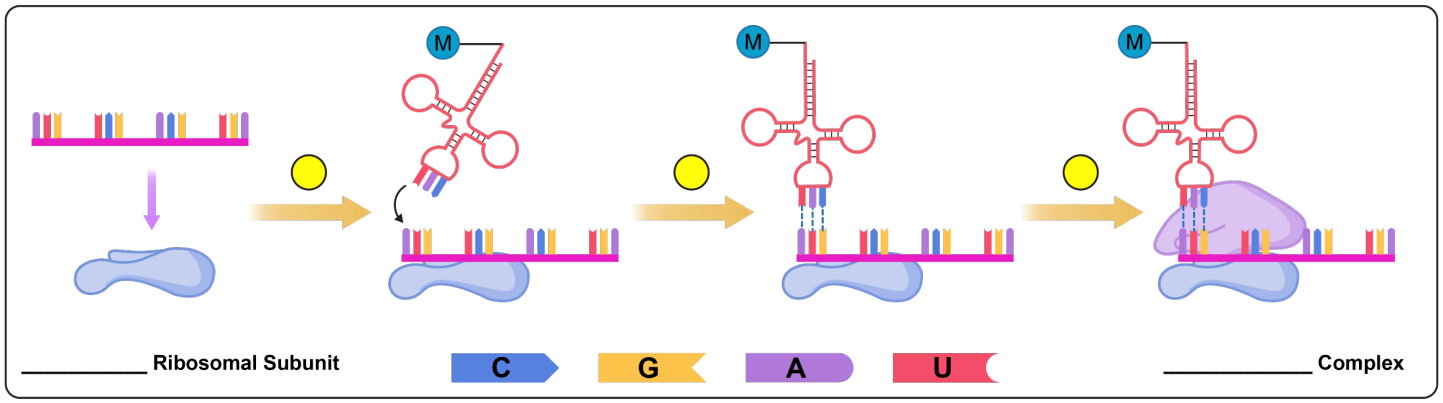
CONCEPT: TRANSLATION: PROTEIN SYNTHESIS

- Similar to transcription, the process of translation consists of 3 steps.

1. _____ 2. _____ 3. _____

1 Initiation

- Ribosomes consist of small and large ribosomal _____.
  - □ Each subunit is made of _____ and rRNA.
  - a. The mRNA binds to the _____ ribosomal subunit.
  - b. A _____-carrying tRNA (U A C anticodon) binds to the start codon (A U G).
  - c. Initiation is completed when the _____ subunit joins the small subunit complex.



EXAMPLE: Which of the following is not a part of the initiation step of translation?

a) Activation of tRNA through aminoacyl-tRNA synthetase.

b) Combination of large ribosomal subunit with the small subunit complex.

c) Binding of mRNA to the small ribosomal subunit.

d) Binding of Met-tRNA with the start codon (AUG) through complementary base pairing.

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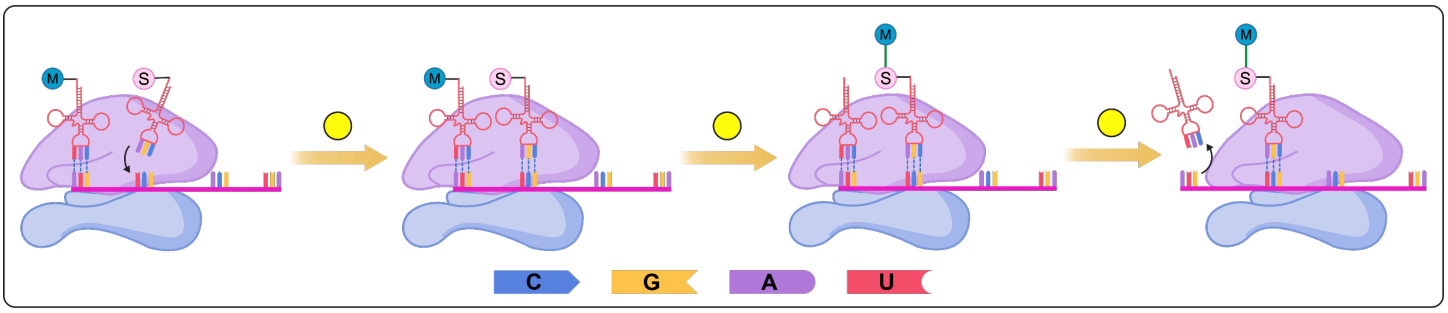
(2) Elongation

(d) A second tRNA approaches and _____ to the next codon in the complex.

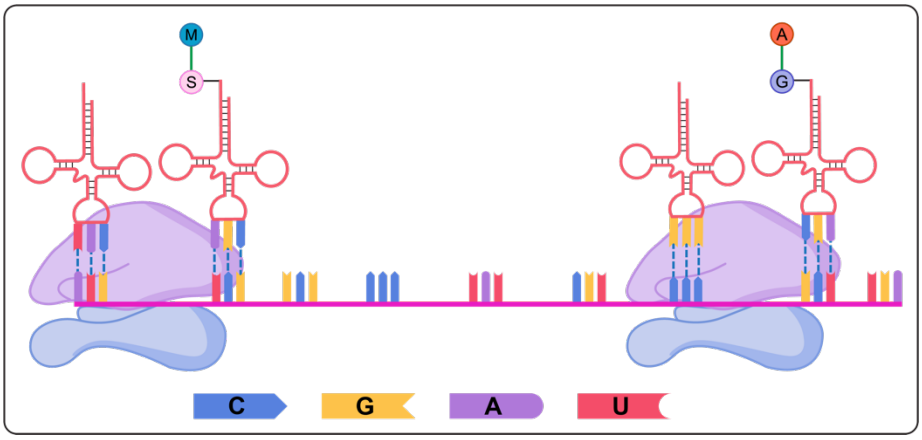
(e) A _____ bond forms between methionine (M) and the second amino acid (S here).

(f) **Translocation:** the whole ribosome _____ to the next codon after the first tRNA leaves the complex.

- Steps (d) to (f) keep repeating.



● A single mRNA can be translated by _____ ribosomes simultaneously.



EXAMPLE: A section of a protein has the sequence: Phe–Val–Arg. What is a possible mRNA codon sequence?

a) 5' AGA GUA UUU 3'

b) 5' GUA UUU AGA 3'

c) 5' AGA UUU GUA 3'

d) 5' UUU GUA AGA 3'

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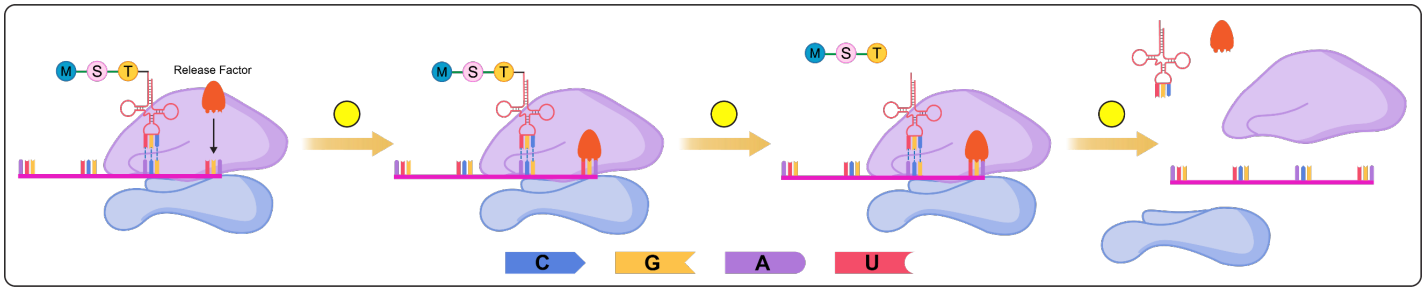
(3) Termination

- Translation terminates when the ribosome encounters a stop codon (UAA, UAG, or UGA).
  - (g) The _____ factor protein binds to the stop codon.
  - (h) The peptide chain is _____ and released from the last tRNA.
  - (i) The whole complex disassembles.



- Methionine is generally _____ from the protein backbone after translation.

EXAMPLE: Write the sequence of the peptide translated from the following DNA template sequence:

3' ATG GGT AAA GGT 5'

a) Tyr–Pro–Ser–Pro

b) Tyr–Pro–Phe–Pro

c) Met–Pro–Phe–Pro

d) Pro–Phe–Pro–Tyr

PRACTICE: Tuftsin is an immunostimulator tetrapeptide having the following sequence:

Thr–Lys–Pro–Arg

Write a possible sequence for the gene (Informational & template strand) that codes for this tetrapeptide.