## Unit 5: Metabolism

Concept of Metabolism:

Description is the sum total of the chemical acactions of bio molecules in an organisum.

The three main purpose of Metabolism:

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a) Conversion of food to energy and

b) Conversion of food to the building total blocks such as proteins, lipids

c) Elemination of toxins.

These enzyme - catalyzed reactions allow organisums to grow and reproduce, maintain their structures and respond to their

The metabolic roactions are categorized.

into two types:

) Catabolisic reactions: Involving breakdown
of compounds

2) Anaboli Anabolic reactions: Involving building up (synthesis) of compounds (such as proteins, carbo hydrates, lipids and nucleic acids).

The catabolism soleases energy and anabolism consumes enougy. Enzymes are crucial to the metabolish reactions because they allow the organisums to drive the desirable reactions that sequire enougy and will not ad occur by themselves. By coupling them to spontaneous reactions that energy release energy. In living organisums chamical bonds are broken or made as a part of the exchange and transformation of energy.

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1) Endergonic reactions:

- They are chemical reactions that require

an input of energy to proceed.
- In these reactions the energy of products is higher than that of the reactants.

-The readants absorb energy from their surroundings to form products with higher energy content.

- They are often associated with energy absorbing processes such as photosynthesis where plants capture and store energy toom sunlight to convert causon dioxide ar water into glucose

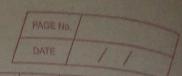
2) Exergonic reactions:

They release energy as they proceed. In these reactions, the energy of the products is lower than that of reactants.

- This means the excess energy is liberated and can be used to perform cellular work. They are characteristic of energy-releasing processes such as cellular respiration where

the breakdown of glucose results in release of energy that is captured in the form of

>ATP Adenosine triphosphate The energy exchanged or the energy transformed during catabolic reactions happens through the energy currency ATP. 2) ATP is called as energy currency of cell because it is the energy molecule that all cells nood in order to do anything within the body



3) Molecule is used as a battery within the cell and allows the consumption of one of its phosphorus molocules to get converted to ADP.

Adenine, ribose and three serially bonded phosphate groups linked together to the phosphodiester bonds.

3) The groadily greatly available enougy is released by the bond breaking between the

second and third bond.

Catabolisma

Ex: Breakdown of glucose by the cellular respiration to produce energy in the form of ATP for particular activities

Anabolism:

Ex: Protein synthesis

Involving assembling of amino acids into the desired protein structures at the cost of or driven by the consumption of ATP

In living organisums catabolic and anabolic experiences are delicately balanced. The energy soleased during catabolism fuels the energy energy domanding anabolic reactions. Maintin Maintaining this equilibrium is essential for the proper functioning and growth of cells.

\* Cellular respiration: 1) It is a process by which biological tuels are oxidized in the presence of inorganic electron acceptors such as oxygen to produce large amount of energy to drive the product-ion of ATP. 2) Collular respiration may be described as set of reactions and processes that are take place in the cells of organisums to convert the chemical energy from the nutrients into ATP then reloase the waste product. 3) A Nutrients that age commonly used by plants and animals in cellular respiration 'are: 2) Amino acids 3) fatty acids i) molecular oxygen 1) First step is allering the food into its alternate chemical compounds and then getting those molecules into you your cells - process known as digestion 2) Once inside the cells the phase of turning the digested tood into usefull energy begins.

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The process of digestion results with carbohyd and other molecules being removed from the consumed food and transported into bloodstream from there the nutrients like glucose will leave the bloodstream through a capillary would and enter a tissue cell.

Once inside the cell, cellular respiration will completely oxidize glucose molecule acleasing high energy electrons. The overall goal is to make ATP a storage form of energy.

for most of the cells the cellular respiration is a four stage process that begins with:

a) Glycolysis:

in the se cytoplasm of the sugar and occurs in the se cytoplasm of the cell. It is a multiple step reaction and involves acceptation of several enzymes. Fand in the process two molecules of ATP and two molecules of pyrvate are producted.

When oxygen is present the next stage of cellular despiration takes place:

6) Pyruvate oxidation:

This process happens in the mitochondria of the cell. Each biomolecule is converted into acetyle (OA and carbon dioxide is formed.

a series of enzymatic reactions will get converted

as carebon dioxide and water.

tes O Citaie acid cycle: The acety 1 COA

4) Electron transport chain:

The electron transport is a series of membrane bound carriers in mitochondria that pass electrons from one to another and in the process the membrane proteins are able to capture the energy and use them to produce the ATP molecules.

· Aerobic vs Ha Anaerobic respiration

DAnaerobic respiration is a part of cellular suspiration, 9+ consists of multiple phases and one of the phases is glycolysis which is an anaerobic process (in the absence of oxygen).

and does not require oxygen. During glycolysis
is broken down into pyruvate

molecules producing a small amount of ATP and

high enougy electron carrier.

This phase can occur in the absence of oxygen making it an essential component of both aerobic

and anaerobic pathways.

In the absence of oxygen, the pyruvate molecules generated undergo fermentation reaction. So while the aerobic suspiration requires oxygen and is more efficient in terms of ATP production produces lesser ATP's and includes the int initial ways of glycolysis which does not depend on oxygen