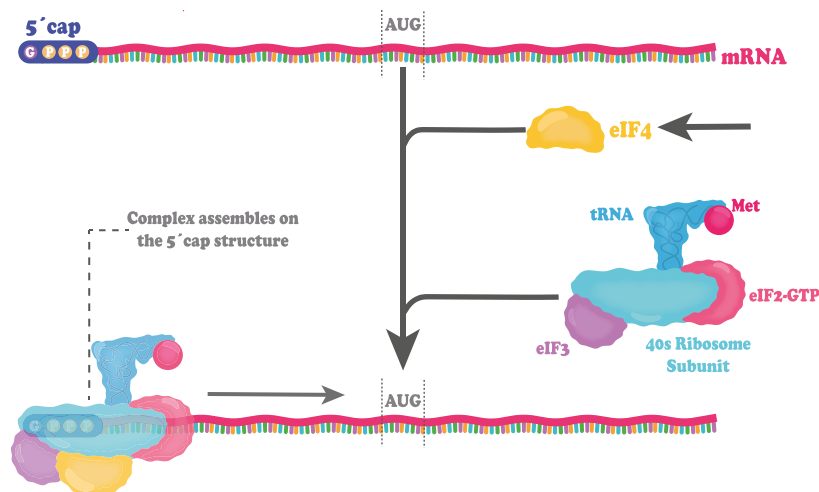


## CONCEPT: TRANSLATION

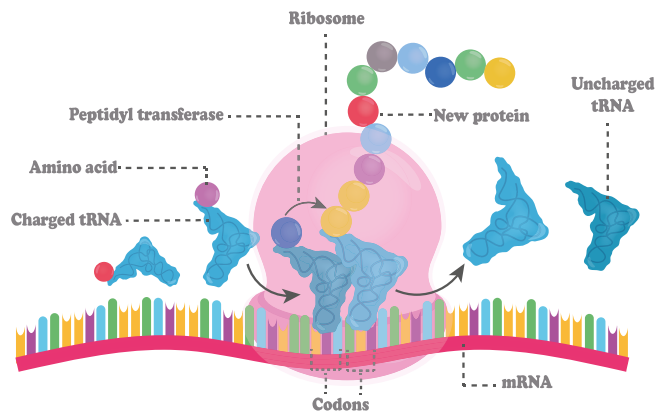
- **Translation** is the process of turn mRNA into Protein, and occurs in three steps: initiation, elongation, and termination
  - Prokaryotic transcription initiation requires a specific \_\_\_\_\_
    - The **shine-dalgamo sequence** is responsible for prokaryotic initiation
      - Proceeds the initiation codon, and helps position the initiator tRNA
      - **Initiation factors (IF1,2,3)** are required for correct initiation
  - Eukaryotic transcription initiation requires many proteins
    - mRNA in the cytoplasm has many secondary structures, and is covered in proteins
    - **Initiation factors (Eif4,A,B,G)** associate with the 5' cap, remove proteins, and expose the mRNA
    - The **initiation complex** scans the mRNA looking for the AUG start codon
    - A **kozak sequence** is a consensus sequence around the start codon that increases translation efficiency
  - An **initiator tRNA** initiates \_\_\_\_\_
    - For prokaryotes the tRNA is attached to N-formylmethionine
    - For eukaryotes the tRNA is attached to an initiator methionine (tRNA<sup>met</sup>)

## EXAMPLE:



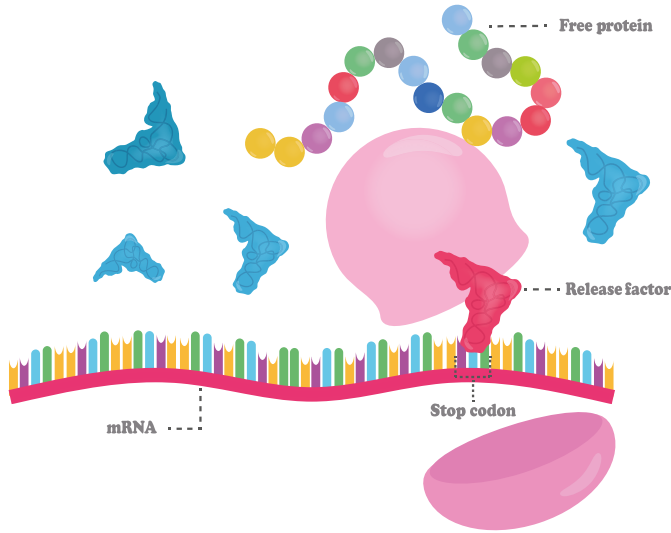
- Once the AUG start codon has been found, the ribosome is \_\_\_\_\_ and elongation can begin
    - Each of the Ribosomal sites (A,P,E) are important during translation
      - **Elongation factors (Ef-Tu, Ef-G)** assist the ribosome and tRNA in protein synthesis
        - These are controlled through GTP hydrolysis
1. A charged tRNA binds to Ef-Tu-GTP, and enters into the A site
  2. GTP is hydrolyzed and Ef-Tu is released
  3. The tRNA moves to the P site, and the amino acid is attached to the growing polypeptide chain
  4. EF-G binds in the P site
  5. EF-G-GTP hydrolysis moves the tRNA from the P to the E site

**EXAMPLE:**



- Termination is \_\_\_\_\_ through stop codons and release factors
  - **Release factors** are proteins that recognize stop codons
    - **Stop codons** include UGA, UAA, OR UAG
  - When a ribosome encounters a stop codon, and release factors binds instead of a tRNA
    - The release factors hydrolyze GTP and this terminates translation

**EXAMPLE:**



- The **wobble hypothesis** states that the third nucleotide in a codon is less \_\_\_\_\_ than the first two
  - Allows the anticodon of the tRNA to pair with more than one mRNA sequence
  - Helps multiple codons code for the same amino acid

**EXAMPLE:**

