Purpose

Energy	- for cellular activities
Produce ATP	- to support energy creating chemical reactions
Remove CO2	- to prevent dangerous PH fluctuations resulting from of reactions
Homeostatis	- by exchanging O2 and CO2 with the atmosphere and blood

Definitions

Alveoli	- small thin-walled sacs where gas exchange occurs
Bronchi	- two main branches stemming from the trachea
Bronchioles	- small branches stemming from the bronchi
Larynx	- voice box at the entrance to the trachea
Lungs	- organs consisting of the lower portion of the respiratory airways, the pulmonary circulation, and connective tissue
Nasal Passages	- the nose
Respiratory Airways	- tubes that move air between the atmosphere and the alveoli
Respiratory System	- system responsible for breathing in & out
Pharynx	- passageway to the lungs and the stomach
Pleura	- produce fluid that lubricates the lung to prevent friction when breathing
Pleural Cavity	- the space between the pleural sacs
Pleural Sacs	- thin, fluid-filled, membranes that enclose the lungs

Definitions (cont)

Trachea	- tube through which air is conducted to the lungs
Ventilation	- the exchange of air between the atmosphere and alveoli

External Respiration

1. **Ventilation** or gas exchange between the atmosphere and air sacs in the lungs

2. **Exchange** of O2 and CO2 between air in the alveoli and the blood in the pulmonary capillaries

3. **Transport** of O2 and CO2 by the blood between the lungs and tissues

4. **Exchange** of O2 and CO2 between blood in the systemic capillaries and the tissue cells

This then leads into Cellular Respiration

Pressures Important for Ventilation

1. Atmospheric Pressure

2. Intra-alveolar Pressure

3. Intrapleular Pressure

4. Transmural Pressure Gradient

Boyle's Law

Volume Change → Pressure Change → Flow of Gases to Equalized Pressure

Boyle's Law: at a constant temperature the pressure of a gas varies inversely with its volume

Large Container = molecules far apart = low pressure

Small Container = molecules close together = high pressure

Lung Compliance

Otherwise known as flexibility or inverse of stiffness

Greater lung compliance = easier to expand lungs

Determinants of Lung Stiffness:

1. **Stretchability** of lung tissue

2. **Alveolar surface tension**

Pulmonary Surfactant

Is a mixture of phospholipids and proteins

Is secreted by type II alveolar cells

Airway Branching

Conducting zone

Trachea (1) ↓

Bronchi (2) ↓

Bronchioles (16) ↓

Terminal Bronchioles (6x10^4) ↓

Respiratory Zone

where gas exchange happens

Respiratory Bronchioles (5x10^5) ↓

Alveolar Ducts ↓

Alveolar Sacs

Functions of the Conducting Zone

1. Provides a low-resistance pathway for airflow

2. Defends against microbes, toxic chemicals, and other foreign matter.

3. Warms and moistens the air

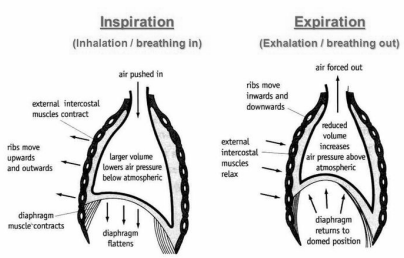
4. Aids in sound production

Inspiration

Diaphragm contracts making the thoracic cavity taller

External intercostal muscles contract lifting the ribcage and widening the thoracic cavity

Inspiration & Expiration Diagram



Expiration

In **Passive Expiration** the inspiratory muscles relax and the ribs, sternum, and diaphragm return to resting

In **Active Expiration** the abdominal muscles contract, causing the diaphragm to push upward, shortening the thoracic cavity. Internal intercostal muscles flattens the ribs and sternum further shortening the cavity.

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