Alterations in Fluid sand Electrolytes

COMPOSITION AND COMPARTMENTAL DISTRIBUTION OF BODY FLUIDS

ICF/ECF

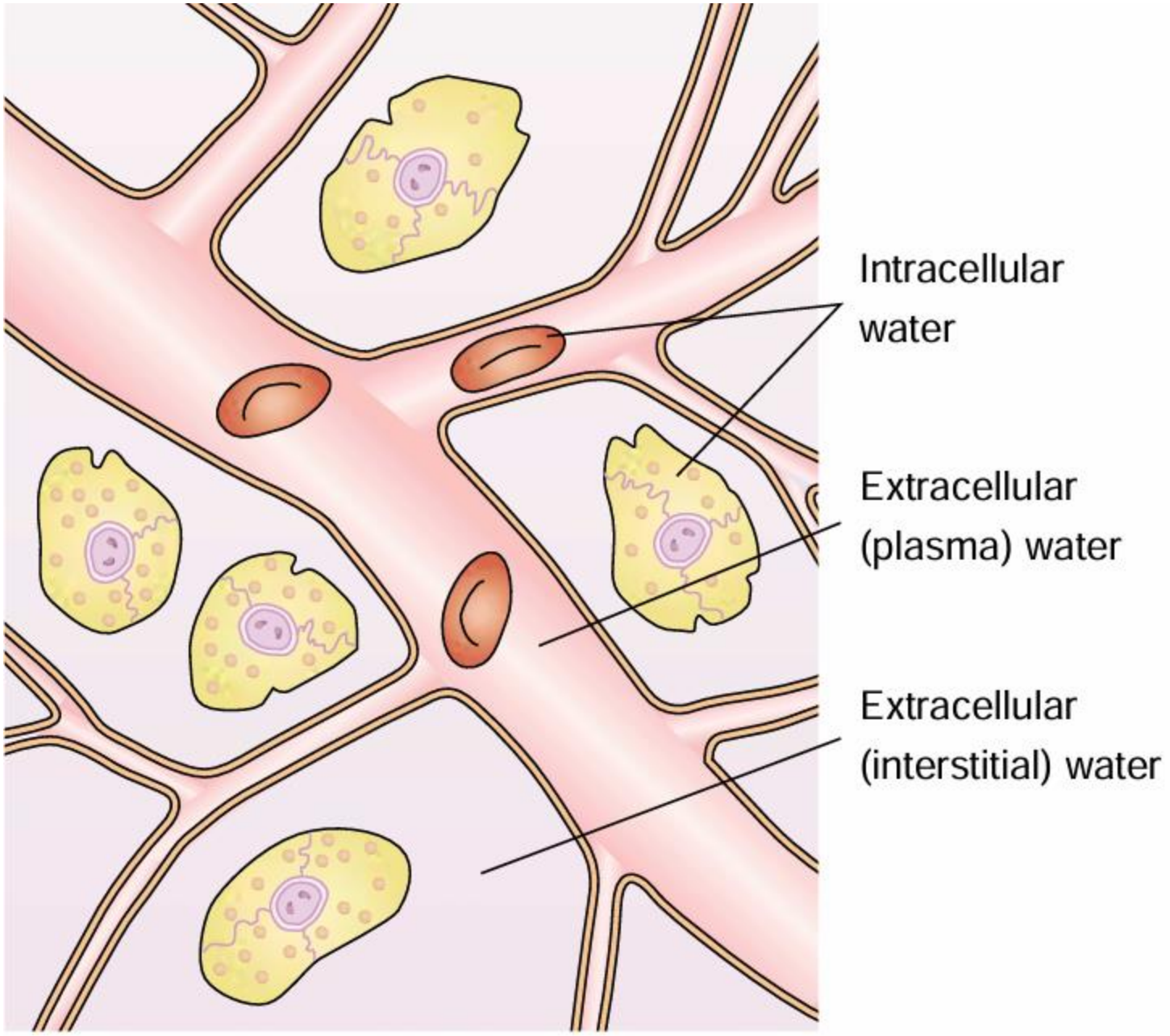
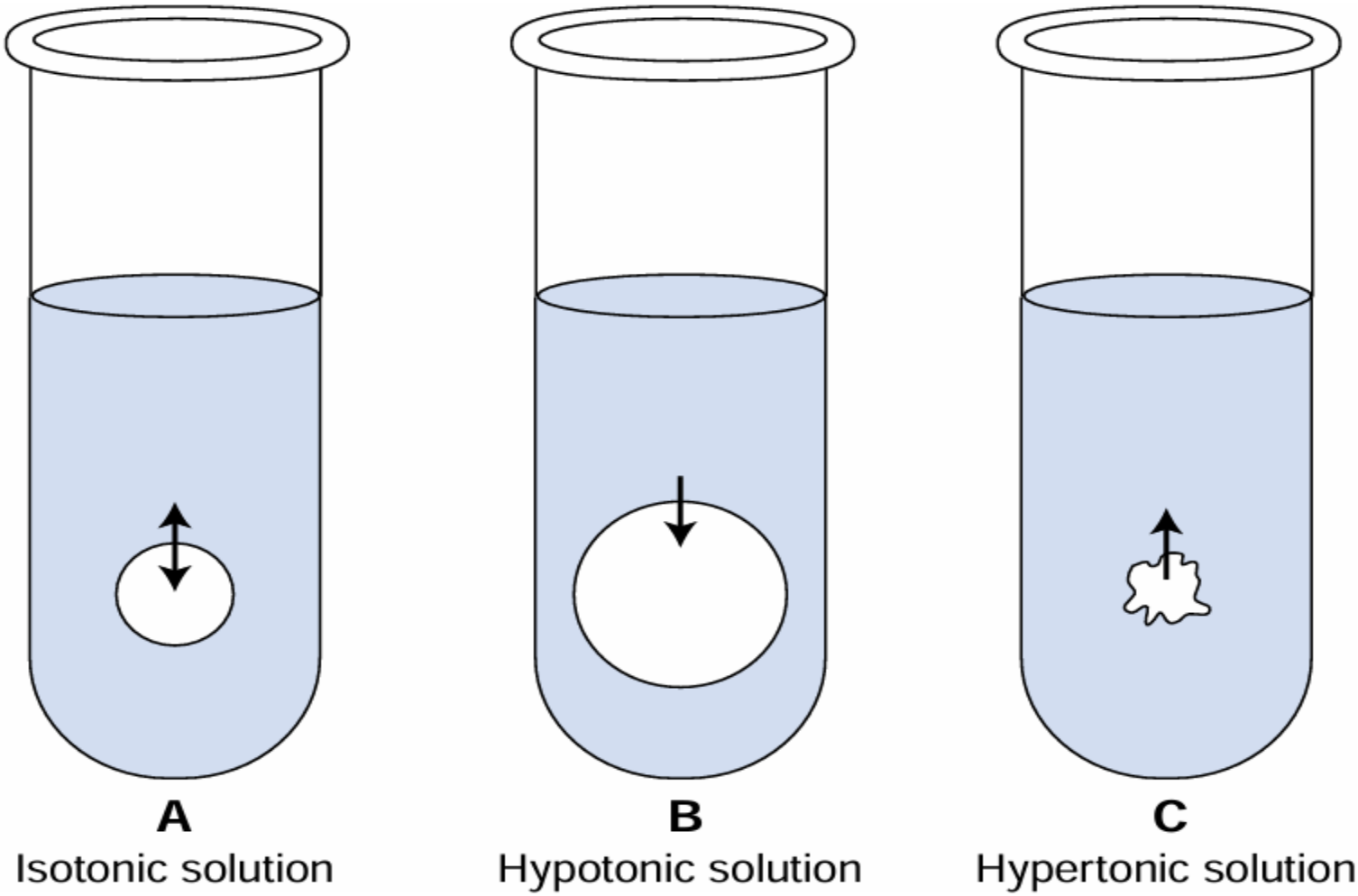

Intracellular
water
Extracellular
(plasma) water
Extracellular
(interstitial) water

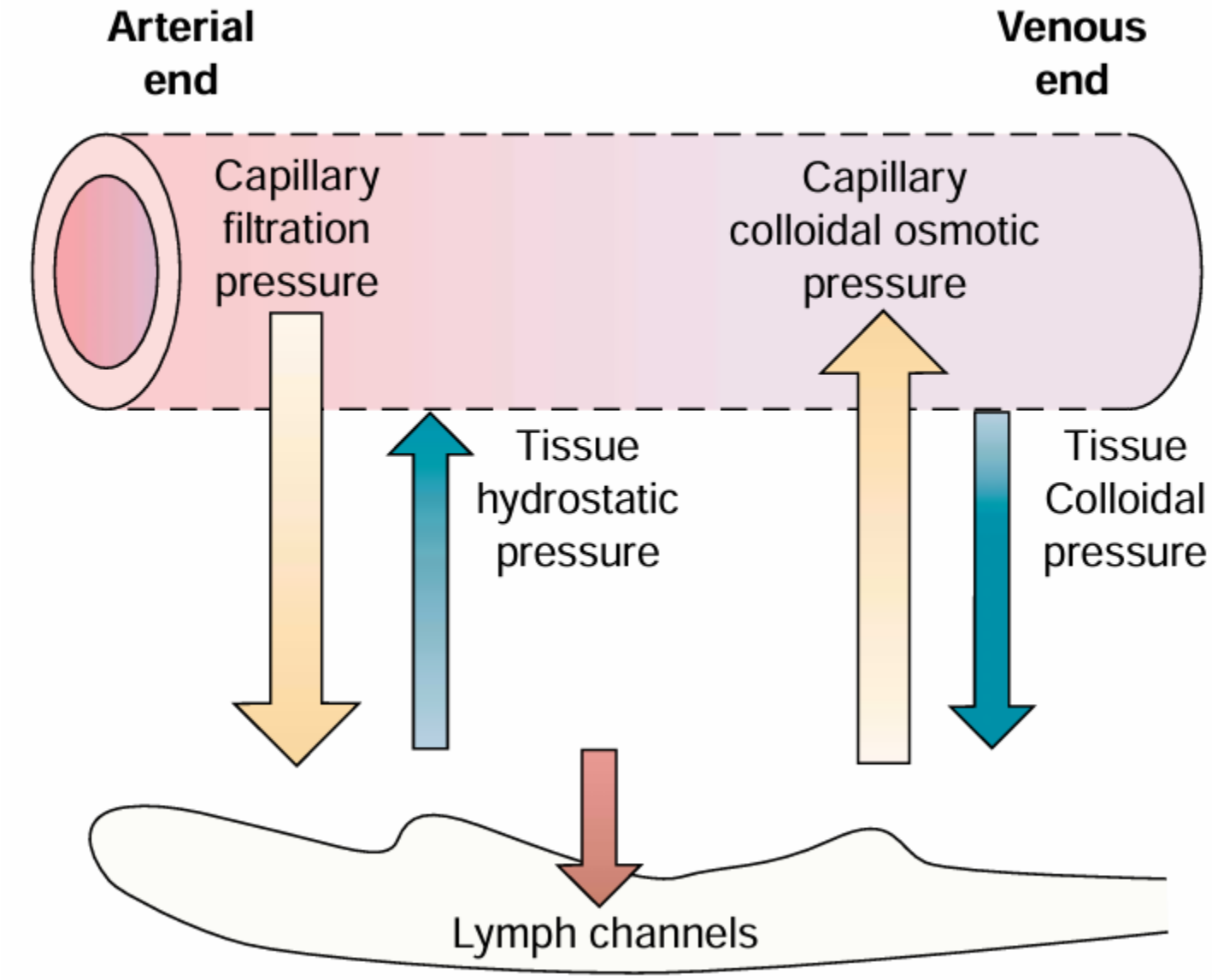
TABLE 6-1 Concentrations of Extracellular and Intracellular Electrolytes in Adults

Electrolyte	Extracellular Concentration*	Intracellular Concentration*
Sodium	135–145 mEq/L	10–14 mEq/L
Potassium	3.5–5.0 mEq/L	140–150 mEq/L
Chloride	98–106 mEq/L	3–4 mEq/L
Bicarbonate	24–31 mEq/L	7–10 mEq/L
Calcium	8.5–10.5 mg/dL	<1 mEq/L
Phosphate/ phosphorus	2.5–4.5 mg/dL	4 mEq/kg†
Magnesium	1.8–3.0 mg/dL	40 mEq/kg†

Diffusion and Osmosis

Tonicity


A
Isotonic solution
B
Hypotonic solution
C
Hypertonic solution


Arterial end
Venous end
Capillary filtration pressure
Capillary colloidal osmotic pressure
Tissue hydrostatic pressure
Tissue Colloidal pressure
Lymph channels

Edema

Generalised

Localised

Edema: causes

Increased Capillary Pressure

1. **Increased vascular volume:**

- Heart failure
- Kidney disease
- Premenstrual sodium retention
- Pregnancy
- Environmental (heat, stress)

2. Venous obstruction

- Liver disease with portal vein obstruction
- Acute pulmonary edema
- Venous thrombosis (thrombophlebitis)

3. Decreased arteriolar resistance

- Calcium channel–blocking drug responses

Decreased Colloidal Osmotic Pressure

1. **Increased loss of plasma proteins**

- Protein-losing kidney diseases
- Extensive burns

Decreased Colloidal Osmotic Pressure

2. Decreased production of plasma proteins

- Liver disease
- Starvation, malnutrition

Increased Capillary Permeability

- Inflammation
- Allergic reactions (e.g., hives, angioneurotic edema)
- Malignancy (e.g., ascites, pleural effusion)
- Tissue injury and burns

Obstruction of Lymphatic Flow

- Malignant obstruction of lymphatic structures
- Surgical removal of lymph nodes

Third-Space Accumulation

- Hydrothorax
- Ascites

Thank you