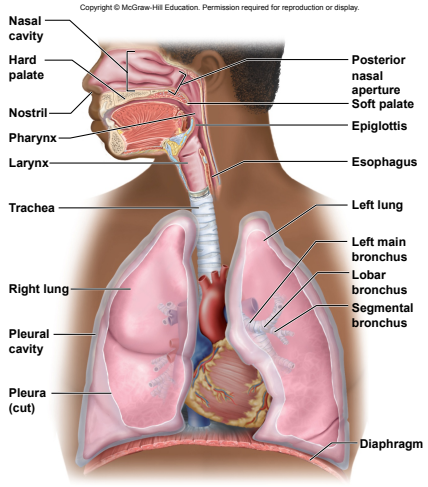
Fig. 22.1



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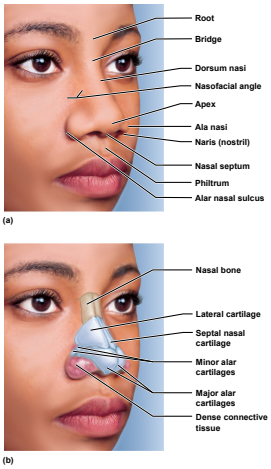

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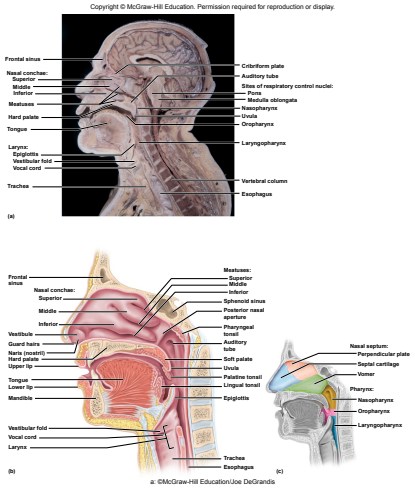

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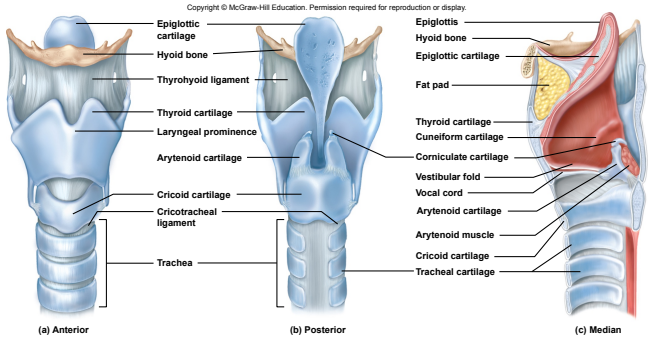

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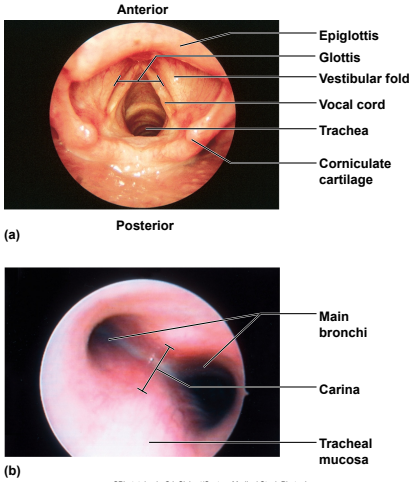

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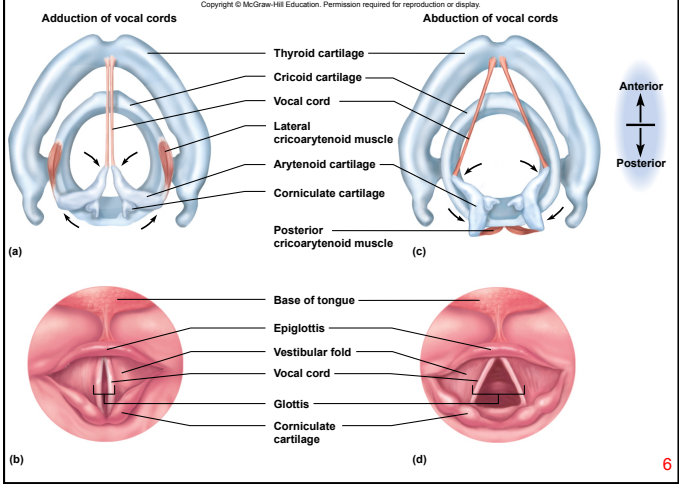
Fig. 22.6



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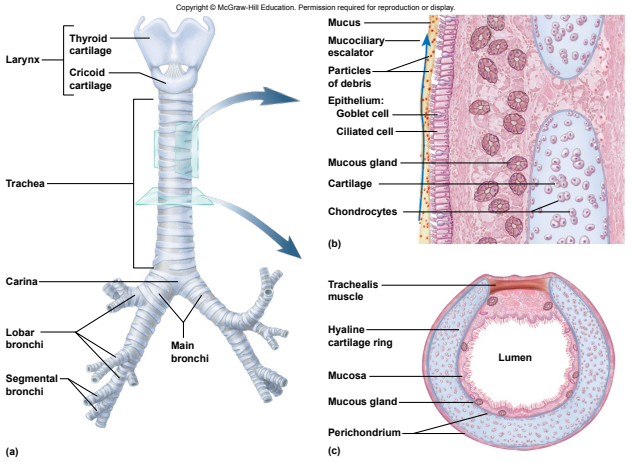

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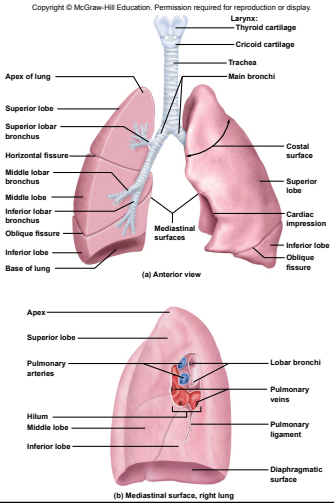

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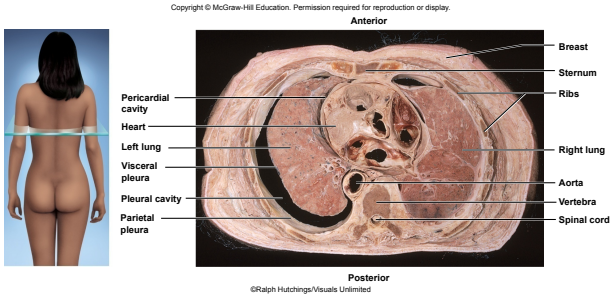

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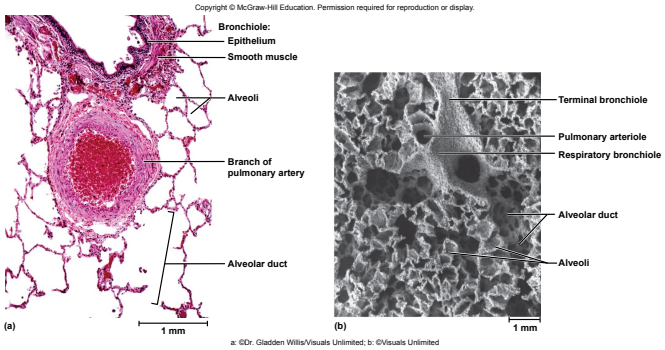

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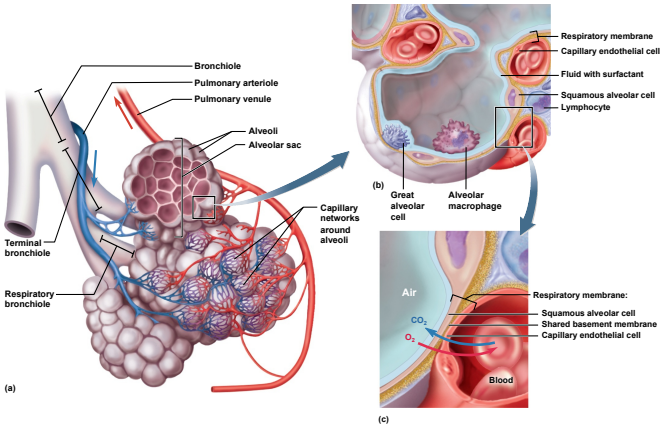

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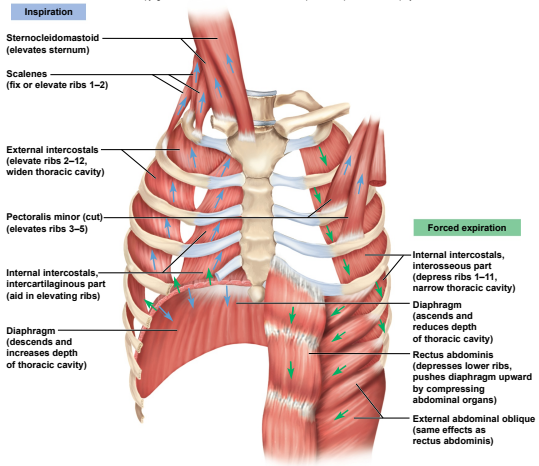

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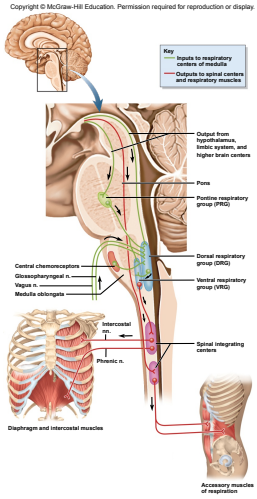

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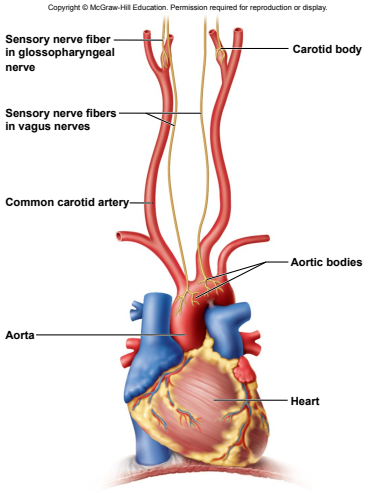


Table 22.1

TABLE 22.1	The Gas Laws of Respiratory Physiology
Boyle's law[14]	The pressure of a given quantity of gas is inversely proportional to its volume (assuming a constant temperature).
Charles's law[15]	The volume of a given quantity of gas is directly proportional to its absolute temperature (assuming a constant pressure).
Dalton's law[16]	The total pressure of a gas mixture is equal to the sum of the partial pressures of its individual gases.
Henry's law[17]	At the air–water interface, the amount of gas that dissolves in water is determined by its solubility in water and its partial pressure in the air (assuming a constant temperature).

[14] Robert Boyle (1627–91), Anglo–Irish physicist and chemist
[15] Jacques A. C. Charles (1746–1823), French physicist
[16] John Dalton (1766–1844), English physicist and chemist
[17] William Henry (1774–1836), English chemist

Fig. 22.16

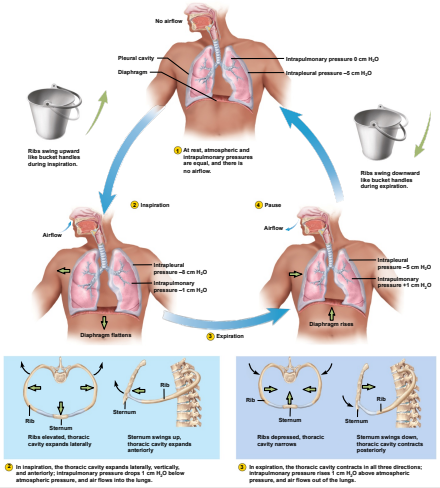
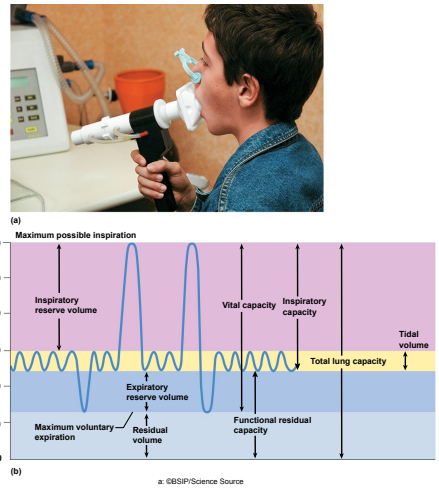


Fig. 22.17

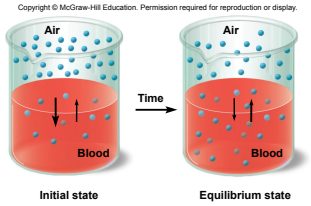


a: ©BSIP/Science Source

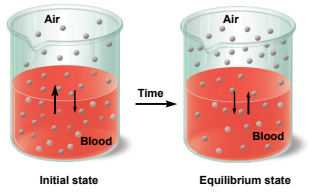
Table 22.2

TABLE 22.2	Respiratory Volumes and Capacities for an Average Young Adult Male	
Measurement	**Typical Value**	**Definition**
Respiratory volumes		
Tidal volume (TV)	500 mL	Amount of air inhaled and exhaled in one cycle during quiet breathing
Inspiratory reserve volume (IRV)	3,000 mL	Amount of air in excess of tidal volume that can be inhaled with maximum effort
Expiratory reserve volume (ERV)	1,200 mL	Amount of air in excess of tidal volume that can be exhaled with maximum effort
Residual volume (RV)	1,300 mL	Amount of air remaining in the lungs after maximum expiration; the amount that can never voluntarily be exhaled
Respiratory capacities		
Vital capacity (VC)	4,700 mL	The amount of air that can be inhaled and then exhaled with maximum effort; the deepest possible breath (VC = ERV + TV + IRV)
Inspiratory capacity (IC)	3,500 mL	Maximum amount of air that can be inhaled after a normal tidal expiration (IC = TV + IRV)
Functional residual capacity (FRC)	2,500 mL	Amount of air remaining in the lungs after a normal tidal expiration (FRC = RV + ERV)
Total lung capacity (TLC)	6,000 mL	Maximum amount of air the lungs can contain (TLC = RV + VC)

Fig. 22.18



(a) Oxygen



(b) Carbon dioxide

Fig. 22.19

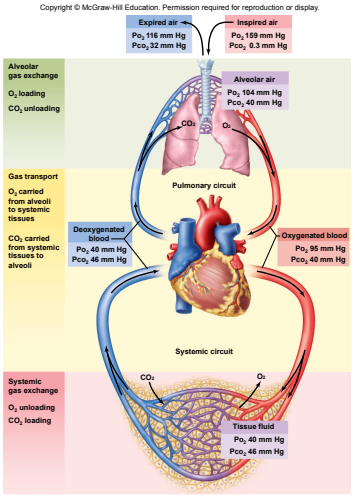


Fig. 22.20

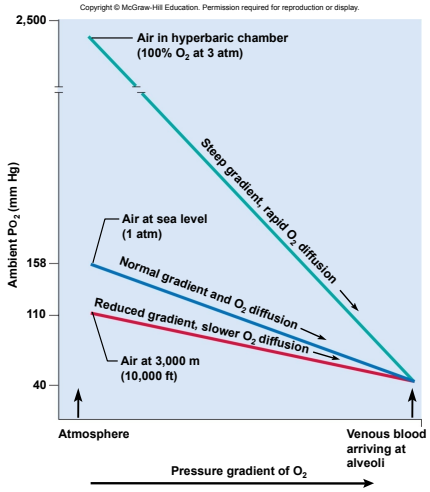
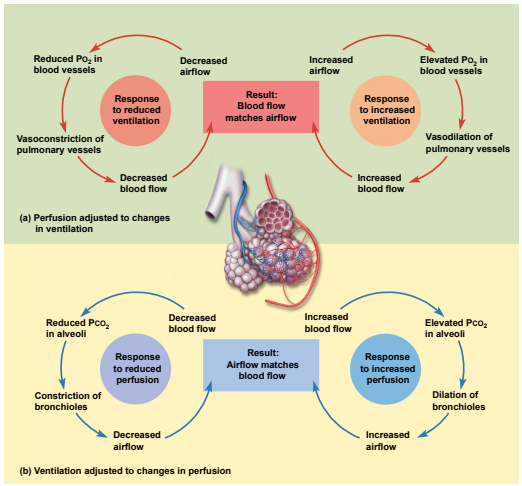


Fig. 22.22



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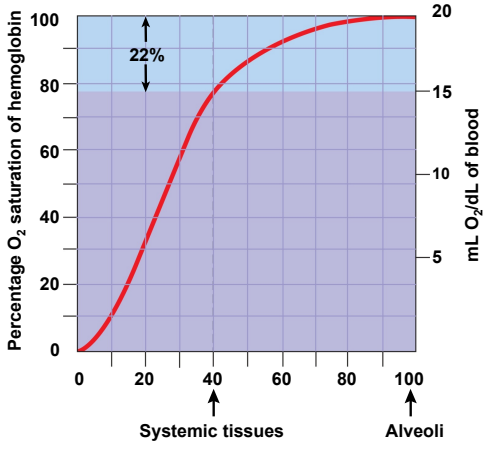


Fig. 22.24

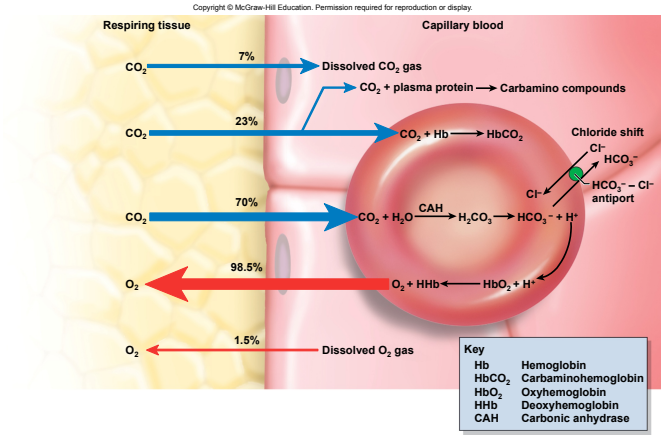


Fig. 22.25

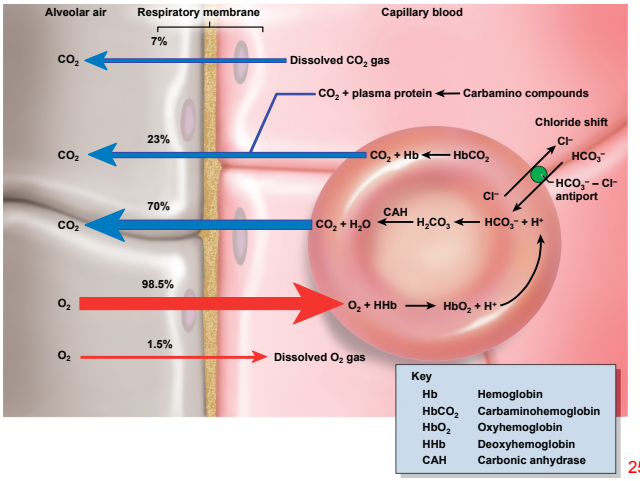
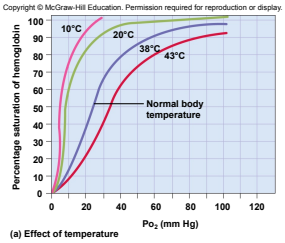
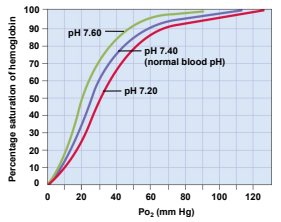


Fig. 22.26



(a) Effect of temperature



(b) Effect of pH