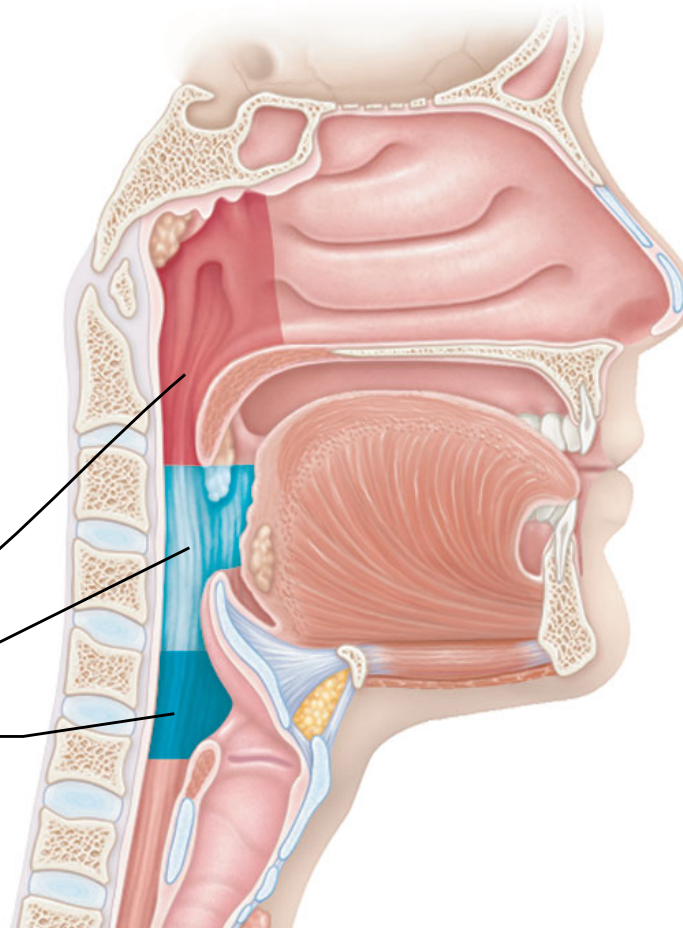


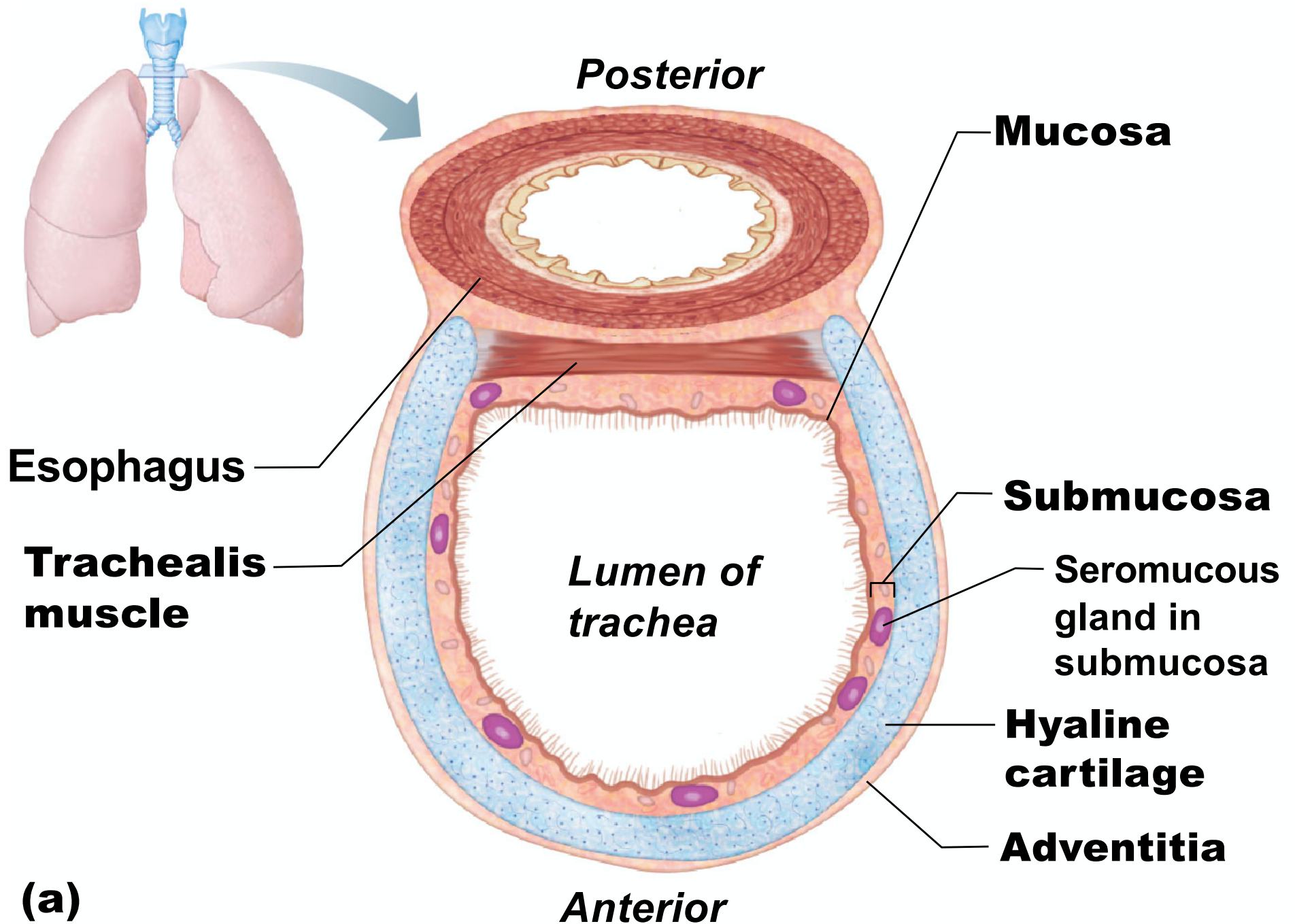
(b) Detailed anatomy of the upper respiratory tract

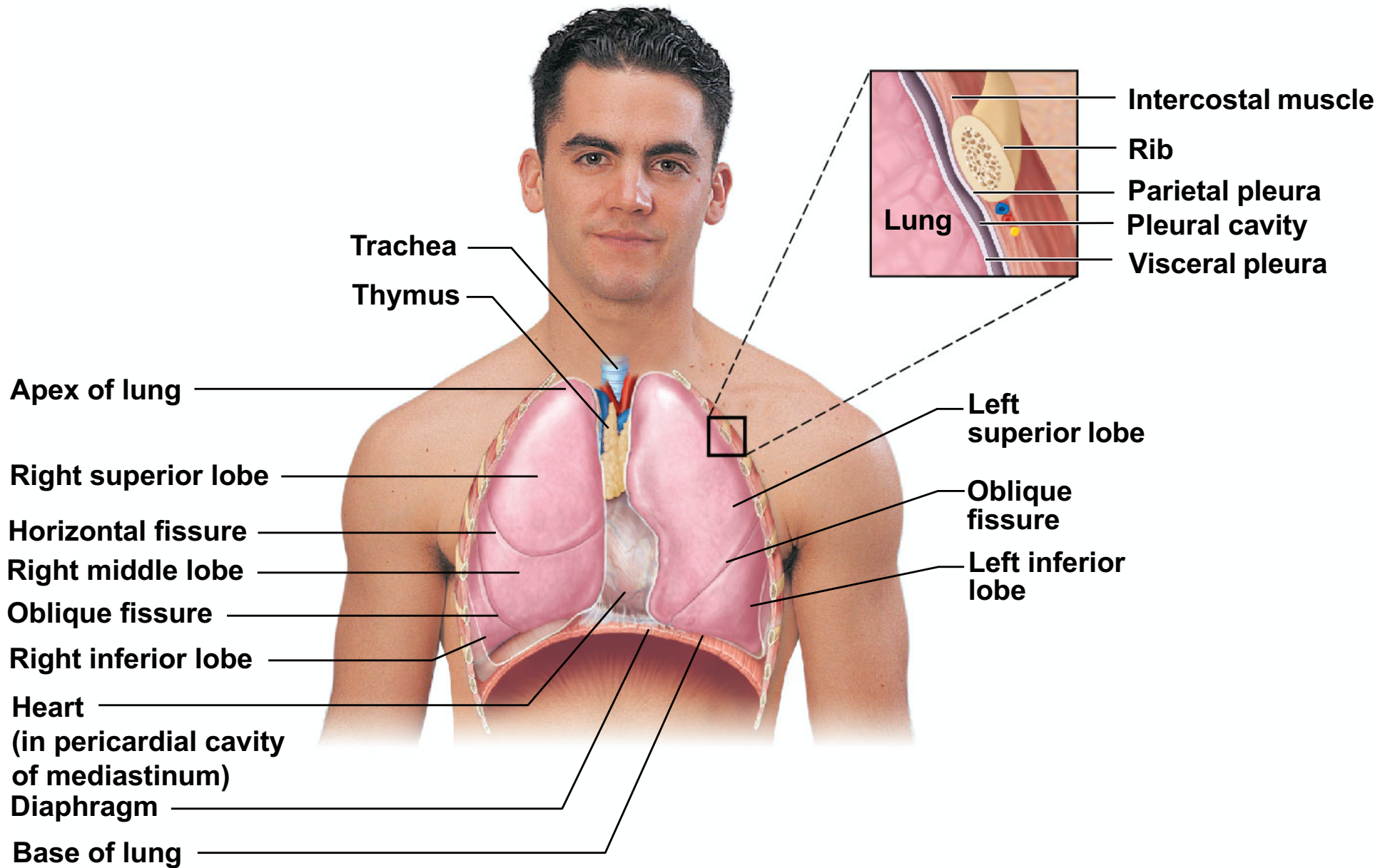
Pharynx

- Nasopharynx
- Oropharynx
- Laryngopharynx

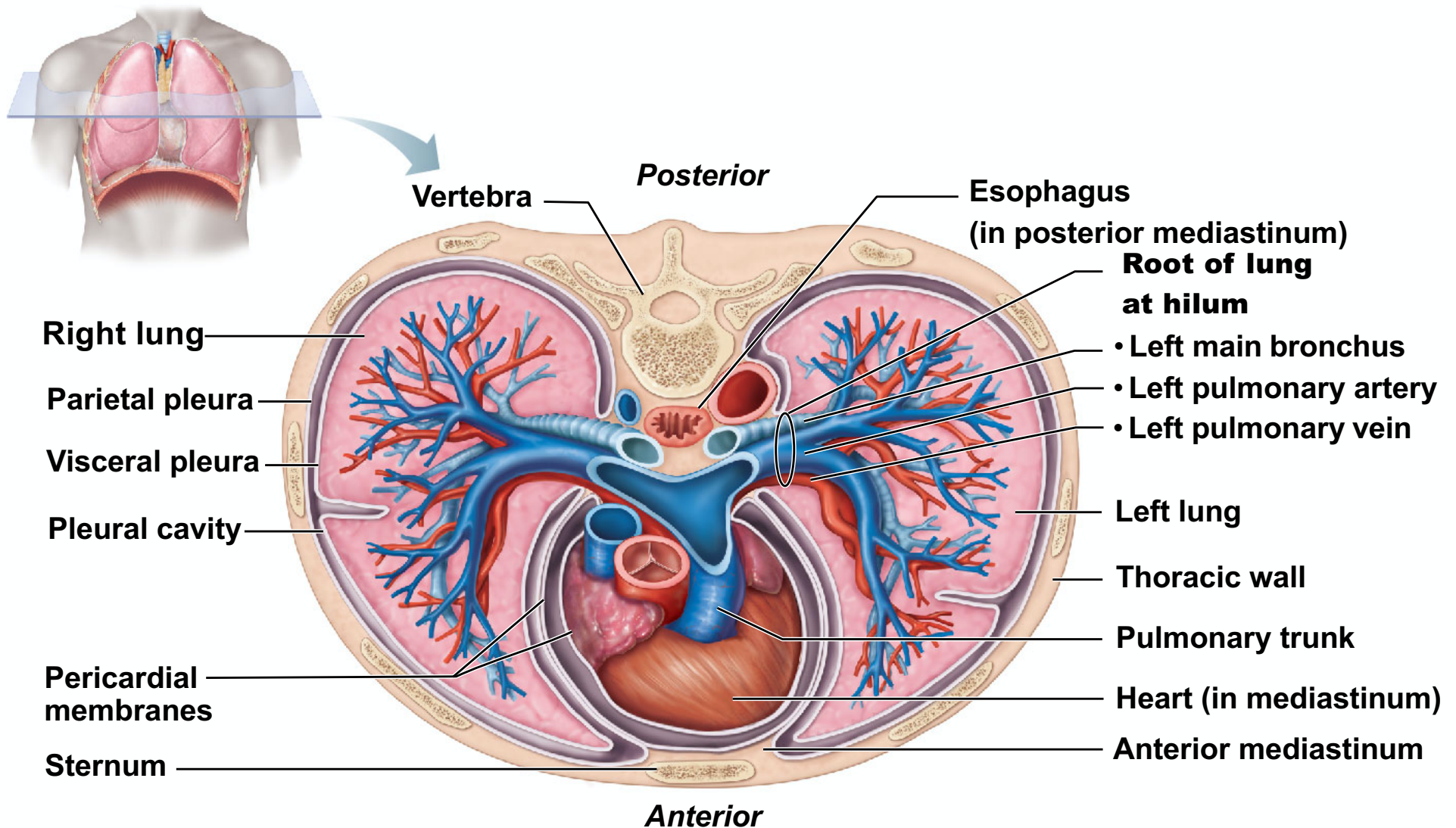


(a) Regions of the pharynx

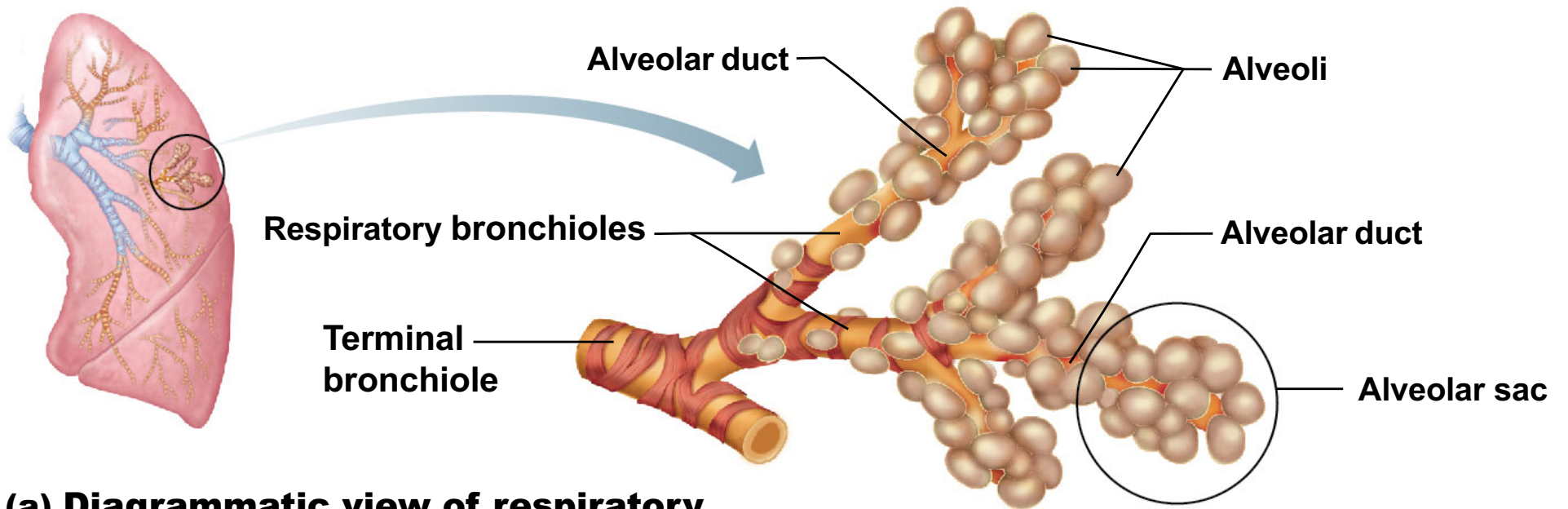




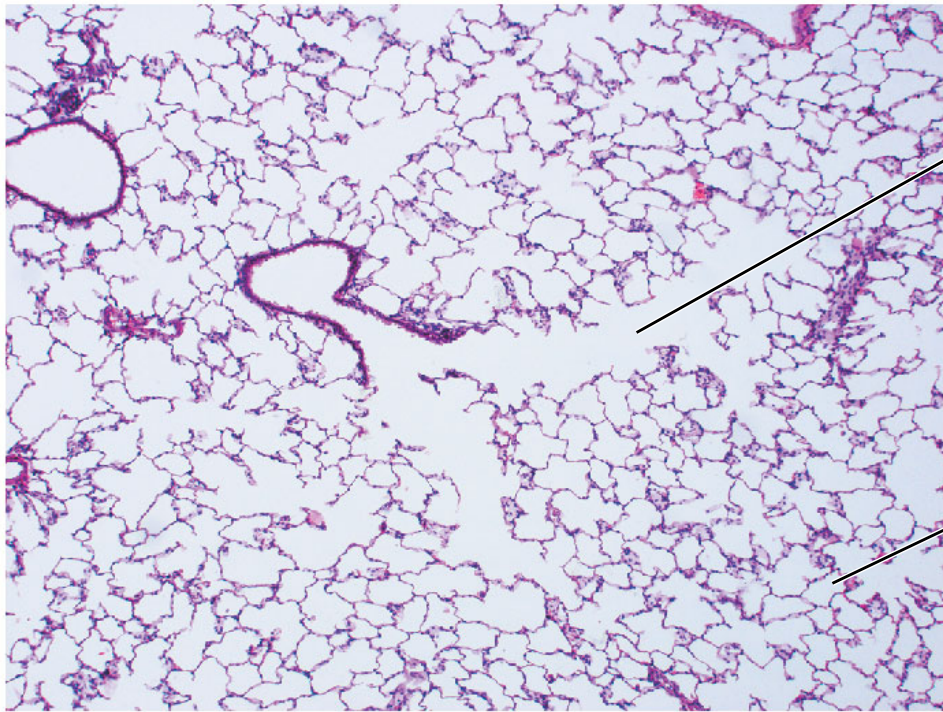
(a) Anterior view. The lungs flank mediastinal structures laterally.



(b) Transverse section through the thorax, viewed from above



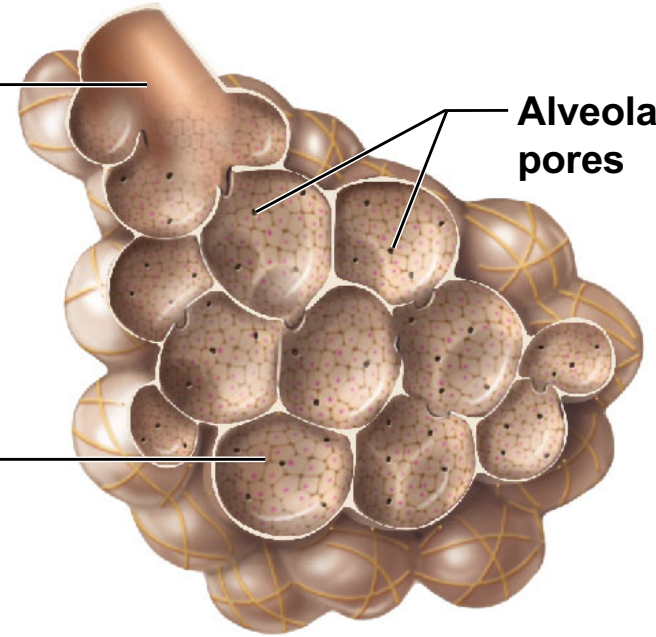
(a) Diagrammatic view of respiratory bronchioles, alveolar ducts, and alveoli



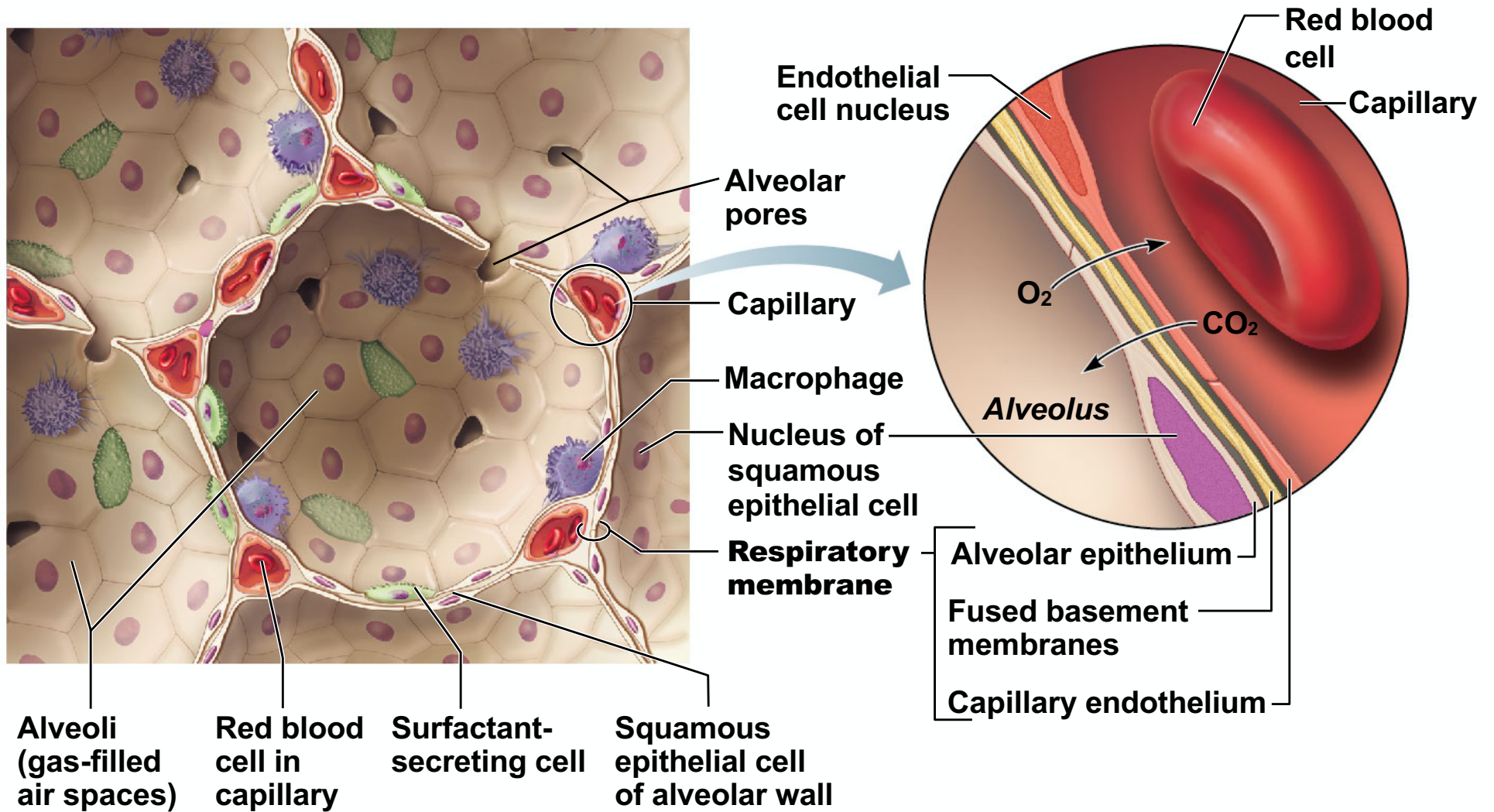
Alveolar duct

Alveolus

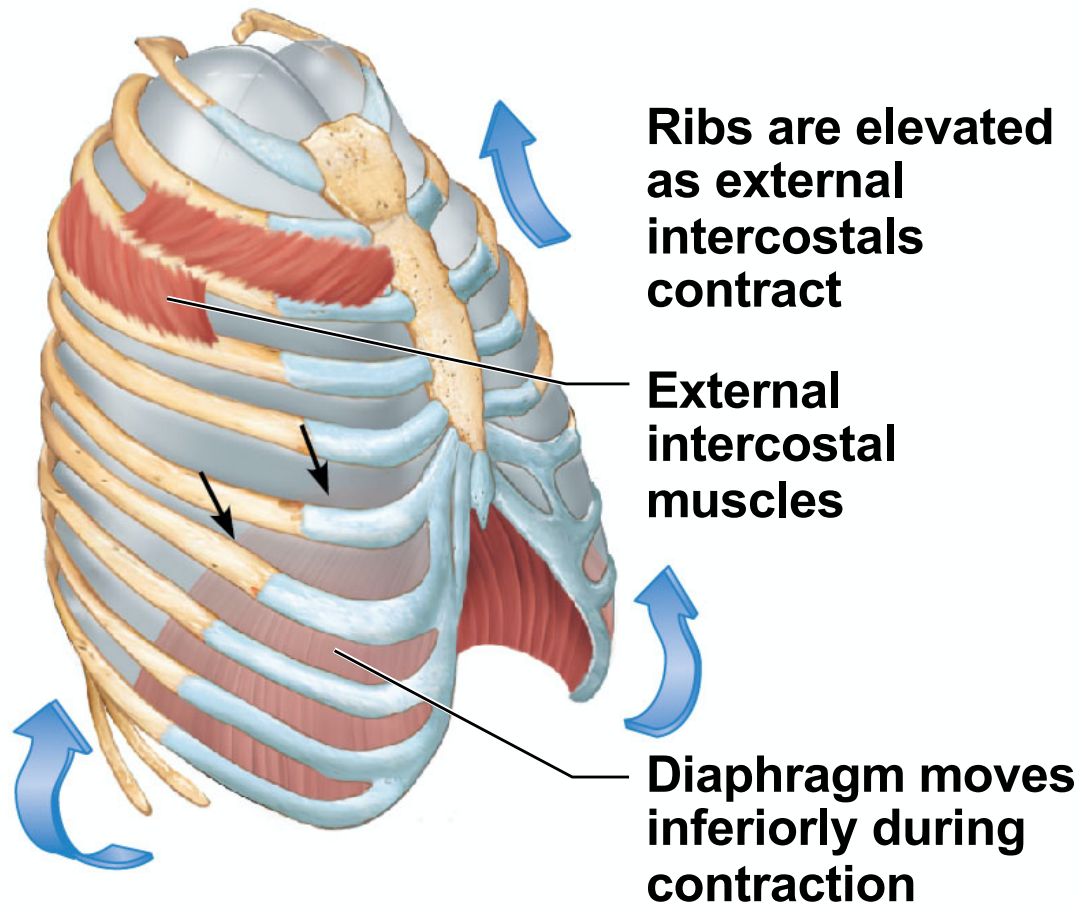
Alveolar pores



(b) Light micrograph of human lung tissue, showing the final divisions of the respiratory tree (120×)

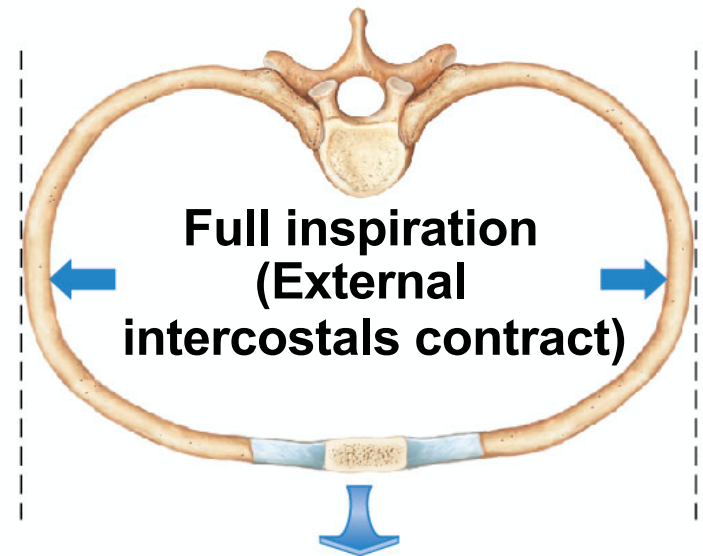


Changes in anterior-posterior and superior-inferior dimensions

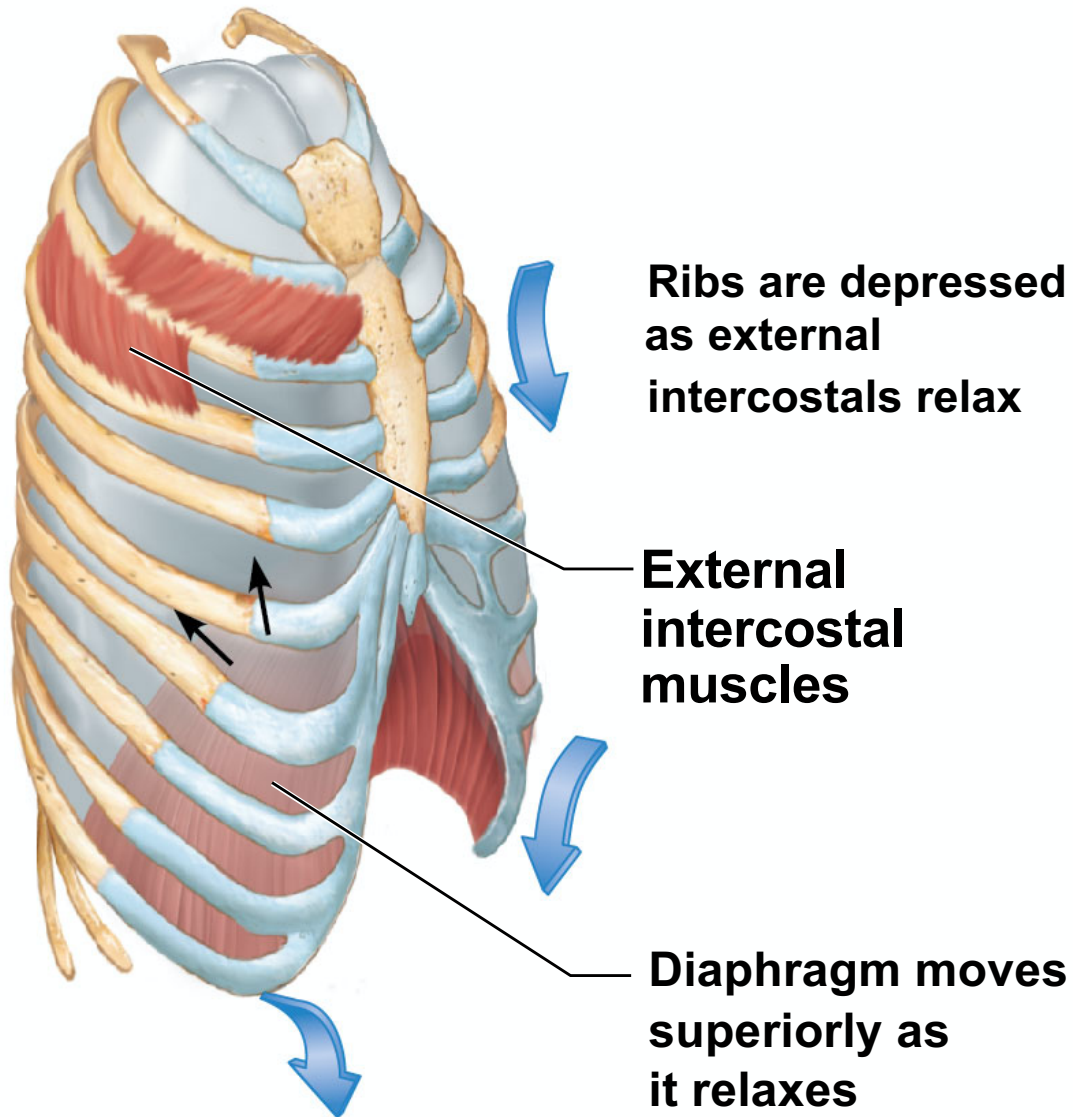


(a) Inspiration: Air (gases) flows into the lungs

Changes in lateral dimensions

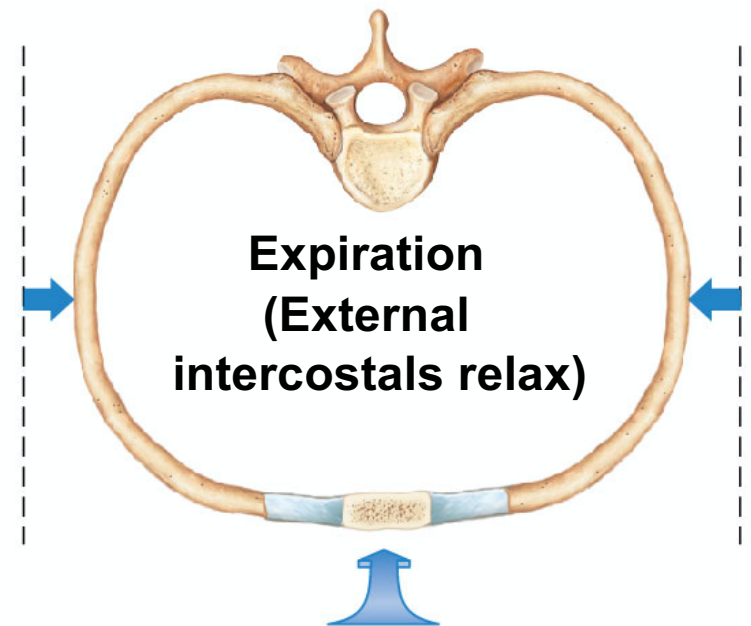


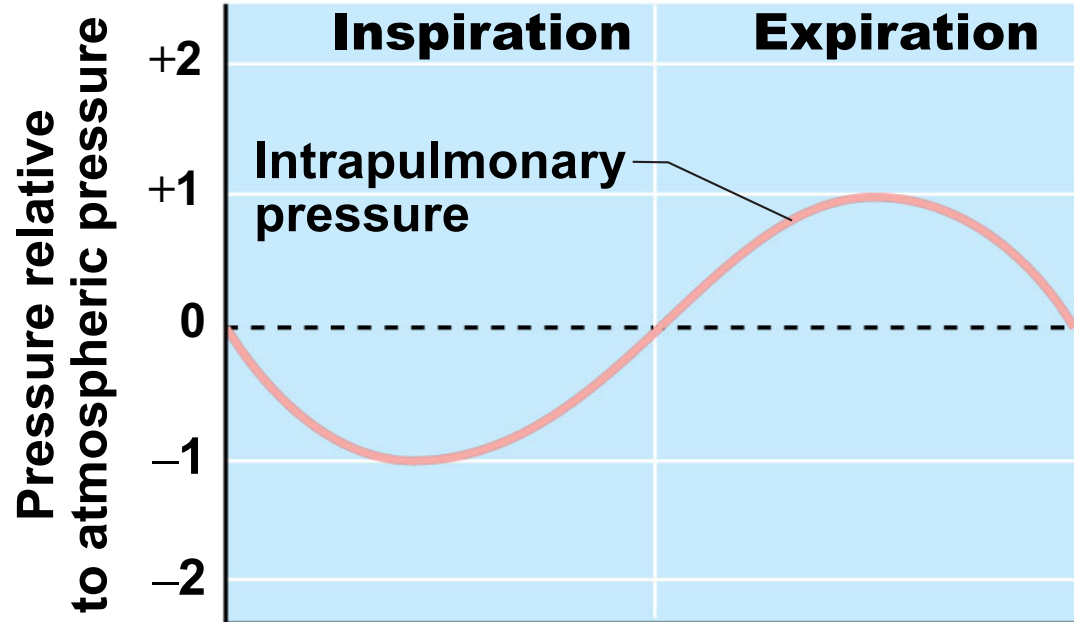
Changes in anterior-posterior and superior-inferior dimensions



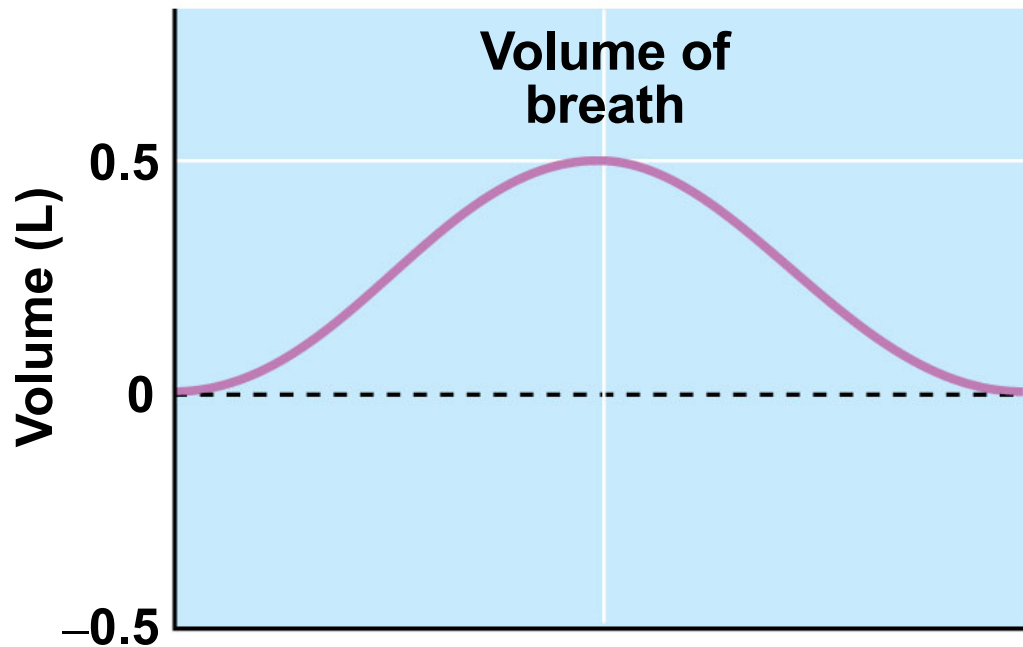
(b) Expiration: Air (gases) flows out of the lungs

Changes in lateral dimensions





(a)



(b)

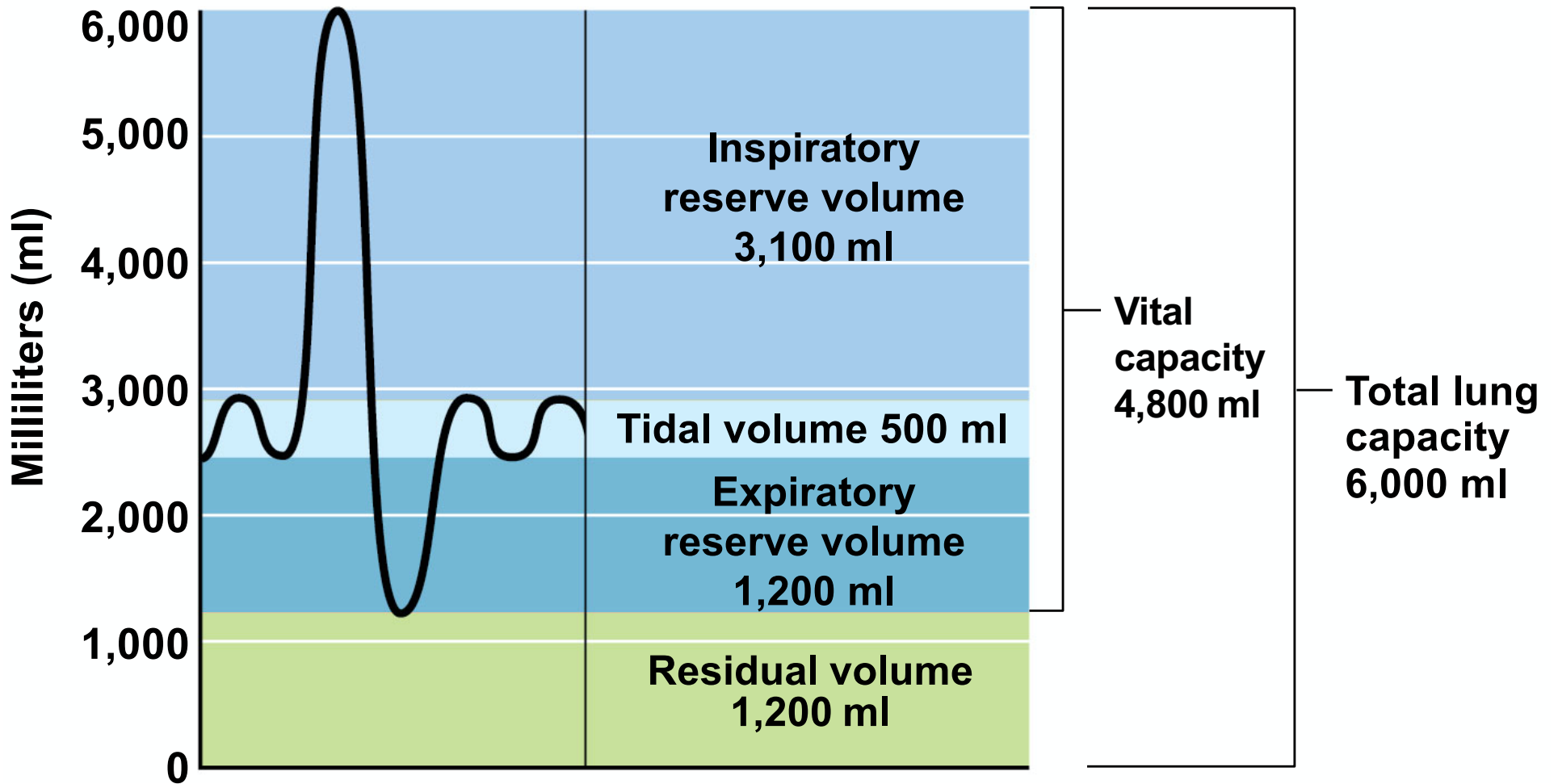
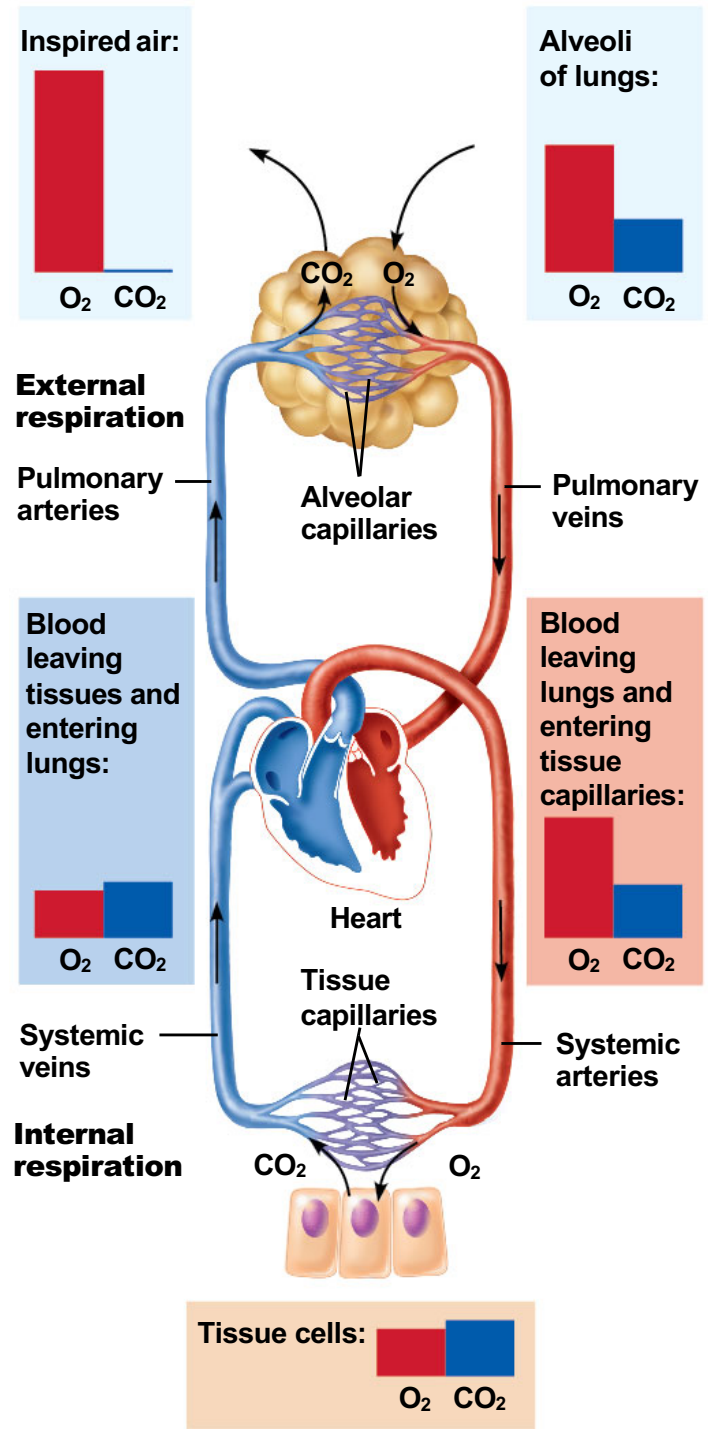


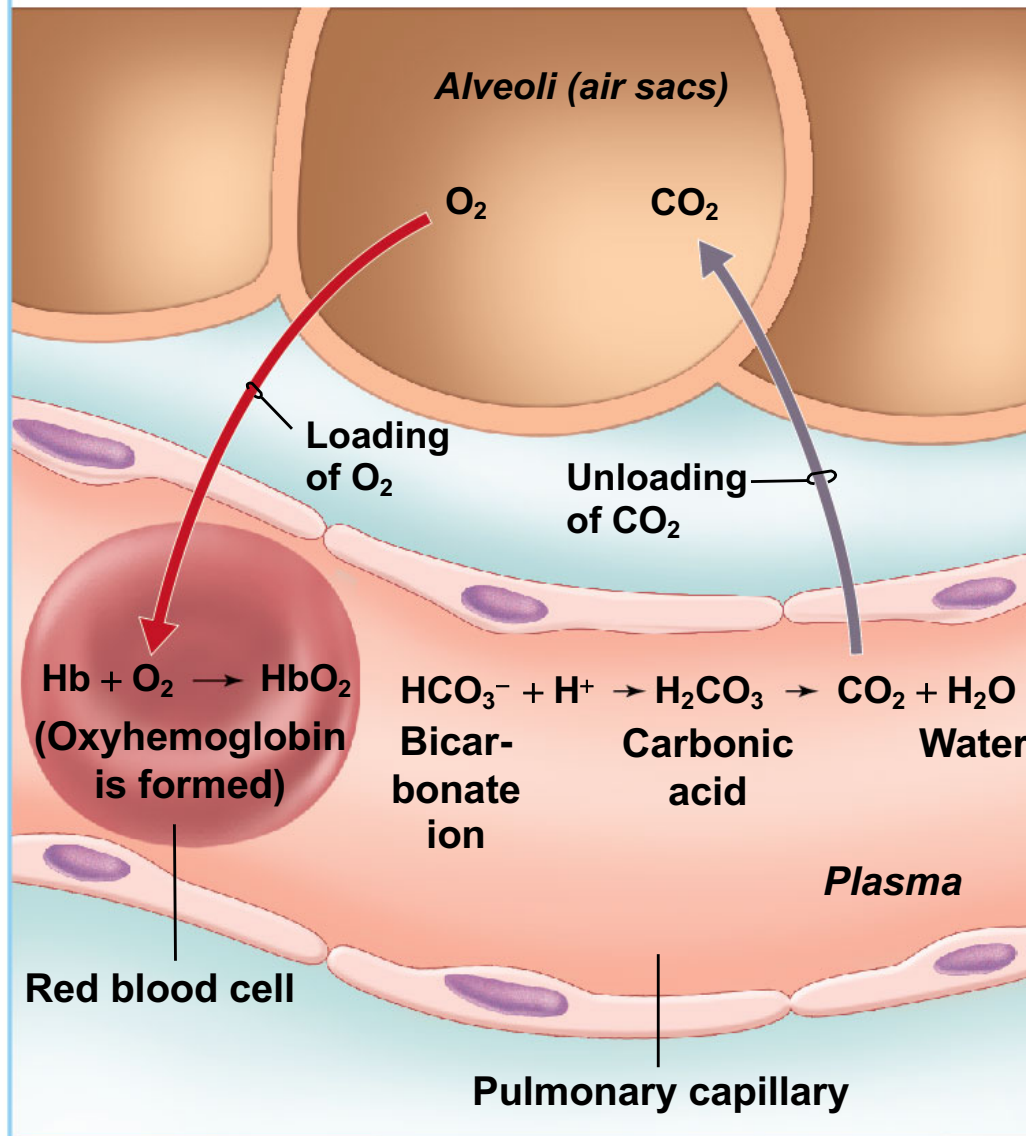
Table **13.1** **Nonrespiratory Air (Gas) Movements**

Movement	Mechanism and result
Cough	Taking a deep breath, closing glottis, and forcing air superiorly from lungs against glottis. Then, glottis opens suddenly, and a blast of air rushes upward. Coughs act to clear the lower respiratory passageways.
Sneeze	Similar to a cough, except that expelled air is directed through nasal cavities instead of through oral cavity. The uvula (u'vu-lah), a dangling tag of tissue hanging from the soft palate, becomes depressed and closes oral cavity off from pharynx, routing air through nasal cavities. Sneezes clear upper respiratory passages.
Crying	Inspiration followed by release of air in a number of short expirations. Primarily an emotionally induced mechanism.
Laughing	Essentially same as crying in terms of the air movements produced. Also an emotionally induced response.
Hiccups	Sudden inspirations resulting from spasms of diaphragm; initiated by irritation of diaphragm or phrenic nerves, which serve diaphragm. The sound occurs when inspired air hits vocal folds of closed glottis.
Yawn	Very deep inspiration, taken with jaws wide open; ventilates all alveoli (some alveoli may remain collapsed during normal quiet breathing).



**(a) External respiration in the lungs
(pulmonary gas exchange)**

**Oxygen is loaded into the blood, and
carbon dioxide is unloaded.**



(b) Internal respiration in the body tissues (systemic capillary gas exchange)

Oxygen is unloaded and carbon dioxide is loaded into the blood.

