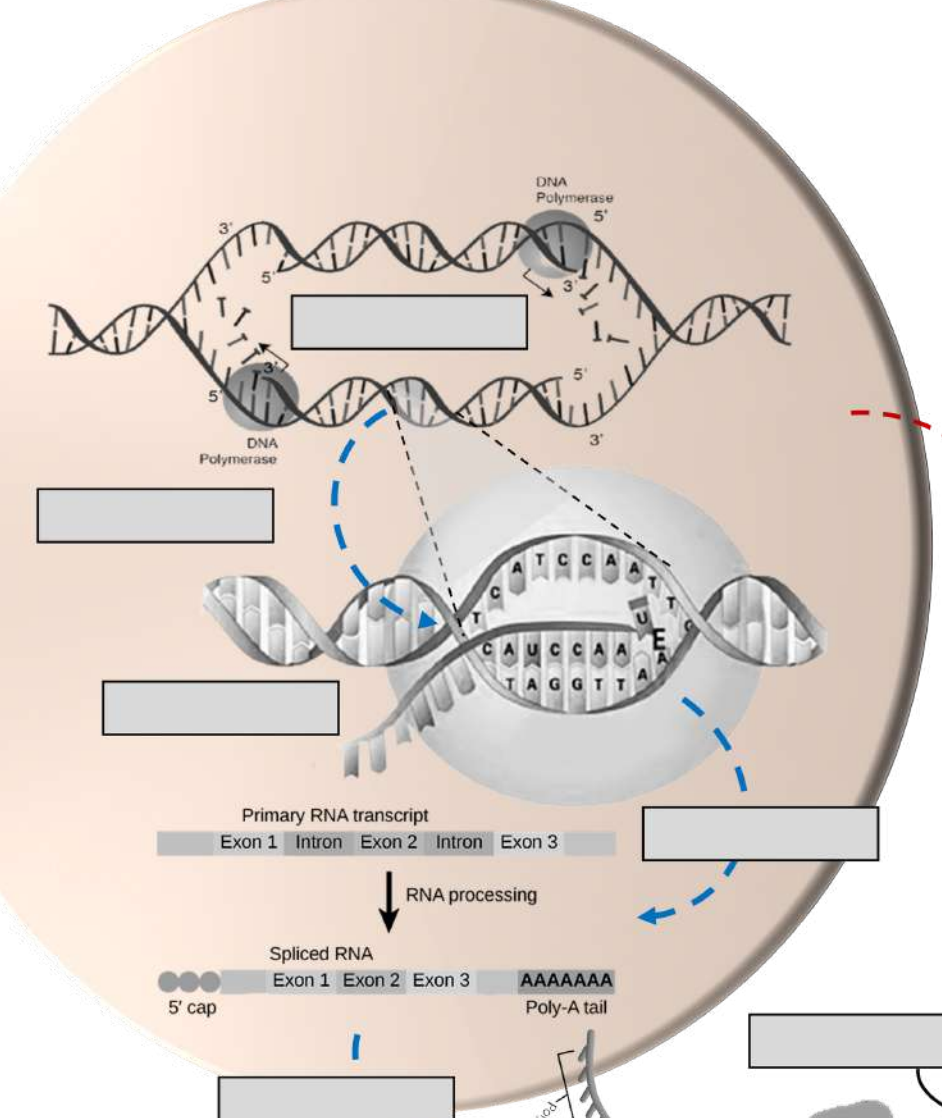
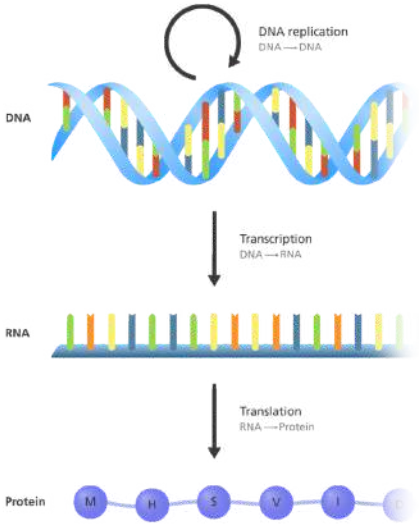
The Central Dogma





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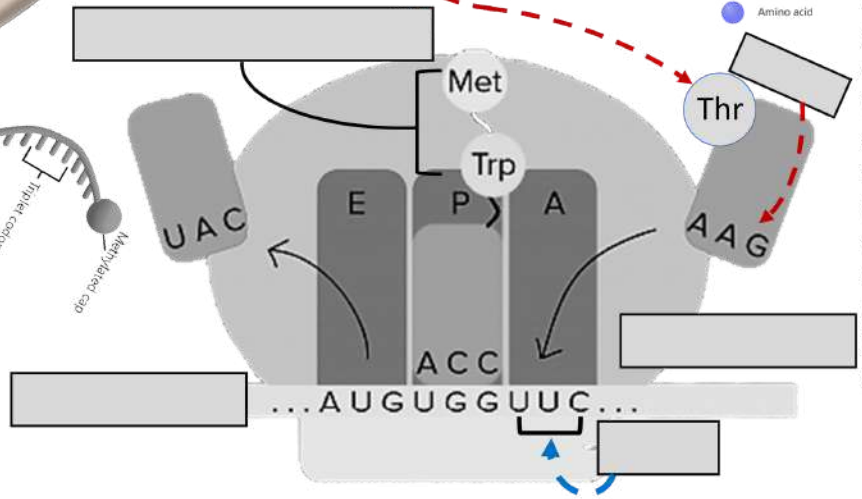

Summary

- **What.** The **'Central Dogma'** is the process by which the instructions in **DNA** are converted into a functional product. It was first proposed in 1958 by Francis Crick, discoverer of the structure of DNA. ... In **transcription**, the information in the DNA of every cell is converted into small, portable RNA messages
- **Why.** The information to produce a protein is encoded in the cell's DNA. When a protein is produced, a copy of the DNA is made (**called mRNA**) and this copy is **transported** to a ribosome. **Ribosomes** read the information in the mRNA and use that information to assemble **amino acids** into a protein.. Every cell in the human body contains protein. The basic structure of protein is a **chain of amino acids**. You **need protein** in your diet to help your **body repair cells** and **make new ones**.
- **Where.** **Ribosomes** are the sites in a cell in which protein synthesis takes place. Cells have many ribosomes, and the exact number depends on how active a particular cell is in synthesizing proteins. It occurs in two stages. **transcription** and **translation**. **Transcription** is the transfer of genetic instructions in **DNA to mRNA** in the nucleus. It includes three steps. initiation, elongation, and termination. After the mRNA is processed, it carries the instructions to a ribosome in the cytoplasm. **Translation** is the process by which a **protein** is **synthesized** from the information contained in a molecule of **messenger RNA (mRNA)**. During **translation**, an **mRNA sequence** is read using the **genetic code**, which is a set of rules that defines how an mRNA sequence is to **be translated into the 20-letter code of amino acids**, which are the building blocks of proteins.

- When an **RNA transcript** is first made in a eukaryotic cell, it is considered a pre-mRNA and must be processed into a **messenger RNA (mRNA)**.
- A **5' cap** is added to the beginning of the RNA transcript, and a **3' poly-A tail** is added to the end.
- In **splicing**, some sections of the RNA transcript **(introns) are removed**, and the remaining sections **(exons) are stuck back together**.
- Some **genes** can be alternatively **spliced**, leading to the production of different **mature mRNA molecules** from the same initial transcript.
- **mRNA** then leaves the nucleus to find a **ribosome**

DNA Replication

TRANSCRIPTION

DNA → RNA

Processing

Nucleus

Cytoplasm

mRNA

mRNA

Growing POLYPEPTIDE Chain

Codon

TRANSLATION

Anticodon

tRNA

mRNA → Protein

Ribosome

DNA Triplet	mRNA Codon	tRNA Anticodon	Amino Acid
1.			Methionine (Met)
2.		GGA	
3. TTC			
4.	UAG		
5. GTC			
6.			Tryptophan (Trp)
7.		GUA	
8.	UUU		

Arg CGU CGC CGA CGG

Gly GGC GGC GGA GGG

Phe UUU UUC

Leu UUA UUG CCU CUC CUA CUG

Ile AUU AUC

Met AUG

Val GUU GUC GUA GUG

Ser UCU UCC UCA UCG AGU AGC

Pro CCU CCC CCA CCG

Thr ACU ACC ACA ACG

Ala GCU GCC GCA GCG

Tyr UAU UAC

Stop UAA UAG UGA

His CAU CAC

Gln CAA CAG

Asn AAU AAC

Lys AAA AAG

Asp GAU GAC

Glu GAA GAG

Cys UGU UGC

Trp UGG

TAC GGA ATC GTA ACC AAA

Codons Found in Messenger RNA

Second Base

First Base	U	C	A	G	Third Base
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	Stop	Stop	A
	Leu	Ser	Stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G