Gas Exchange – Humans:

- The lungs contain millions of little air sacs called alveoli where gas exchange happens.
- The blood passing next to the alveoli has just returned from the rest of the body, so it contains lots of carbon dioxide and very little oxygen. Oxygen diffuses out of the alveolus into the blood. Carbon dioxide diffuses out of the blood and into the alveolus to be breathed out.
- When the blood reaches the body cells, oxygen is released from the red blood cells and diffuses into the cells.
- At the same time, carbon dioxide diffuses out of the cells into the blood. It's then carried back to the lungs.

Alveoli:

- The huge number of microscopic alveoli gives the lungs a huge surface area.
- There's a moist lining for gases to dissolve in.
- The alveoli have very thin walls – only one cell thick, so the gas doesn't have to travel far.
- They have a great blood supply to maintain a high concentration gradient.
- The walls are permeable – gases can diffuse across easily.

Smoking:

- Smoking damages the walls inside the alveoli, reducing the surface area for gas exchange and leading to diseases like emphysema.
- The tar in cigarettes damages the cilia (little hairs) in your lungs and trachea. These hairs, along with mucus, catch a load of dust and bacteria before they can reach the lungs. The cilia also help to keep the trachea clear by sweeping mucus back towards the mouth. When these cilia are damaged, chest infections are more likely.
- Tar also irritates the bronchi and bronchioles, encouraging mucus to be produced which can't be cleared very well by damaged cilia. This causes smoker's cough and chronic bronchitis.
- The carbon monoxide in cigarette smoke reduces the amount of oxygen the blood can carry. To make up for this, the heart rate increases – this leads to an increase in blood pressure. High blood pressure damages the artery walls, making the formation of blood clots more likely. This increases the risk of coronary heart disease.
- Tobacco smoke also contains carcinogens – chemicals which can lead to cancer.