

PROTEIN SYNTHESIS

TRANSLATION



1. Translation is the process of synthesizing a protein from an mRNA template. The mRNA template is read in groups of three bases called codons. Each codon codes for a specific amino acid.

2. During translation, the ribosome moves along the mRNA template, reading the codons and adding the corresponding amino acids to the growing polypeptide chain.

3. The process of translation is controlled by transfer RNA (tRNA) molecules, which carry the amino acids to the ribosome. Each tRNA has an anticodon that matches the codon on the mRNA template.



THE GENETIC CODE

"One codon at a time"

1. Biological systems use sequences of three nucleotides to specify the amino acids that are used to build proteins. These sequences are called codons.

2. Each codon specifies a particular amino acid. For example, the codon AUG codes for the amino acid methionine.

3. The sequence of codons in an mRNA molecule determines the sequence of amino acids in a protein. This process is called translation.

4. The genetic code is a set of rules that defines how the sequence of nucleotides in a gene is translated into the sequence of amino acids in a protein.

"One gene - one protein"

1. Each gene contains the instructions for making a specific protein. The sequence of nucleotides in a gene determines the sequence of amino acids in the protein.

2. The process of translating the genetic code into a protein is called translation. This process is controlled by transfer RNA (tRNA) molecules.

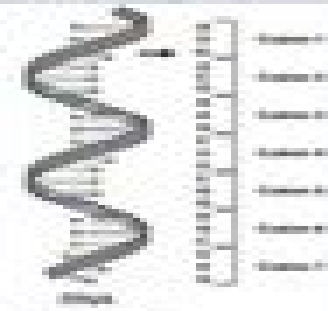


Diagram of a DNA double helix.

Diagram of a DNA double helix.

THE GENETIC CODE

First base	Second base				Third base
	U	C	A	G	
U	UUU Phe	UCU Ser	UAU Tyr	UGU Cys	U
	UUC Phe	UCC Ser	UAC Tyr	UGC Cys	C
	UUA Leu	UCA Ser	UAA Stop	UGA Stop	A
	UUG Leu	UCG Ser	UAG Stop	UGG Trp	G
C	CUU Leu	CCU Pro	CAU His	CGU Arg	C
	CUC Leu	CCC Pro	CAC His	CGC Arg	C
	CUA Leu	CCA Pro	CAA Gln	CGA Arg	A
	CUG Leu	CCG Pro	CAG Gln	CGG Arg	G
A	AUU Ile	ACU Thr	AUU Ile	AUU Ile	A
	AUC Ile	ACC Thr	AUA Ile	AUA Ile	C
	AUA Ile	ACA Thr	AUA Ile	AUA Ile	A
	AUG Met	ACG Thr	AUG Met	AUG Met	G
G	GUU Val	GCU Ala	GAU Asp	GGU Gly	G
	GUC Val	GCC Ala	GAC Asp	GGC Gly	C
	GUA Val	GCA Ala	GAA Glu	GGA Gly	A
	GUG Val	GCG Ala	GAG Glu	GGG Gly	G

THE GENETIC CODE IS A REFERENCE TOOL

THE GENETIC CODE

First base	Second base	Third base	Amino acid
U	U	U	Phe
U	U	C	Phe
U	U	A	Leu
U	U	G	Leu
U	C	U	Ser
U	C	C	Ser
U	C	A	Ser
U	C	G	Ser
U	A	U	Tyr
U	A	C	Tyr
U	A	A	Stop
U	A	G	Stop
U	G	U	Cys
U	G	C	Cys
U	G	A	Stop
U	G	G	Trp
C	U	U	Leu
C	U	C	Leu
C	U	A	Leu
C	U	G	Leu
C	C	U	Pro
C	C	C	Pro
C	C	A	Pro
C	C	G	Pro
C	A	U	His
C	A	C	His
C	A	A	Gln
C	A	G	Gln
C	G	U	Arg
C	G	C	Arg
C	G	A	Arg
C	G	G	Arg
A	U	U	Ile
A	U	C	Ile
A	U	A	Ile
A	U	G	Ile
A	C	U	Thr
A	C	C	Thr
A	C	A	Thr
A	C	G	Thr
A	A	U	Met
A	A	C	Met
A	A	A	Met
A	A	G	Met
A	G	U	Val
A	G	C	Val
A	G	A	Val
A	G	G	Val
G	U	U	Val
G	U	C	Val
G	U	A	Val
G	U	G	Val
G	C	U	Ala
G	C	C	Ala
G	C	A	Ala
G	C	G	Ala
G	A	U	Asp
G	A	C	Asp
G	A	A	Glu
G	A	G	Glu
G	G	U	Gly
G	G	C	Gly
G	G	A	Gly
G	G	G	Gly

1. Using the genetic code, determine the amino acid sequence of the following mRNA. Remember to use the start and stop codons.

ATG	CCG	ATT	CCC	GAA	TTC	ATA
Start	Pro	Ile	Pro	Glu	Phe	Met

2. Using the genetic code, determine the amino acid sequence of the following mRNA. Remember to use the start and stop codons.

Start	Pro	Ile	Pro	Glu	Phe	Met
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3. Using the genetic code, determine the amino acid sequence of the following mRNA. Remember to use the start and stop codons.

Start	Pro	Ile	Pro	Glu	Phe	Met
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Genetic Mutations Packet

Mike Jess

A red circular graphic with a gradient, appearing as a stylized arrow or a partial circle, located to the right of the name bar.

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