

# CAIE Biology A-level

## Topic 9 - Gas Exchange and Smoking

### Definitions and Concepts

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**Alveolus (pl alveoli)** - Tiny air sacs that serve as the primary gaseous exchange surface. They consist of a thin epithelial cell layer, collagen and elastic fibres.

**Bronchioles** - Many small divisions of the bronchi. They contain smooth muscle to restrict airflow to the lungs but do not have cartilage. They are lined with a thin layer of ciliated epithelial cells.

**Bronchus (pl bronchi)** - Divisions of the trachea that lead into the lungs. They are small tubes supported by incomplete rings of cartilage.

**Carbon monoxide** - A compound with the chemical formula CO. It binds preferentially to haemoglobin, which reduces the amount of oxygen that can be transported in the blood.

**Carcinogen** - A substance which increases the risk of cancer.

**Cartilage** - Strong, flexible connective tissue that supports the walls of the trachea and bronchi, preventing collapse.

**Chronic obstructive pulmonary disease (COPD)** - Refers to a group of lung conditions which cause breathing difficulties, including emphysema and chronic bronchitis.

**Cilia** - Small, hair-like organelles that extend from the surface of eukaryotic cells. They have motile and sensory functions.

**Ciliated epithelium** - Specialised cells found lining the trachea which have tiny hair-like cilia that waft mucus up to the back of the throat, where it is swallowed.

**Elastic fibres** - Fibres of elastin that allow the alveoli to stretch as air is drawn in and recoil to expel air. They are also found in the trachea, bronchi and bronchioles.

**Exchange surface** - A surface over which materials are exchanged from one region to another. An effective exchange surface has a large surface area, thin layers, a good blood supply, and ventilation to maintain a steep diffusion gradient.

**Goblet cells** - Specialised cells that secrete mucus onto the trachea lining. The mucus traps harmful substances and microorganisms, preventing their entry into the lungs.

**Lung cancer** - A respiratory disease often caused by smoking as well as exposure to radiation and carcinogens. Symptoms include a cough, blood-stained sputum, shortness of breath and weight loss.

**Lungs** - The primary organs of the mammalian respiratory system.

**Mammalian gas exchange system** - A complex system found in mammals in which oxygen and carbon dioxide gases are exchanged.

**Mucous glands** - Glands which contain clusters of mucous-secreting cells.

**Nicotine** - An alkaloid chemical found in tobacco which causes blood vessels to constrict and increases the risk of cardiovascular disease.



**Smooth muscle** - Involuntary muscle found in the walls of the trachea and bronchi. It constricts the lumen of the bronchi by contracting, reducing airflow to the lungs.

**Squamous epithelium** - A single layer of flattened epithelial cells.

**Tar** - A chemical substance produced when tobacco is burnt that contains harmful chemicals and carcinogens. It may become deposited in the airways causing inflammation, mucus production and paralysis of the cilia.

**Tobacco smoke** - Cigarette smoke which damages the cilia, resulting in a build-up of dirty mucus.

**Trachea (mammals)** - The main airway that acts as a passage for air to pass to and from the bronchi. It is a tube supported by incomplete rings of cartilage.

