

The Flow of Info aka The Central Dogma:

1. Overview of the Central Dogma:

- A. Replication → Transcription → Translation
- B. Chromosome structure
- C. Polycistronic message vs. intron excision

2. DNA Structure

- A. Negative supercoiling (relative to DNA double helix coiling)
 - DNA gyrase = topoisomerase II
 - Inhibited by Nalidixic acid & Novobiocin - Archaea too!
 - Some + supercoiling in thermophiles - use reverse gyrase
- B. Topoisomerase I - relaxes supercoiling, first step in replication
- C. Other structures: Bent DNA, Inverted repeats, Hairpins
- D. Restriction enzymes cut at palindromes

3. DNA replication

- A. Semi-conservative model
- B. Origin of Replication & Theta structures
- C. Lagging & Leading strands
- D. Enzymes involved: Table 6.4

4. Transcription

- A. Initiation – Pribnow & TATA Box
 - a. RNA polymerases
- B. Elongation – ribonucleotides like ATP
- C. Termination – rho independent & dependent types
- D. Similarities & Differences with DNA replication

4. Universal Code is Degenerate

- A. Anti-codon and wobble
- B. Structure of tRNAs
- C. Translator molecule once charged with AA

5. Translation

- A. Initiation – IFs
 - a. Shine-Dalgarno sequence
- B. Elongation – EFs
 - a. Aminoacyl-tRNA binding
 - b. Peptide bond formation
 - c. Translocation
- C. Termination – RFs
 - a. Ribosome dissociation

6. Molecular Chaperone

- A. Aids in protein folding
- B. Transports to location needed
- C. Analogous to Rough Endoplasmic Reticulum in Eucarya

Antibiotics Affecting Replication, Transcription, & Translation

DNA replication:

Nalidixic Acid & Novobiocin – Inhibit DNA gyrase

Transcription:

Rifampin – Beta subunit of RNA polymerase

Actinomycin – DNA binding, blocks elongation

Translation:

Streptomycin – Blocks initiation on SSU of ribosome

Chloramphenicol – Blocks elongation on LSU via peptide bond

Tetracycline – Blocks elongation SSU

Cycloheximide – Eucarya ribosome specific

Diphtheria Toxin – EF blocker; both Archaea and Eucarya