**المحاضرة الرابعة المرحلة الأولى**

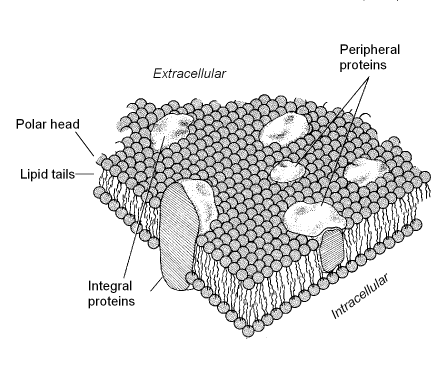
**كلية الطب**

**proteins :-**

Proteins floating in the fluid lipid bilayer membrane, most of which are glycoprotein**.**

Two types of proteins occur:

1-integral proteins that protrude all the way through the membrane,

2- peripheral proteins that are attached only to one surface of the membrane.****

**1-integral proteins Functions**

Many of the integral proteins act as:

A- structural channels (or pores)

Function:-that have selective properties, through which water molecules and water-soluble substances ,like ions, can diffuse between the extracellular and intracellular fluids.

B- carrier proteins

Function:- even transport substances in the direction opposite to their natural direction of diffusion, which is called “active transport.”

D – enzymes.

Function**:-**catalyzing reactions at the surfaces of the membrane

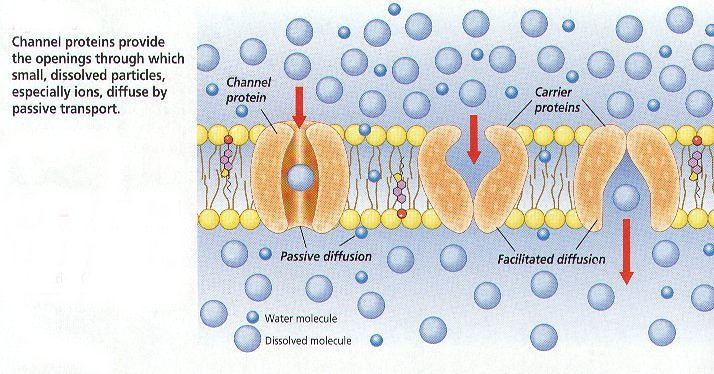
E- receptors,

Function :-Interaction of receptors with specific ligands causes conformational changes in the receptor protein. induces interactions between the receptor and proteins in the cytoplasm that act as second messengers,relaying the signal from the extracellular part of the receptor to the interior of the cell.

\***Peripheral protein**

molecules are often attached to the integral proteins.

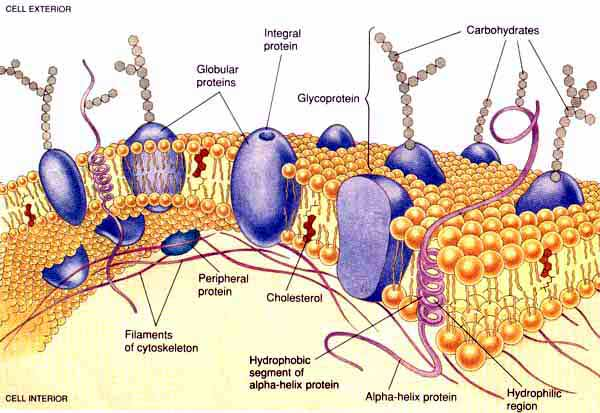
Its function ,act as enzymes that catalyze chemical reactions in the cell or as membrane“ pores.



**Carbohydrates Cell “Glycocalyx.”**

- Membrane carbohydrates in combination with proteins or lipids in the form of glycoproteins like( integral proteins)or glycolipids on tenth ( membrane lipid molecules).

- portions of these molecules protrude to the outside of the cell, called the glycocalyx which act as receptor for binding hormones, such as insulin.



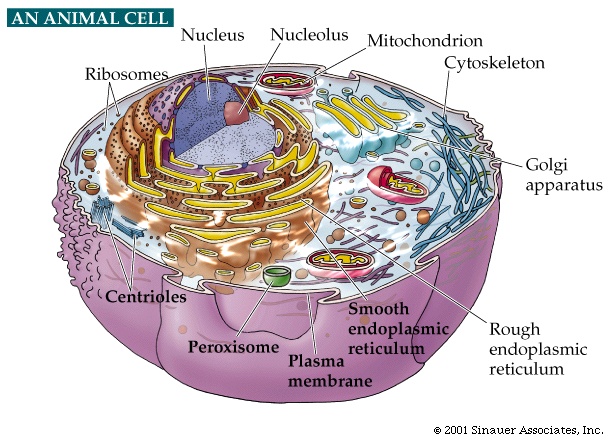
**Cytoplasm and Its Organelles**

The clear fluid portion of the cytoplasm in which the particles are dispersed

is called cytosol;contains

-dissolved proteins, electrolytes ,neutral fat globules, glycogen granules, ribosomes, secretory vesicles

- five especially important organelles: the endoplasmic reticulum, the Golgi apparatus, mitochondria, lysosomes, and peroxisomes.

***Endoplasmic Reticulum***

-a network of tubular and flat vesicular called cisternae interconnect structures

in the cytoplasm

-their walls similar to the cell membrane.

-The space inside the tubules and vesicles is filled with endoplasmic matrix, a watery medium connected with the space between the two membrane surfaces of the nuclear membrane.

-the vast surface area of this reticulum and the multiple enzyme systems provide a major share of the metabolic functions of the cell.

\***There are two types of endoplasmic reticulum:-**

*a- rough or granular endoplasmic reticulum*

-is studded with ribosomes which gives it a "rough" appearance.

-Ribosomes are a large numbers of minute granular particles attached to the outer surfaces of many parts of the endoplasmic reticulum .

- composed of a mixture of RNA and proteins, and they function to

synthesize new protein molecules in the cell.

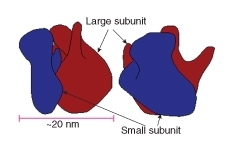
*b- smooth or, agranular, endoplasmic reticulum*

has no attached ribosomes. Its functions is the synthesis of lipid , storage calcium ion, and drug detoxification .

**Ribosomes:**-

-The ribosomes are about 15 nm in diameter .

-Each is made up of a large & small subunit.



-They contain about 65% RNA & 35% protein .

-They are the site of protein synthesis .

-Attached ribosomes to E.R synthesis proteins such as hormones & the cell membrane proteins.

-While , the free ribosomes synthesize cytoplasmic proteins such as hemoglobin & the proteins found in peroxisomes & mitochondria.

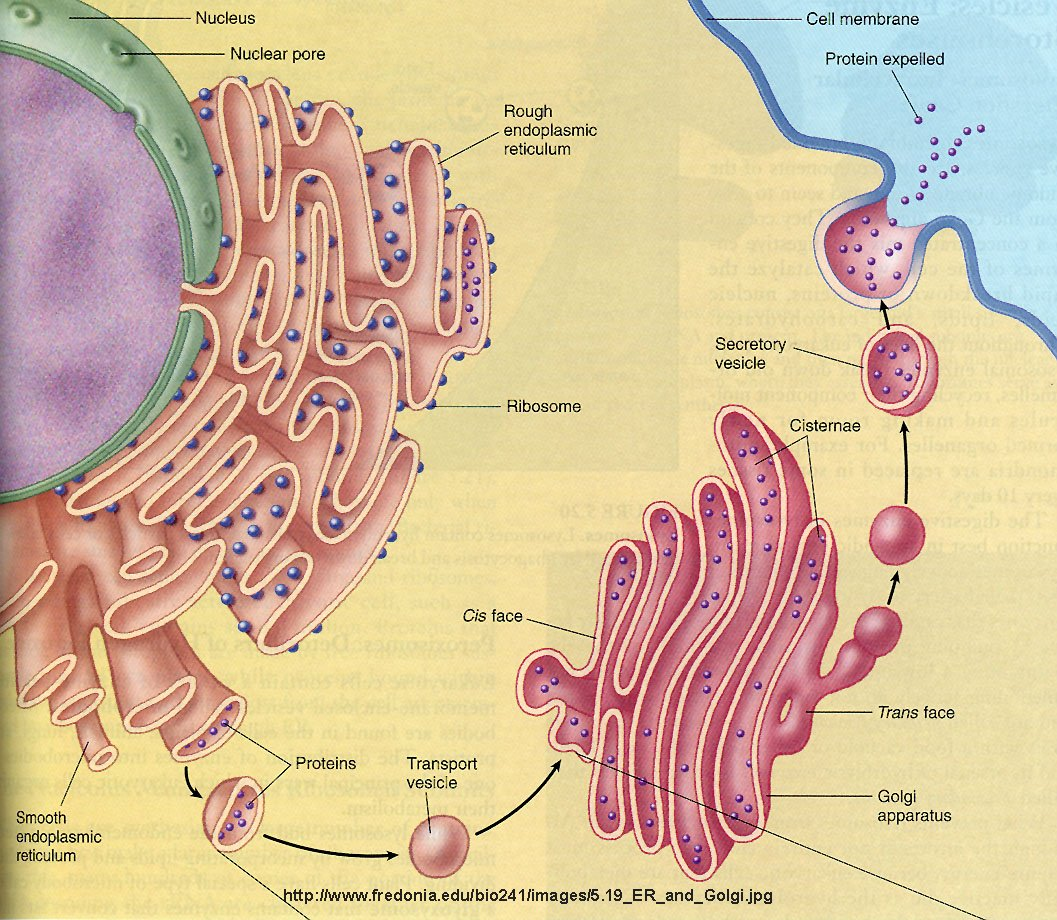
***Golgi Apparatus***

- It is composed of four or more stacked layers of thin, flat, enclosed vesicles,

- prominent in secretory cells, where it is located lying near one side of the nucleus,

In which the secretory substances are extruded.

-its functions association with the endoplasmic reticulum, that small “transport vesicles” from ER ,fuse with the Golgi apparatus ,then processed in the Golgi apparatus to form lysosomes, secretory vesicles, and Peroxisomes.



**Lysosomes**

ar**e** vesicular organelles formed by the golgi apparatus . The lysosomes provide an intracellular digestive system , contains digestive enzymes that allow lysosomes to digest intracellular substances & structures ,especially damages cell structure , food particles & un wanted materials , such as bacteria .

-Lysosomes is quite different from one cell to another , but it usually is 250 to 750 nm in diameter. It is surrounded by atypical lipid bilayer membrane and filled with large numbers of small granules 5 to 8 nm in diameter , which are protein aggregates of hydrolytic (digestive)enzymes :

-About 40 acid hydrolase enzymes have been found in lysosomes & the principal substances that they digest are proteins ,carbohydrates ,lipids & derivatives of these .

-Ordinary the membrane surrounding the lysosome prevents digestive of other substances of their cell.

**Secretory Vesicles**

all secretory substances are formed by the endoplasmic reticulum–Golgi apparatus system are storage in vesicles called secretory vesicles then released from the Golgi apparatus into the cytoplasm in the form or secretory granules.like in pancreatic acinar cells ,vesicles store protein proenzymes (enzymes that are not yet activated). Then proenzymes are secreted later

through the outer cell membrane into the pancreatic duct and then into the duodenum, where they become activated and perform digestive functions on the food in the intestinal tract.

**Peroxisomes**

-are vesicles that use oxygen to break down toxic substances in the cell.

-formed by self replicate by growing bigger and then dividing.

- They are common in liver and kidney cells that break down harmful substances.

-Peroxisomes are named for the hydrogen peroxide (H2O2) that is produced when they break down organic compounds.

-Hydrogen peroxide is toxic, and in turn is broken down into water (H2O) and oxygen (O2) molecules.

**Vacuoles**

are membrane-bound organelles that can have secretory, excretory, and storage functions. Many organisms will use vacuoles as storage.