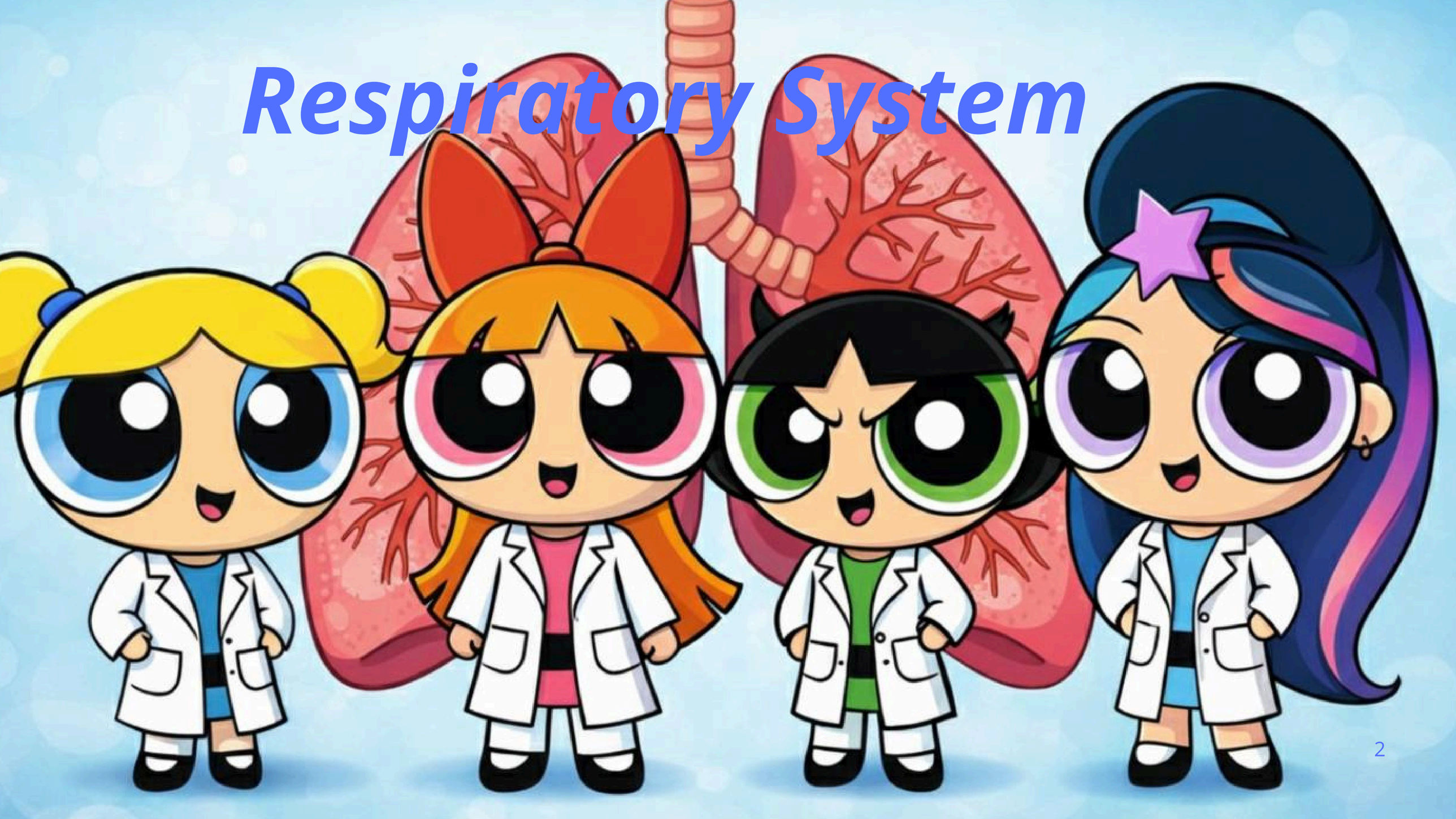
Respiratory System



Every cell in the body needs oxygen to survive. The respiratory system provides a way for oxygen (O2) to enter the body. It also provides a way for carbon dioxide (Co2), the waste product of cells, to leave the body.

The respiratory system is made up of two sections:

1. The upper respiratory tract
2. The lower respiratory tract

Respiratory tract:

The respiratory tract is the anatomical structure through which the air moves in and out.

The organs of the respiratory tract can be divided “ Structurally “ into 2 groups :

The Upper Respiratory Tract

Nose

Nasal cavity

Sinuses

Pharynx

Larynx

The Lower Respiratory Tract

Lungs

Trachea

Bronchial Tree

The organs of the Respiratory Tract can be divided “FUNCTIONALLY” into 2 groups :

The Conducting Portion

System of interconnecting cavities and tubes that conduct air into the lungs

- Nose
- Pharynx
- Larynx
- Trachea
- Bronchi

The Respiratory Portion

System where the exchange of respiratory gases occurs

- Respiratory bronchial
- Alveolar Ducts
- Alveoli

Non respiratory functions of respiratory tract

Besides the primary function of gaseous exchange, the respiratory tract is involved in several non-respiratory functions of the body :

1.Olfaction: Olfactory receptors present in the mucous membrane of nostril are responsible for olfactory sensatio

2.Vocalization: Along with other structures, larynx forms the speech apparatus

3.Prevention of dust particles: The dust particles, which enter the nostrils from air are prevented from reaching the lungs by filtration action of the hairs in nasal mucus membrane

The particles which escape the protective mechanisms in nose and alveoli are thrown out by cough reflex and sneezing reflex

4.Defense mechanism: This is performed by their defenses and by the presence of various types of cells in the mucous membrane lining the alveoli of lungs.

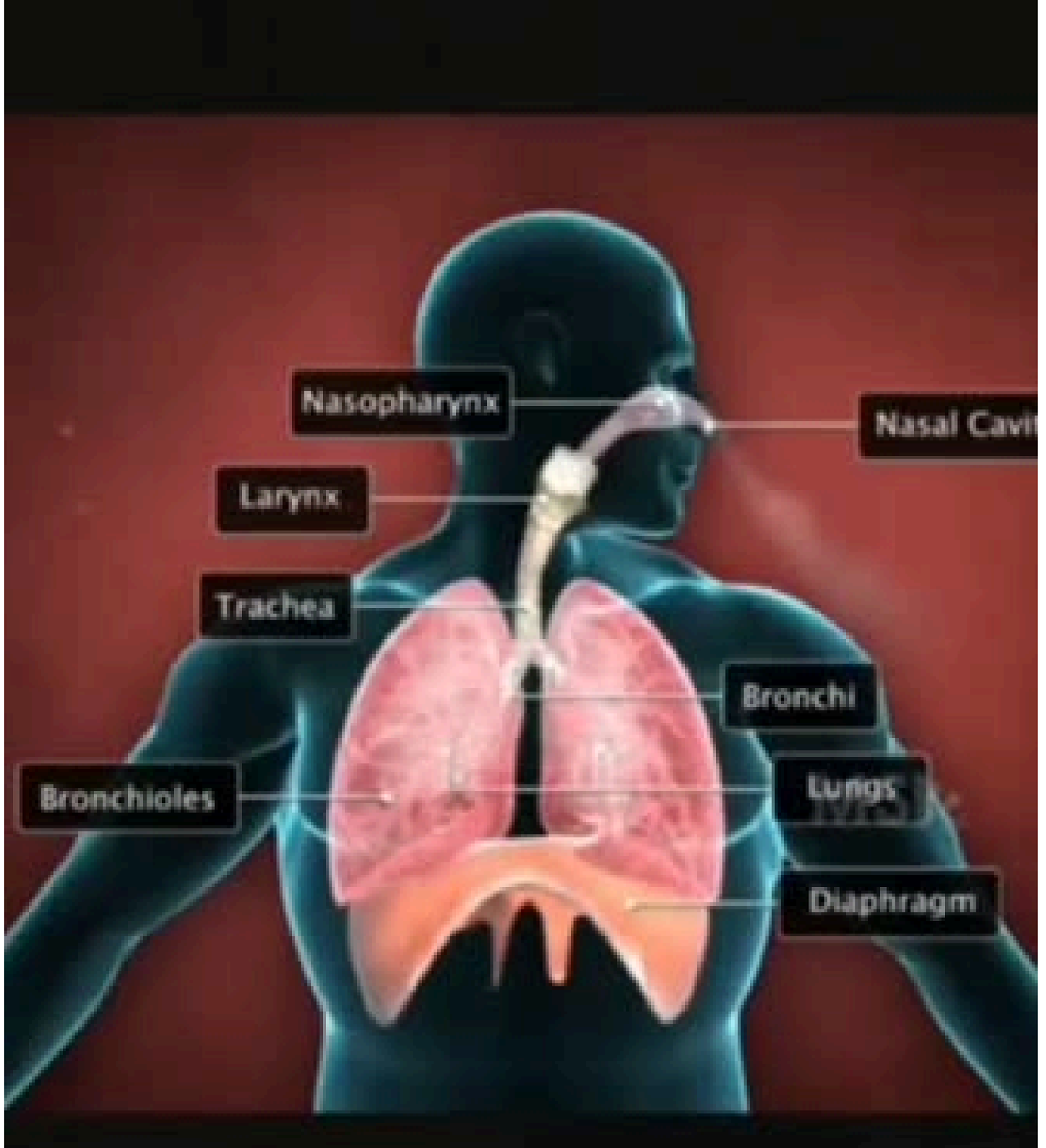
5.Maintenance of water balance : Respiratory tract plays a role in water loss mechanism During expiration, water evaporates through the expired air and some amount of body water is lost

6.Regulation of body temperature : During expiration, along with water, heat is also lost from the body. Thus, respiratory tract plays a role in heat loss mechanism.

7.Regulation of acid-base balance : Lungs play a role in maintenance of acid–base balance balance of the body by regulating the Co2 content in blood. Co2 is produced during various metabolic reactions in the tissues of the body When it enters the blood, it combines with water to form carbonic acid. Since carbonic acid is unstable, it splits into hydrogen and bicarbonate ions.

8.Anticoagulant function: Mast cells in lungs secrete heparin; which is an anticoagulant.

9.Synthesis of hormonal substances: Lung tissues are also known to synthesis the hormonal substances, which have many physiological actions in the body including regulation of blood pressure


Nasopharynx
Nasal Cavit
Larynx
Trachea
Bronchi
Bronchioles
Lungs
Diaphragm

Respiration

Respiration is the movement of oxygen (O2) from the outside environment to the cells within tissues, and the transport of carbon dioxide (Co2) in the opposite direction. Or, it is the exchange of gases between the atmosphere, lungs, blood, and tissues; where the O2 is taken in and Co2 is given out

Typs of Respiration

Respiration is often classified into two types

1.External respiration that involves exchange of respiratory gases, O2 and Co2 between lungs and blood

2.Internal respiration which involves exchange of gases between blood and tissues

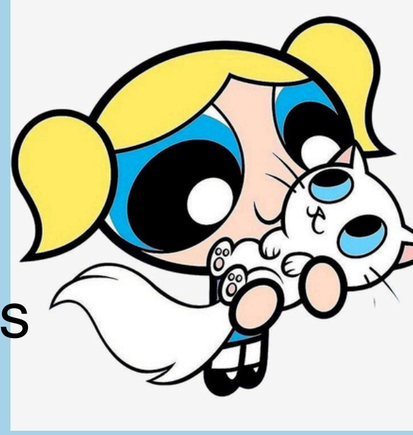
Stages of Respiration

Respiration occurs in two stages

1.Inspiration during the air enters the lungs from atmosphere

2.Expiration during the air leaves the lungs

The term respiration includes 4 basic separate processes

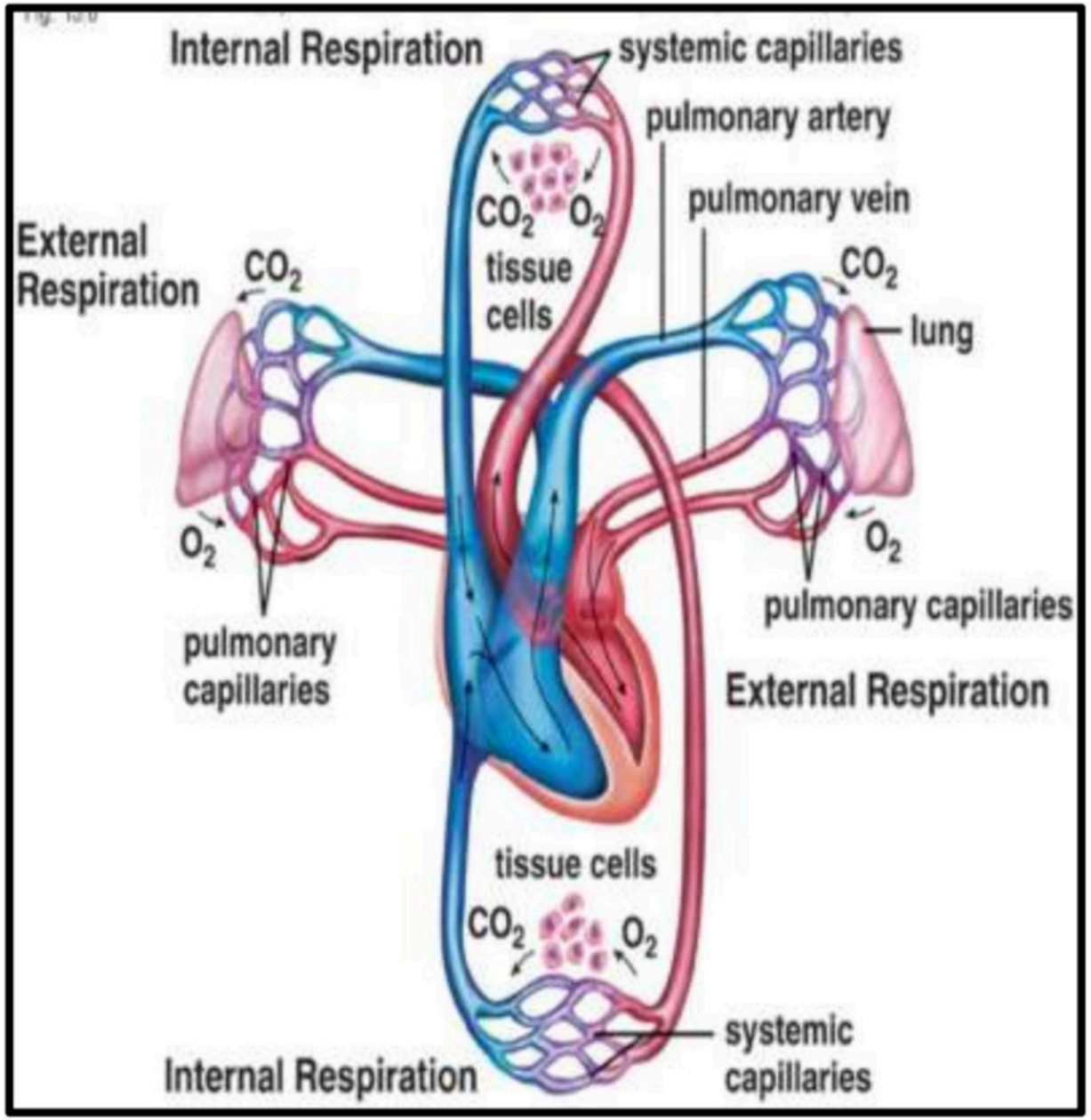


1.Pulmonary ventilation= (breathing)
It is the inhalation (inflow) & exhalation (outflow) of air. Involve the exchange of air between the atmosphere and lungs alveoli (in and out)

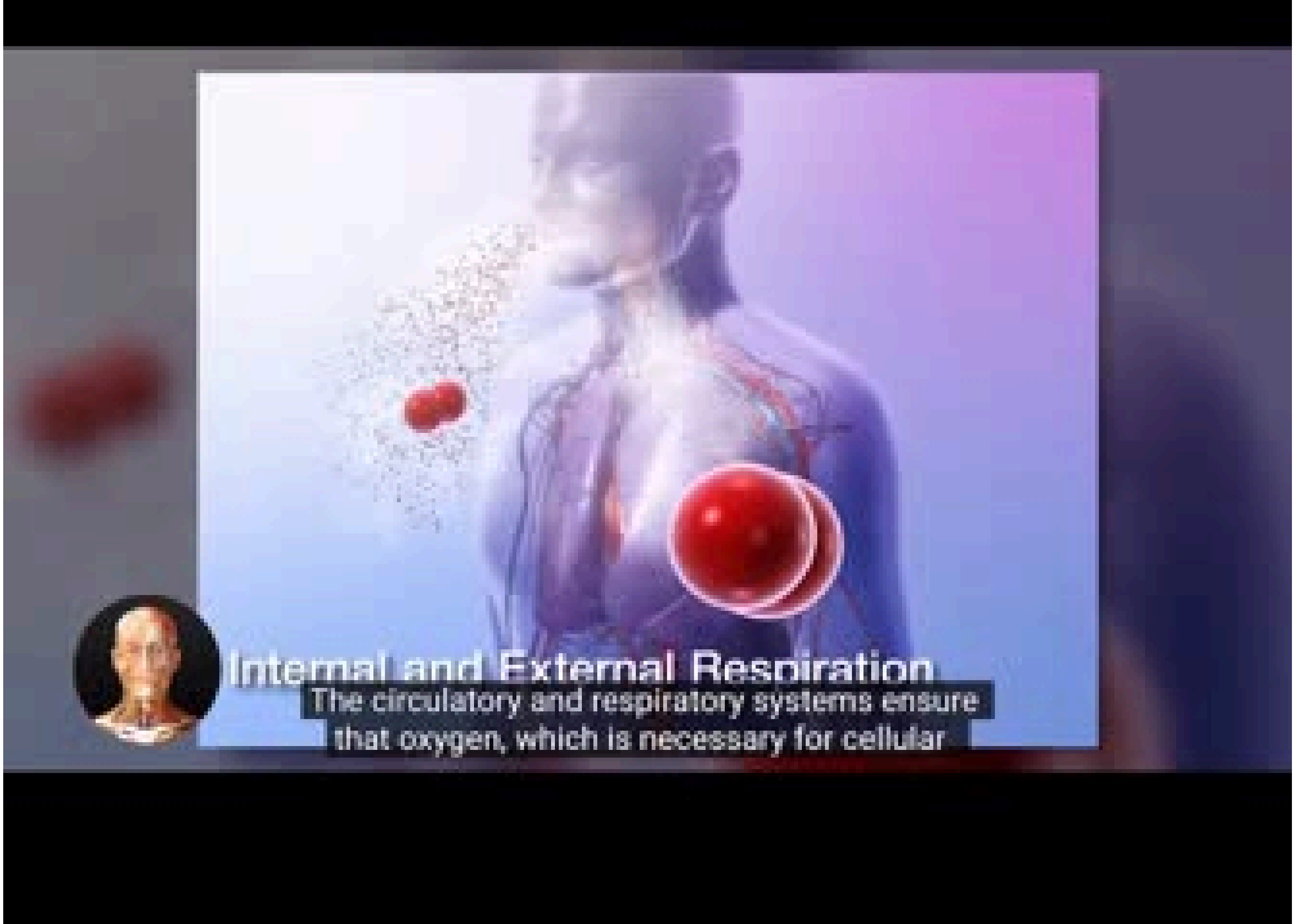
2.External respiration= (pulmonary) within the lungs.
It is exchange of gases between lung's alveoli & blood in pulmonary capillaries which gains O2 and loses Co2

3.Transport of respiratory gases = (via the blood).
Oxygen and carbon dioxide transported to and from the lungs and tissue cells of the body via the bloodstream

4.Internal respiration = (cellular respiration) within the tissue “O2 utilization”
It is exchange of gases between blood in systemic capillary & tissue cells



External and Internal Respiration


Internal and External Respiration
The circulatory and respiratory systems ensure
that oxygen, which is necessary for cellular

Lungs

It is the main and primary organ of the respiratory system. The paired soft , spongy, cone-shaped lungs separated medially and are enclosed by the diaphragm and thoracic cage

Each lung is enclosed by a bilayered serous membrane called pleura or pleural sac, the
visceral (inner) layer and the parietal (outer) layer. The narrow space in between the
two layers of pleura is called intrapleural space or pleural cavity

Its space contains a thin film of pleural fluid which is involved in the creating the negative pressure called intrapleural pressure within intrapleural space

Tracheobronchial Tree

The trachea and bronchi are together called tracheobronchial tree. It forms a part of air passage. Components of tracheobronchial tree:

1. Trachea bifurcates into two main or primary bronchi called right and left bronchi

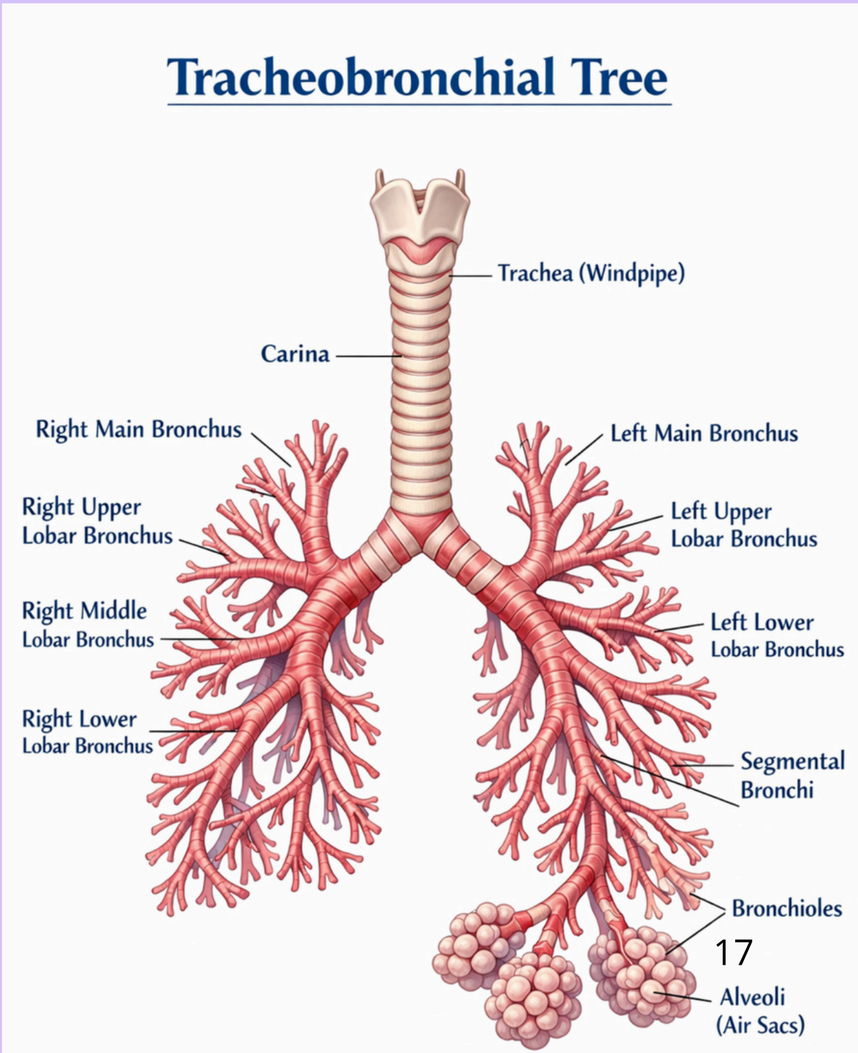
2. Each primary bronchus enters the lungs and divides into secondary bronchi

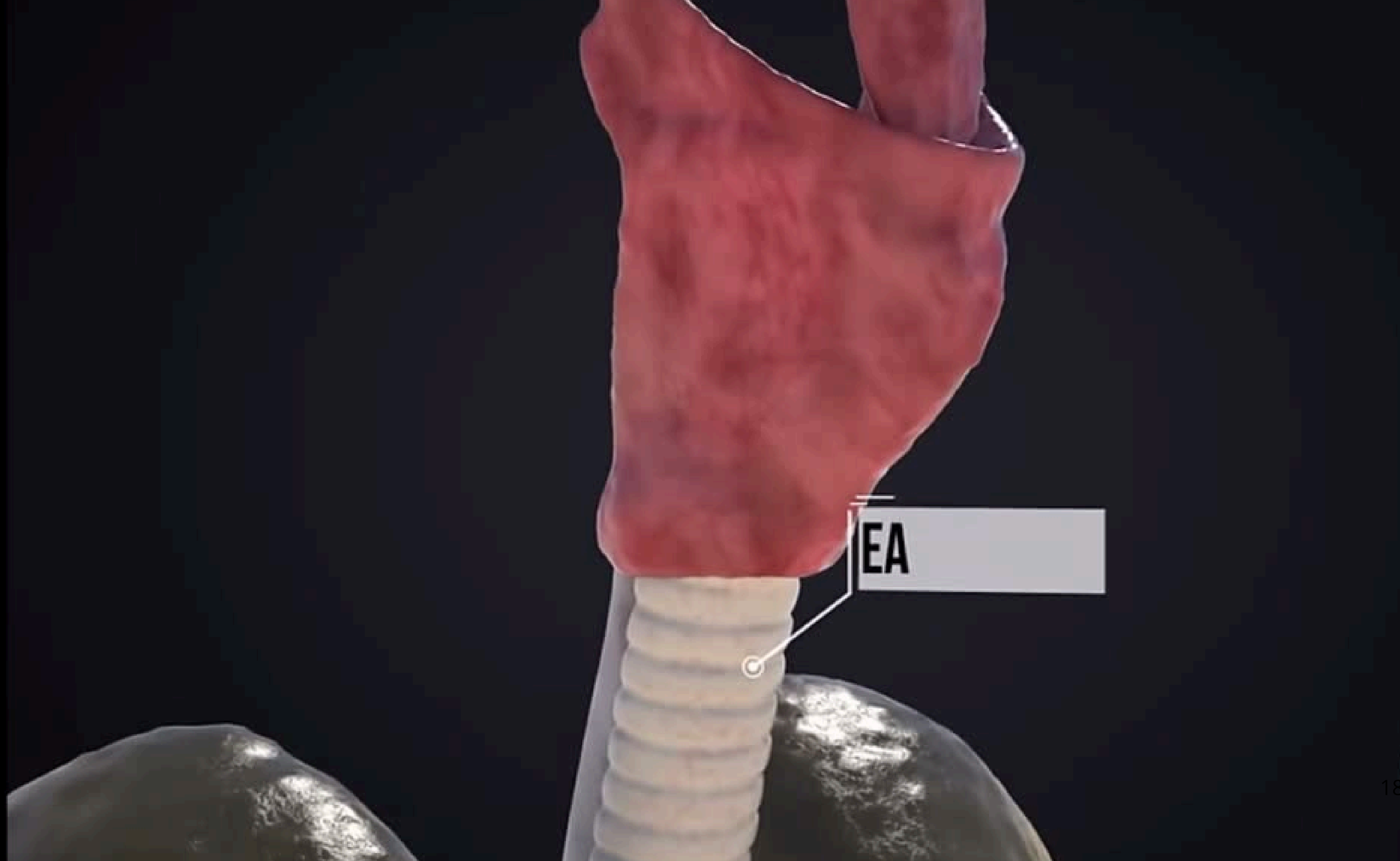
3. Secondary bronchi divide into tertiary bronchi. In right lung, there are 10 tertiary bronchi and in left lung, there are eight tertiary bronchi

4. Tertiary bronchi divide several times with reduction in length and diameter into many generations of bronchioles

5.When the diameter of bronchiole becomes 1 mm or less, it is called terminal bronchiole.

6.Terminal bronchiole continues or divides into respiratory bronchioles, which have a diameter of 0.5 mm.

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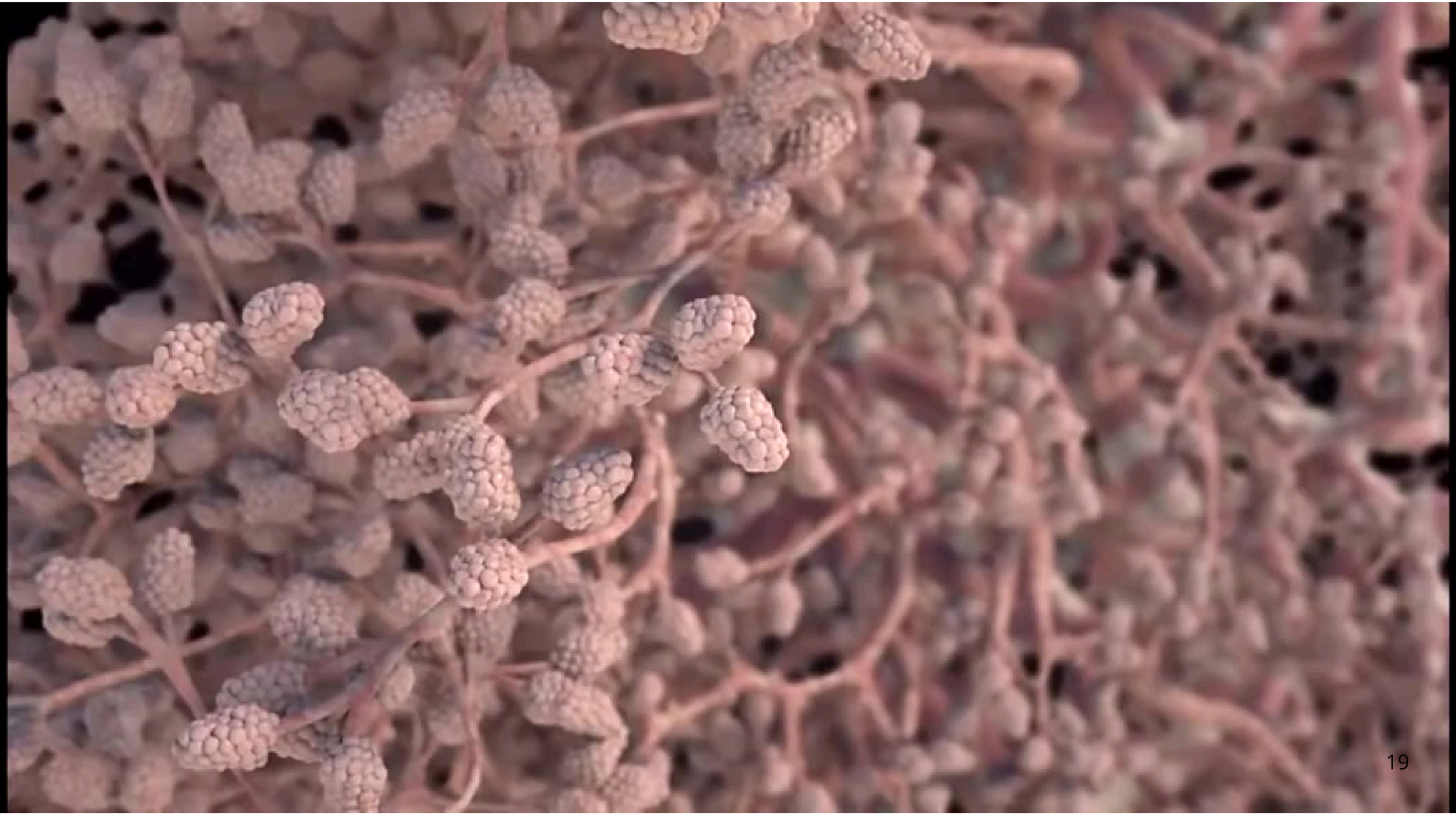

Suffixes of Respiration

Suffix	Meaning	Example	Definition of Example
-pnea	breathing	orthopenia Or-THOP-nē-a	difficulty that is relieved by assuming an upright (ortho-) position
-oxia*	level of oxygen	hypoxia hī-POK-sē-a	decreased amount of oxygen in the tissues
-capnia*	level of carbon dioxide	hypercapnia hī-per-KAP-nē-a	increased carbon dioxide in the tissues
-phonia	difficulty in speaking	dysphonia dis-FŌ-nē-a	difficulty in speaking

Roots of the Respiratory system

Root	Meaning	Example	Definition of Example
nas/o	nose	intranasal in-tra-NĀ--zal	within the nose
rhin/o	nose	rhinoplasty RĪ-nō-plas-tē	plastic repair of the nose
pharyng/o*	pharynx	Pharyngeal fa-RIN-jē-al	pertaining to the pharynx
laryng/o*	larynx	laryngospasm la-RIN-gō-spazm	spasm (sudden contraction) of the larynx
trache/o	Trachea	Tracheotome TRĀ-kē-ō-tōm	instrument used to incise the trachea

bronch/o, **bronch**/i	Bronchus	Bronchogenic brong-kō-GEN-ik	originating in a bronchus
bronchiol	Bronchiole	Bronchiolectasis brong-kē-ō-LEK-ta-sis	dilatation of the bronchioles

An e is added to the root before the adjective ending -al

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TEST YOUR LUNGS

HOLD BREATH whilst the ball is going round on the circumference of a circle

0 1 2 3 4 5 6 7 8 9 10

NORMAL LUNGS

STRONG LUNGS

SUPER LUNGS


THE END