

**(7) Transcription and Translation**

**Objectives:**

1. Compare and contrast:
    - a. Transcription and DNA replication
    - b. DNA and RNA
    - c. DNA polymerase and RNA polymerase
  2. Transcription: Details of process including start and stop sites, components, and application
  3. Coupling of transcription and translation
  4. Difference between prokaryotic and eukaryotic RNA: including methods of RNA processing and coupling of transcription and translation
  5. Translation: 4 components, details of process, and inhibitors of translation, and application
- Fig. 7-1: Flow of genetic information
  - **transcription** - DNA → RNA
  - **translation** - RNA → protein

**I. How transcription differs from DNA replication:**

1. Uses RNA polymerase
2. RNA strands do not remain hydrogen bonded to the DNA template after being transcribed
3. Only one strand of the DNA molecule is transcribed for a specific gene
4. RNAs are only copied from regions of the DNA that contain genes

**DNA polymerase vs. RNA polymerase**

<b>DNA POLYMERASE</b>	<b>RNA POLYMERASE</b>
1. DNA replication	1. Transcription
2. Catalyzes linking of deoxyribonucleotides	2. Catalyzes linking of ribonucleotides
3. Needs RNA primers to start DNA synthesis (needs 3'-OH end)	3. Does not need primer to start RNA synthesis
4. Has proof-reading capabilities (1 error in 10 <sup>7</sup> )	4. Does not have proof-reading capabilities (1 in 10 <sup>4</sup> )

**Two types of Nucleic acids: DNA and RNA**

<b>DNA</b>	<b>RNA</b>
1. Deoxyribonucleotides (G, A, T, C) Sugar = deoxyribose	1. Ribonucleotides (G, A, U, C) Sugar = ribose
2. Thymine pairs with adenine	2. Uracil pairs with adenine
3. Double-stranded helix	3. Single-stranded
4. Cannot fold into various structures	4. Can fold into 3-D structures
5. Functions solely as information storage	5. Convey information; structural and catalytic functions