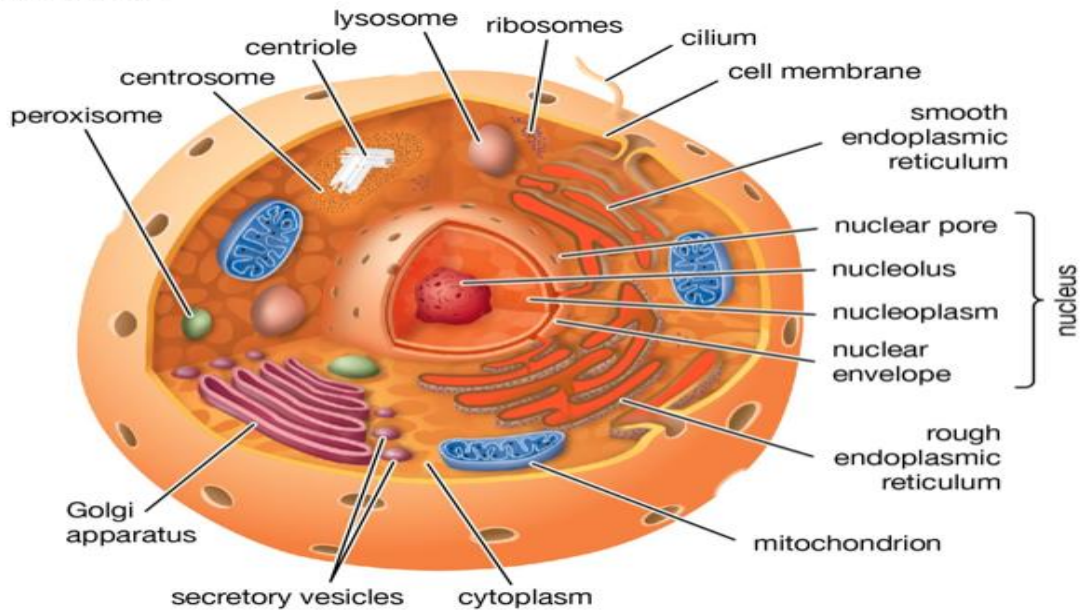


The cell

Animal cell

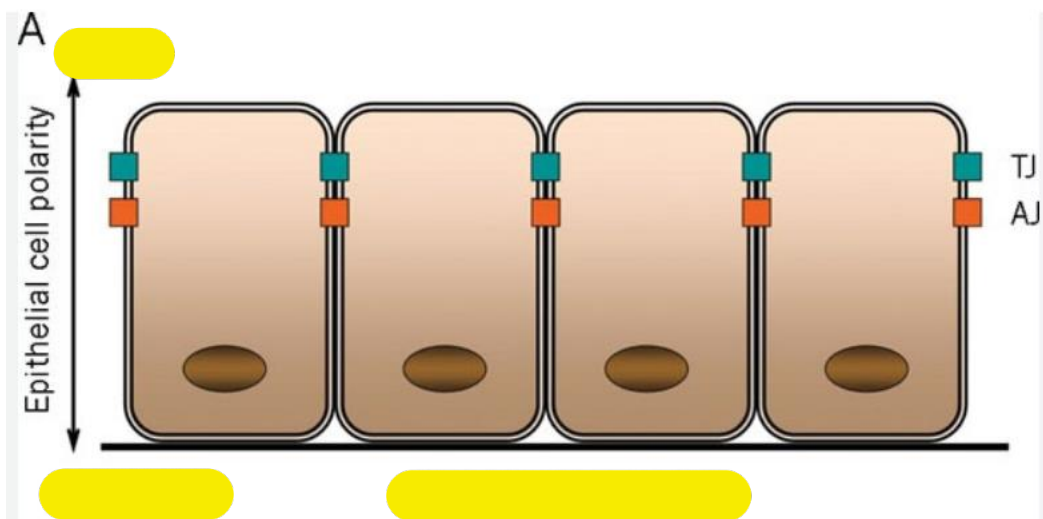


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Cell polarity

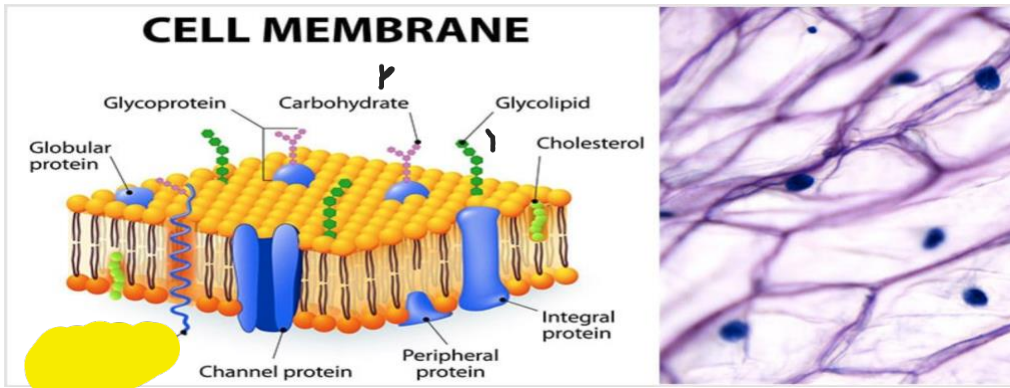
Many cells show polarity, meaning different areas of the cell have different structures. The most-studied polarity is in epithelial cells, they have

- [redacted]
- [redacted]



1.

- The membrane that envelopes every eukaryotic cell. It functions as a selective barrier; regulating the passage of materials in and out of the cell.



- Membranes range from 7.5 to 10 nm in thickness and are visible only in the electron microscope.

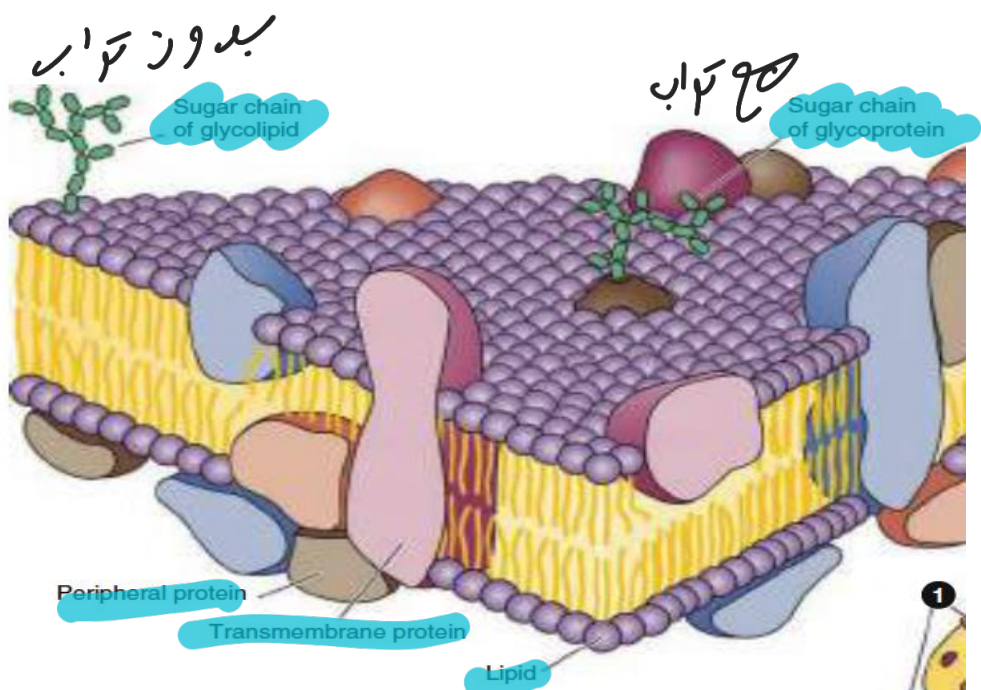
Components of plasma membrane

- ① الليبيدات الفسفورية
- ② الكوليسترول
- ③ بروتينات

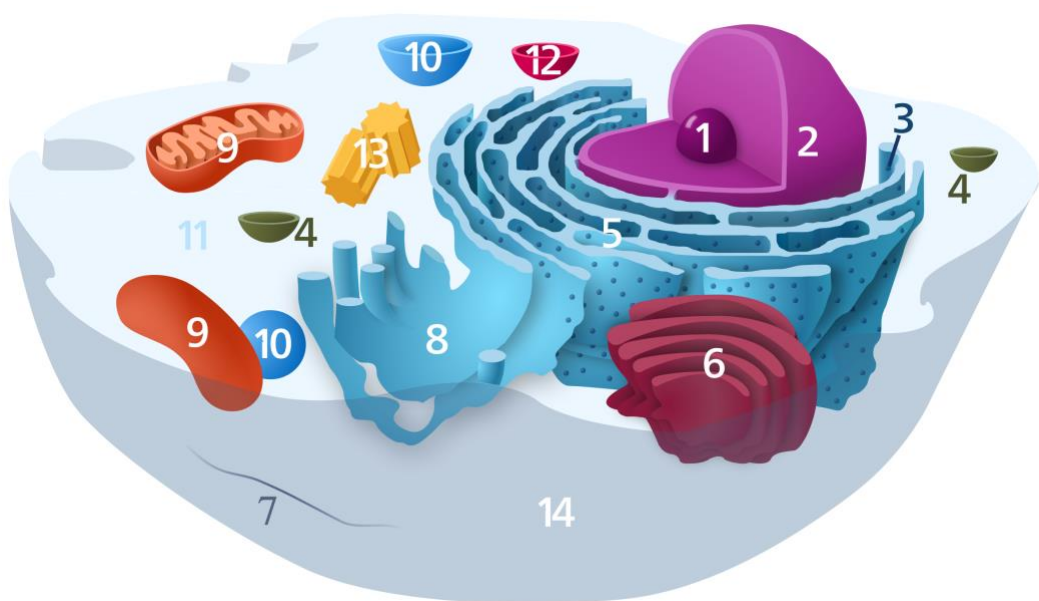
1. Integral: incorporated directly within the lipid bilayer

2. Peripheral: bound to one of the two membrane surfaces, particularly on the cytoplasmic side

- ④ (carbohydrate) chains linked to many of the phospholipid (to form glycolipids) and protein (to form glycoproteins) molecules.



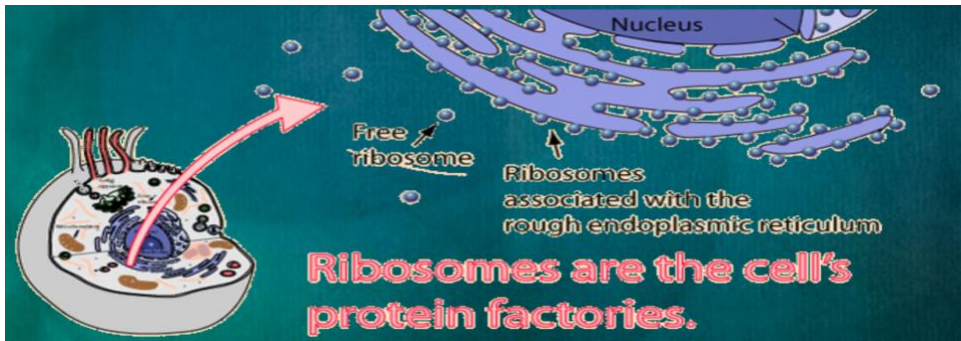
The Cytoplasm



- Inside the cell membrane, the fluid cytoplasm (or cytosol) bathes metabolically active structures called organelles, which may be membranous (such as mitochondria) or nonmembranous protein complexes (such as ribosomes).
- The cytoplasm is a fluid medium, which also determines a cell's shape and motility.

← الخلية

1. Ribosomes



Type

Size

- are **macromolecular machines**, about **20-30 nm**, which **assemble polypeptides (proteins) from amino acids in a sequence specified by mRNA**

Function

- They can be **free in the cytosol** or **bound to the rough endoplasmic reticulum**
- During **protein synthesis** many **ribosomes** are **attached to the rough endoplasmic reticulum**

Function of

- Free ribosomes** **synthesize cytosolic and cytoskeletal proteins** and **proteins for import into the nucleus, mitochondria, and peroxisomes.**

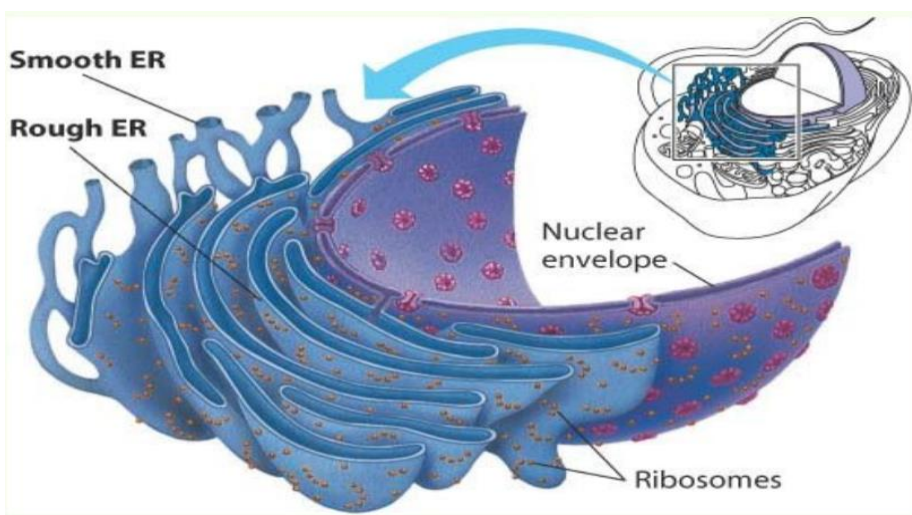
Function of

- Bound ribosomes** **synthesize proteins that are to be incorporated into membranes, stored in lysosomes, or eventually secreted from the cell.**

locations

note

2. Endoplasmic Reticulum (ER)



What is The ER?

- Is an [redacted]

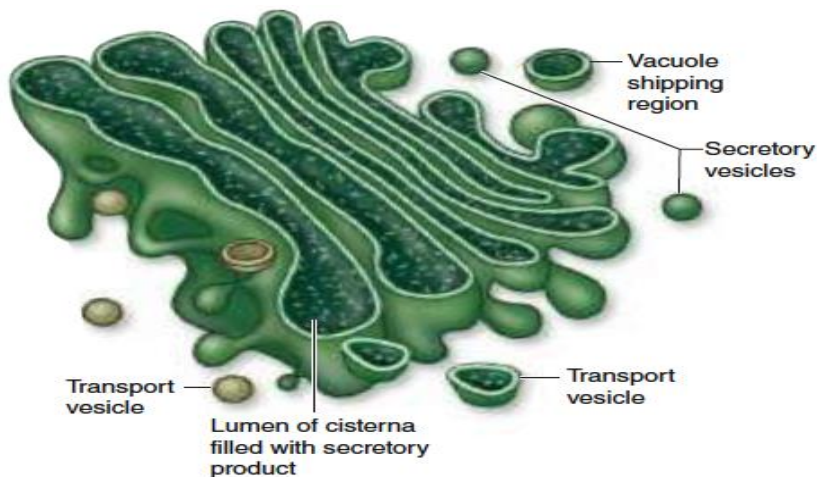
- Types :

1. [redacted] 1
2. [redacted] 2

- Functions of ER

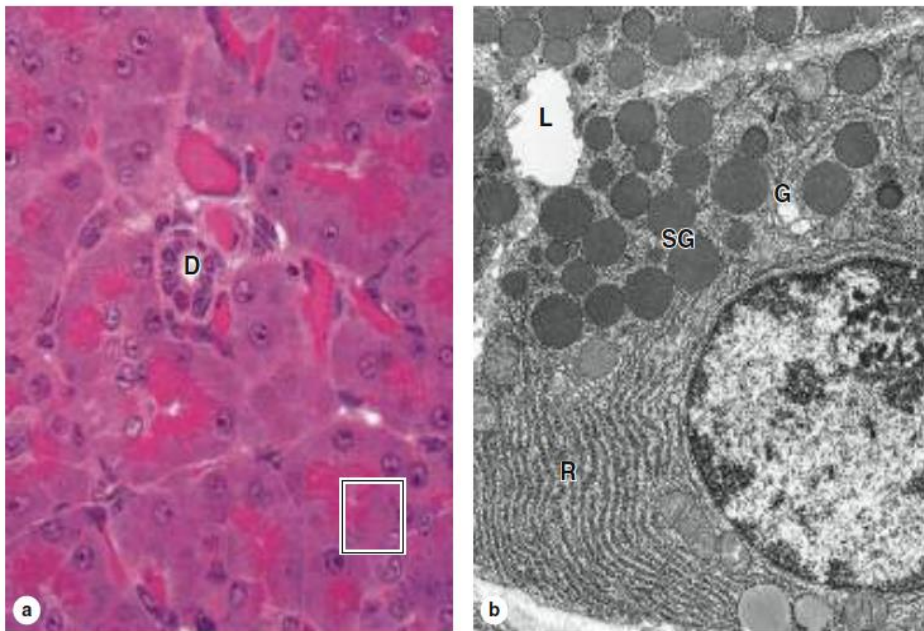
- ① 1. **Synthesis:** Provides a place for chemical reactions
- ② 2. sER is the site of lipid synthesis and carbohydrate metabolism ②
- ③ 3. rER synthesizes proteins for secretion, incorporation into the plasma membrane, and as enzymes within lysosomes
- ④ 4. **Transport:** Moves molecules through cisternal space from one part of the cell to another, sequestered away from the cytoplasm
- ⑤ 5. **Storage:** [redacted], sER stores Ca^{2+}
- ⑥ 6. **Detoxification:** sER detoxifies both drugs and alcohol

3. Golgi Apparatus



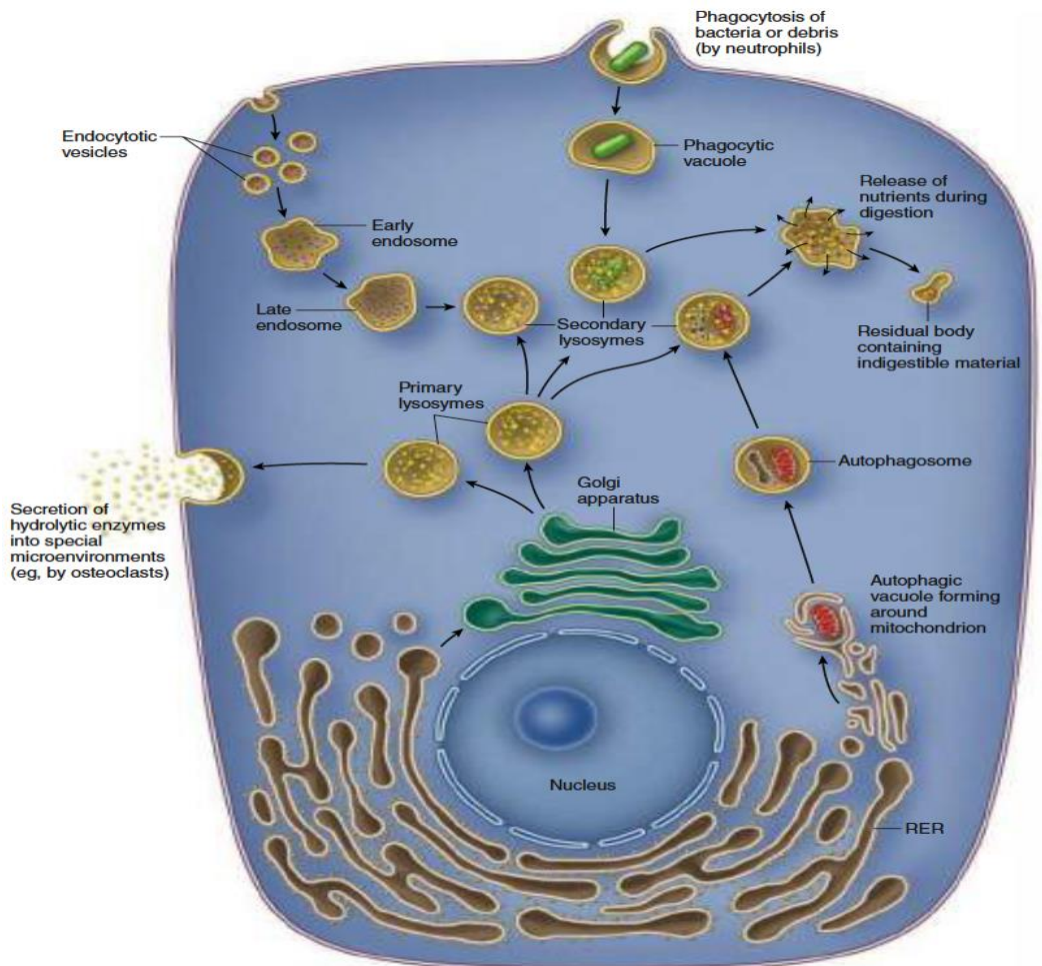
- [redacted]
- [redacted]
- [redacted]
- Material moves from the rER cisternae to the Golgi apparatus in small, membrane-enclosed carriers called **transport vesicles**
- Has two sides (ends):
- **Receiving end (cis):** receives transport vesicles
- **Shipping end (tran):** ships secretory vesicles

4. Secretory Granules



- The granules are surrounded by membrane and contain a concentrated form of the secretory product

5. Lysosomes



- Are sites of intracellular digestion and turnover of cellular components.

- [redacted] but [redacted]

Synthesis is
rER
packaging
Golgi
Apparatus

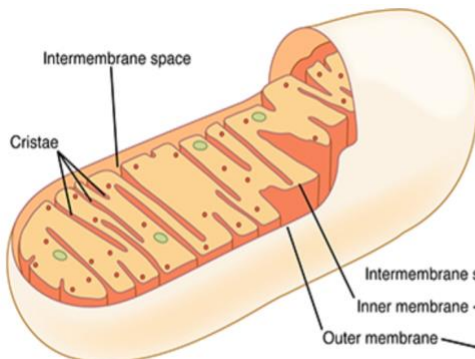
- Synthesis of lysosomal enzymes occurs in the rER, with packaging in the Golgi apparatus. Endocytosis produces vesicles that fuse with endosomes before merging with lysosomes.
- Phagocytic vacuoles (or phagosomes) fuse with primary lysosomes to become secondary lysosomes (or heterolysosomes), in which ingested material is degraded.

NOTE

primary lysosomes + phagocytic vacuoles

→ Secondary lysosome

6. Mitochondria



اصطفاة!

Define

Function

- Are membrane-enclosed organelles with arrays of enzymes specialized for aerobic respiration and production of adenosine triphosphate (ATP), [redacted]

- [redacted] cells with a high-energy metabolism (eg, cardiac muscle, cells of some kidney tubules) have abundant mitochondria, whereas cells with a low-energy metabolism have few mitochondria.

TEM

- Under the TEM each mitochondrion is seen to have two separated and very different membranes that together create two compartments: the innermost matrix and a narrow intermembranespace

2

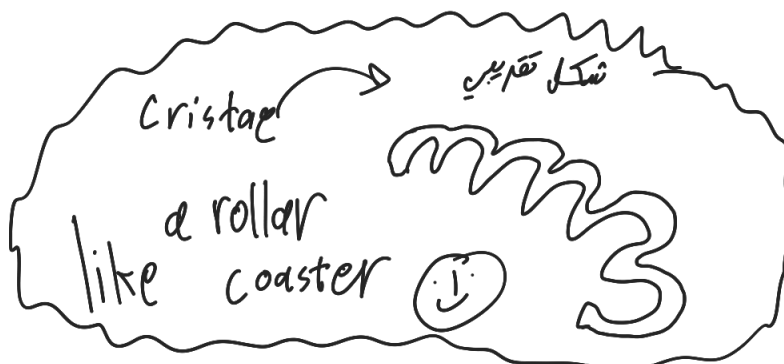
1

porins
function

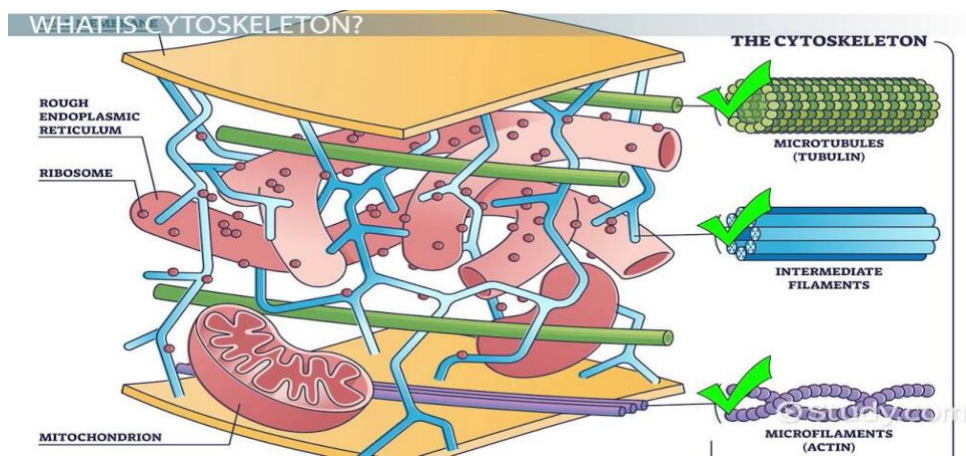
- The [redacted] contains many transmembrane proteins called porins that form channels through which small molecules such as pyruvate and other metabolites pass from the cytoplasm to the intermembranespace.

function

- [redacted], which project into the matrix and greatly increase the membrane's surface area



7. The cytoskeleton



- Is a complex array of:

- microtubules.
- microfilaments (also called actin filaments)
- intermediate filaments.

- Function {
- These protein polymers determine the shapes of cells, play an important role in the movements of organelles and cytoplasmic vesicles, and also allow the movement of entire cells.

8. Role of the nucleus

- Contains the code for all of a cell's enzymes and other proteins.
- It also contains the molecular machinery to replicate the DNA and to synthesize and process all types of RNA.
- The nucleus usually appears as a **shape of the nucleus**, often near the cell's center. **location of the nucleus**
- It consists of a **nuclear envelope containing chromatin**, with one or more specialized regions of chromatin called **nucleoli**.

Components of the nucleoli

8.1. Define Chromatin

- The mass of DNA and its associated proteins
- Microscopically two categories of chromatin can be distinguished:
 1. **chromatin** is visible as finely dispersed granular material in the electron microscope and as lightly stained basophilic areas in the light microscope. It is associated with active cells

types

of chromatin

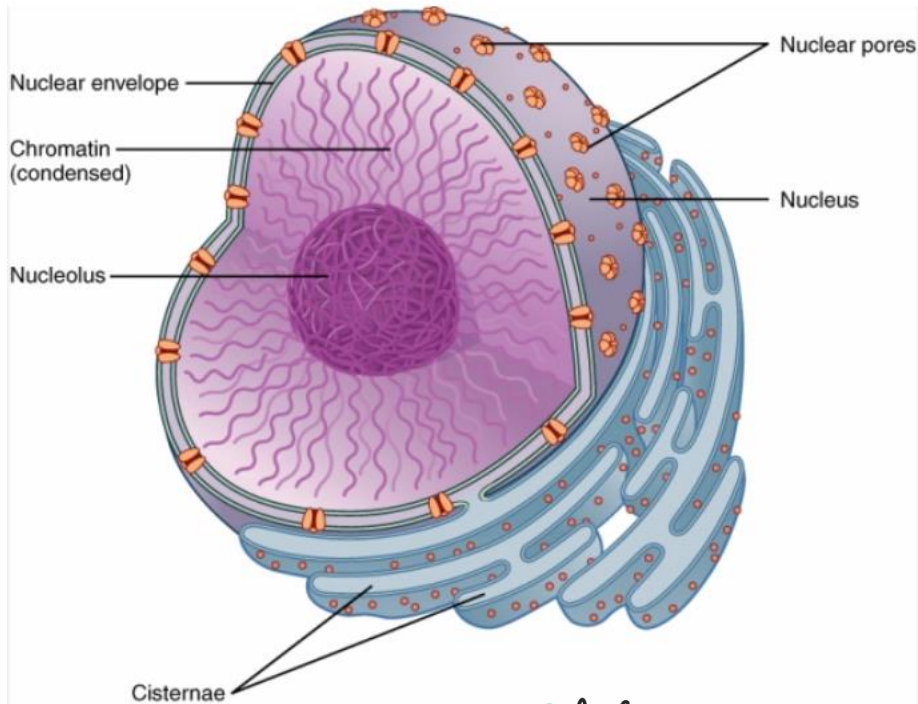
● صبغات ذات صبغة قاعدية في الميكروسكوب الضوئي

صاده ذات كثافه بالاكروونات
في الميكروسكوب الالكتروني
خشن / غليظ / تخين

2. Nucleolus appears as coarse, electron-dense material in the electron microscope and as intensely basophilic clumps in the light microscope. It is associated with inactive cells

8.2. Nucleolus

كثله شديده القاعده في الميكروسكوب الضوئي

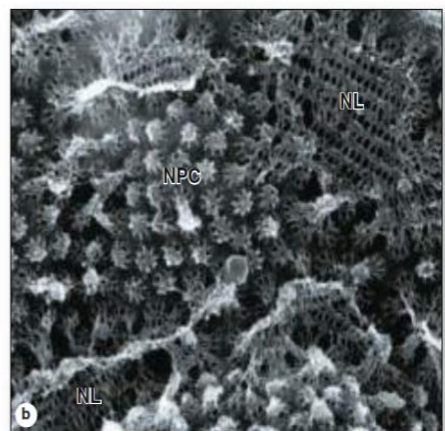
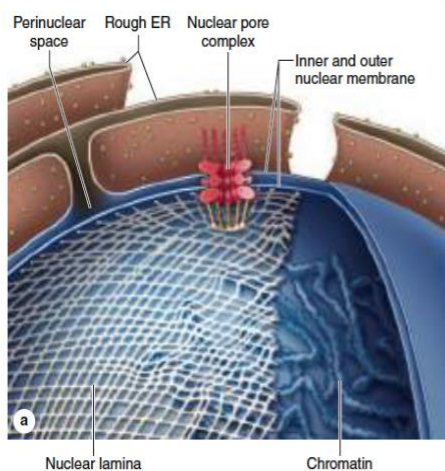


● Shape of the nucleolus

● Define nucleolus

- Nucleolus, highly basophilic subdomain of nuclei in cells actively engaged in protein synthesis
- Function
- It is the location of ribosomal subunit assembly and transcription of ribosomal RNA (rRNA)

8.3. The Nuclear Envelope



- Nuclear envelope with a nuclear pore complex which separates the cytoplasm from nucleoplasm

● Function of N. envelope

حول النواه

- The outer membrane binds ribosomes and is continuous with the rER.

↳ remind: It's the rough endoplasmic reticulum

I'm not certain of the spelling 😊

اختراق

- [Redacted]

- It is supported internally by a meshwork, the nuclear lamina, composed of intermediate filament subunits called lamins.

Note

8.4. Nuclear pore complexes

- Nuclear pore complexes (nuclear pores) contain more than 30 core proteins (nucleoporins), span both membranes of the nuclear envelope, and regulate the bidirectional transfer of macromolecular complexes between the nucleus and cytoplasm

Note

Span: تمتد

تحتوي على طبقتي الغلاف النووي وتنظم الانتقال ثنائي الاتجاه للعضيات كبيرة الحجم الموجودة بين النواة والسيتوبلازم