All aerobic organisms require a constant supply of oxygen to release energy in the form of ATP during respiration. The CO2 produced in the process needs to be removed as its build-up could be harmful to the body.

The volume of oxygen that has to be absorbed and the volume of CO2 that must be removed are large in mammals because:

- They are relatively large organisms with a large volume of living cells.
- They maintain a high body temperature which is related to them having high the abolic and respiratory rate of P39

As a result mammals have evolved specialised surfaces = lungs to ensure efficient gas exchange between the air and blood.

## **Mammalian lungs:**

The lungs are the site of gas exchange in mammals. They are located inside the body because:

- Air is not dense enough to support and protect these delicate structures
- The body as a whole would otherwise lose a great deal of water and dry out.

The lungs are supported and protected by the ribcage. The ribs can be moved by the muscles between them. The lungs are ventilated by a tidal stream of air, thereby ensuring that the air within them is constantly replenished. Structure of the human gas-exchange system

<u>The lungs</u>: a pair of lobed structures made up of a series of **highly branched tubules called bronchioles which end in tiny air sacs called alveoli.** 

<u>The trachea</u>: a flexible airway that is supported by rings of cartilage. The cartilage prevents the trachea collapsing as the more sure inside falls when breathing in. the tracheal walls are made up of muscle lack with ciliated epithelium and goblet cells.

two divisions of the trachea, each leading to one lung. Like the trachea they produce mucur to cap dirt particles and have cilia that move the dirt-laden mucus towards the threat. The arger bronchi are supported by cartilage, but this reduces as they become smaller.

The bronchioles: series of branching sub-divisions of the bronchi. Their walls are made up of muscle lined with epithelial cells. This muscle allows them to constrict so they can control the flow of air in and out of the alveoli.

<u>The alveoli</u>: minute air sacs at the end of bronchioles. Between the alveoli there are some collagen elastic fibres. The alveoli are lined with epithelium. The elastic fibres allow them to stretch as they fill with air. They then spring back during breathing out in order to expel the CO2 rich air. The alveolar membrane is the gas-exchange surface.

