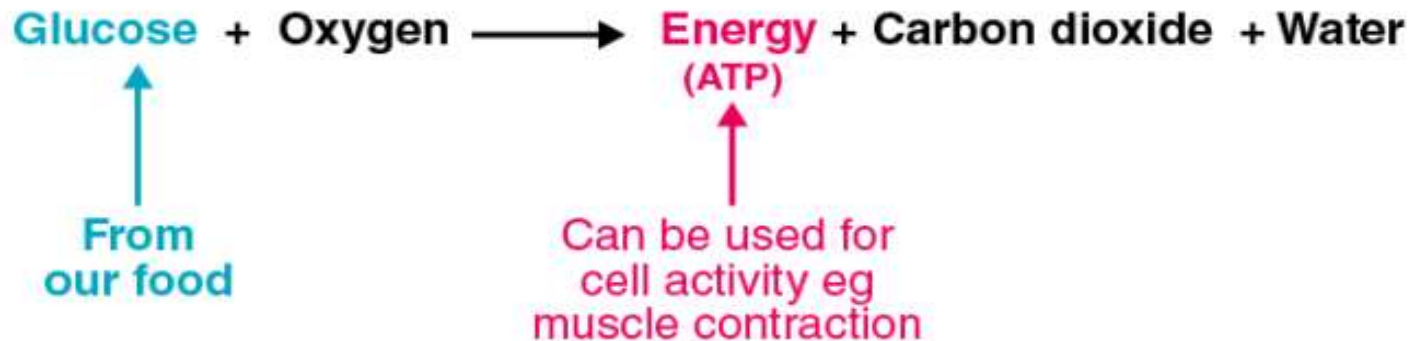




RESPIRATION

INTRODUCTION TO RESPIRATION

- Respiration broadly means the exchange of gases.
- Animals and plants have different means of exchange of gases.
- At a cellular level, respiration means the burning of the food at the for generating the energy needed for other life processes.
- Cellular respiration may take place in the presence or absence of oxygen.



RESPIRATION IN HUMANS

- ❖ The human respiratory system is more complex and involves breathing, exchange of gases and cellular respiration.
- ❖ A well defined respiratory system helps breathing and exchange of gases.
- ❖ Breathing involves the inhalation of oxygen and exhalation of carbon dioxide.
- ❖ The gaseous exchange takes place in the lungs and oxygen is supplied to all cells of the body.
- ❖ Cellular respiration takes place in each and every cell.

AEROBIC RESPIRATION

- Oxidation of food materials by oxygen
- Produces 38 ATP
- The steps followed in cellular respiration

First step is breakdown of glucose (6C) into pyruvates (3C) in the cytoplasm

Second step– Pyruvate is then broken down to CO_2 and water and it takes place in the mitochondria where energy is produced in ATP form.

ANAEROBIC RESPIRATION

- It is the Oxidation of nutrients without using up the molecular oxygen
- It gives 2 ATPs.
- **First step**– glycolysis in cytoplasm, 2 pyruvate produced
- **Second step** is the break down of pyruvic acid into ethanol and water and energy (in yeast) and lactic acid and energy (in muscle cells)

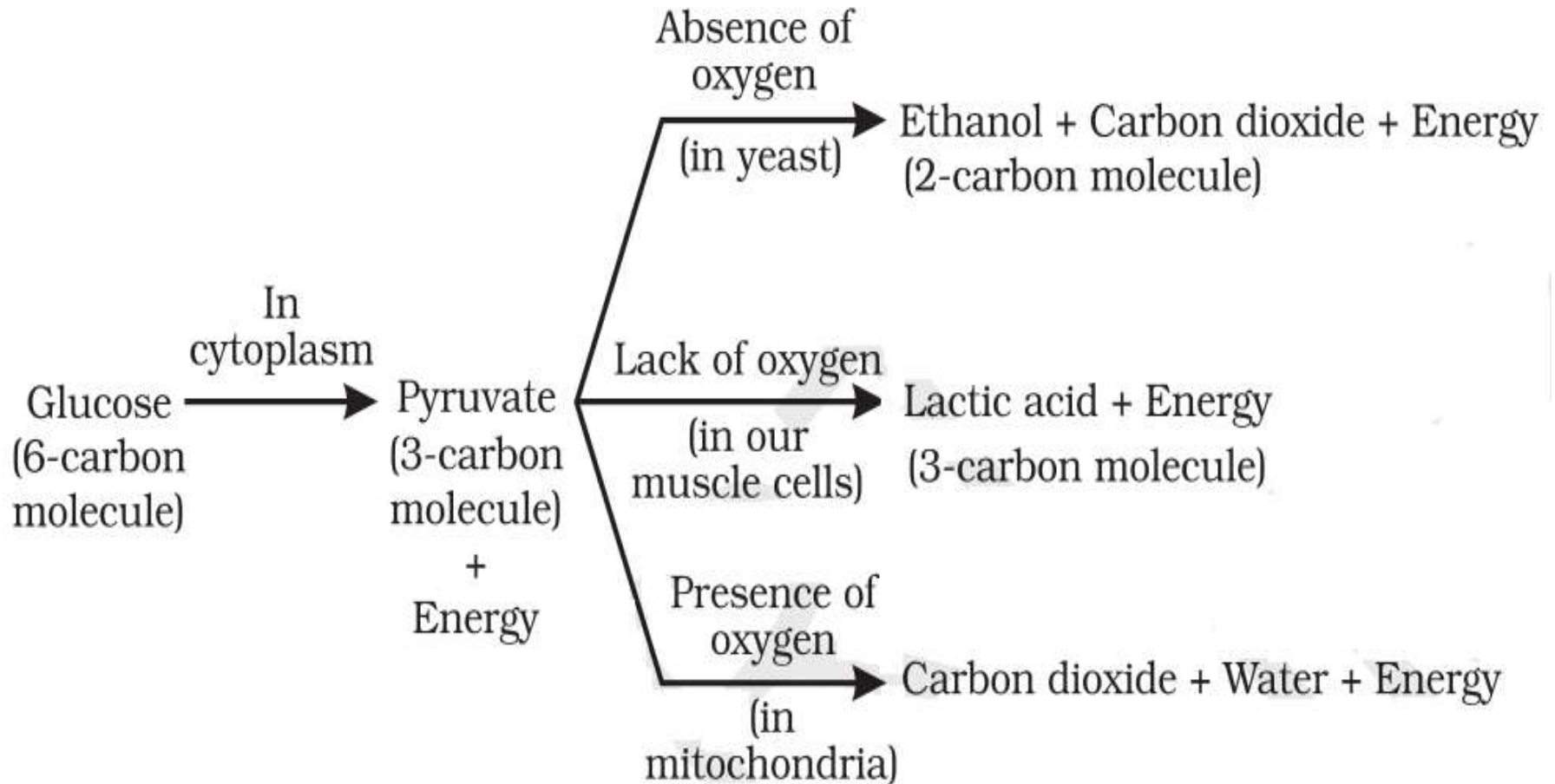
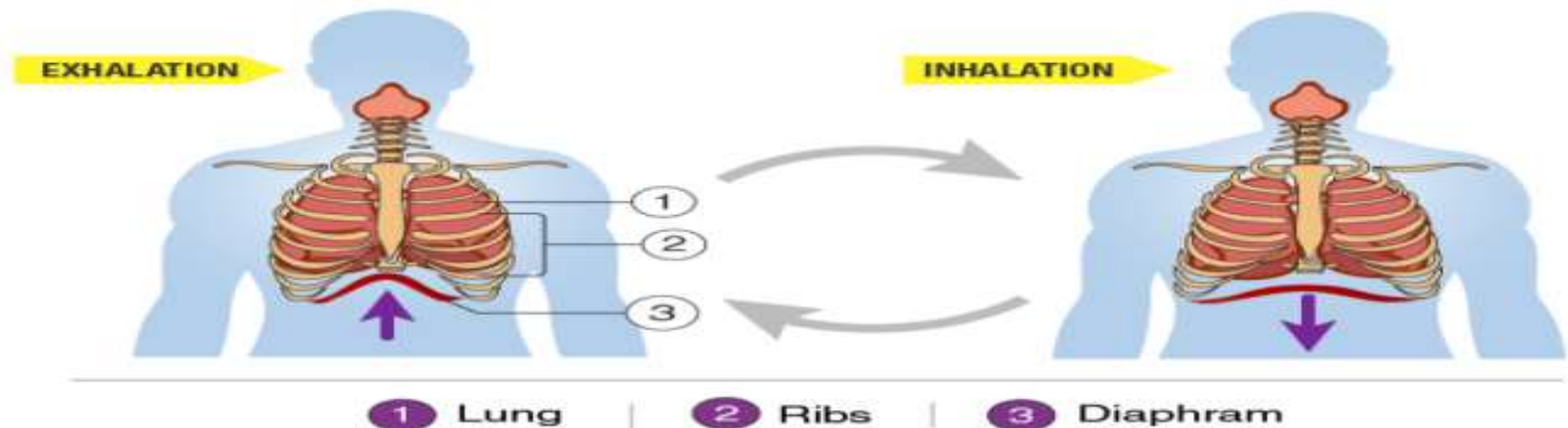


Fig: Break-down of glucose by various pathways

PHYSIOLOGY OF RESPIRATION

- Breathing in humans is facilitated by the action of internal intercostal and external intercostal muscles attached to the ribs and the diaphragm.
- When the dome-shaped diaphragm contracts and becomes flattened and the rib cage is expanded due to the action of intercostal muscles, the volume of the lungs increases, pressure there drops down and the air from outside gushes in. This is inhalation.
- To exhale, the diaphragm relaxes, becomes dome-shaped again, chest cavity contracts due to the action of intercostal muscles, the volume inside the lungs decreases, pressure increases and the air is forced out of the lungs.
- Inhaled air increases the concentration of oxygen in the alveoli, so oxygen simply diffuses into the surrounding blood vessels.
- Blood coming from cells has more concentration of carbon dioxide than outside air and thus carbon dioxide simply diffuses out of the blood vessels into the alveoli.
- Thus, breathing takes place due to the combined action of intercostal muscles and diaphragm while the exchange of gases takes place due to simple diffusion.



- ❖ Inhalation and Exhalation
- ❖ The process of taking in air rich in oxygen is called **inhalation**.
- ❖ Similarly, the process of giving out air rich in carbon dioxide is called **exhalation**.
- ❖ One breath comprises one inhalation and one exhalation.
- ❖ A person breathes several times in a day.
- ❖ The number of times a person breathes in one minute is termed as his/her **breathing rate**.

RESPIRATION IN LOWER ANIMALS

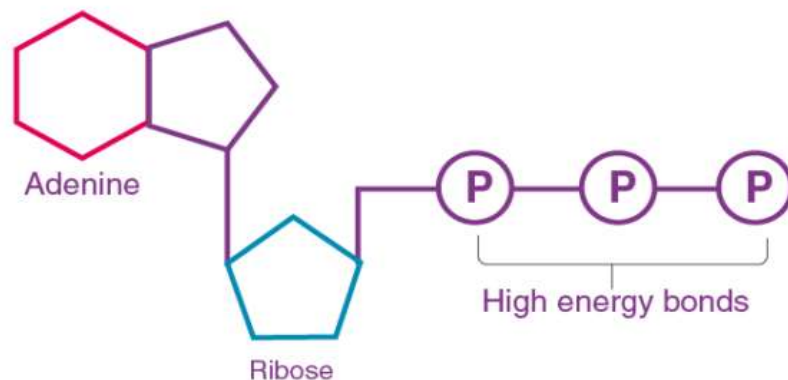
- ❖ Lower animals lack a sophisticated respiratory system like lungs, alveoli etc.
- ❖ Respiration in them takes place by simple exchange mechanisms.
- ❖ Animals like earthworms take in gases through their skin.
- ❖ Fishes have gills for gaseous exchange.
- ❖ Insects have a tracheal system, which is a network of tubes, through which air circulates and gaseous exchange takes place.
- ❖ Frogs breathe through their skin when in water and through their lungs when on land.

RESPIRATION IN MUSCLES

- ❖ Respiration in muscles can be anaerobic when there is not enough oxygen.
- ❖ Glucose gets broken down to carbon dioxide and lactic acid.
- ❖ This results in the accumulation of lactic acid that makes the muscles sore.
- ❖ This type of anaerobic respiration is also known as lactic acid fermentation.

ATP

- ❖ It is the energy currency of the cell.
- ❖ ATP stands for Adenosine Tri-Phosphate.
- ❖ This molecule is created as a result reaction like photosynthesis, respiration etc.
- ❖ The three phosphate bonds present in the molecule are high energy bonds and when they are broken, a large amount of energy is released.
- ❖ Such released energy is then used for other metabolic reactions.



RESPIRATION IN PLANTS

- ❖ Unlike animals and humans, plants do not have any specialized structures for gaseous exchange
- ❖ They have stomata (present in leaves) and lenticels (present in stems) which are involved in the exchange of gases.
- ❖ Compared to animals, plant roots, stems, and leaves respire at a very lower rate.

thank
you