CHAPTER 10

RESPIRATION IN ORGANISMS

CLASS: VII HAND OUT(MODULE 1/2)

Why do we respire?

- All living organisms need food which gives them the required energy.
- The energy present in the food gets released when the organisms respire or breathe.
- These cells have different functions to perform in these organisms such as digestion, respiration, transportation and excretion.

How food helps us in gaining energy?

- As we breathe, we take in the air that contains oxygen in it and breathe out air which contains carbon dioxide. This oxygen when transported to our cells helps in breaking down the food and we get energy.

What is cellular respiration?

- Cellular respiration can be defined as the process in which the food that we eat is broken down inside the cells which results in the release of energy. All the cells in living organisms undergo cellular respiration.
- The oxygen that an organism breathes in reacts with the carbohydrates (glucose) present in the food and results in the release of carbon dioxide, water and energy.

Glucose + Oxygen → Carbon dioxide + Water

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Aerobic Respiration in Animals

Glucose → Ethanol + Carbon dioxide

$C_6H_{12}O_6 \rightarrow C_2H_5OH + 2CO_2$

(You might also see ethanol with the formula C_2H_6O. It's the same thing.)

Anaerobic Respiration in Yeast

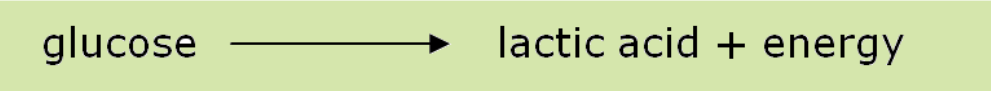
Anaerobes:

- Organisms that can exist in the absence of air are called anaerobes.
- They undergo anaerobic respiration hence can get energy even without oxygen.

- For example, Yeasts. These are unicellular organisms that exist in the absence of oxygen as well.
- As a byproduct, they release ethanol and carbon dioxide. That is why they are used to make wine and beer. This is called as alcohol fermentation.

Anaerobic respiration in human beings

- Sometimes muscles of human beings can respire without oxygen which generally happens after heavy exercise such as running, or walking for a longer duration etc.
- In such situations, the muscles require more energy and the supply of oxygen is not enough then anaerobic respiration takes place in the muscles which produce lactic acid along with energy.
- This lactic acid accumulates in the muscles and causes cramps, while we do heavy exercises.
- In order to get relief from cramps, we can take a hot water bath or hot oil massage to our muscles which improves the blood circulation in the muscles.
- As a result, the oxygen reaches the cells easily which breaks on the lactic acid into carbon dioxide and water.



Anaerobic Respiration in Muscles Releases Lactic Acid

Breathing:

- **Breathing** is the process of moving air in and out of the lungs to facilitate gas exchange Breathing occurs continuously in the organisms.
- **Inhalation** is the process of taking the air rich in oxygen inside the body.
- **Exhalation** is a process of releasing out air rich in carbon dioxide out of the body.
- **Breathing rate** can be defined as the number of times a person breathes in a minute.
- A breath can be defined as an inhalation followed by an exhalation.
- The breathing rate is not always constant in human beings. We generally breathe faster when our body needs more energy for example while exercising because the body needs more oxygen that can break down the food to release energy.
- An average adult human being breathes 15 to 18 times in a minute. While exercising, this rate can change up to 25 times a minute.

The mechanism of breathing in human beings

- We take in the air present in the environment through our nostrils which travels through the nasal cavity.

- Then it moves through the windpipe and reaches the lungs.
- The lungs are located in the chest cavity which is surrounded by the ribs.
- On the floor of the chest cavity lays a muscle sheet called diaphragm.
- During the breathing process, the movement of the ribs and diaphragm takes place. This is so because the lungs expand and contract during breathing.
- As we take in the air it fills up the lungs. This moves the diaphragm downwards and the ribs outwards.
- The lungs when releasing out air from the body which brings back the diaphragm and the ribs to their original positions.

Why do we sneeze?

- As we inhale the air present in the surroundings sometimes various unwanted particles eg. dust etc.stuck in the hair in our nostrils but some of them can get through the nasal cavity.
- They cause irritation in the nasal cavity which makes us sneeze and helps in getting rid of the unwanted particles out of the nasal cavity.

What do we breathe out?