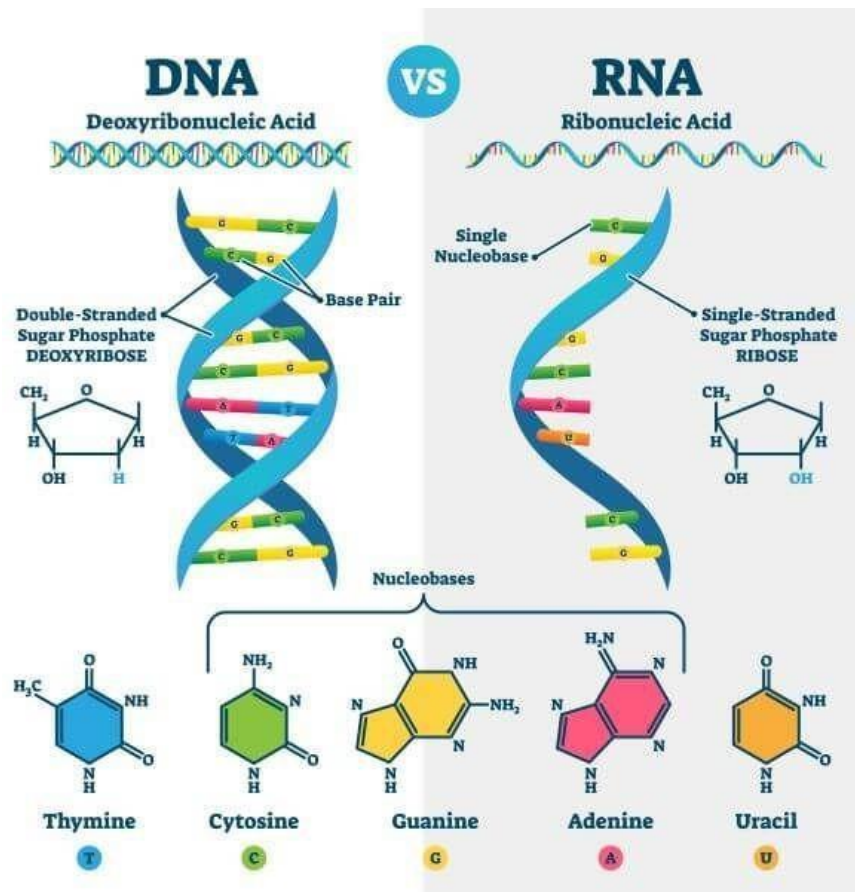
- 3- The phosphate groups have a negative charge each, making RNA a charged molecule (polyanion).
- 4- The bases form hydrogen bonds between cytosine and guanine, between adenine and uracil and between guanine and uracil.
- 5- An important structural component of RNA that distinguishes it from DNA is the presence of a hydroxyl group at the 2' position of the ribose sugar.



Structure of a fragment of an RNA

Comparision between DNA and RNA:

DNA	RNA
Stores genetic information for the cell	Uses the information stored in DNA to make proteins
Contains the 5-carbon sugar deoxyribose	Contains the 5-carbon sugar ribose
Double-stranded	Single-stranded
Contains thymine	Contains uracil
Self-replicating	Synthesised by transcription



DNA and RNA molecules have different functions. DNA stores genetic information for the cell, whereas RNA codes for amino acids and acts as a messenger between DNA molecules and the ribosomes.

NA molecules are ***self-replicating***, whereas RNA molecules are synthesized by a process called ***transcription***.

