Structured viva
(With answers)
Chapters 1 to 4
Original version dedicated to
Avicenna Medical College

Dr. Muhammad Attique

M.Phil. (Thesis in process)

Senior Demonstrator

Physiology

Avicenna Medical College

Give examples of substances transported by Primary active transport

Primary active transport

- sodium,
- potassium,
- calcium,
- hydrogen,
- chloride

Give examples of substances transported by Secondary active transport (antiport)

Secondary active transport

Countertransport

- Sodium calcium
- Sodium hydrogen

Give examples of substances transported by Secondary active transport (symport)

Cotransport

- glucose
- amino acids
- Chloride
- Iodine
- Iron
- urate

Give examples of substances transported by diffusion

oxygen, nitrogen, carbon dioxide, and alcohols

What are aquaporins?

Aquaporins

- narrow pore that permits water molecules to diffuse through the membrane in single file.
- The pore is too narrow to permit passage of any hydrated ions.
- the density of some aquaporins (e.g., aquaporin-2) in cell membranes is not static but is altered in different physiological conditions.

What are the two principal methods of Glucose transport

Glucose transport

Name	Site	Mechanism
glucose transporter 4 (GLUT4), 14 members of a family of membrane proteins (called GLUT)	is activated by insulin, which can increase the rate of facilitated diffusion of glucose as much as 10- to 20-fold in insulin-sensitive tissues.	Facilitated diffusion
Sodium-glucose co-transporters	specially important mechanisms in transporting glucose across 1.renal and 2.intestinal epithelial cells	Secondary active co transport

What are the functions of Sodium potassium pump?

Sodium potassium pump

- it causes negativity on the inside.
- electrogenic because it creates an electrical potential across the cell membrane.
- the Na+-K+ pump performs a continual surveillance role in maintaining normal cell volume.
- Prevents intracellular water excess
- Prevents cell bursting

What is telomere?

A telomere is a region of repetitive nucleotide sequences located at each end of a chromatid

What is the function of telomere?

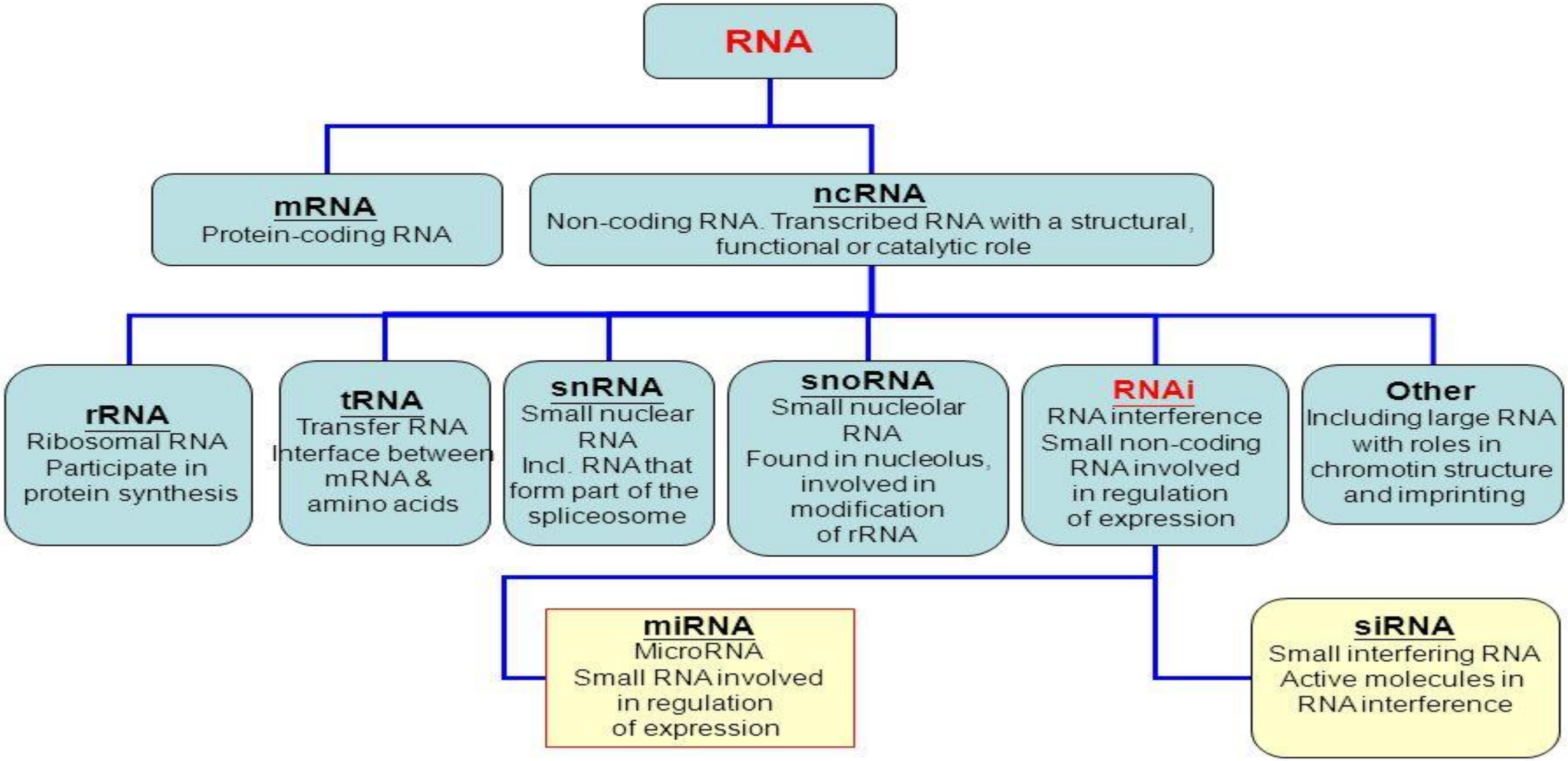
Telomeres serve as protective caps that prevent the chromosome from deterioration during cell division. Telomeres Prevent the Degradation of chromosomes.

what happens to the telomeres in cell division?

Each time a cell divides, an average person loses 30 to 200 base pairs from the ends of that cell's telomeres.

Name the different types of RNAs

Type of RNA molecules



What are polyribosomes?

polyribosomes.

clusters of ribosomes frequently occur, with 3 to 10 ribosomes being attached to a single mRNA at the same time.

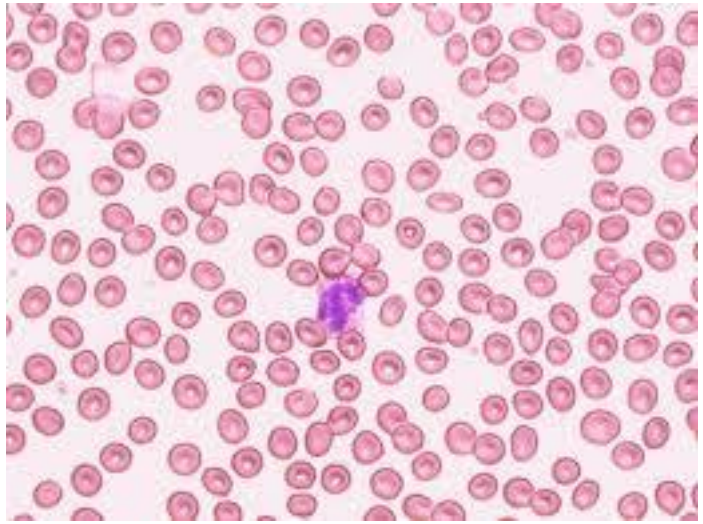
- Which cell is the largest cell in the human body?

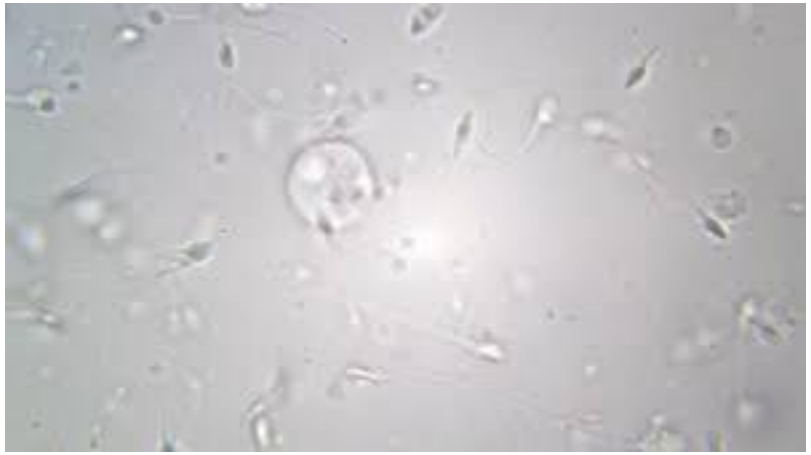
The largest cell in the human body is the female ovum or egg.

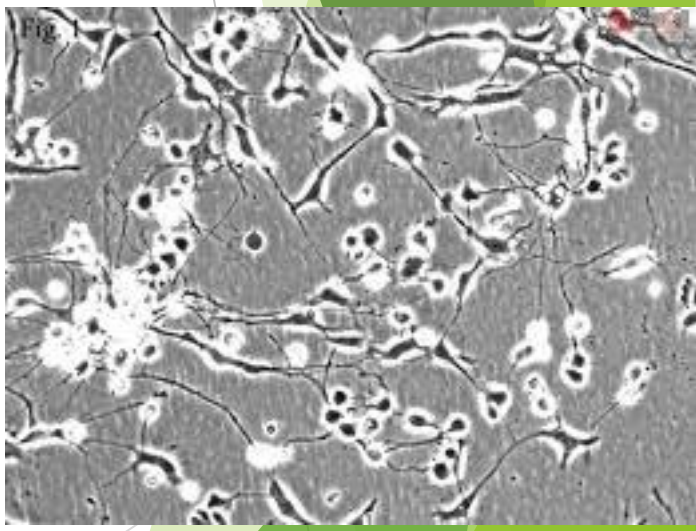
The human ovum is roughly one millimeter across and is only just visible to the naked eye.

- Which cell is the smallest cell in the human body?

(rbc) (sperm cells) (cerebellar granule cells)







Name the self replicating organelles

self-replicative

- Mitochondria
- Peroxisomes
- chromosomes

- Name the membrane enveloped organelles

Most organelles of the cell are covered by membranes composed primarily of lipids and proteins. These membranes include the

- cell membrane,
- nuclear membrane,
- membrane of the endoplasmic reticulum,
- membrane of mitochondria,
- membrane of lysosomes
- membrane of Golgi apparatus.

- Name the types of cell locomotion mechanisms in human body

Motile cells

Flagellum	Cilia	Ameboid
1. Sperms	1. Respiratory tract epithelium 2. Fallopian (uterine tube) epithelium	1. white blood cells through tissues. 2. germinal cells of the skin 3. fibroblasts

- Describe the lysosomes

(1) lysozyme, which dissolves the bacterial cell membrane;

(2) lysoferrin, which binds iron and other substances before they can promote bacterial growth; and

(3) acid at a pH of about 5.0, which activates the hydrolases and inactivates bacterial metabolic systems.

provide an intracellular digestive system that allows the cell to digest

(1) damaged cellular structures,

(2) food particles that have been ingested by the cell, and

(3) unwanted matter such as bacteria.

40 different hydrolase (digestive) enzymes

Lysosomes are responsible for much of this regression.

Lysosomes play a key role in the process of autophagy

Describe the peroxisomes

Peroxisomes

1. formed by self-replication (or perhaps by budding off from the smooth endoplasmic reticulum)
2. oxidases capable of combining oxygen with hydrogen ions derived from different intracellular chemicals to form hydrogen peroxide (H2O2).

Hydrogen peroxide is a highly oxidizing substance and is used in association with catalase, another oxidase enzyme present in large quantities in peroxisomes, to oxidize many substances that might otherwise be poisonous to the cell.

3. catalase
4. about half the alcohol a person drinks is detoxified into acetaldehyde by the peroxisomes of the liver cells in this manner.
5. to catabolize long chain fatty acids.

Name the Cell Cytoskeleton—Filament and Tubular Structures

Cell Cytoskeleton—Filament and Tubular Structures

Ectoplasm

actin and myosin

Flagellum

cilium

the centrioles and

the mitotic spindle.

Describe Apoptosis

Apoptosis

programmed cell death that occurs in multicellular organisms. Biochemical events lead to characteristic cell changes (morphology) and death.

These changes include blebbing, cell shrinkage, nuclear fragmentation, chromatin condensation, chromosomal DNA fragmentation, and global mRNA decay.

The average adult human loses between 50 and 70 billion cells each day due to apoptosis.

For an average human child between the ages of 8 to 14 year old approximately 20 to 30 billion cells die per day.

Which cells have No nucleus?

No nucleus

Red blood cells

Platelets

Which cells are multinucleate?

multinucleate

Osteoclasts

Skeletal muscle cells

Describe Pinocytosis

Pinocytosis

ingestion of **minute particles** that form vesicles of extracellular fluid and particulate constituents inside the cell cytoplasm.

it occurs so rapidly in macrophages that about 3 percent of the total macrophage membrane is engulfed in the form of vesicles each minute.

100 to 200 nanometers in diameter—

most large macromolecules, such as most protein molecules, can enter cells.

coated pits, fibrillar protein called clathrin, actin and myosin

Describe Phagocytosis

Phagocytosis

Phagocytosis occurs in much the same way as pinocytosis occurs, except that it involves large particles rather than molecules. Only certain cells have the capability of phagocytosis, most notably the tissue macrophages and some white blood cells.

bacterium, a dead cell, or tissue debris

- Give examples of regression

Regression of Tissues and Autolysis of Damaged Cells

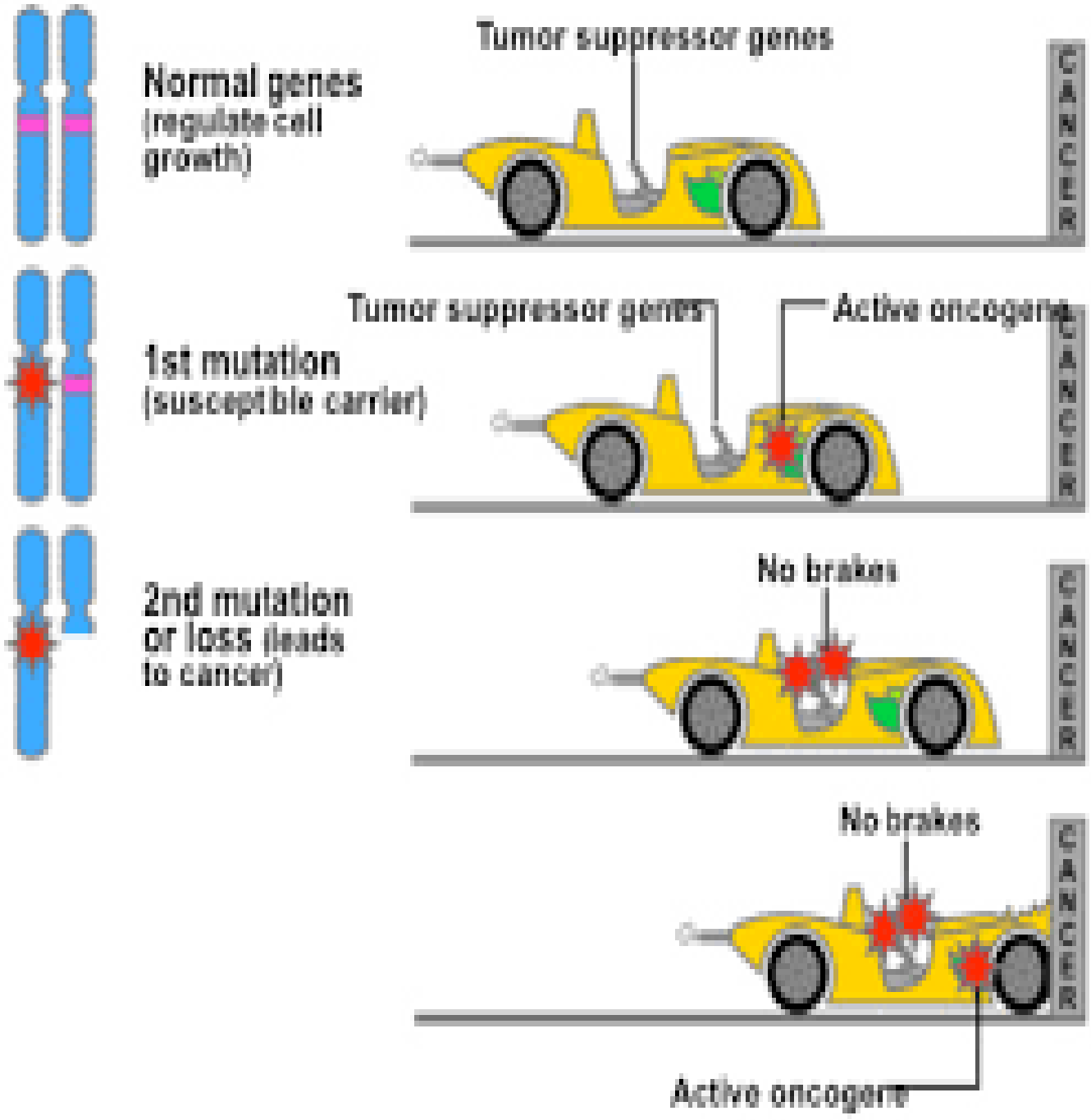
uterus after pregnancy,

in muscles during long periods of inactivity, and in mammary glands at the end of lactation. Lysosomes are responsible for much of this regression.

What are Proto oncogenes?

Proto oncogenes

A **proto-oncogene** is a normal gene that could become an **oncogene** due to mutations or increased expression. **Proto-oncogenes** code for proteins that help to regulate cell growth and differentiation.

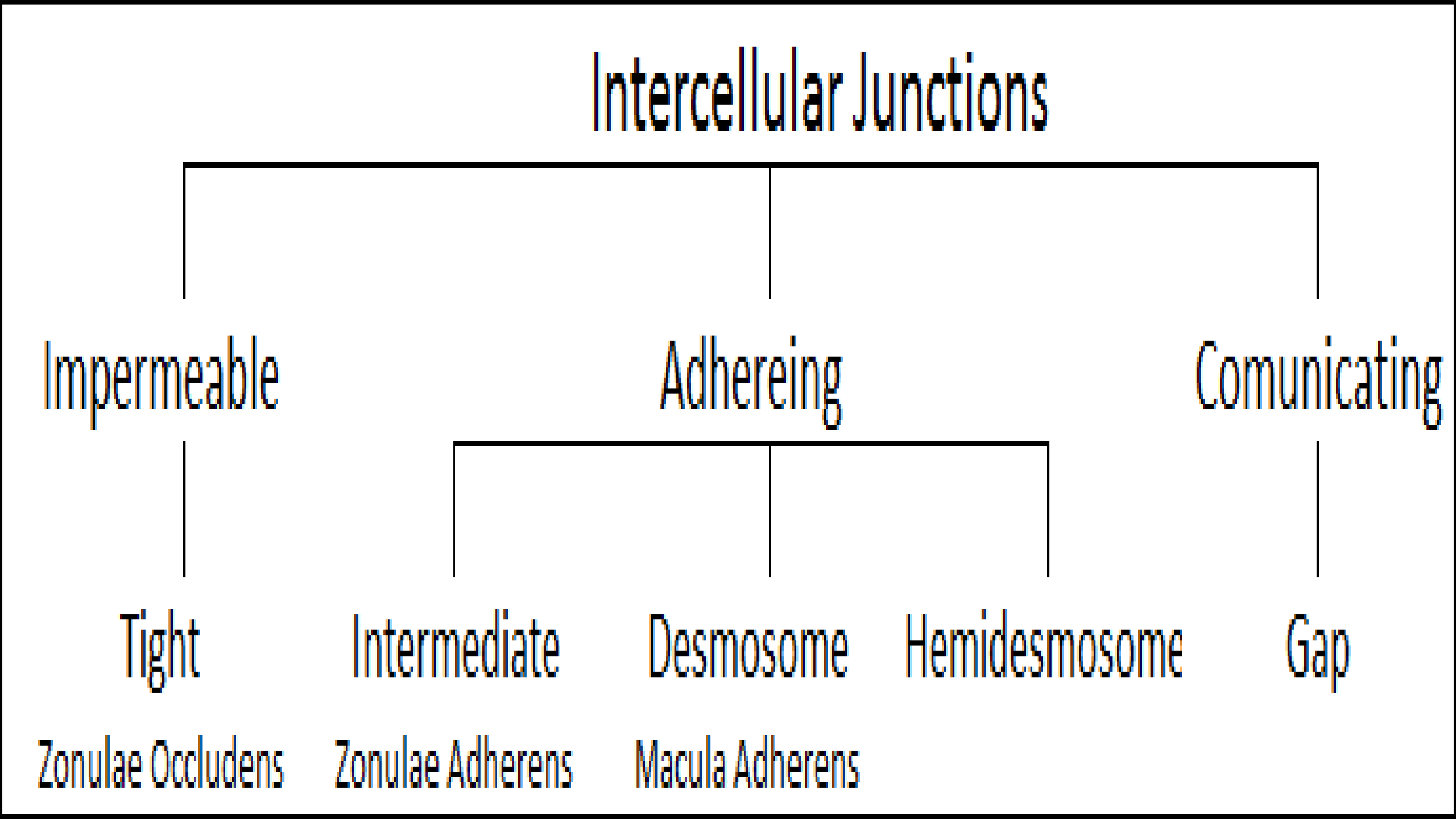


Describe the Centrosomes

Centrosomes

- Near the nucleus in the cytoplasm of eukaryotic animal cells is a **centrosome.** The centrosome is made up of two **centrioles** and surrounding amorphous **pericentriolar material.** The centrioles are short cylinders arranged so that they are at right angles to each other. Microtubules in groups of three run longitudinally in the walls of each centriole (Figure 2–1). Nine of these triplets are spaced at regular intervals around the circumference.
- The centrosomes are **microtubule-organizing centers (MTOCs)** that contain -tubulin. The microtubules grow out of this -tubulin in the pericentriolar material. When a cell divides, the centrosomes duplicate themselves, and the pairs move apart to the poles of the mitotic spindle, where they monitor the steps in cell division. In multinucleate cells, a centrosome is near each nucleus.

- Name the different types of intercellular junctions


Intercellular Junctions
Impermeable
Adhereing
Comunicating
Tight
Intermediate
Desmosome
Hemidesmosome
Gap
Zonulae Occludens
Zonulae Adherens
Macula Adherens

Where does the cell use its ATP?

1. Biosynthesis
2. Active transport
3. Muscular contraction