

Module 4: Cells

Keys to Success & Study Guide

Learning Objectives

By the end of this module, you should be able to: 1. **Differentiate** between prokaryotic and eukaryotic cells based on structure and complexity. 2. **Identify** and describe the function of major eukaryotic organelles. 3. **Trace** the production and transport of cellular products through the endomembrane system. 4. **Explain** the Endosymbiotic Theory regarding the origin of mitochondria and chloroplasts.

Key Terminology Checklist

Define these terms in your own words to ensure mastery. - [] **Cytoplasm:** The jelly-like fluid filling the cell. - [] **Plasma Membrane:** The boundary of the cell. - [] **Organelle:** "Little organ"; specialized structure within a cell. - [] **Ribosome:** The site of protein synthesis. - [] **Cytoskeleton:** Network of fibers (microtubules, microfilaments) holding the cell together. - [] **ATP:** The energy currency generated by mitochondria.

Concept Check

1. The Limits of Size

- **Question:** Why do cells have to be as small as they are?
- **Deep Dive:** Imagine a cell is a balloon. As you blow it up, the inside (volume) grows huge, but the rubber skin (surface area) stretches thin. If the membrane is the "mouth" of the cell, can a tiny mouth feed a giant body?

2. Prokaryote Simplicity

- **Question:** In what major way do prokaryotic cells differ from eukaryotic cells?
- **Deep Dive:** Prokaryotes lack a nucleus. Where is their DNA kept? (The Nucleoid region). They are simple, but successful—are there more bacteria on Earth or humans?

3. Powering the Cell

- **Question:** What is the role of mitochondria in a cell?
- **Deep Dive:** Mitochondria perform **Cellular Respiration**. They use Oxygen and Sugar to make ATP. Which cells in your body would need the *most* mitochondria? (Muscle cells? Brain cells? Why?).

4. Clean Up Crew

- **Question:** What do lysosomes do?
- **Deep Dive:** Lysosomes contain digestive enzymes. What happens if a lysosome bursts *inside* the cell? (This is actually a mechanism for programmed cell death, or Apoptosis).

Study Tips

- **Cell City:** Do not just memorize the list of organelles. Assign them a job in a city or a factory. It makes the abstract functions concrete.
- **Draw two cells:** Draw a Plant Cell and an Animal Cell side-by-side.
 - Highlight the differences (Wall, Chloroplast, Vacuole).
 - Review the shared structures (Nucleus, Mitochondria, ER).
- **Prefixes:**
 - *Cyto-* = Cell.
 - *Pro-* = Before.
 - *Eu-* = True.
 - *Kary-* = Nucleus.