

Exchange Surfaces and Breathing

7.1 Specialised Exchange Surfaces

- Large multicellular organisms have a higher metabolic rate than small unicellular organisms because they have more cells.
- The demand for O_2 and glucose to be supplied and CO_2 to be removed much higher
- In large multicellular organisms the surface area to volume ratio is too small and the diffusion differences are too large and therefore the rate of diffusion is too slow to meet these demands alone
- Therefore, they have exchange surfaces like the lungs linked up to the organs by transport systems eg. blood

Specialised Exchange surfaces:

- Compact
- Very large surface area
- Maintains gradients — ventilation (breathing) movements and movements of blood
- Reduced barriers (only 2 layers of cells so few cell membranes)
- Good blood supply
- Short diffusion distance — alveoli and capillary wall 1 cell thick, and cells are thin (squamous epithelium)
- Surface must be permeable — cell membranes are
- Way to pick up O_2 easily — respiratory pigment

7.2 The Mammalian Gaseous Exchange System

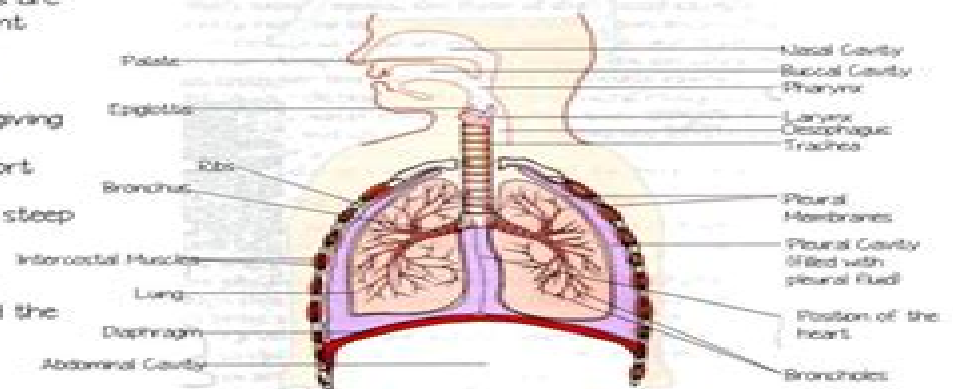
- Exchange surfaces have:
 - o Increased/large surface area — giving more area for diffusion
 - o Thin 1 cell thick wall — giving short diffusion pathway
 - o Good blood supply — maintains a steep concentration gradient
 - o Good ventilation — maintains steep gradients for O_2 and CO_2 between the blood in the air and the lungs

7.1 SPECIALISED EXCHANGE SURFACES

7.2 THE MAMMALIAN GASEOUS EXCHANGE SYSTEM

7.3 MEASURING THE PROCESS

7.4 VENTILATION AND GAS EXCHANGE IN OTHER ORGANISMS



Tissue	Function/Adaptation in the lungs
Cartilage	<ul style="list-style-type: none"> - Holds the lumen of the trachea and bronchi open/gives support - Prevents collapse of the trachea/bronchi during inhalation
Goblet Cells	<ul style="list-style-type: none"> - Secrete mucus to trap bacteria, viruses and dust particles. Mucus contains water and mucin proteins
Ciliated Epithelium	<ul style="list-style-type: none"> - Move in a coordinated way to move/sweep mucus up from the lungs towards the throat
Squamous Epithelium	<ul style="list-style-type: none"> - Very thin lining cells found in alveoli - Provides short diffusion distance for gas exchange
Elastic Tissue	<ul style="list-style-type: none"> - Stretched during inhalation - Recoil during exhalation to help increase air pressure/help air be expelled from the lungs

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