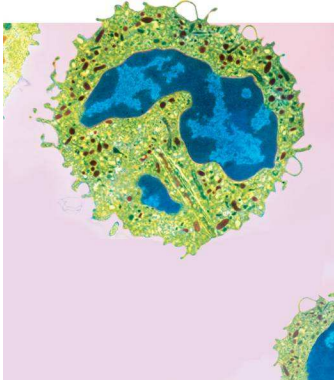


## 7-2 Eukaryotic Cell Structure



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## 7-2 Eukaryotic Cell Structure → Comparing the Cell to a Factory

### Eukaryotic Cell Structures

Structures within a eukaryotic cell that perform important cellular functions are known as **organelles**.

Cell biologists divide the eukaryotic cell into two major parts: the nucleus and the cytoplasm.

The **cytoplasm** is the portion of the cell outside the nucleus.

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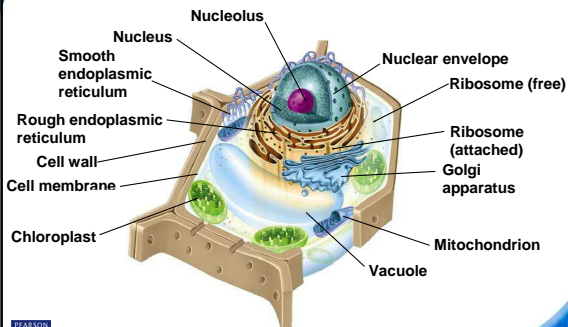
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## 7-2 Eukaryotic Cell Structure → Comparing the Cell to a Factory

active art  
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### Plant Cell



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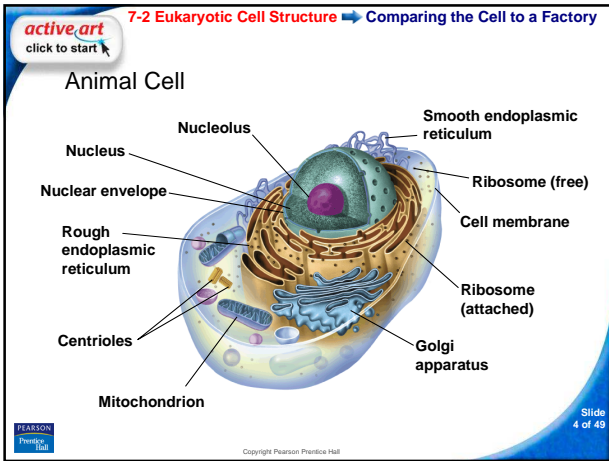
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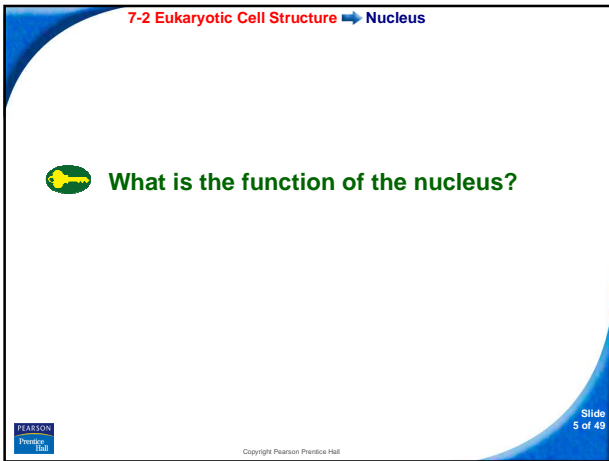
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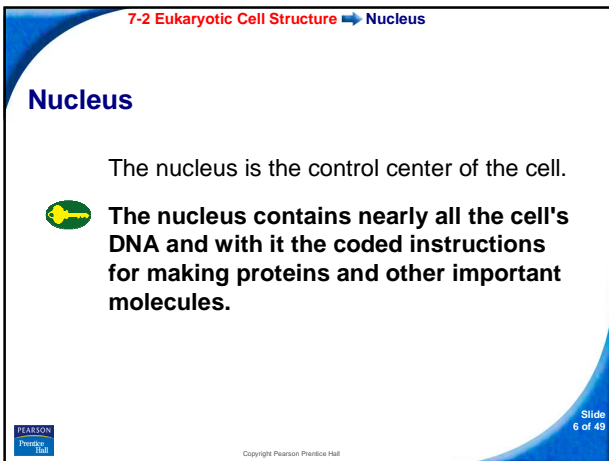
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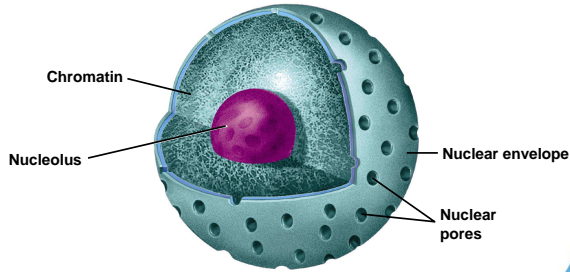
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7-2 Eukaryotic Cell Structure → Nucleus

The Nucleus



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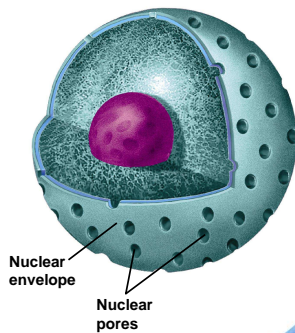
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7-2 Eukaryotic Cell Structure → Nucleus

The nucleus is surrounded by a **nuclear envelope** composed of two membranes.

The envelope is dotted with nuclear pores, which allow material to move in and out of the nucleus.



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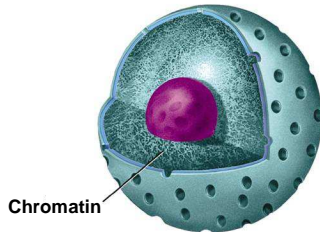
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7-2 Eukaryotic Cell Structure → Nucleus

The granular material in the nucleus is called **chromatin**.

Chromatin consists of DNA bound to protein.



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7-2 Eukaryotic Cell Structure → Nucleus

When a cell divides, chromatin condenses to form **chromosomes**.

Chromosomes contain the genetic information that is passed from one generation of cells to the next.



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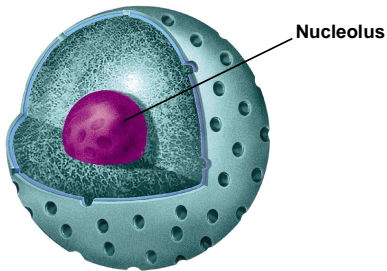
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7-2 Eukaryotic Cell Structure → Nucleus

Most nuclei also contain a **nucleolus**.

The nucleolus is where the assembly of ribosomes begins.



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7-2 Eukaryotic Cell Structure → Ribosomes

 **What is the function of the ribosomes?**



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## Ribosomes

One of the most important jobs carried out in the cell is making proteins.



**Proteins are assembled on ribosomes.**

**Ribosomes** are small particles of RNA and protein found throughout the cytoplasm.



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Ribosomes produce proteins by following coded instructions that come from the nucleus.

Cells that are active in protein synthesis are often packed with ribosomes.



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**What is the function of the endoplasmic reticulum?**



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## Endoplasmic Reticulum

Eukaryotic cells contain an internal membrane system called the **endoplasmic reticulum**, or ER.



The endoplasmic reticulum is where lipid components of the cell membrane are assembled, along with proteins and other materials that are exported from the cell.



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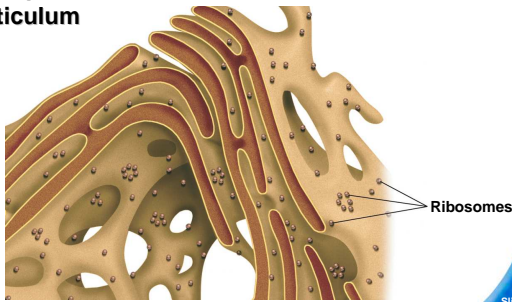
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## Endoplasmic Reticulum



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There are two types of ER—rough and smooth.

The portion of the ER involved in protein synthesis is called rough endoplasmic reticulum, or rough ER.

Ribosomes are found on the surface of rough ER.

Rough ER is abundant in cells that produce large amounts of protein for export.



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7-2 Eukaryotic Cell Structure → Endoplasmic Reticulum

Smooth ER does not have ribosomes on its surface.

Smooth ER contains collections of enzymes that perform specialized tasks, such as synthesis of membrane lipids and detoxification of drugs.



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7-2 Eukaryotic Cell Structure → Golgi Apparatus



What is the function of the Golgi apparatus?



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7-2 Eukaryotic Cell Structure → Golgi Apparatus

### Golgi Apparatus

Proteins produced in the rough ER move into the Golgi apparatus.



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7-2 Eukaryotic Cell Structure → Golgi Apparatus

The Golgi apparatus appears as a stack of closely apposed membranes.



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7-2 Eukaryotic Cell Structure → Golgi Apparatus



**The Golgi apparatus modifies, sorts, and packages proteins and other materials from the endoplasmic reticulum for storage in the cell or secretion outside the cell.**

From the Golgi apparatus, proteins are then “shipped” to their final destinations throughout the cell or outside of the cell.

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7-2 Eukaryotic Cell Structure → Lysosomes



**What is the function of lysosomes?**

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## Lysosomes

**Lysosomes** are small organelles filled with enzymes.

Lysosomes break down lipids, carbohydrates, and proteins into small molecules that can be used by the rest of the cell.

Lysosomes also break down organelles that have outlived their usefulness.



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What is the function of vacuoles?



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## Vacuoles

Some cells contain saclike structures called **vacuoles** that store materials such as water, salts, proteins, and carbohydrates.



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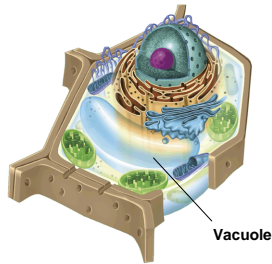
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7-2 Eukaryotic Cell Structure → Vacuoles

In many plant cells there is a single, large central vacuole filled with liquid. The pressure of the central vacuole allows plants to support heavy structures such as leaves and flowers.



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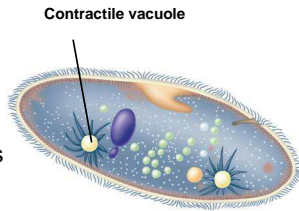
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7-2 Eukaryotic Cell Structure → Vacuoles

Vacuoles are also found in some unicellular organisms and in some animals.

The paramecium contains a contractile vacuole that pumps excess water out of the cell.



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7-2 Eukaryotic Cell Structure → Mitochondria and Chloroplasts

 **What is the function of the mitochondria?**



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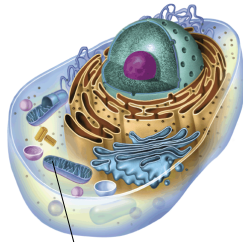
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### Mitochondria

Nearly all eukaryotic cells contain mitochondria.



**Mitochondria convert the chemical energy stored in food into compounds that are more convenient for the cell to use.**



Mitochondrion



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Mitochondria are enclosed by two membranes—an outer membrane and an inner membrane.

The inner membrane is folded up inside the organelle.



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**What is the function of chloroplasts?**



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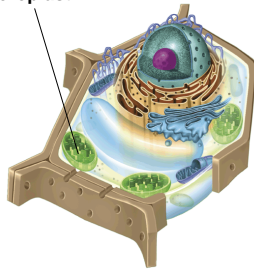
### Chloroplasts

Plants and some other organisms contain **chloroplasts**.



**Chloroplasts capture energy from sunlight and convert it into chemical energy in a process called photosynthesis.**

Chloroplast



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Chloroplasts are surrounded by two membranes.  
Chloroplasts contain the green pigment chlorophyll.



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**What are the functions of the cytoskeleton?**



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## Cytoskeleton

Eukaryotic cells are given their shape and internal organization by the **cytoskeleton**.



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The cytoskeleton is a network of protein filaments that helps the cell to maintain its shape. The cytoskeleton is also involved in movement.

The cytoskeleton is made up of:

- microfilaments
- microtubules



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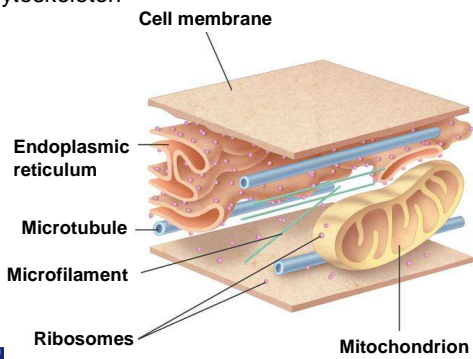
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## Cytoskeleton



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### Microfilaments

Microfilaments:

- are threadlike structures made up of the protein actin.
- form extensive networks in some cells.
- produce a tough, flexible framework that supports the cell.
- help some cells move.



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### Microtubules

Microtubules are hollow structures made up of proteins known as tubulins. Microtubules:

- maintain cell shape.
- are important in cell division.
- build projections from the cell surface—cilia and flagella—that enable some cells to swim rapidly through liquids.



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In animal cells, structures known as centrioles are formed from tubulin.

**Centrioles** are located near the nucleus and help to organize cell division.



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**7-2 Section QUIZ**

Continue to: **Section QUIZ** - Or - Click to Launch: 

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**7-2 Section QUIZ**

**1** In the nucleus of a cell, the DNA is usually visible as

- a. a dense region called the nucleolus.
- b. the nuclear envelope.
- c. granular material called chromatin.
- d. condensed bodies called chloroplasts.

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**7-2 Section QUIZ**

**2** Two functions of vacuoles are storing materials and helping to

- a. break down organelles.
- b. assemble proteins.
- c. maintain homeostasis.
- d. make new organelles.

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**7-2 Section QUIZ**

- 3 Chloroplasts are found in the cells of
- a. plants only.
  - b. plants and some other organisms.
  - c. all eukaryotes.
  - d. most prokaryotes.



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**7-2 Section QUIZ**

- 4 Which of the following is NOT a function of the Golgi apparatus?
- a. synthesize proteins
  - b. modify proteins
  - c. sort proteins
  - d. package proteins



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**7-2 Section QUIZ**

- 5 Which of the following is a function of the cytoskeleton?
- a. manufactures new cell organelles
  - b. assists in movement of some cells from one place to another
  - c. releases energy in cells
  - d. modifies, sorts, and packages proteins



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