



**Cell &
Molecular
Biology
Notes**

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Cell Biology

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1st Lecture

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* Tiny embryo ^{by cellular} division and adding ^{cells} → large adult
 * We can use cells therapy in medicine

- In the past, scientists couldn't study the cells because they didn't have microscopes.

- Each development in microscopes is followed by many developments in the knowledge about the cells (Each type of microscopes has its own ability to show a specific organelles)

- By these microscopes scientists discovered how to grow cells in laboratory

• Cells have limited number of divisions and then they die.

• Now, scientists have discovered way to keep them divided without die.

• HeLa Cells (immortalize cells)
 Scientists use these cells to study

the structure and the chemical reactions in living cells. Also, it's used in drugs to examine them and evaluate the effects and efficiency.

"Cells are highly complex and organized."

+ Cells control the metabolic pathways and biochemistry of cells by the information that encoded in the genes (The sequence of bases)

DNA

A C C G T A T T C C G G
 T G G C A T A A G G C C

Each gene has a unique sequence of bases ⇒ So... different sequence of amino acids.

When the sequence of amino acids is changed due to the changing in the sequence of bases in DNA, these changes lead to "mutations"... many mutations are positive, they help the species to adapt with the new conditions.

- Cells are reproduced by cellular division before this process... Cells must be prepared

First: DNA is duplicated... so each daughter cell has one of these two identical copies of DNA.

photo synthesis → produce Glucose by using ATP.
 (plants and prokaryotes)

Cellular respiration → oxidation of Glucose to generate ATP which is used to energize the cells activity.

- Cells carry out several reactions (metabolic pathways).

- Enzymes facilitate the chemical reactions and changes.

The cells perform three types of work:

1- physical 2- chemical 3- transporting

Cells can transport materials ⇒

The cyto skeleton inside the cells is very dynamic; It's continually broken and reformed to perform specific function. Also, cells are always moving.

- Motor proteins change their shapes to power the process. Also they have internal chemical changes (dynamic and chemical changes)

- Some cells (protest) can move from a place to another to get nutrients (cells covered by receptors)



- The receptors can bind with Hormones and other factors.



- This binding stimulates the cells to a response which might be a change in chemical reactions or gene expression.

* Cells protect themselves from changing or consuming more than enough energy of materials by feedback. (Allosteric inhibition)

to keep a cell in a propiate situation (Highly regulated)

* Cells regulate themselves by regulate the enzymatic works.

□ There are Two Main Classes of Cells: Eukaryotic, prokaryotic

□ They share some properties:-

* DNA (but they differ in the shape and slight different in structure)

* plasma membrane (the same structure and composition)

* The Ribosomes (They differ in structure)

↓
The antibiotics depend on this fact to destroy the ribosomes of bacteria without damage the ribosomes of the human cells.

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* Cytosol

* Chromosomes

- Selective permeability

plasma membrane

Some materials can span the plasma membrane easily but others can not. (hydrophobic can pass this membrane easily) because of the lipids.

Animals cells don't have cell walls

Eukaryotic cells are more complex than prokaryotic cells.

The distinguish properties of plant cells :-

1. Vacuole 2. Cell walls

3. Chloroplasts

* Eukaryotics are divided by (mitosis).

* prokaryotics are divided by (simple fission)

* prokaryotes have different flagellum than eukaryotes.

* real nucleus containing nucleolus (eukaryotes)
"DNA inside it".

* much more genetic material in eukaryotes.

* many chromosomes in eukaryotes.

* eukaryotic cells produce ATP in mitochondria → prokaryotic cells in the cytoplasm.

* DNA is universal Genetic Code.

Cell Biology

1st Lecture

TCA \Rightarrow Krebs's cycle

Eukaryotic cells are

Compartmentalized organization

(Golgi apparatus and

Endoplasmic reticulum etc)

Bacteria use different flagellum in structure and mechanism.

Bacteria live in different environments and conditions.

Autoclave \Rightarrow sterilization device uses high temperature and pressure.

Each instrument has its own way and mechanism in sterilization.

* The smallest known cell is the mycoplasma \Rightarrow it doesn't have cell wall and it doesn't affect other cells strongly but it engulfs them in nutrients and decreases the division.

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The types of Bacteria that live inside the healthy and non-healthy body differ from each other.

Inside the Cow the bacteria breaks down the cellulose.

- There are microbionics live over the human skin and they are very important.