Blood Supply to Lungs

- Pulmonary Circulation
  - Blood supply to alveolar capillaries
    - From right ventricle ($-O_2$, $+CO_2$)
    - To left atrium ($+O_2$, $-CO_2$)
- Bronchial Circulation
  - Systemic blood to lungs
    - Bronchi, bronchioles, etc.

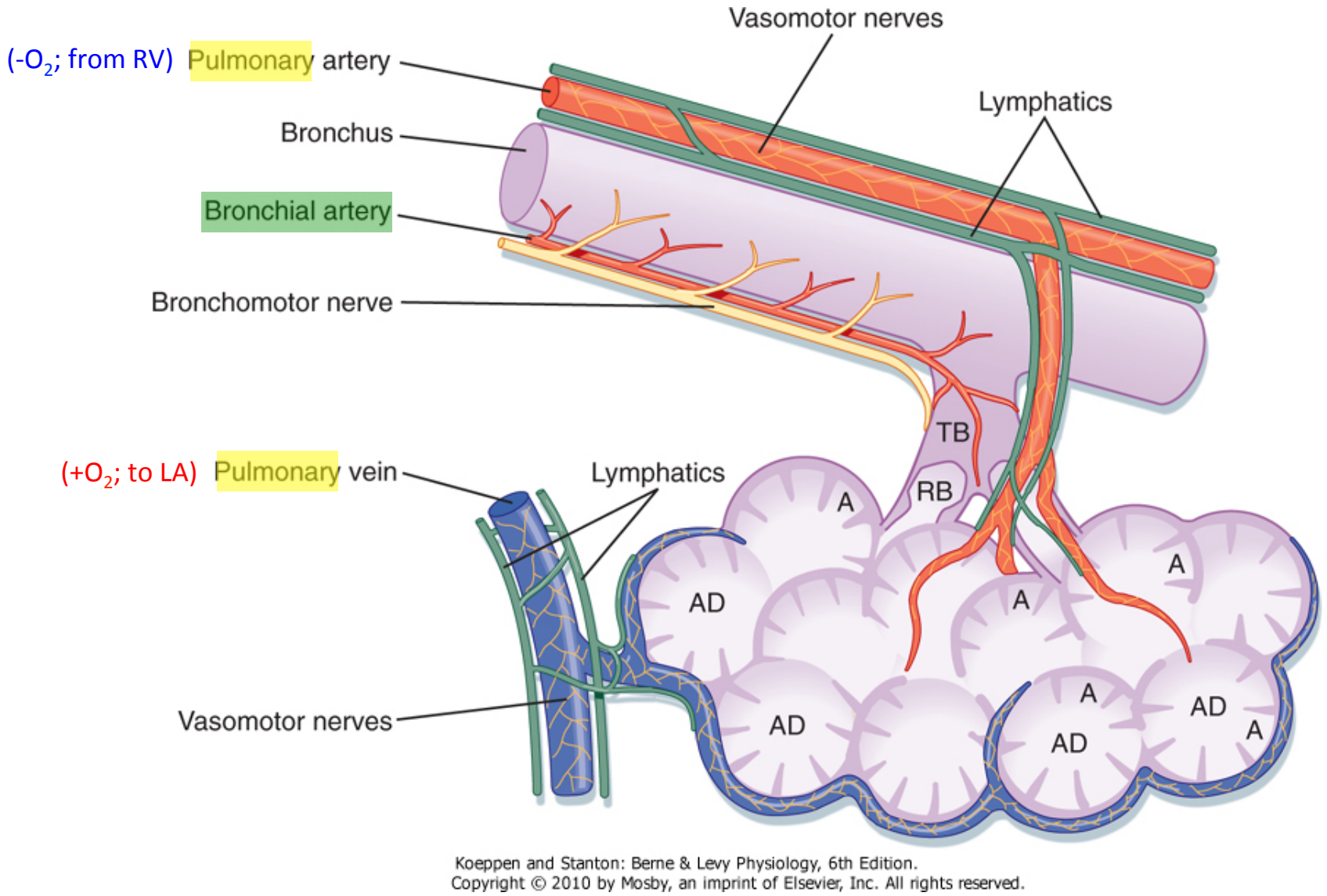
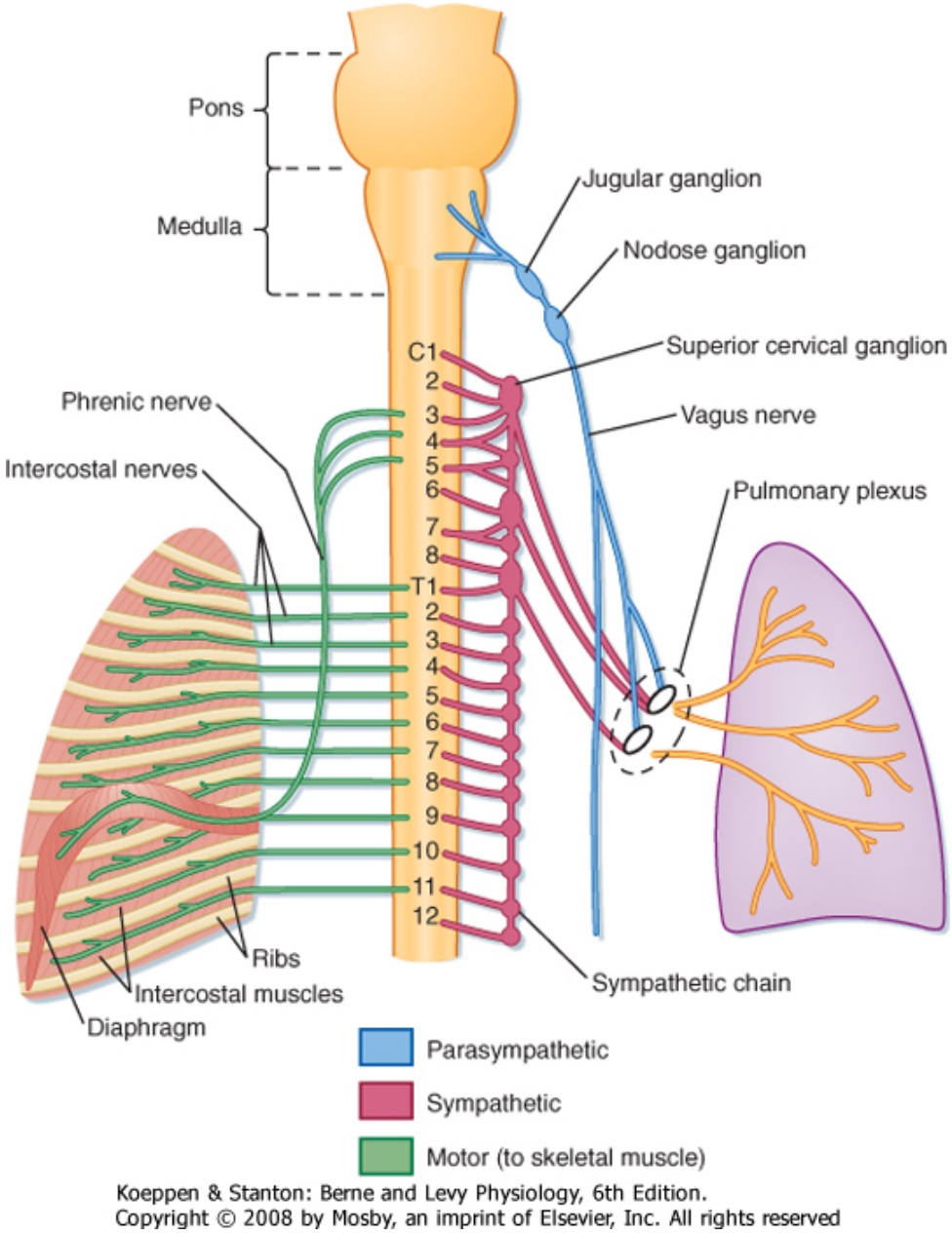


Figure 20-8 Anatomic relationship between the pulmonary artery, the bronchial artery, the airways, and the lymphatics. A, alveoli; AD, alveolar ducts; RB, respiratory bronchioles; TB, terminal bronchioles.



Koeppen & Stanton: Berne and Levy Physiology, 6th Edition.

Figure 20-9 Innervation of the lungs. The autonomic innervation (motor and sensory) of the lung and the somatic (motor) nerve supply to the intercostal muscles and diaphragm are depicted.

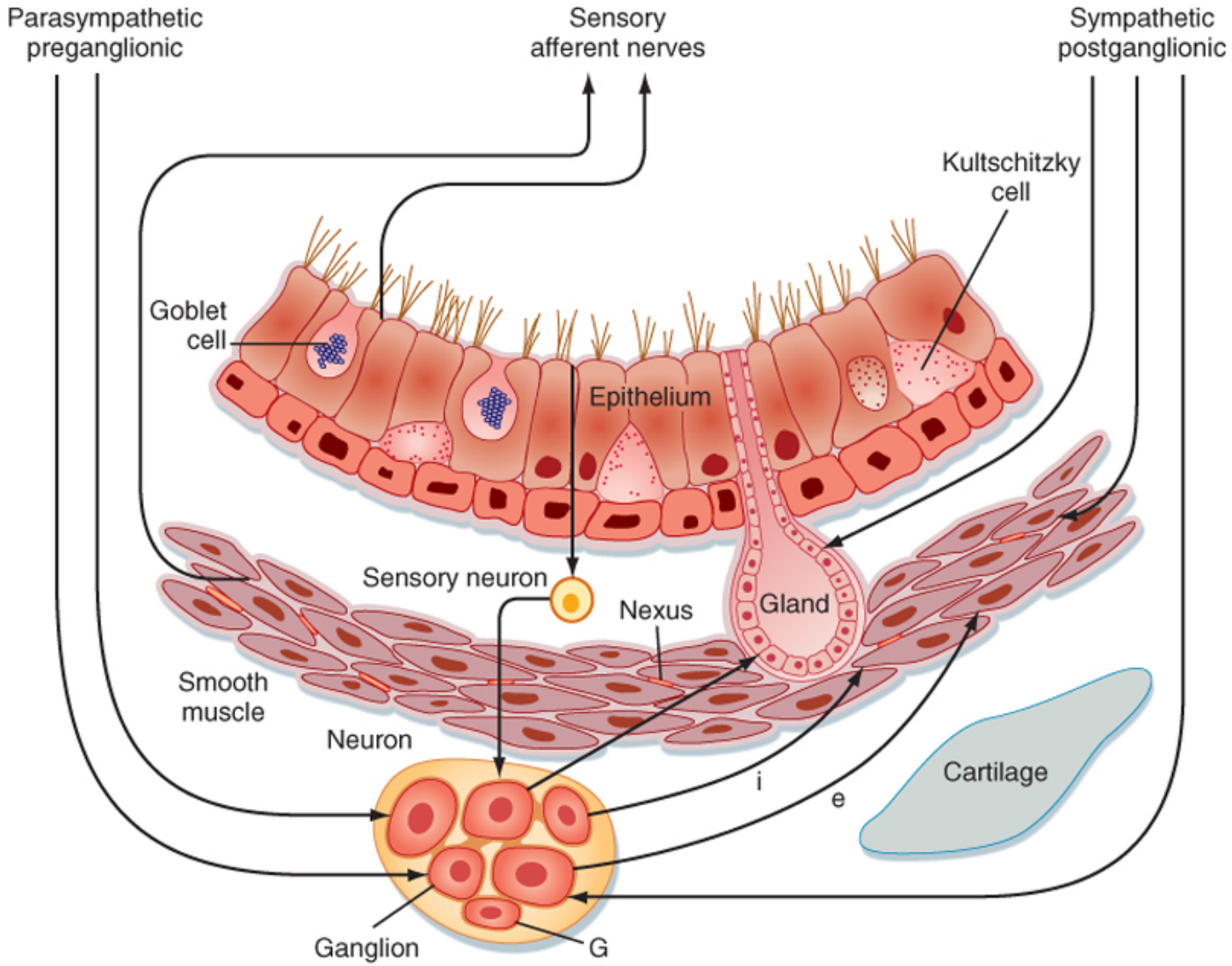


Figure 20-10 Schematic summary of the innervation of the airways. Parasympathetic, preganglionic fibers descend into the vagus and terminate in the ganglia. The ganglia contain excitatory neurons that are cholinergic and inhibitory neurons that are nonadrenergic. Other neurons with an integrative function are probably also present. Glial cells (G) are present in the ganglia. Postganglionic fibers to the smooth muscle are excitatory (e) or inhibitory (i).

It is enclosed and bounded:

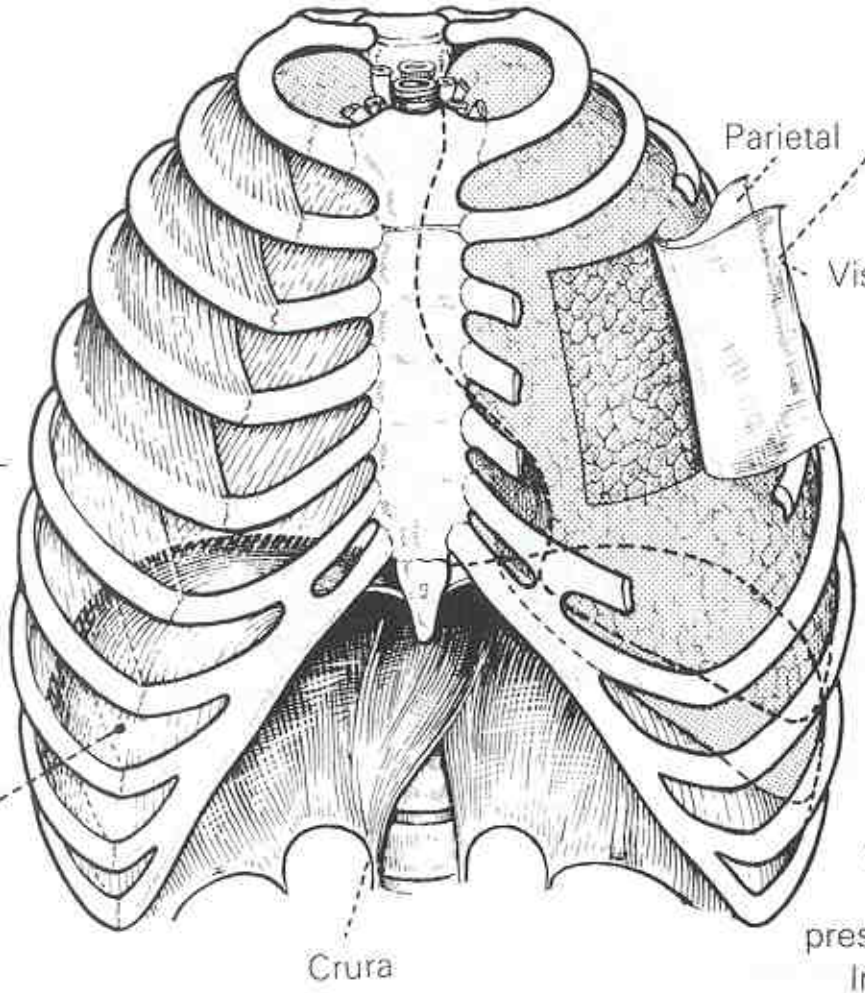
ABOVE by the upper RIBS and tissues of the neck;

AT THE SIDES by the RIBS and INTERCOSTAL MUSCLES;

AT THE BACK by the RIBS and VERTEBRAL COLUMN (or back bone);

IN FRONT by the RIBS, COSTAL CARTILAGES and STERNUM (or breast bone);

BELOW by the DIAPHRAGM (a strong dome-shaped sheet of skeletal muscle with a central tendon which separates the thoracic cavity from the abdominal cavity



It is lined by a thin moist membrane – the PLEURA – the inner layer of which invests the LUNGS. In health there is a thin film of fluid between these two pleural layers which causes adhesion but allows them to slip (like two glass sheets with fluid between). Elastic recoil of lungs **tends** to pull visceral layer away from parietal layer. This creates subatmospheric or negative intrapleural pressure (about – 2 mmHg). In **quiet inspiration,** the chest wall is **tending** to pull away from lungs and the intrapleural pressure increases to – 6 mmHg. With **forced inspiration** it can become – 30 mmHg.

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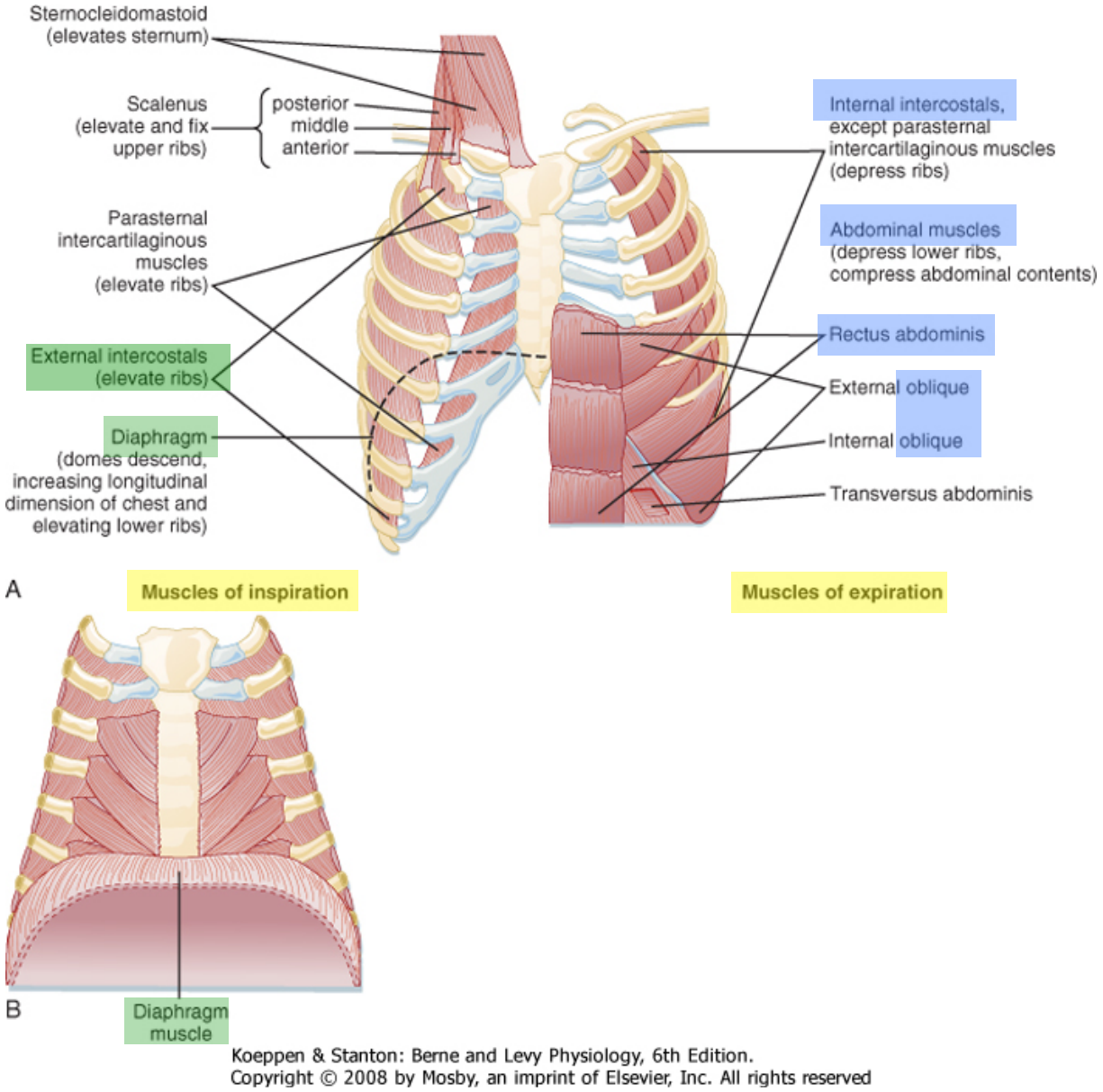

Figure 20-12 The major respiratory muscles. A, The inspiratory muscles are on the left side, and the expiratory muscles are on the right side. B, The diaphragm muscle in relation to the rib cage. (From Garrity ER, Sharp JT. In Pulmonary and Critical Care Update, vol 2. Park Ridge, IL, American College of Chest Physicians, 1986.)

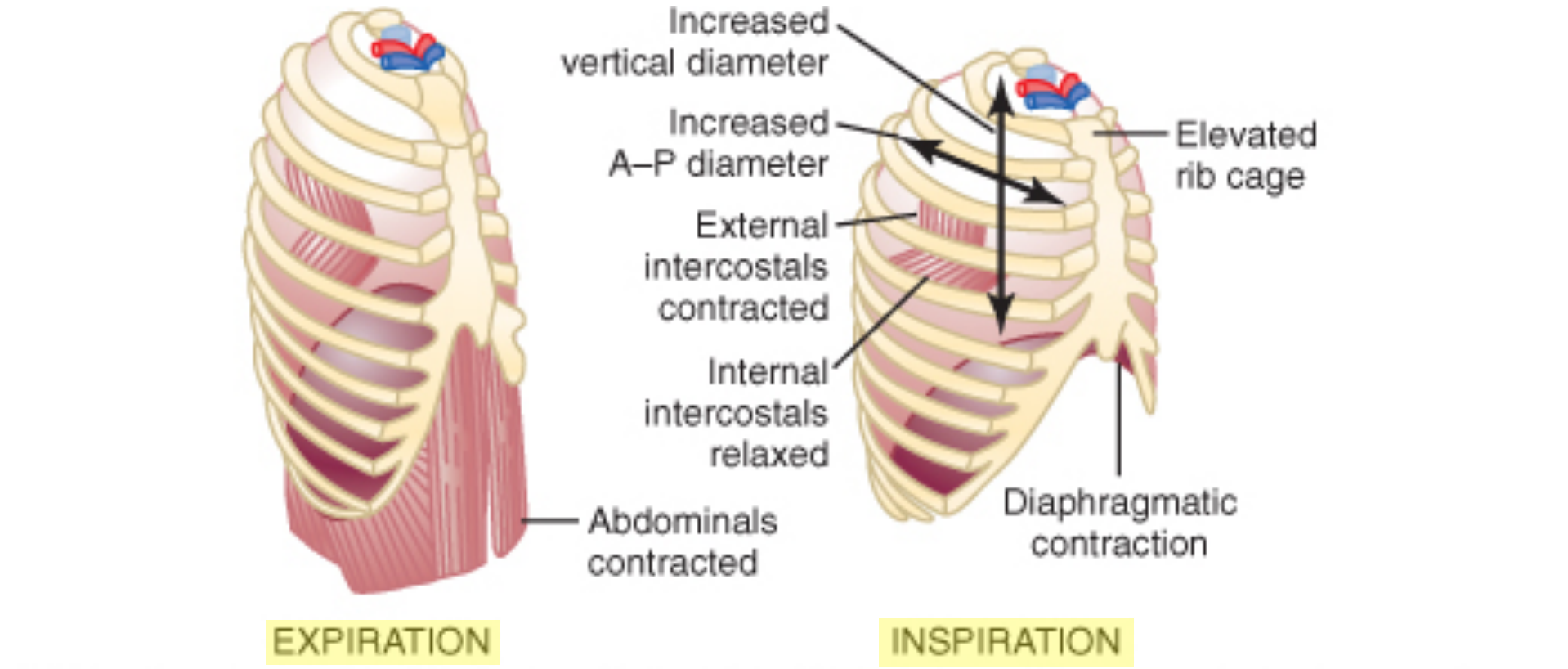

Figure 37-1 Contraction and expansion of the thoracic cage during expiration and inspiration, demonstrating diaphragmatic contraction, function of the intercostal muscles, and elevation and depression of the rib cage.

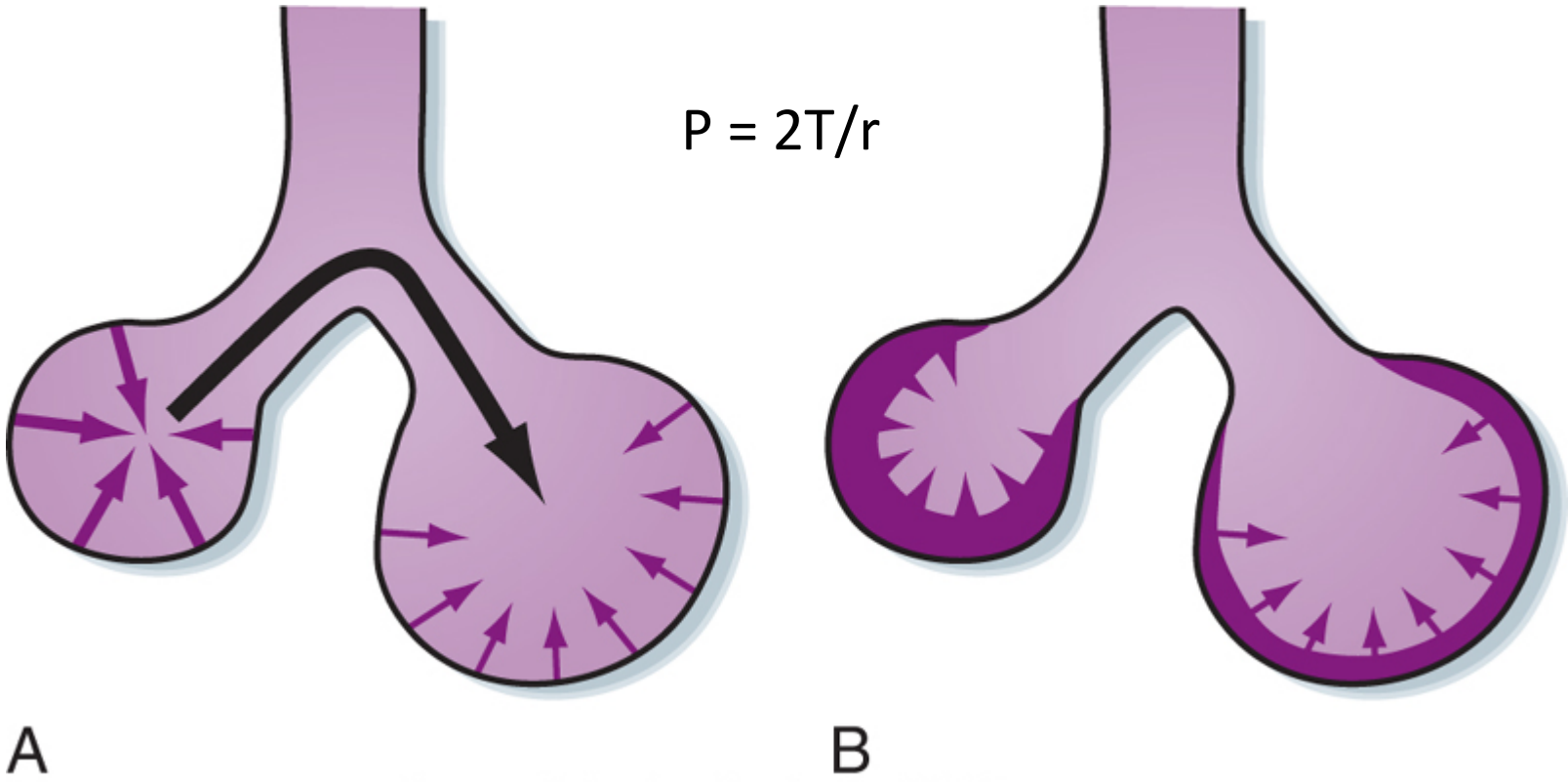

Figure 20-13 Surface forces in a sphere attempt to reduce the area of the surface and generate pressure within the sphere. By Laplace's law, the pressure generated is inversely proportional to the radius of the sphere. A, Surface forces in the smaller sphere generate higher pressure (heavier arrows) than those in the larger sphere (lighter arrows). As a result, air moves from the small sphere (higher pressure) to the larger sphere (lower pressure; black arrow). This causes the small sphere to collapse and the large sphere to become overdistended. B, Surfactant (shaded layer) lowers surface tension and lowers it more in the smaller sphere than in the larger sphere. The net result is that the pressure in the small and larger spheres is similar and the spheres are stabilized. (See page 427)

END

Video 3, Module 11