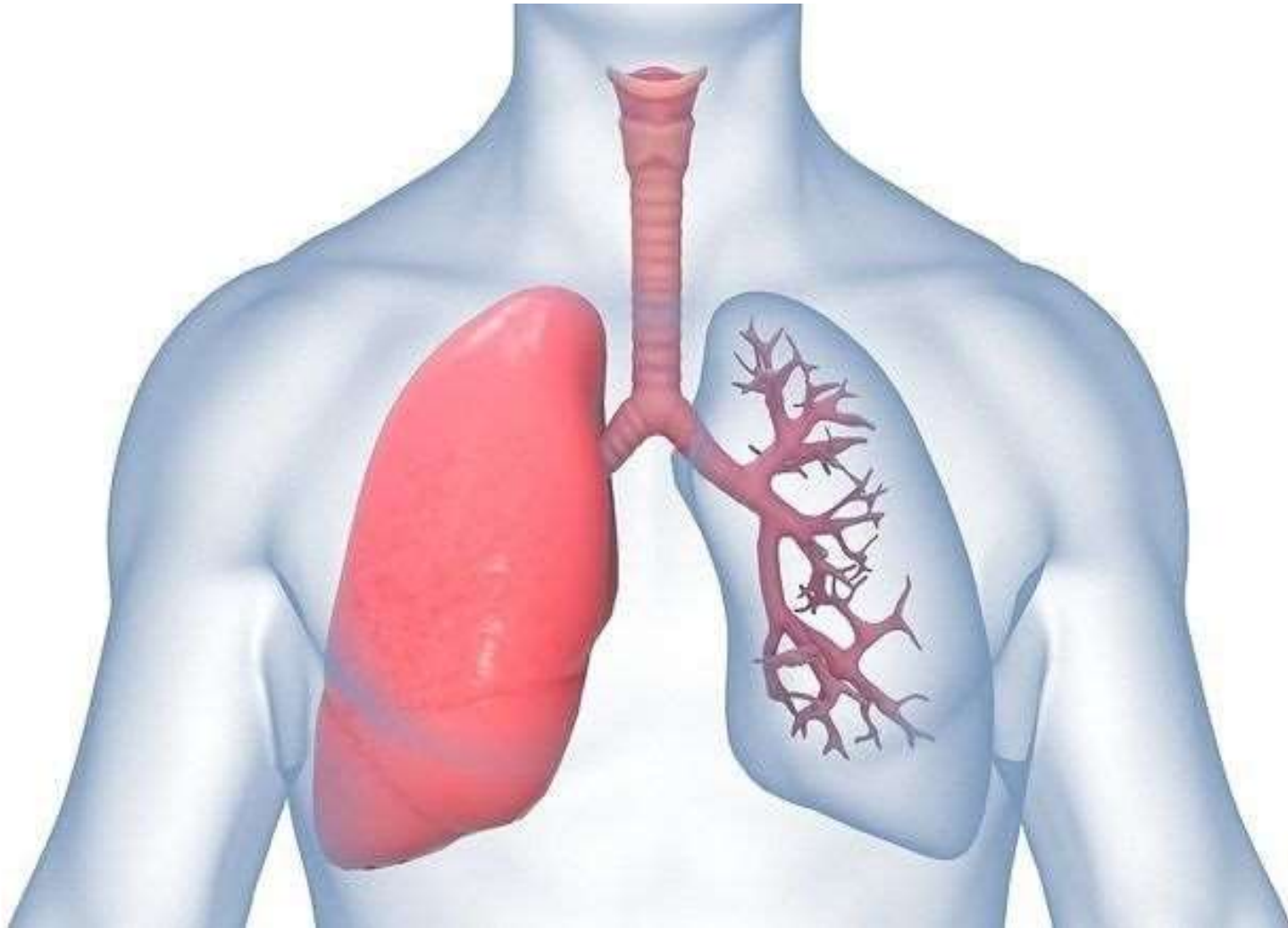


# Respiration and Gas Exchange

## KEY CONCEPT

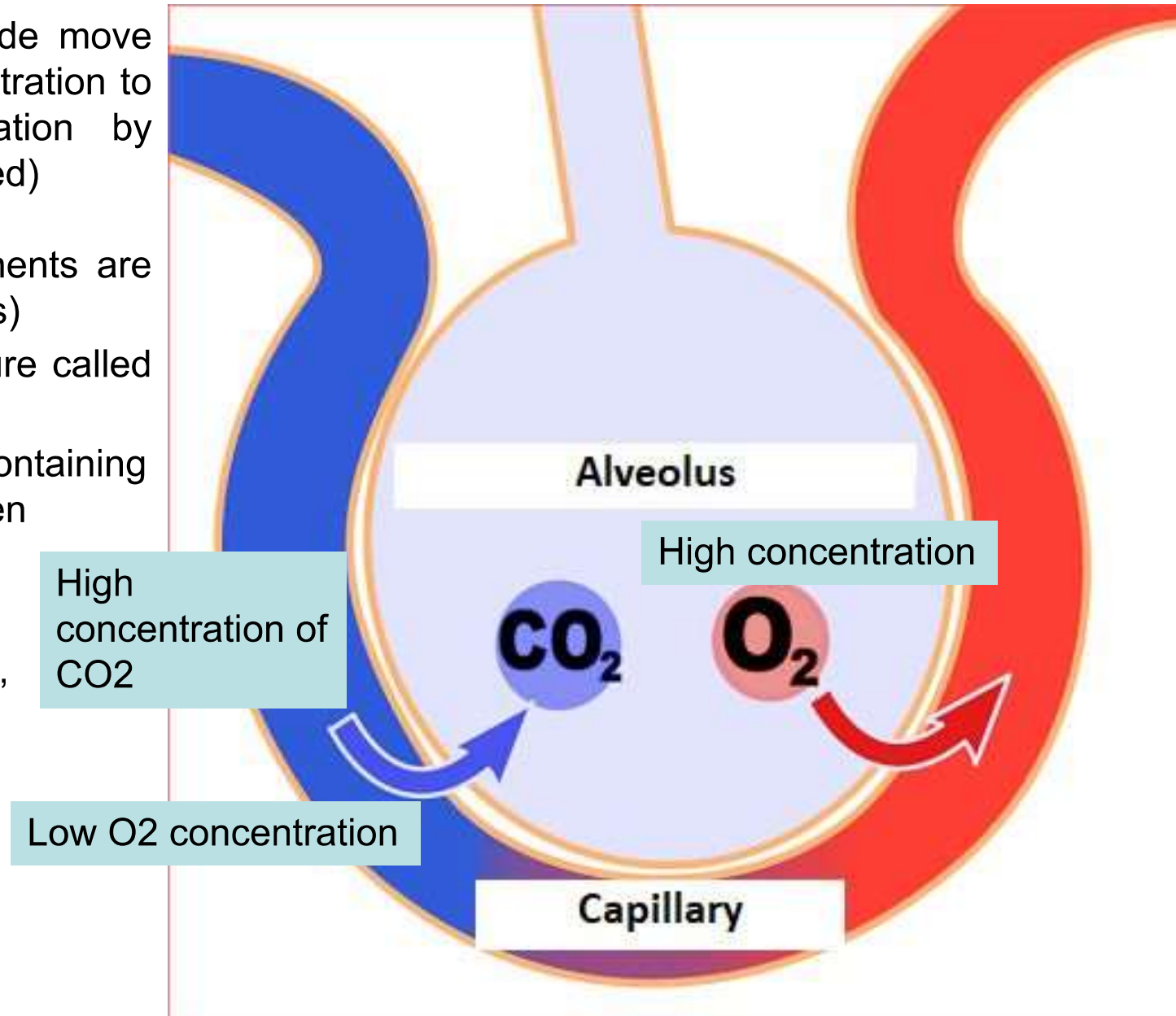
**The respiratory system exchanges oxygen and carbon dioxide.**



# Respiration and Gas Exchange

## • Carbon dioxide – oxygen exchange

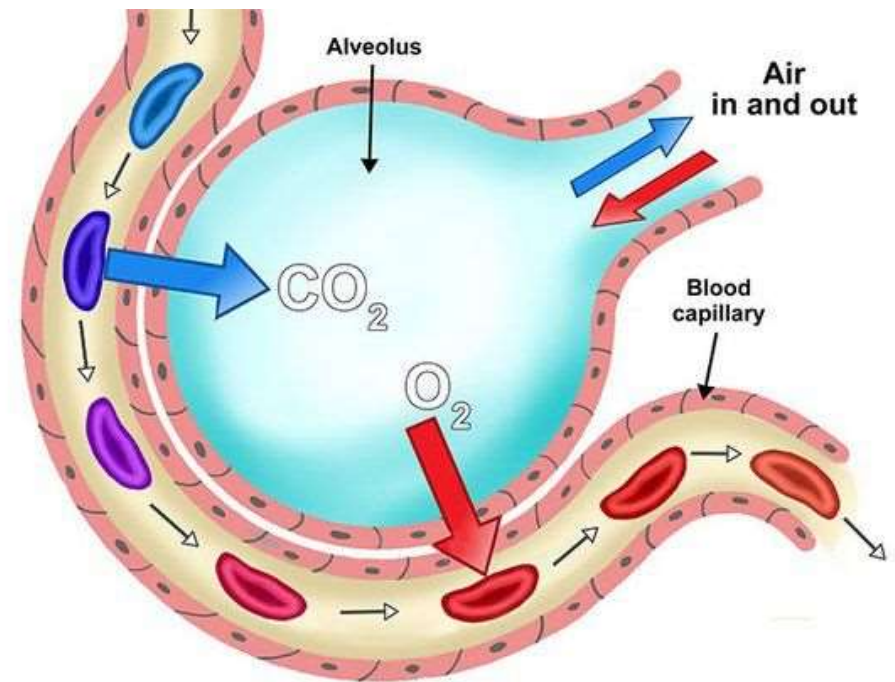
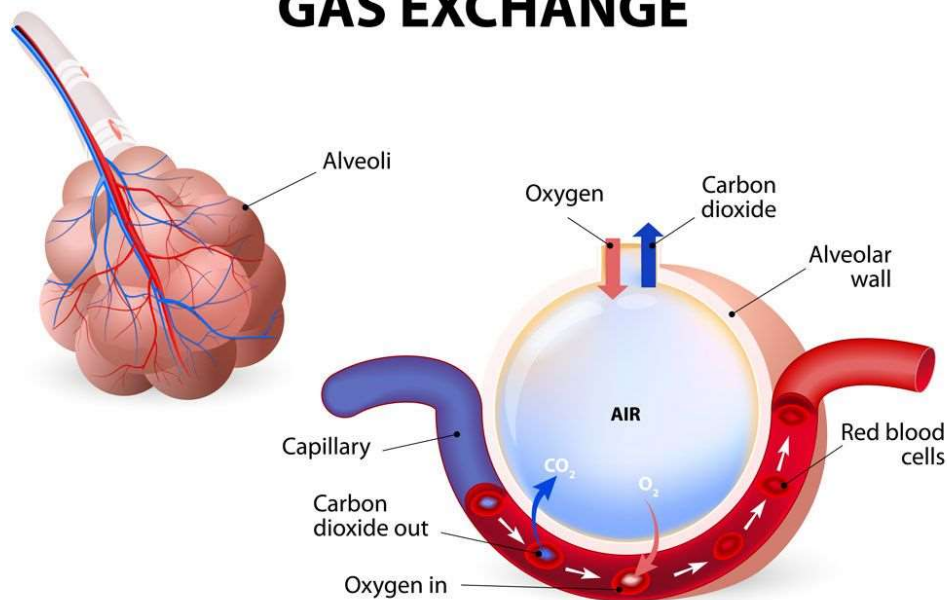
- Oxygen and carbon dioxide move from areas of high concentration to areas of low concentration by **diffusion**. (no ATP is needed)
- One of the blood components are the **Red Blood Cells** (RBCs)
- RBC has a special structure called hemoglobin.
- **Hemoglobin** is an Iron containing protein that can bind oxygen
- Each Hemoglobin protein has four **Iron sites**, thus **binding** four **oxygen** molecules,



# Respiration and Gas Exchange

- Gas exchange occurs **in the alveoli** of the lungs.
- Oxygen and carbon dioxide are carried by the blood to and from the alveoli.
  - oxygen diffuses from alveoli into capillary
  - oxygen binds to hemoglobin in red blood cells
  - carbon dioxide diffuses from capillary into alveoli

## ALVEOLUS GAS EXCHANGE

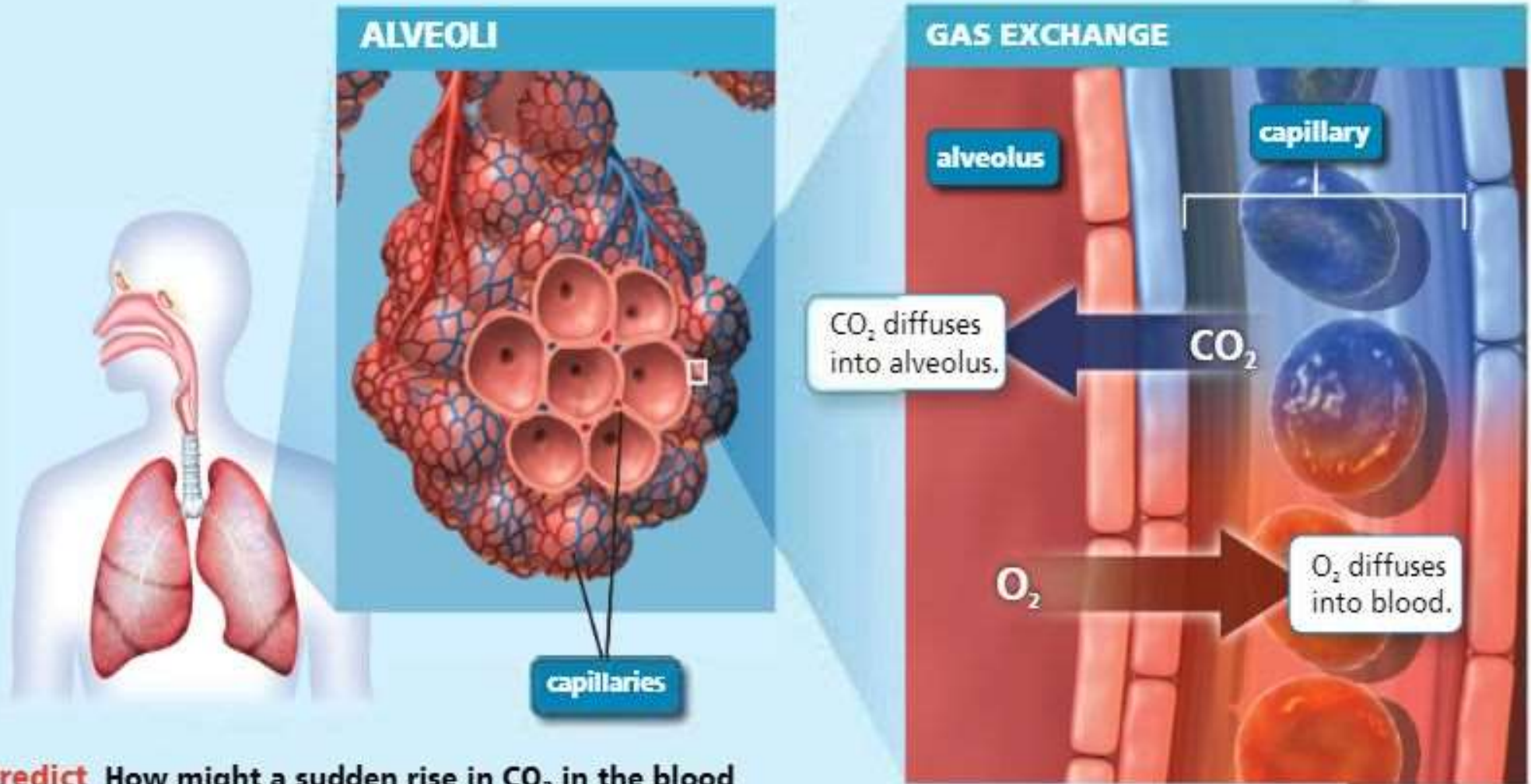




# Respiration and Gas Exchange

## FIGURE 2.2 Gas Exchange in the Alveoli

Diffusion of gases into and out of the alveoli maintains  $O_2$  and  $CO_2$  homeostasis.

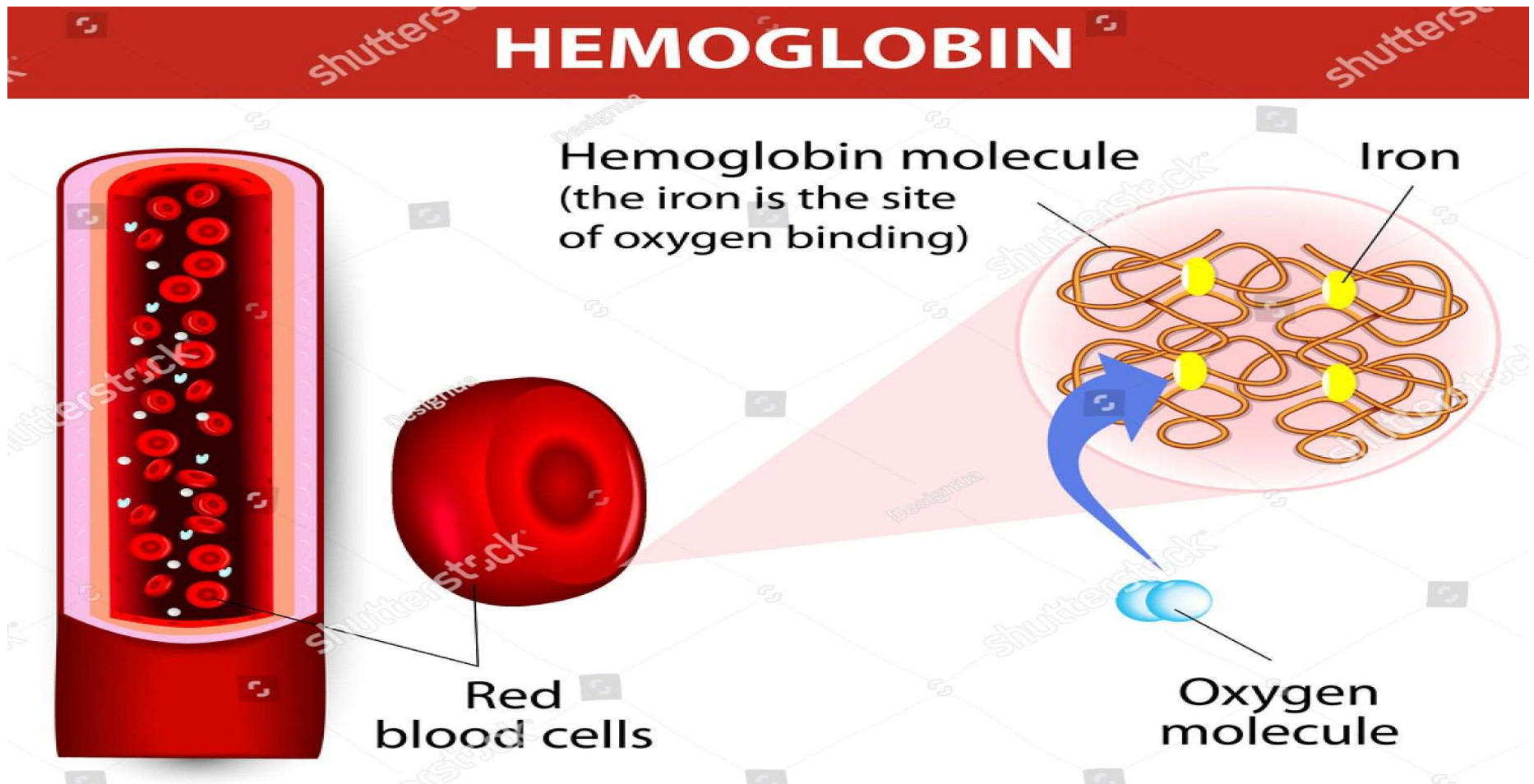


**Predict** How might a sudden rise in  $CO_2$  in the blood affect the gas exchange process?

# Respiration and Gas Exchange

- Hemoglobin structure:

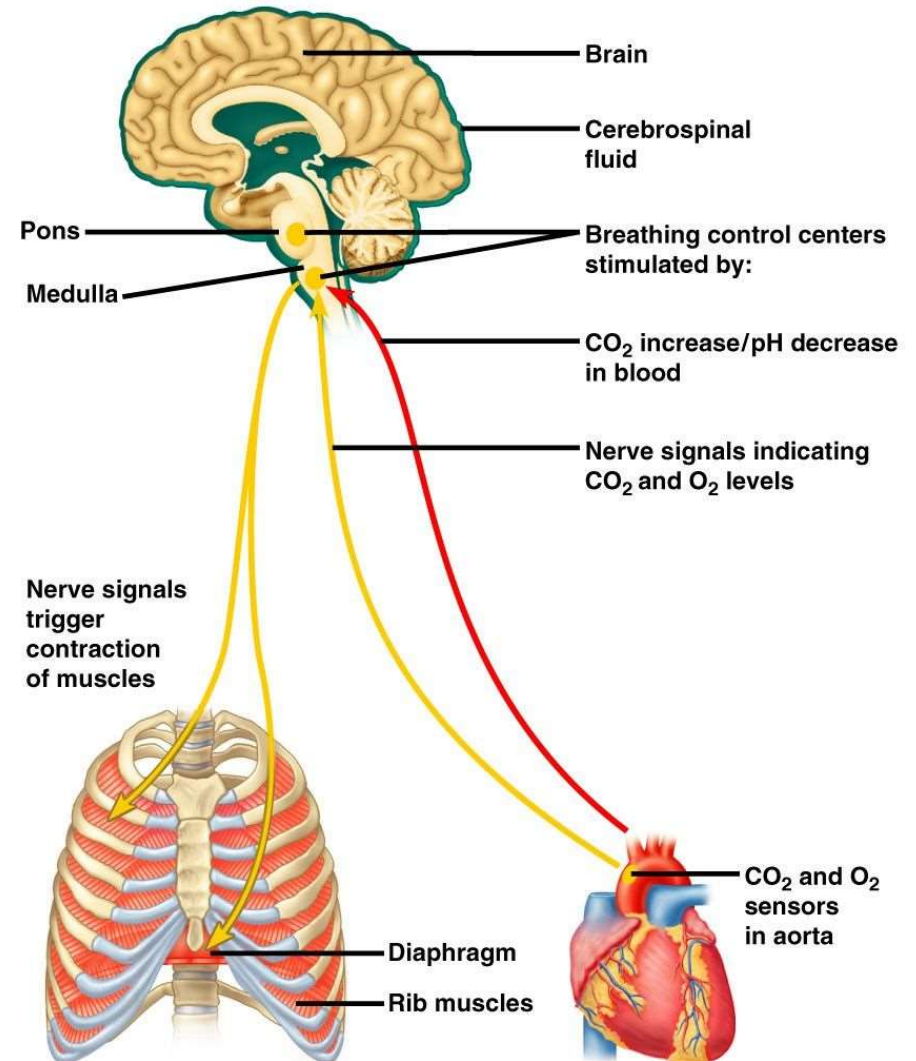
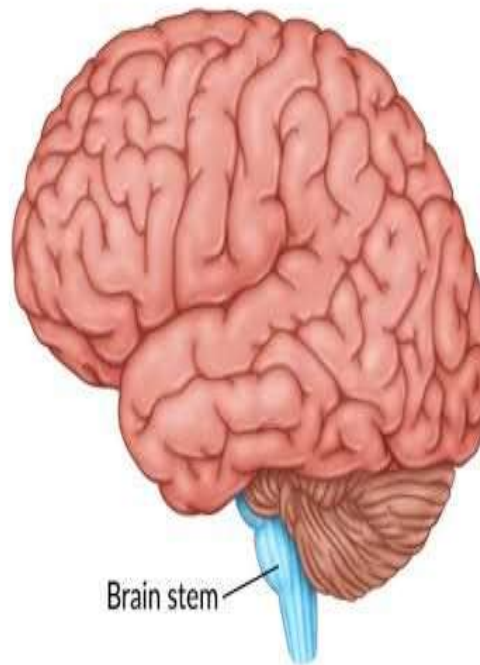
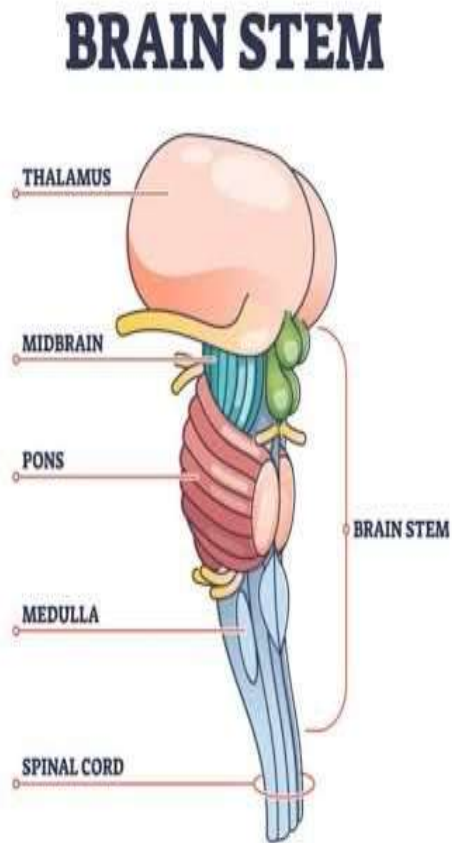
A hemoglobin protein showing the 4 binding sites of Oxygen





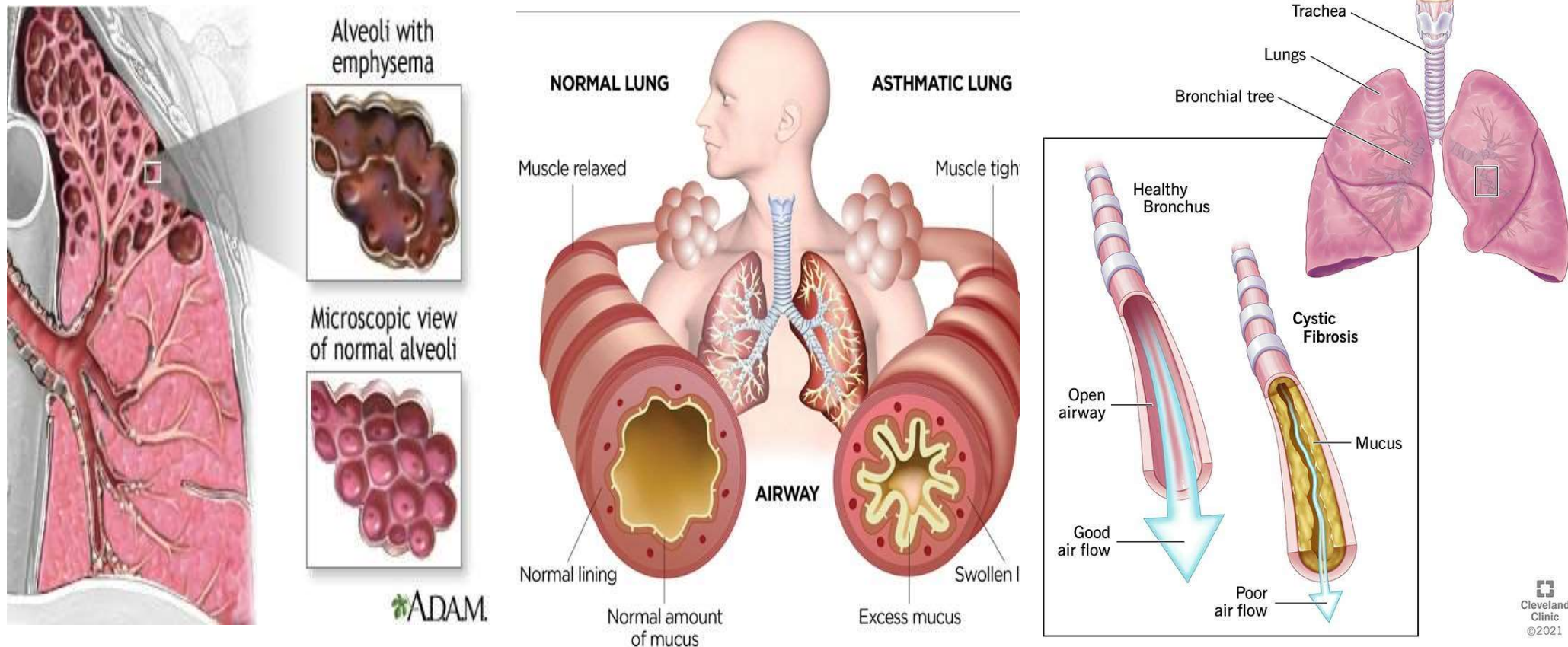
# Respiration and Gas Exchange

- Gas exchange occurs in the alveoli of the lungs.
- Breathing is regulated by the **brain stem. (pons)**



# Respiration and Gas Exchange

- **Respiratory diseases** interfere with gas exchange.
  - Lung diseases reduce airflow and oxygen absorption.
    - **Emphysema** destroys alveoli.
    - **Asthma** constricts airways (bronchi or bronchioles)
    - **Cystic fibrosis** produces sticky mucus.





# Respiration and Gas Exchange

- Smoking is the leading cause of lung diseases.

