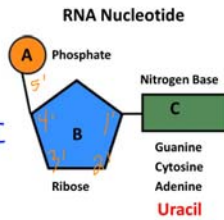


DNA to Protein via RNA

- Sequence of nucleotides in DNA contain info to make proteins
 - Each gene contains info for assembling an amino acid chain
 - Human cells contain ~20,000 - 25,000 genes
- RNA "reads" DNA to create amino acid sequence to create proteins

- RNA Nucleotide (single helix)
 - Ribose Sugar
 - N Bases: A, U (uracil), G, C
 - Phosphate



3 Types of RNA:

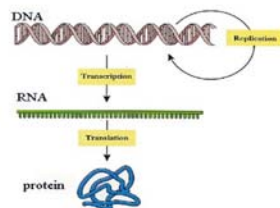
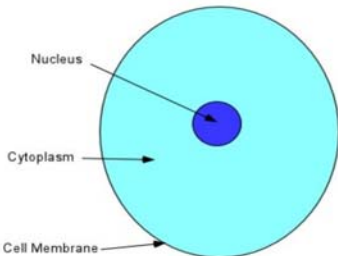
- 1. Messenger RNA (mRNA)**
 - Reads DNA sequence in the nucleus & goes to the cell's cytoplasm
 - Carries info (message) to make a protein
- 2. Ribosomal RNA (rRNA)**
 - Clamps onto the mRNA and uses the message to assemble amino acids in the correct order (to form a protein)
- 3. Transfer RNA (tRNA)**
 - Transfers amino acids to the ribosome to be assembled into a protein

DNA to Protein

2 Steps:

1. Transcription (in the nucleus)

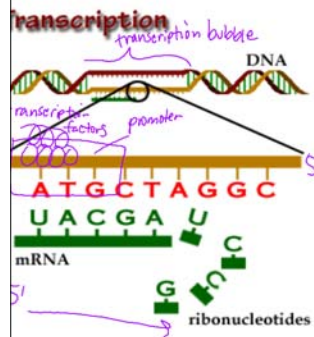
2. Translation (in the cytoplasm of the cell)



TRANSCRIPTION:

DNA → mRNA

nucleus → cytoplasm

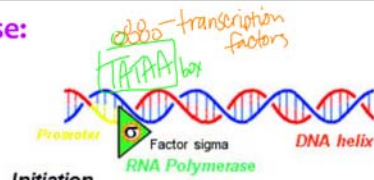


- 1. Topoisomerase** Relaxes DNA; **Helicase** unzips DNA
- Free RNA nucleotides pair with complementary DNA nucleotides with **RNA Polymerase** to create **mRNA (5' → 3' direction)**
- DNA strands recoil, mRNA leaves the nucleus and enters the cytoplasm (through nuclear pores)

Phases of RNA Polymerase:

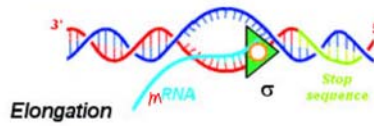
1. Initiation

(start of mRNA)
@ promoter



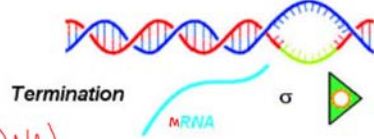
2. Elongation

(mRNA chain)



3. Termination

(stops making mRNA)



Overview of Transcription:

Enzymes Involved:

- ① Topoisomerase (uncoil)
- ② Helicase (unzip)
- ③ Transcription (binding) factors
- ④ RNA Pol

TRANSCRIPTION: DNA → mRNA

