

Respiratory System

- **Breathing** Taking in of air (inhalation)
Taking out of air (exhalation)
- **Respiration** Using of **oxygen** in the cells for energy production. This oxygen is used for energy (ATP) production in the cells.

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→ The body system which is responsible for the exchange of gases between body fluid and outer environment is called respiratory system.

Respiratory System

Upper
Respiratory
tract



Nose
Pharynx (foodpipe)

Lower
Respiratory
tract



Larynx
Trachea (windpipe)
Bronchi
Lungs

∴ Respiration from nose is more preferable because the filtration of air happens through nose.

Upper Respiratory System

Nose

Structure

- externally visible part
- composed of bones, cartilages and fatty tissue
- two nasal cavities separated by nasal bone
- Vestiboles inside nasal cavity

Function

- contain hair which does filtration of air
- Blood capillaries present underneath the mucous membrane, which maintain the temp (keep the air warm depending on external temperature).

Pharynx

Structure

- Cone-shaped passageway leading from oral cavity and nasal cavity

Function

- Part of digestive and respiratory system

i-Nasopharynx ii-Oropharynx iii-Laryngopharynx

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Lower Respiratory tract

Larynx

Structure

- enlargement at the top of trachea
- composed of cartilages and muscles
- consist of epiglottis

↳ food entering: epiglottis close
↳ air entering: epiglottis open

Function

- Also called voice box. (due to the presence of vocal cords)

Trachea

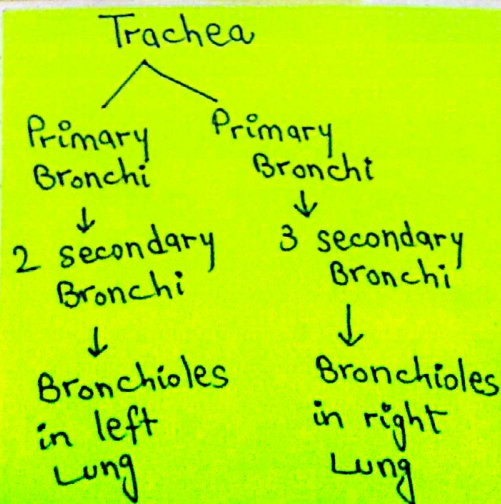
Structure

- Membranous tube
- Consist 15-20 C shaped cartilage

Function

- Also called windpipe (allows the air to pass through the lungs)

Bronchi and Bronchioles



• Alveoli is the site of gaseous exchange.

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Alveoli

Structure

- Terminal bronchioles give rise to alveolar ducts
- Alveolar ducts have tiny air filled sacs/chambers called alveoli.

Function

- Site of exchange of gases
- 0.1mm thick wall
- 700 million alveoli present in each Lung (MCQ)

Mechanism of Ventilation

Inspiration

→ Inhalation

→ Active phase of breathing

→ Lungs expand

diaphragm contracts

thoracic cavity increases space

external intercostals contract

internal intercostals relax

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Expiration

- exhalation
- Passive phase of breathing
- Lungs & contract
diaphragm expand
thoracic cavity decrease space
external intercostals relax
internal intercostals contract

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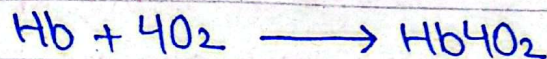
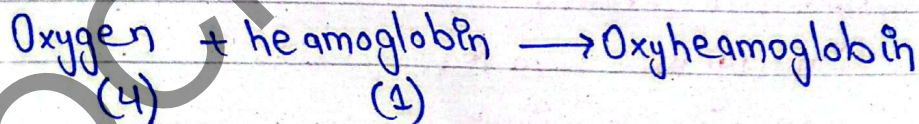
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- * Breathing is an involuntary action.
- * Controlled by medulla in the brain

Transport Of Oxygen

↳ Blood transports O_2 from Lungs to tissues.

- * 97% oxygen is carried by RBC, called oxyhemoglobin



This process can be reversed by carbonic anhydrase (enzyme).

Transport Of Carbon Dioxide

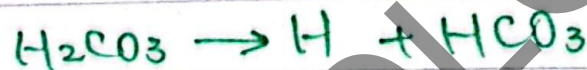
Transported in 3 ways:

- i. In the form of bicarbonate ions
• 70% CO_2 transports

→ CO_2 diffuse in blood, then react with water forming Carbonic acid



→ Carbonic acid is unstable so it diffuses



→ Accumulation of H^+ ions increase acidity in the blood. H^+ ion associates with oxyhemoglobin to form hemoglobic acid



(Release oxygen)

- ii. As Carbaminohemoglobin (23%)



- iii. As dissolved CO_2 in plasma

• Only 7% goes this way

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Disorders

Sinusitis

- Inflammation of nasal cavity

Causes: Cold and wet climate, pollution, viral infection

Symptoms: Fever, nasal block, pus discharge etc

Treatment: Antibiotics (if caused by bacteria)

Otitis

- Middle ear inflammation

Causes: Faulty eustachian tube, cold/allergy

Symptoms: Ear pain, irritation, hearing loss

Treatment: Antibiotics, drainage if needed

Pneumonia

- Infection of Lungs

Causes: Bacteria, viruses, fungi

Symptoms: Cough with phlegm, fever, chest pain, breathing difficulty

Treatment: Antibiotics, rest

• Pneumonia is caused by bacteria streptococcus pneumoniae

Emphysema

- Damage of alveoli (enlargement of alveoli)

Causes: Smoking, long term air pollution

Symptoms: Wheezing, fatigue, shortness of breath

Treatment: Inhalers, oxygen therapy, avoid smoking

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Tuberculosis (contagious disease)

- Infectious lung disease caused by *Mycobacterium tuberculosis*

Cause: Spread by droplets

Symptoms: Persistent cough, night sweats etc

Treatment: Long term antibiotics

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COPD

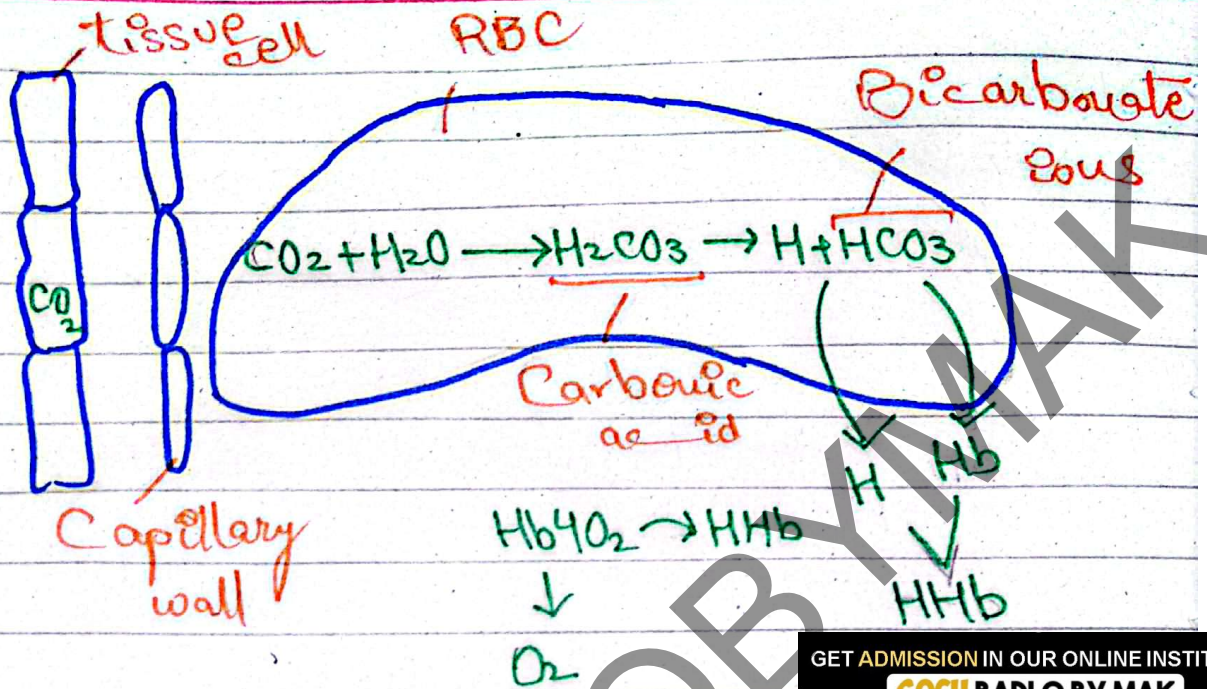
- group of lung conditions that cause breathing disorders.

Cause: Smoking, very rare genetic problem

Symptoms: Cough with phlegm, breathing issue

Treatment: Avoid smoking, inhalers, pulmonary rehabilitation.

CO₂ from tissues to blood



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CO₂ from blood to Lungs (alveoli)

