TENDER HEART HIGH SCHOOL, SEC-33B, CHD

CLASS - 9 DATE - 08.07.2024

SUBJECT - BIOLOGY TEACHER - Nidhi Rana

CHAPTER 7 Respiration in Plants

Respiration contrasted with photosynthesis - Respiration and Photosynthesis are distinctly opposite processes as -

Respiration

$$C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + \text{Energy released}$$

Photosynthesis

$$6CO_2 + 6H_2O \xrightarrow[\text{Energy consumed}]{+\text{Solar}} C_6H_{12}O_6 + 6O_2$$

More differences between photosynthesis and respiration are listed out in Table 7.2. at Page 60 of textbook

Respiration in plants Vs Respiration in animals.

1) In plants there is no gaseous transport, the respiratory gases diffuse in and out of cell by simple diffusion whereas in animals blood circulates to transport respiratory gases.
2) **End product of anaerobic respiration** -
   In plants - Ethyl alcohol or Ethanol
   In animals - Lactic acid.
3) In plants respiration process produces little heat as compared to plants.

CHAPTER - 14 Respiratory System

Respiration - is a catabolic process of releasing energy by breaking down glucose for carrying out life processes. **Major characteristics** -

1) Respiration occurs inside living cells, hence called cellular or tissue respiration.
2) It occurs in a series of steps. First phase glycolysis occurs in cytoplasm and second phase

CLASS- 9
CHAPTER- 14
TEACHER- Nidhi Rana

Kreb's cycle occurs in mitochondria

3) Each break down step involves a particular enzyme.

4) Energy is released in form of - ATP and heat energy. ATP is called the energy currency of the cell ADP continuously converts to ATP when energy is available When energy is used up to do a particular work then ATP is converted into ADP.

5) Essential steps of respiration are common in plants and animals.

Why do we need energy? [a few activities are -]

1) Body needs energy for synthesis of proteins from amino acids, production of enzymes, production of new cells (for growth)

2) Energy is needed for contraction of muscles to bring about movement in the body

3) Energy is needed in conduction of nerve impulses

4) Energy is needed to keep body warm.

Why do animals need more energy than plants?
because animals consume more energy in doing their physical activities Eg for locomotion, for chewing food, for looking after their young ones etc. which the plants are not doing.

Why do birds and mammals need still more energy?
Birds and mammals are warm blooded animals they have to produce a lot of energy (heat) for keeping their body warm. especially in the cold winter days when outside temperature is very low. Liver cells in particular produce much heat, muscle cells also contribute to it.

CLASS-9
CHAPTER-14
TEACHER- Nidhi Rana

Why do we shiver and clatter our teeth in winters?
During winters when temperature is very low shivering and clattering of teeth is an emergency (physical) activity of the muscle cells to produce extra heat to keep the body warm.

Respiratory substance - Glucose
All energy for doing any activity is obtained from oxidative breakdown of glucose. When glucose is not available cells breakdown fats or proteins to produce glucose for respiratory needs. Flesh eating animals have proteins (meet) as the main constituent of their diet. Hence excess amino acids are broken down in their bodies by deamination and the glucose thus produced may be used immediately or may get stored in liver as glycogen for later use.

Two kinds of Respiration -

1. **Aerobic respiration** - using oxygen.
$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 38\,ATP + Heat$$

2) **Anaerobic respiration** (in absence of oxygen)
It may be seen in microbes (like bacteria), tapeworms living inside human intestine etc. In animal cells like skeletal muscle cells it occurs when these muscles have to work very fast with insufficient oxygen. (temporarily) Eg During continuous physical exercise like fast running, walking etc. In such situation muscles start working in absence of oxygen to provide extra energy through anaerobic respiration. During anaerobic respiration some extra energy is released alongwith release of Lactic acid. Accumulation of Lactic acid in muscles

gives us the feeling of fatigue. This is a condition called as oxygen debt. When we rest after the exercise lactic acid gets slowly oxidised by the oxygen later available and then "debt is cleared" producing CO_2 in the process.

Anaerobic respiration in animals

$C_6H_{12}O_6 \longrightarrow$ Lactic Acid + 2ATP + Heat energy

Main Points about anaerobic respiration in animals -

1) It is slow process
2) No CO_2 is released
3) It occurs for temporary period and cannot continue for long time. The product lactic acid has toxic effect on cells, which causes muscle fatigue and aches.
4) Total energy released per mole of glucose is (2ATP) much less as compared to aerobic respiration (38ATP)

Differences in anaerobic respiration in Plants and animals -

(i) Glucose is broken down to -
Ethanol and CO_2 in plants
Lactic acid in animals.

ii) Released heat energy is more in plants than in animals.

Parts of Respiration -

i Breathing - physical process in which the air is taken in and forced out of the Oxygen absorbing organs (respiratory organs, Lungs.)

ii Gaseous Transport -

O_2 - oxygen is carried by RBCs as oxyhaemoglobin.

CO_2 - is transported by blood in two ways -

(a) as bicarbonates dissolved in plasma (fluid part of blood)

(b) in combination with haemoglobin of RBCs as carbamino-haemoglobin

(iii) Tissue respiration - The terminal blood vessel i.e. the capillaries deliver the oxygen to the body cell or tissue where oxygen diffuses through their thin walls [oxygen before reaching the body cells enters into the tissue fluid, through which it enters the body cells]. In a similar way capillaries pick up CO_2 released by the body cells.

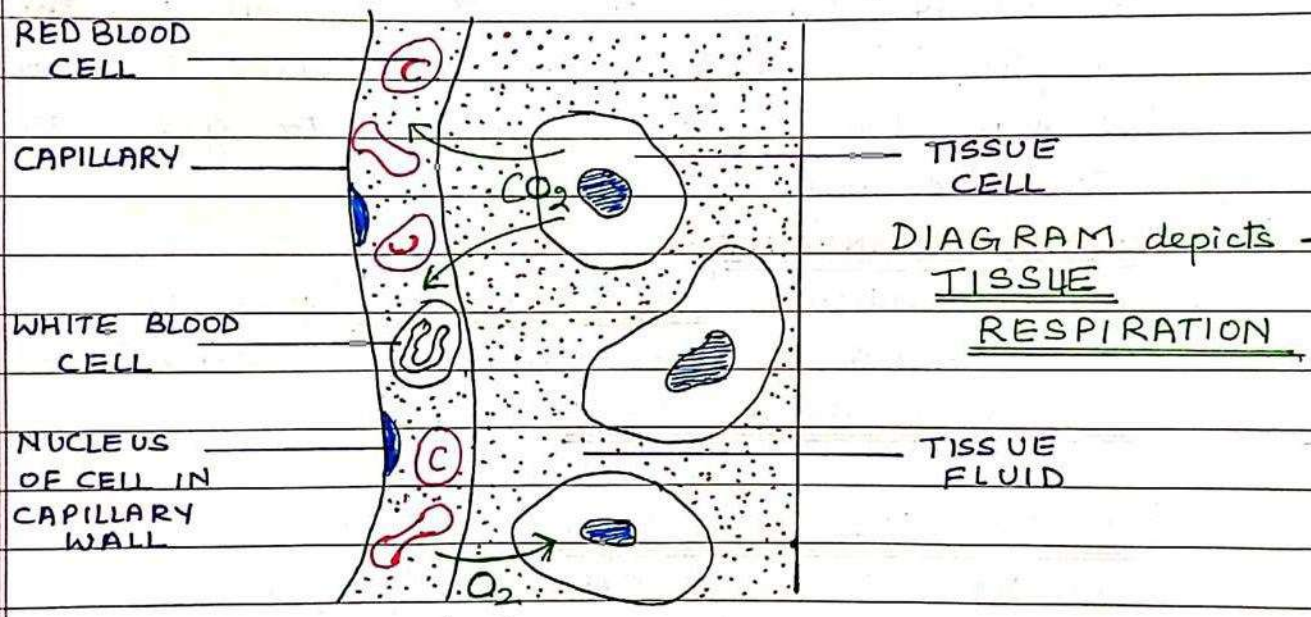

DIAGRAM depicts - TISSUE RESPIRATION

Cellular respiration - The complex chemical changes which occur inside the cell to release energy from glucose.

Main phases of respiration -

1. Glycolysis - occurs in cytoplasm. In this glucose is broken down into pyruvic acid which further breaks down to ethanol (plants) and lactic acid (animals). It is anaerobic phase and releases little energy.

CLASS- 9
CHAPTER - 14
TEACHER - Nidhi Rana

(ii) Krebs cycle - occurs in mitochondria
In this pyruvic acid / Lactic acid is further broken down into ATP and CO_2
It is aerobic phase and releases lot of energy

⇒ It is wrong to say "we inhale O_2 and exhale CO_2" instead we should say -
"We inhale air containing much oxygen and very little CO_2 and exhale air containing less of oxygen and more of CO_2 than before.

NOTE FOR STUDENTS -
Kindly go through the notes as well as the chapter as being discussed in your textbook. It may take multiple readings to grasp the topics clearly.

HOME ASSIGNMENT -

Q-1 Do the following 'Review questions' given on Page 62, 63 of your text book in notebook -

C Short Answer type
Q No 1, 3 & 4

D Long Answer type
Q No 1 and 4.