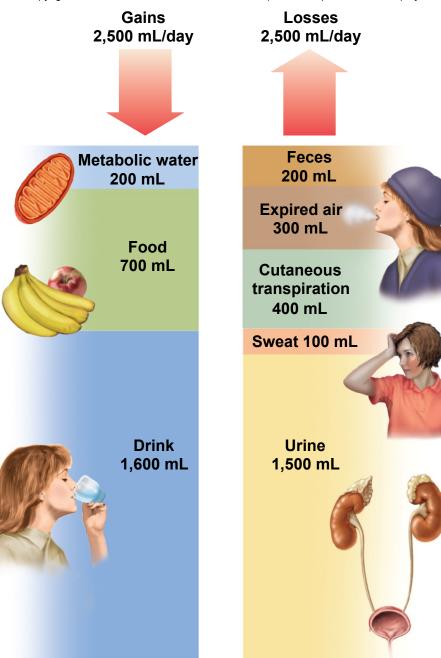
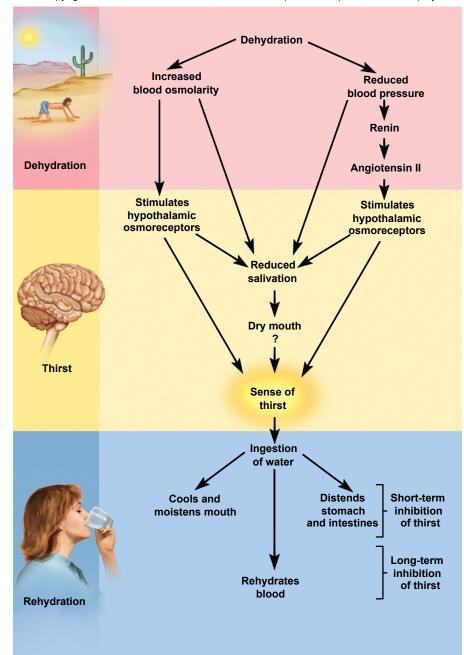
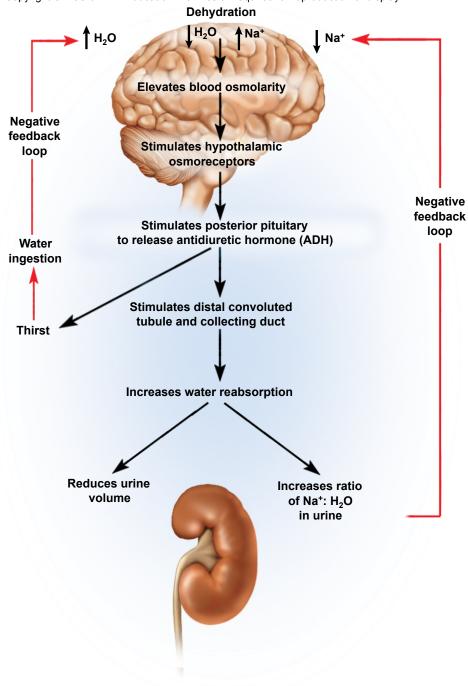
Intracellular fluid Digestive tract - Tissue fluid — Bloodstream Bloodstream Lymph

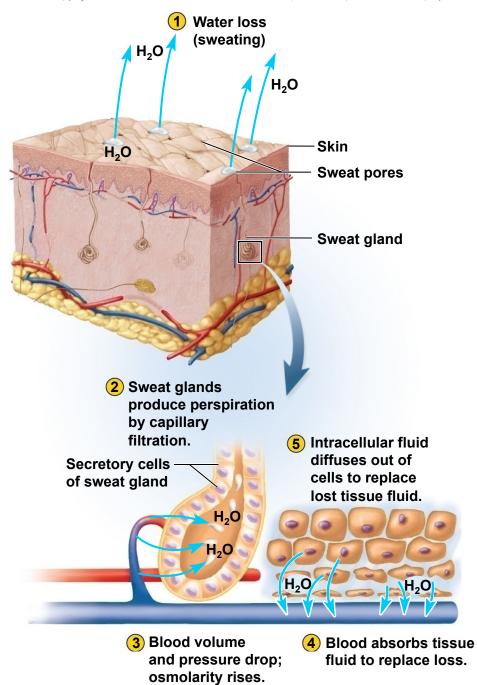


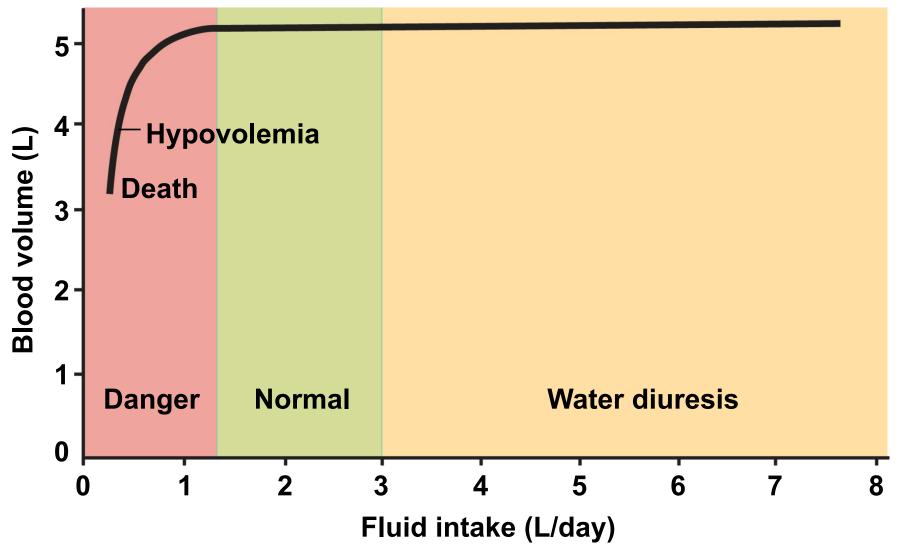
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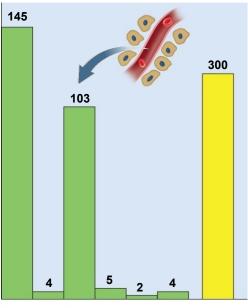


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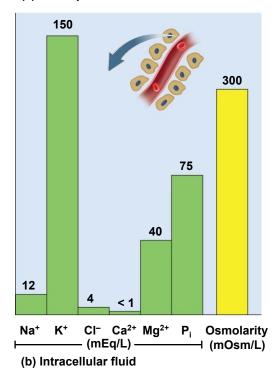


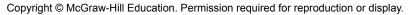


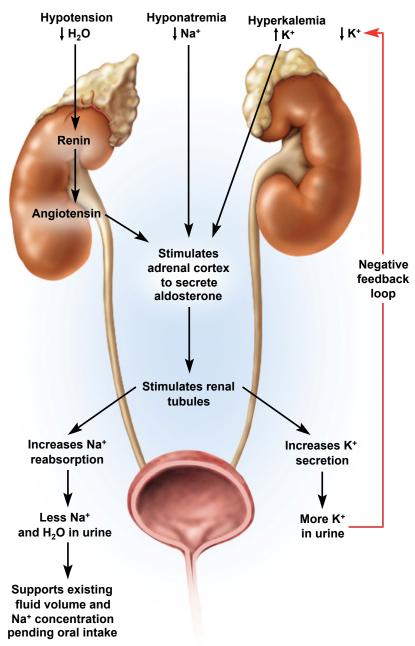


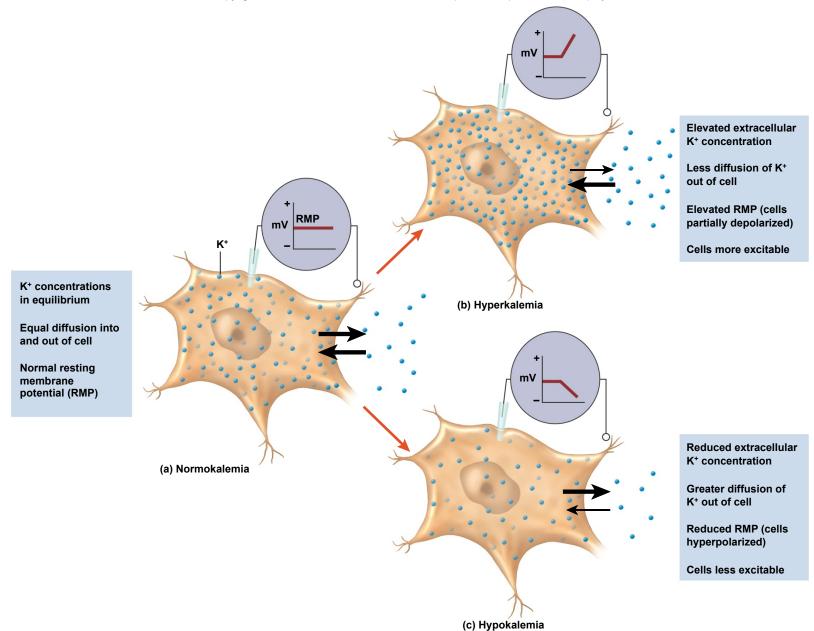


(a) Blood plasma



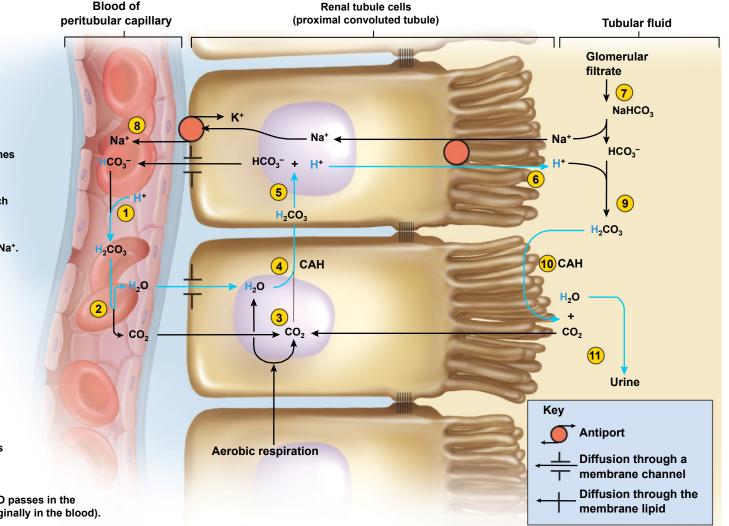




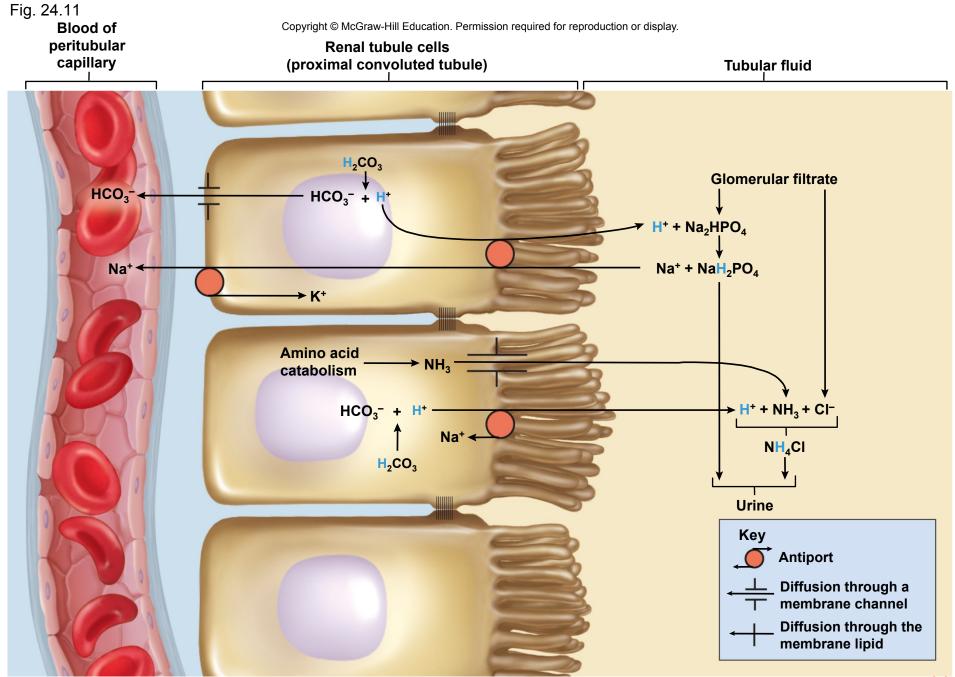


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Fig. 24.10



- H⁺ in blood reacts with HCO₃⁻ to form H₂CO₃.
- 2 H₂CO₃ decomposes into H₂O and CO₂, which enter the tubule cell.
- 3 Tubule cells acquire CO₂ from blood, tubular fluid, and their own aerobic respiration.
- 4 Carbonic anhydrase (CAH) combines H_2O and CO_2 to re-form H_2CO_3 .
- 5 H₂CO₃ ionizes to form HCO₃⁻ (which returns to the blood) and H⁺.
- **6** Na⁺–H⁺ antiport exchanges H⁺ for Na⁺.
- 7 NaHCO₃ from glomerular filtrate decomposes into Na⁺ and HCO₃⁻. Na⁺ is pumped into tubule cell.
- 8 Na⁺ is removed by Na⁺-K⁺ pump at the base of the cell.
- 9 HCO₃⁻ reacts with H⁺ from tubule cell to form H_2CO_3 .
- **10** CAH on brush border decomposes H_2CO_3 to H_2O and CO_2 again.
- CO₂ enters the tubular cell and H₂O passes in the urine (carrying the H⁺ that was originally in the blood).



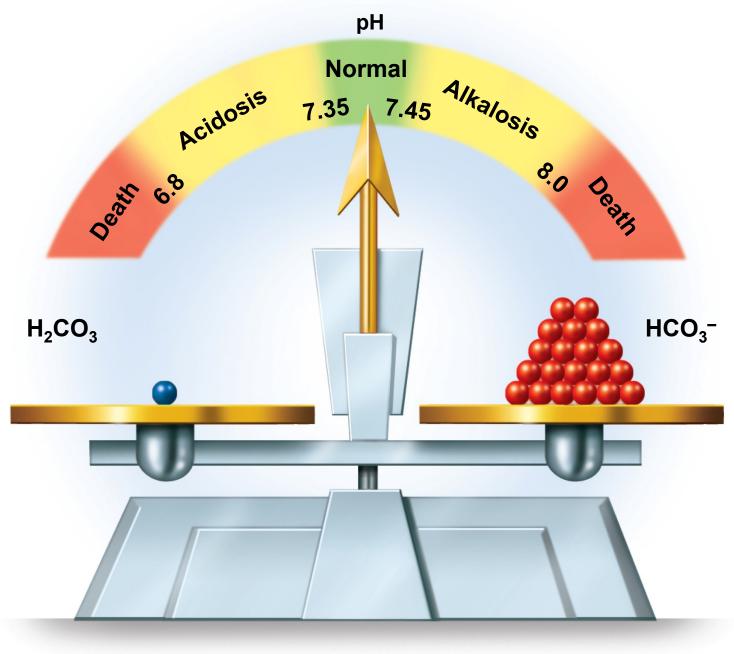


Fig. 24.13

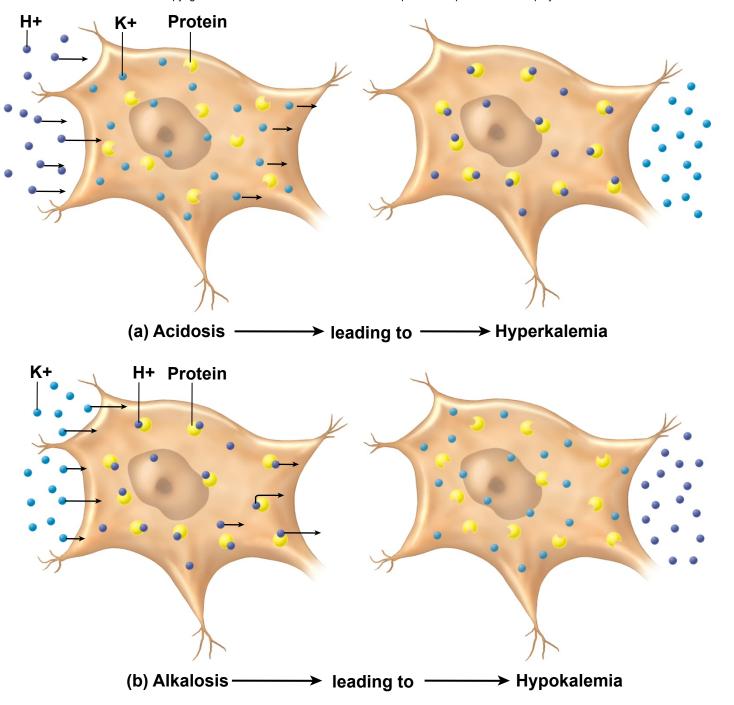


TABLE 24.2	Some Causes of Acidosis and Alkalosis	
	Acidosis	Alkalosis
Respiratory	Hypoventilation, apnea, or respiratory arrest; asthma; emphysema; cystic fibrosis; chronic bronchitis; narcotic overdose	Hyperventilation due to pain or emotions such as anxiety; oxygen deficiency (as at high elevation)
Metabolic	Excess production of organic acids as in diabetes mellitus and starvation; long-term anaerobic fermentation; hyperkalemia; chronic diarrhea; excessive alcohol consumption; drugs such as aspirin and laxatives	Rare but can result from chronic vomiting; overuse of bicarbonates (antacids); aldosterone hypersecretion