

bronchioles to the alveoli. The alveoli are muscular air sacs which inflate and deflate when oxygen enters or carbon dioxide is removed via diffusion. This is effective because there is a high surface area due to there being millions of alveoli throughout the human body, there is a short diffusion pathway as they are surrounded by capillaries which are 1 cell thick and constant ventilation allows the concentration gradient to remain steep.

Humans can ventilate via inspiration (breathing in) and expiration (breathing out) and this helps the maintenance of the amount of Diffusion occurring within the body. Inspiration is where the external intercostal muscles contract, the diaphragm moves down and the ribcage expands upwards and outwards so there's a larger volume for the incoming diffusion of oxygen and there's far more pressure on the thoracic cavity so air is forced in via diffusion. Expiration is where the internal intercostal muscles contract, the diaphragm flattens and ribcage moves inwards so air can exit as there's more pressure in the lungs rather than the thoracic cavity.

Linking to gaseous exchange, respiration is another process in organisms that is heavily related to diffusion. This process has 4 different stages: glycolysis, link reaction, krebs cycle and oxidative phosphorylation. Linking these stages to diffusion is that there is Internal respiration - this is the movement in the internal tissues between cells and capillaries, and External respiration - when gas is exchanged between the alveoli and lung capillaries. Perfusion refers to the blood flow to tissues and organs. Alveoli are perfused by capillaries so the diffusion of oxygen and carbon dioxide can take place.

In plants, in order for respiration to occur there needs to be photosynthesis to occur and diffusion is important for this process as this is where CO_2 is absorbed by the stomata and diffuses into the leaves and the cells. Photosynthesis consists of 2 main stages: the light dependent stages and the light independent stage; light dependent - this is where light is absorbed by the chlorophyll molecules causes photo ionisation and NADPH and ATP is produced. Light Independent - undergoes the calvin cycle where triose phosphate is produced which can help produce useful organic compounds such as glucose needed for respiration to occur, also amino acids and nucleic acids which helps with the synthesis of DNA and the production of proteins for plant growth.

Sticking on the topic of plants another process linked to diffusion is transpiration and this is the evaporation of water from the leaves through the stomata where it diffuses into the environment. So the plant has to undergo the reuptake of water from the root hair cells to the xylem and undergo the cohesion tension theory where the cohesive properties of the water molecule stick together and form a body weight and transpiration pull brings up the water towards the leaves and tension is between the cell walls and the water molecules. This ensures the plant receives the water needed or the cells will shrink and shrivel causing cell death.

Mass transport is a topic that has many elements that are linked to diffusion in organisms, the first being the phloem as it links well with the xylem previously stated. The phloem is involved in Translocation and this is the process involved to move the nutrients by the mass flow hypothesis, at the source this is where the sugars made pass through the companion cells by diffusion down their concentration gradient into the sieve tube elements. This lowers the water potential so water can enter the phloem via osmosis and this creates a high hydrostatic pressure, mass flow then occurs where the nutrients are unloaded at the sink