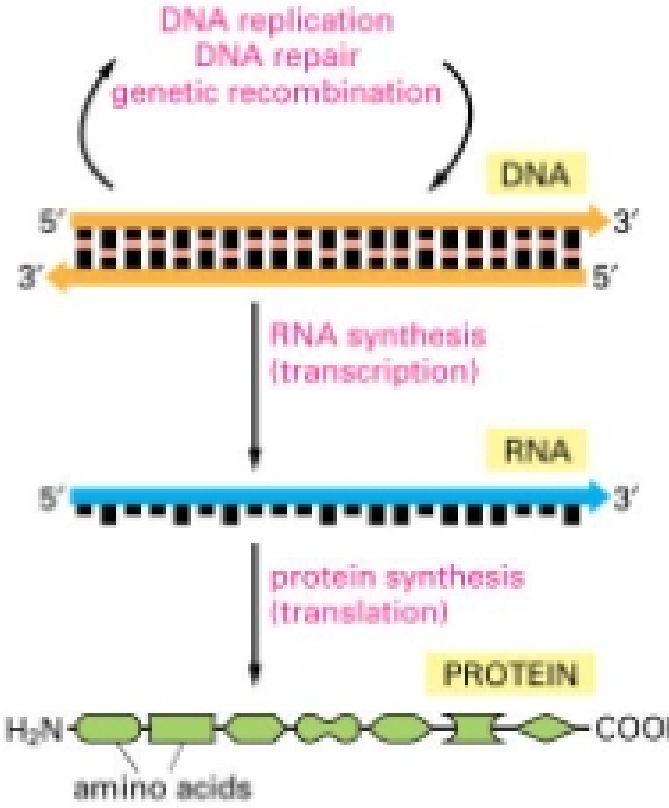
Chapter 15
Intracellular compartments and transport

This material is critical to understanding
- a wide variety of lysosomal storage diseases
- a wide variety of protein sorting diseases
- atherosclerosis/ hypercholesterolemia
- secretion of key proteins such as insulin and immunoglobulins
- biotechnology involving secreted proteins
- potential new therapeutics for Alzheimer's and prion diseases

Objective: Understand protein sorting in a cell, exocytosis, and endocytosis

Part 1 Be able to:

- Explain the difference between necessary and sufficient
- Interpret data and determine if something is necessary, sufficient, or both
- Describe the nuclear pore
- Diagram the Ran GTP/GDP cycle
- Describe the mechanism that inserts proteins in the endoplasmic reticulum, for both soluble and transmembrane proteins, naming the key components
- Diagram clathrin-mediated formation of a vesicle from a membrane
- Diagram SNARE-mediated fusion of a vesicle with a membrane
- Explain the difference between endocytosis and exocytosis
- Draw the chemical structure of a disulfide bond in a reduced and oxidized state



What is the fate of each protein after synthesis?

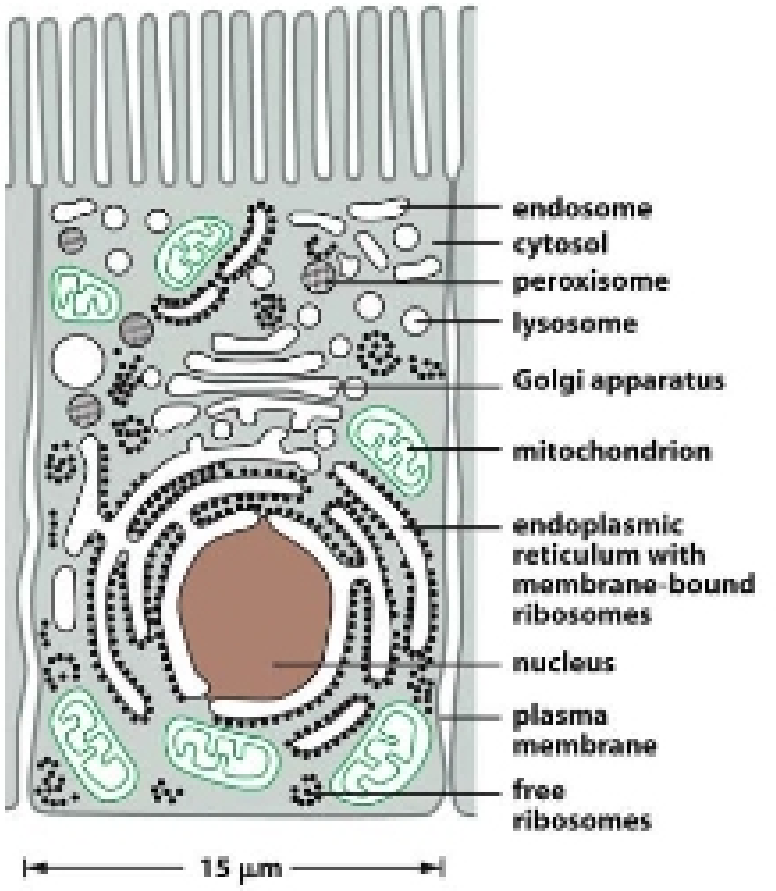
Most proteins function in defined locations within a eukaryotic cell

<u>Compartmentalization</u>

What are these compartments and how do newly synthesized proteins get there?

Cellular compartmentalization is achieved by many different membrane-enclosed organelles

Selectively-permeable membranes



Primary functions of the membrane-enclosed compartments of a eukaryotic cell

Compartment	Main Function
Cytosol	Metabolic pathways, protein synthesis
Nucleus	Contains main genome, DNA/RNA synthesis
ER	Synthesis of most lipids, protein distribution
Golgi	Protein and lipid modification for distribution
Lysosomes	Intracellular degradation
Endosomes	Sorting of endocytosed materials
Mitochondria	ATP synthesis - oxidative phosphorylation
Chloroplasts	Photosynthesis
Peroxisomes	Oxidation of toxic compounds

See text and/or glossary for review