Post- transcriptional Regulation (Modification)

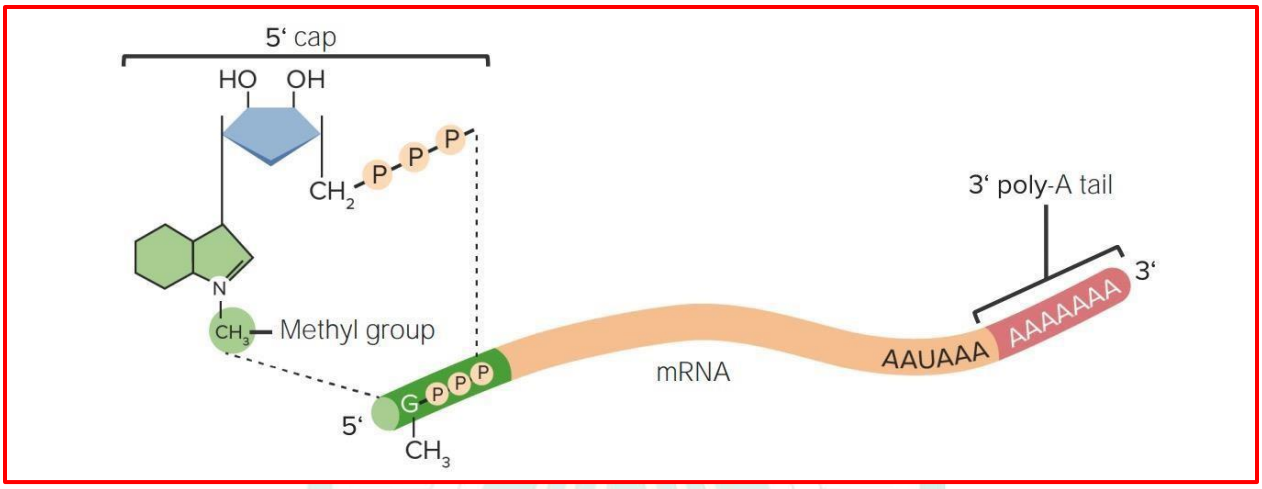
Post-transcriptional regulation can be used to regulate the active amount of RNA by modification . It occurs between the transcription phase and the translation phase of gene expression.

In prokaryotic cell, RNA transcripts are ready to act as mRNA s and get translated into proteins right away, but in Eukaryotic cell pre-RNA needs to go through a few more steps to become an actual mRNA (mature mRNA).

processing includes Additions of 5' cap and poly-A tail. Both the cap and the tail protect the transcript and help it get exported from the nucleus and translated on the ribosomes (protein-making "machines") found in the cytosol.

A-Adding cap structure:

B-Polyadenylation (poly Adenine residue):

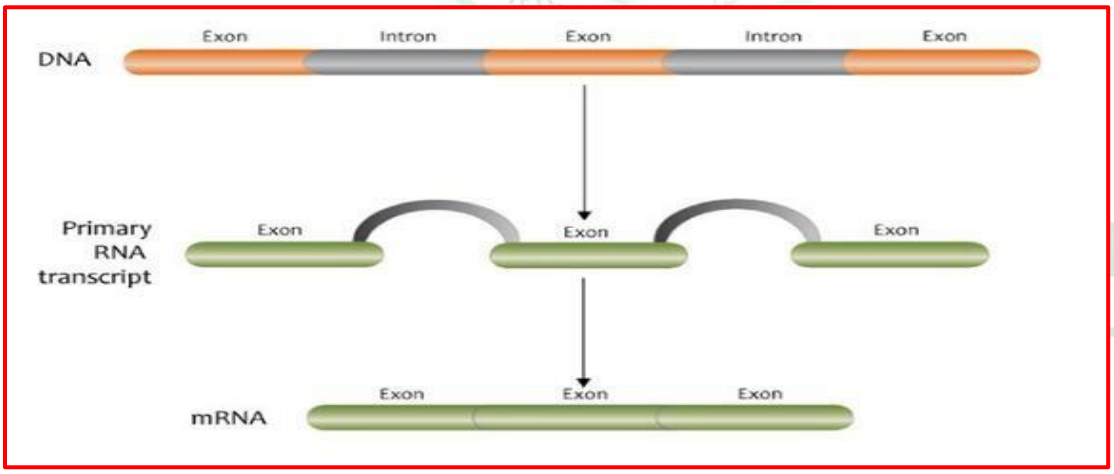


2- Splicing:

Eukaryotic genes are composed of **exons**, which correspond to protein-coding sequences, and intervening sequences called **introns** (sequences in mRNA do not encode functional proteins).

The process of removing introns and reconnecting exons is called splicing.

Introns are removed and degraded while the pre-mRNA is still in the nucleus.

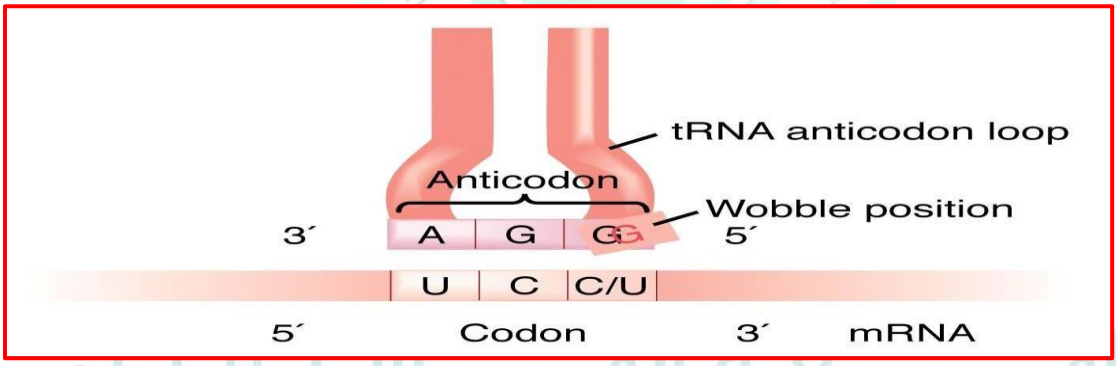


RNA translation:

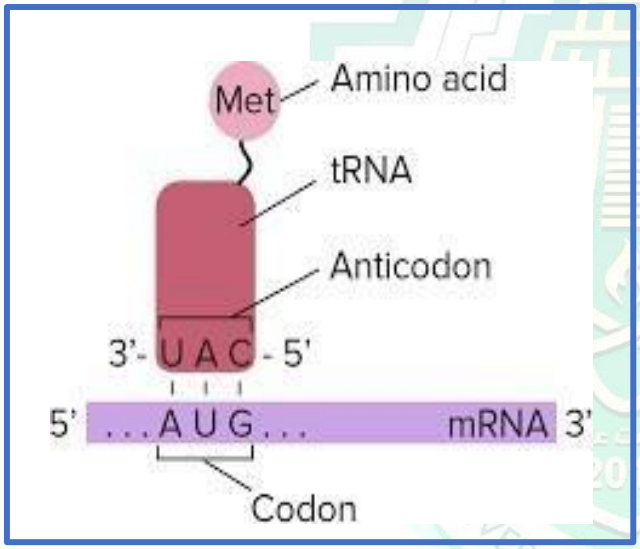
Translation is the process by which a protein is synthesized from the information contained in a molecule of messenger RNA (mRNA). During translation, a mRNA sequence is read using the genetic code.

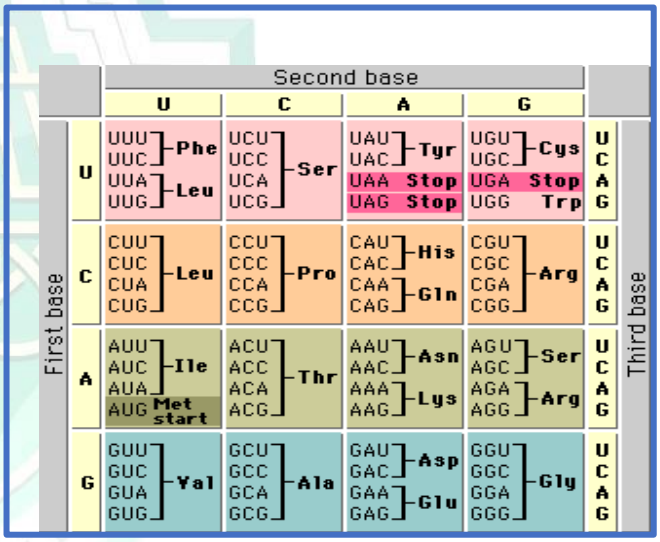
- RNA translation is a process that produces a protein from an mRNA template via the genetic code.
- The process takes place in the cytoplasm.
- Requires another RNA, called tRNA , rRNA.
- Protein synthesis is operated by cell organelle called ribosome.

- The genetic code = triplets of RNA bases (called codons)
- Each codon encodes 1 amino acid.
- mRNA is read from 5' to 3'.
- The protein is made from the -NH2 end to the COOH end.



- For example:
- mRNA codon 5’ AUG 3’
- tRNA anticodon 3’ UAC 5’
- After codon-anticodon matching, the tRNAs covalently binds the
- Correct amino acid and carries it to the ribosome for the protein synthesis.
- the mRNA codon 5’AUG3’ encodes for the amino acid methionine





- 1. Read mRNA sequence: 5’ AUGAAAACU……..3’
- 2. Identify codons: 5’ AUG/AAA/ACU/……3’
- 3. Match codons with amino acids
- • AUG = Met (M)
- • AAA = Lys (K)
- • ACU = Thr (T)
- 4. Continue until you find the stop codon (UAA or UAG or UGA)
- Note: stop codons **do not code** for any amino acid; they just stop translation