

Translation (genetics)

Diagram showing the translation of mRNA and the synthesis of proteins by a ribosome

Translation is the second part of [protein biosynthesis](#) (the making of proteins). It is part of the process of [gene expression](#).

Before translation comes:

1. [transcription](#), which produces a chain of [introns](#) and [exons](#).
2. [RNA splicing](#) by [spliceosomes](#) which remove introns, and
3. formulation of the [messenger RNA](#) from exons.

In [eukaryotes](#), translation happens on the [ribosomes](#) in the [cytoplasm](#) and in the [endoplasmic reticulum](#). In [bacteria](#), translation happens in the cell [cytoplasm](#): they have no [nucleus](#).

Ribosomes are made of a small part and a large part which surround the [mRNA](#) (messenger RNA). In translation, mRNA has the base sequence to make a specific [polypeptide](#). This sequence is originally specified by the [DNA](#), and copied by the mRNA. The polypeptide can be a whole [protein](#). Or, it can be just a part, waiting to be combined with other polypeptides so it can make a whole protein. The polypeptide also has to be folded before it works as a protein.

[Amino acids](#) are carried by specific [tRNAs](#) with [anticodons](#) to connect with mRNA's matching [codons](#). Each tRNA has its own anticodon and carries an amino acid. An anticodon is always together with the same amino acid.

When the tRNA matches with the mRNA, the amino acid that is connected to the tRNA is unconnected from the tRNA and gets connected to the amino acid brought by the previous tRNA.

So, a ribosome works a lot like a stock ticker and ticker tape. Many ribosomes, together with mRNA, will attach themselves to the outer [membrane](#) of the rough [endoplasmic reticulum](#). Any proteins that those ribosomes make go into the inside of the endoplasmic reticulum, where it will probably go into a [vesicle](#) later. The vesicles will then bring the proteins to other [organelles](#) or even the outside of the cell.

Four stages

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Overview of the translation of eukaryotic messenger RNA

Translation happens in four stages: activation (make ready), initiation (start), elongation (make longer) and termination (stop). These terms describe the growth of the amino acid chain (polypeptide).

1. Amino acids are brought to ribosomes and assembled into proteins. In the activation stage, the correct amino acid is [covalently bonded](#) to the correct transfer RNA (tRNA). When the tRNA is connected to an amino acid, it is "charged".
2. Initiation is when the small part of the ribosome connects to 5' end of the mRNA with the help of [initiation factors](#) (IF).
3. Elongation is when the amino acids brought by the "charged" tRNAs are connected to each other to form a polypeptide.

Some [antibiotics](#) work by keeping translation from happening. [Prokaryotic](#) ribosomes are different from eukaryotic [ribosomes](#). So antibiotics can kill bacteria without hurting the eukaryotic host. For example, antibiotics taken by a human might kill the bacteria that is making the human sick but wouldn't hurt the human.

References

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