

# Gene Expression

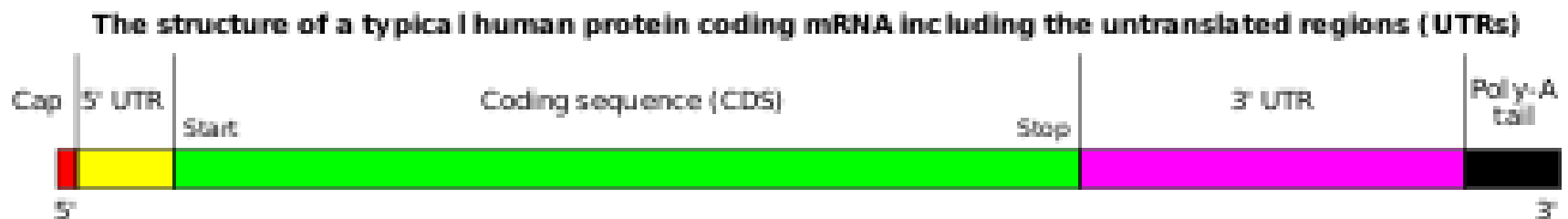
# **Eukaryotic mRNA processing**

# Differences in gene expression between prokaryotes and eukaryotes -3

- Bacterial messenger RNA is translated as without undergoing modifications
- Eukaryotic messenger RNA undergoes splicing and processing

# In eukaryotes messenger RNA undergoes several steps of post-transcriptional modification

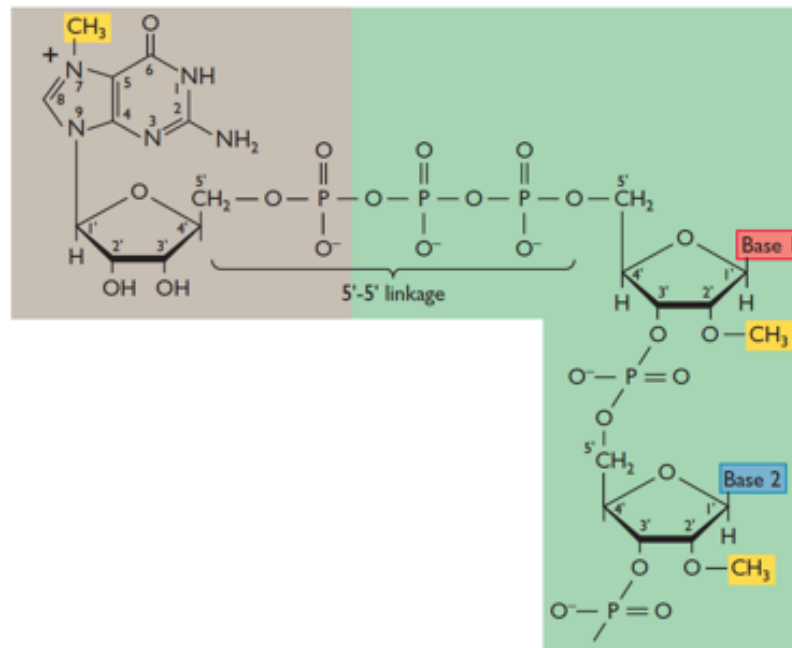
- Post-transcriptional modification is the process in eukaryotic cells where primary transcript RNA is converted into mature RNA.
- The process includes three major steps: addition of a 5' cap, addition of a 3' poly-adenylation tail, and splicing.



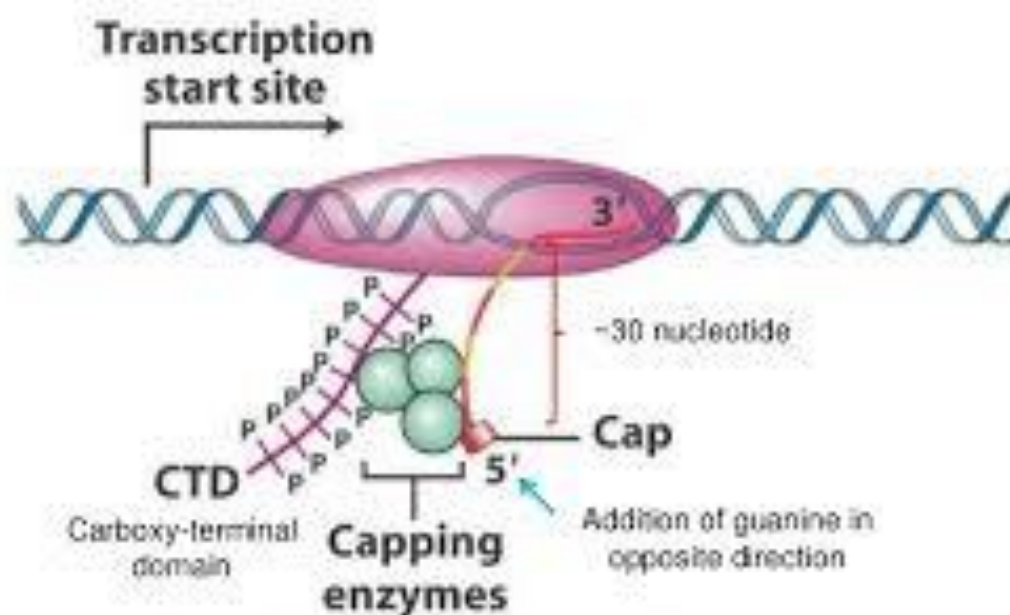
# 5'-capping

- the five-prime cap (5' cap) is a specially altered nucleotide on the 5' end of precursor messenger RNA.

5'-cap structure

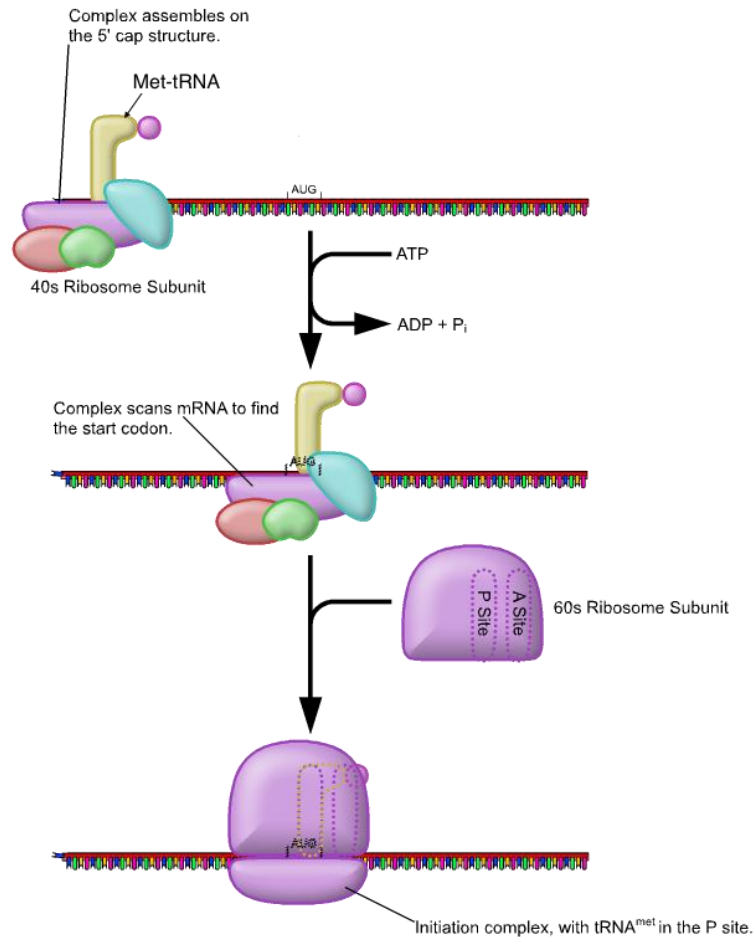


## Co-transcriptional capping

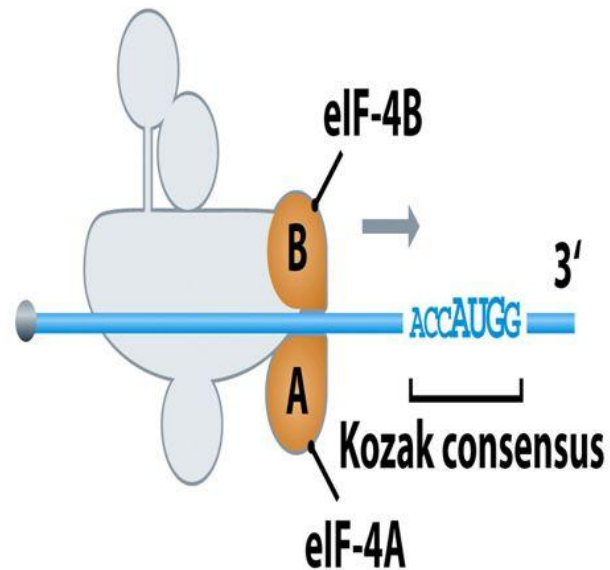


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# Translation pre-initiation complex binds to 5'cap of mRNA



## Scanning



## 13-2. (Cont.) Translation initiation in eukaryote.

Preinitiation complex scans along mRNA until it reaches the initiation codon (a few tens or hundreds nt downstream & located within **Kozak consensus** sequence); large subunits then attach.

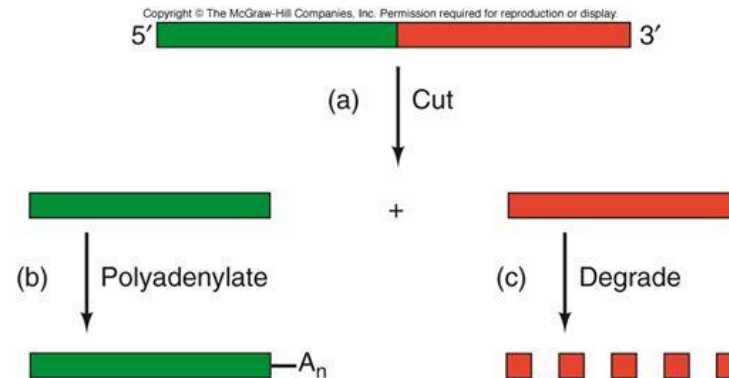


# 3' polyadenylation

- Polyadenylation is the addition of a poly(A) tail to a messenger RNA. The poly(A) tail consists of multiple adenosine monophosphates.
- The poly(A) tail is important for the nuclear export, translation, and stability of mRNA.

# Basic Mechanism of Polyadenylation

- Transcription of eukaryotic genes extends beyond the polyadenylation site



- The transcript is:
  - Cleaved
  - Polyadenylated at 3'-end created by cleavage