

DNA replication

Chromosomes duplicate so each daughter cell inherits an exact copy of generic information. The double-helical strand of DNA is copied by replication.

- 1. <u>Semi-conservative replication</u>: each strand of the double helix serves as a template for a new strand.
- 2. <u>Conservative replication:</u> double helix serves as a template but does not contribute to the new double helix.

(b) Conservative



3. <u>Dispersive replication</u>: fragments of original DNA serves as a template for joining 2 new molecules, each containing old and new parts.

tRNA

Translation: sequences of bases in mRNA converted into a sequence of amino acids in a polypeptide chain on ribosomes.

Codons in mRNA can be translated into amino acids by transfer RNA. tRNA binds and transfers amino acids present in the cytoplasm to the ribosome. tRNA has a 3D structure maintained by complementary base pairing and H bonding.



tRNA charging reaction

Amino acids are attached to tRNA molecules by activating enzymes known as aminoacyl-tRNA synthestases. The product is an amino acid joined to a tRNA – charged tRNA.

Enzyme + ATP + a.a \rightarrow enzyme-AMP-a.a + PPi

Enzyme then catalyses the transfer of amino acid from the AMP to the 3' terminal Enzyme-AMP-a.a + tRNA \rightarrow enzyme + AMP + tRNA-a.a

The activating enzyme finally releases the charged tRNA and can charge another tRNA molecule. tRNA molecules deliver the amino acid to the ribosomes.



- Speed of translation
 Ribosomes can attach to an mRNA molecule allowing several copies of a protein to be synthesised simultaneously → polysome
- Post-Translational destination
 As a polypeptide chain is made, it is instruced signal sequence of amino acids to:
 - i. Be released to the cytoplast conditional translation is complete

Stop translation and go to the endoplasmic reticulum and finish synthesis there. These serve as signal sequence which attach to signal recognition particle.

- iii. Protein synthesis begins on free ribosomes. The signal sequence is present on the polypeptide chain
- iv. The polypeptide chain binds to the signal recognition particle and both bind to a receptor protein in the membrane of the ER
- v. The single recognition particle is released. The signal sequence passes through a channel in the membrane
- vi. The single sequence is removed inside the ER
- vii. The polypeptide continues to elongate
- viii.Translation terminates
- ix. Reobisome is released