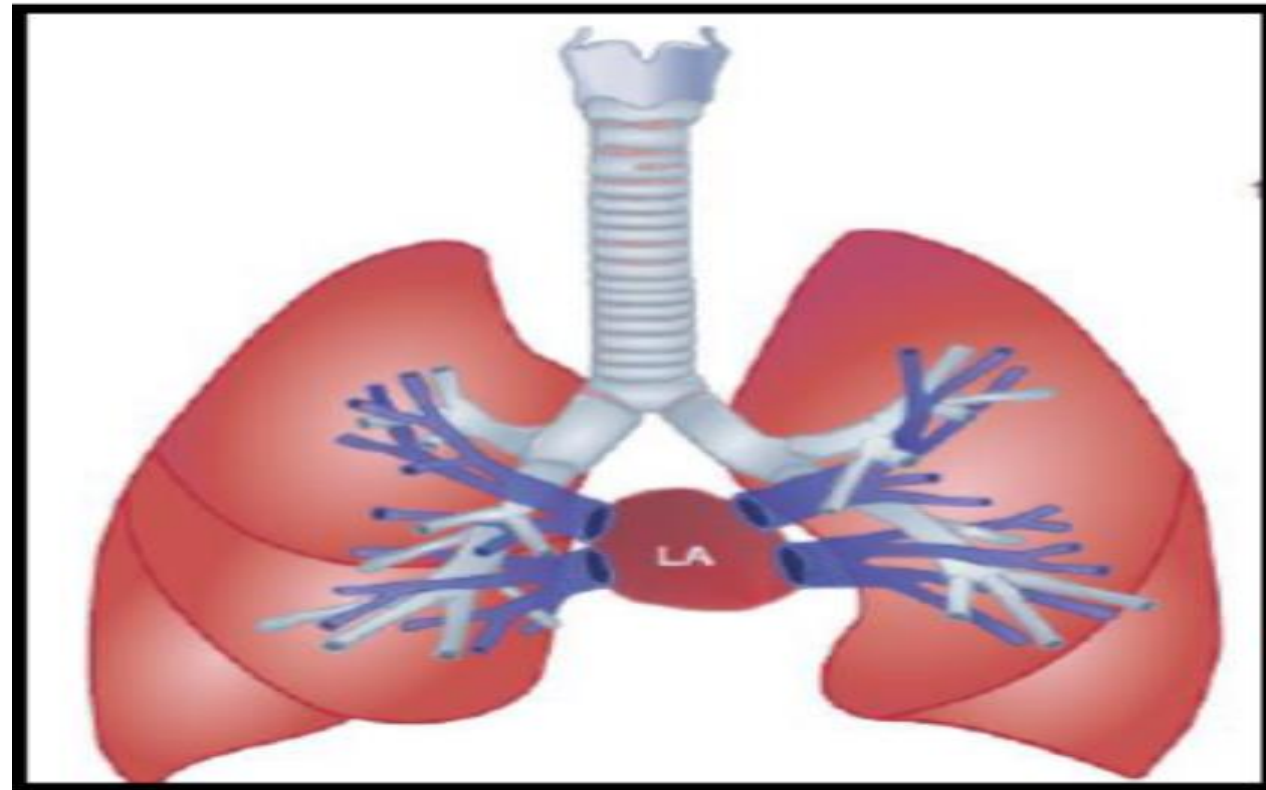


# **Overview of the Respiratory System**

**By Al Shaimaa Mahmoud Kotb**

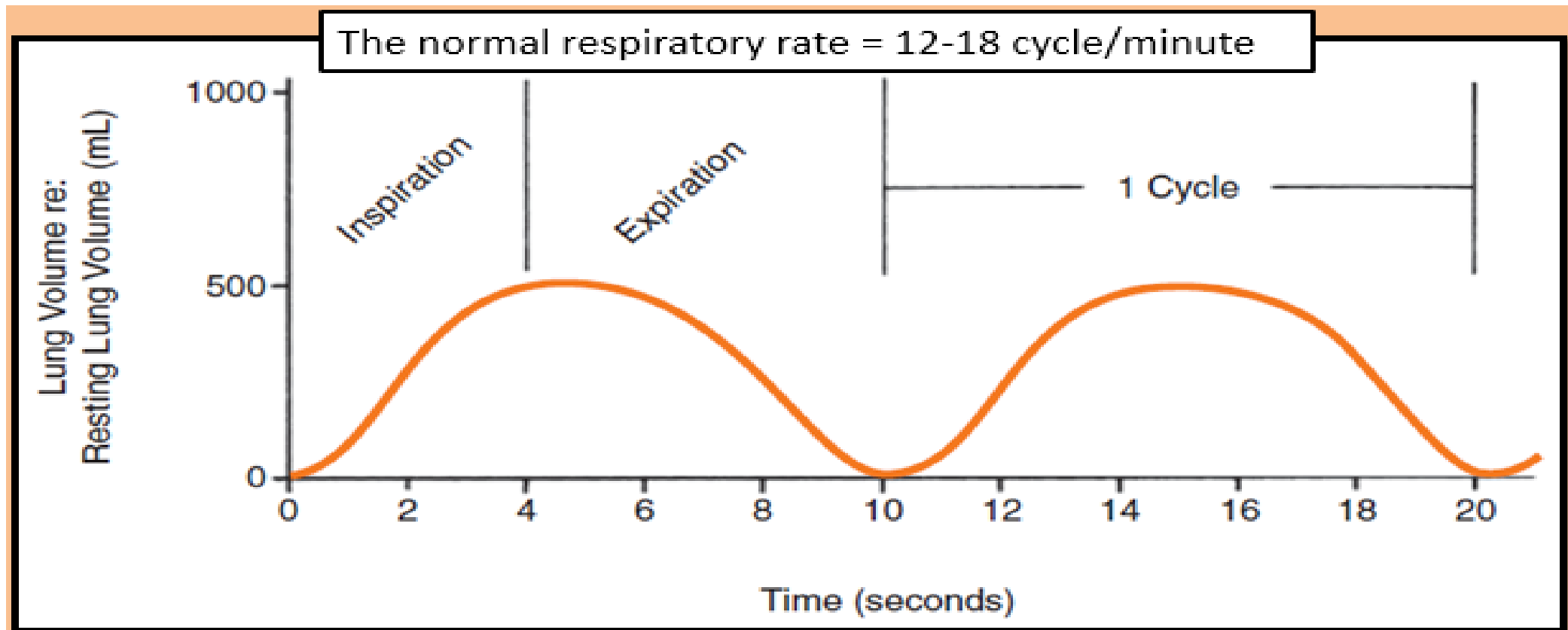
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## Respiration

- It is the process through which the body takes O<sub>2</sub> from the atmosphere and gets rid of CO<sub>2</sub> and water vapor
- **Other functions of respiration**
- 1- Regulation of **body water balance** through loss of water vapor in expired air
- 2- Regulation of **acid base balance** through CO<sub>2</sub> (forming carbonic acid by dissolving in plasma)
- 3- Regulation of **body temperature** through loss of heat to warm inspired air in winter or through loss in water vapor
- 4- Excretion of **waste products** as gases e.g. alcohol, anaesthetic gases.
- 5- **Smell sensation** by olfactory epithelium of the nose.
- 6- **Phonation** (voice production) through vibration of cords by the outflowing air during expiration.
- 7- **Infection** prevention (lysozyme, pulmonary alveolar macrophages).

- **Respiratory rate:** Normal rate in adults is about 12-18 cycles/min
- In newborn respiratory rate is about 40/min and decrease with advancing in age to reach the adult value



Each respiratory cycle consists of

- - **Inspiration**
- - **Expiration**
- - **Expiratory pause**
- The expiratory pause disappears when respiratory rate increases
- Respiratory rate increases in: newborn (40cycles/min), during muscular exercise, emotions and stress

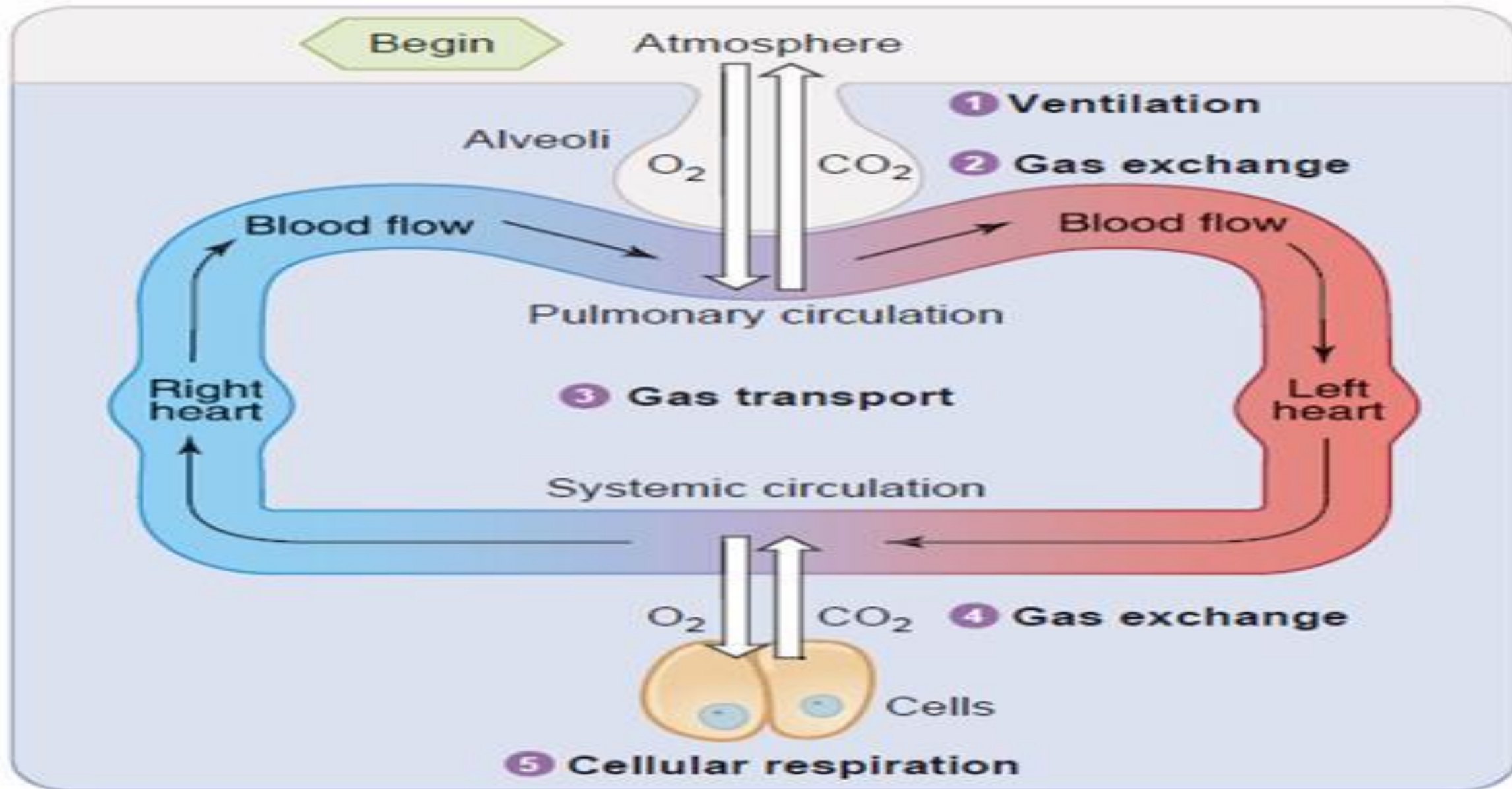
# **Stages of Respiration**

- Respiration process includes 3 stages

**1- Ventilation**

**2- Gas exchange**

**3- transport of gases in blood**



- **Ventilation**

It is the inflow and outflow of air during inspiration and expiration

*Factors which make ventilation easy:*

1- healthy chest wall and muscles

2- Patent air ways

3-The lung surfactant: It is a phospholipid material secreted by alveolar epithelium to lower the surface tension of fluid lining the alveoli and makes their expansion easy

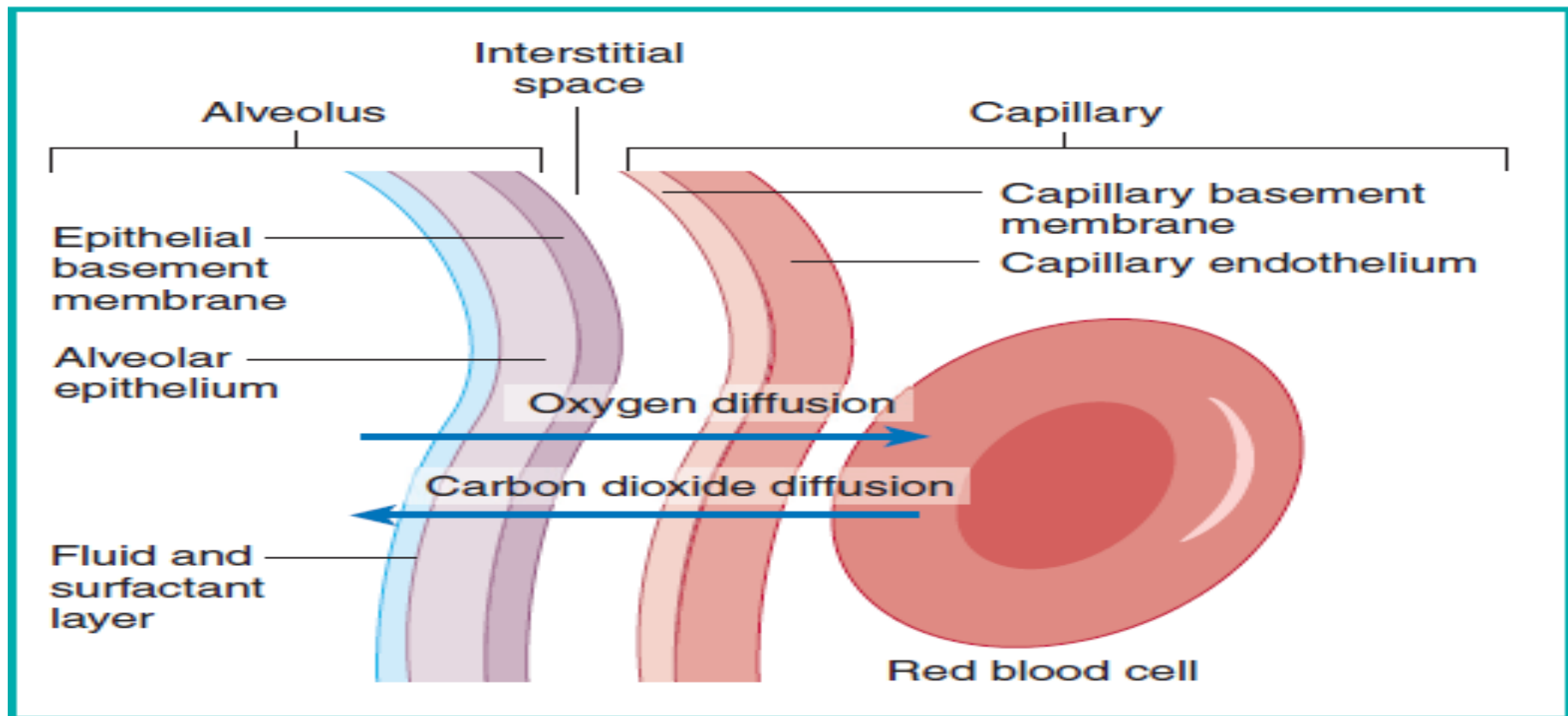
Surfactant decreases in the following conditions and makes respiration difficult (respiratory distress syndrome)

- Premature babies
- Prolonged opened heart surgery
- Hypothyroid children
- Smokers
- Cortisol deficiency

4- Normal elasticity of the lung tissues help make ventilation easy (lung fibrosis due to chronic inflammation affect ventilation)

## 2- Gas exchange

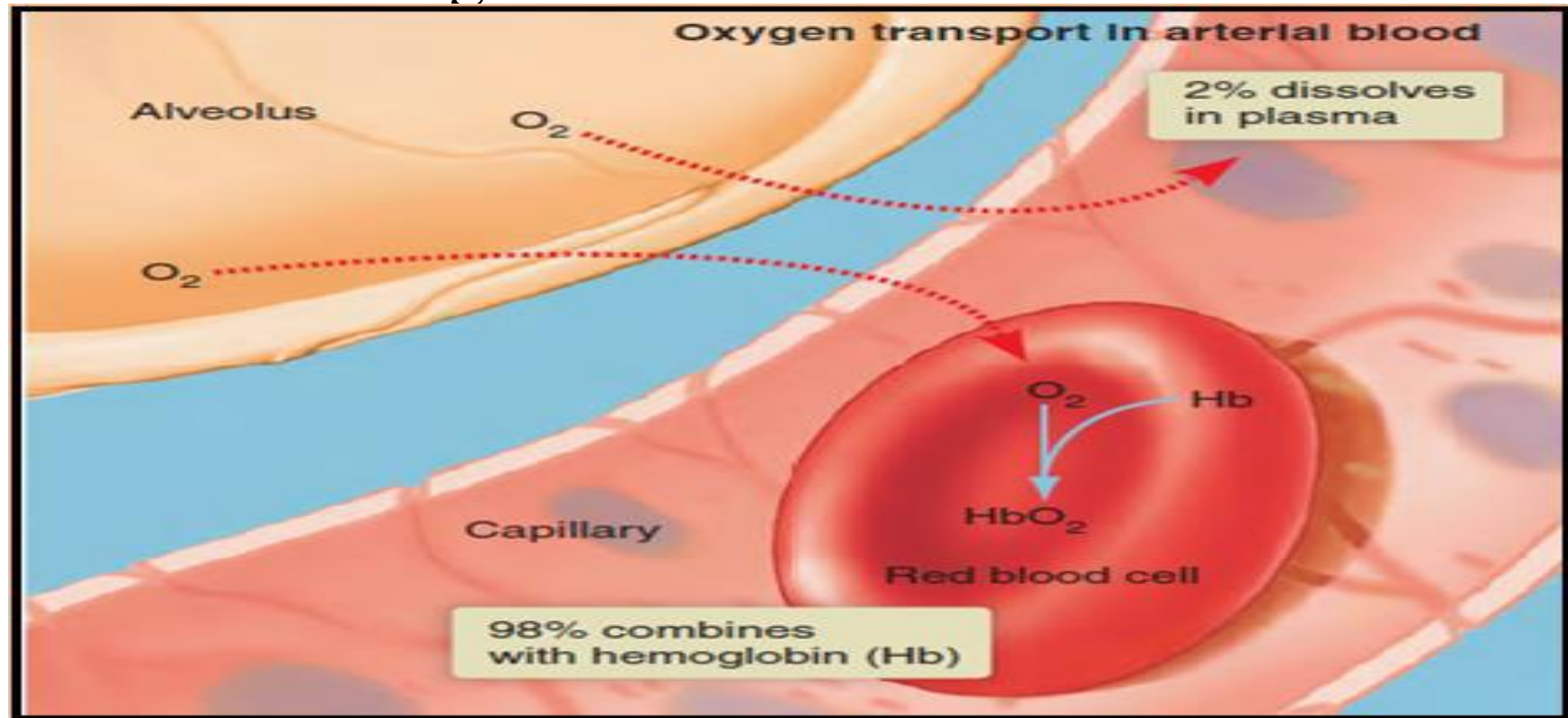
Gas exchange occurs by simple diffusion between gases present in the alveoli (alveolar air) and blood gases in pulmonary capillaries through the very thin pulmonary membrane



# Blood gas transport

Blood gas transport occurs in 2 forms

- 1- In physical solution in plasma. gases dissolve in plasma.
- 2- In chemical combination. gases forms chemical combinations with hemoglobin



- **Disorders of respiration:**

- **1- Hypoxia:**

Hypoxia means decrease O<sub>2</sub> supply to tissues

Types of hypoxia:

- **A. Hypoxic hypoxia**

- Due to decreased oxygenation of blood in the lungs
- As in badly ventilated places, high altitude, air way obstruction.

- **B. Anaemic hypoxia**

- Due to decreased hemoglobin (Hb) content or abnormal Hb function
- As in all causes of anaemia,

- **C. Stagnant hypoxia**

- Due marked decrease in rate of blood flow to tissues
- As in arterial thrombosis

## **D. Histotoxic hypoxia**

- inability of tissues to use and utilize oxygen due to toxins
- As in cyanide poisoning and alcohol toxicity

## **2- Cyanosis:**

- It means bluish discoloration of skin and mucous membranes as a result of increased level of reduced hemoglobin (5 gm% in capillary blood).
- Causes of cyanosis:  
All causes of hypoxic hypoxia and stagnant hypoxia

