BLOOD

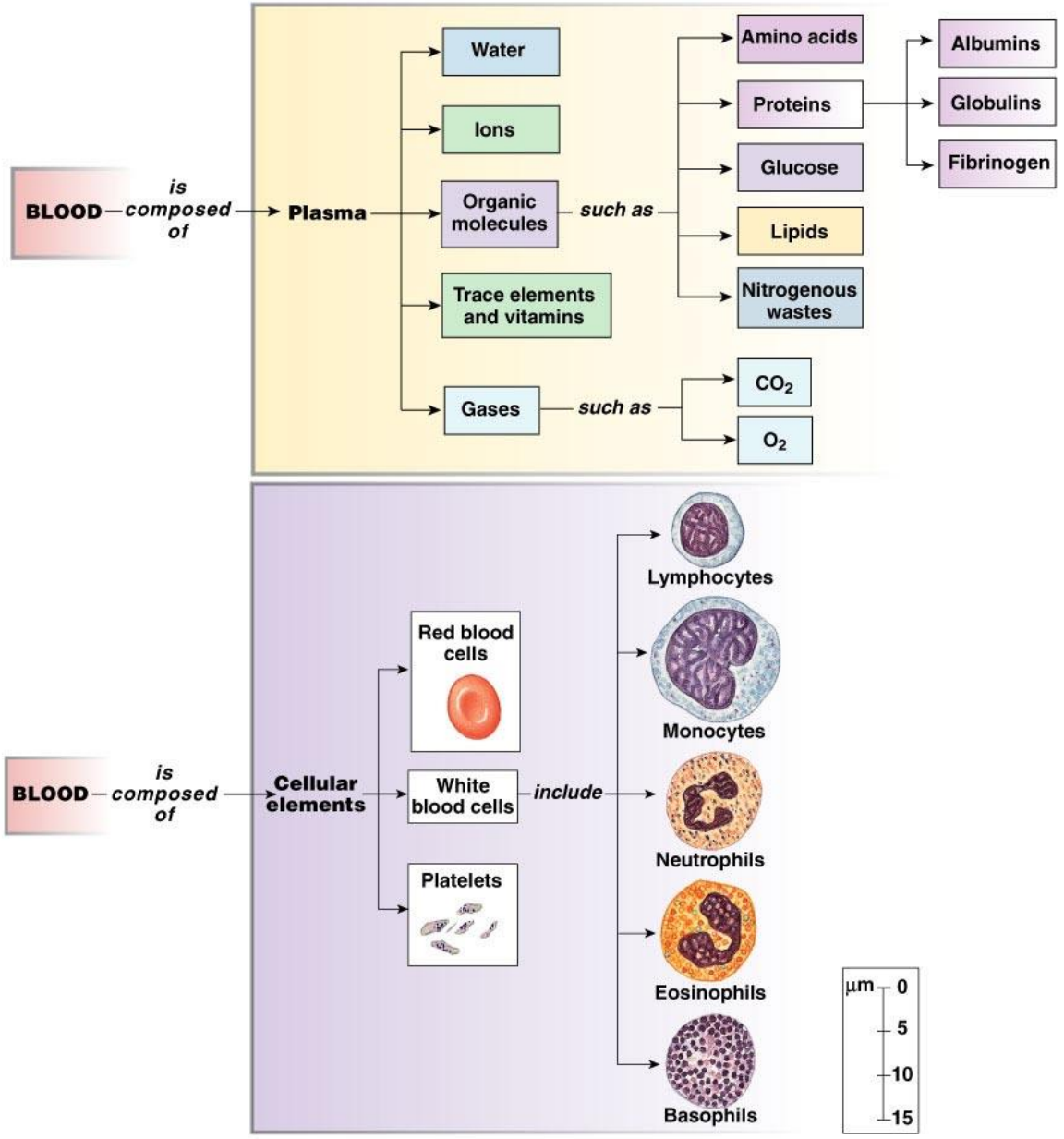


Figure 16-1 - Overhead 2 of 3

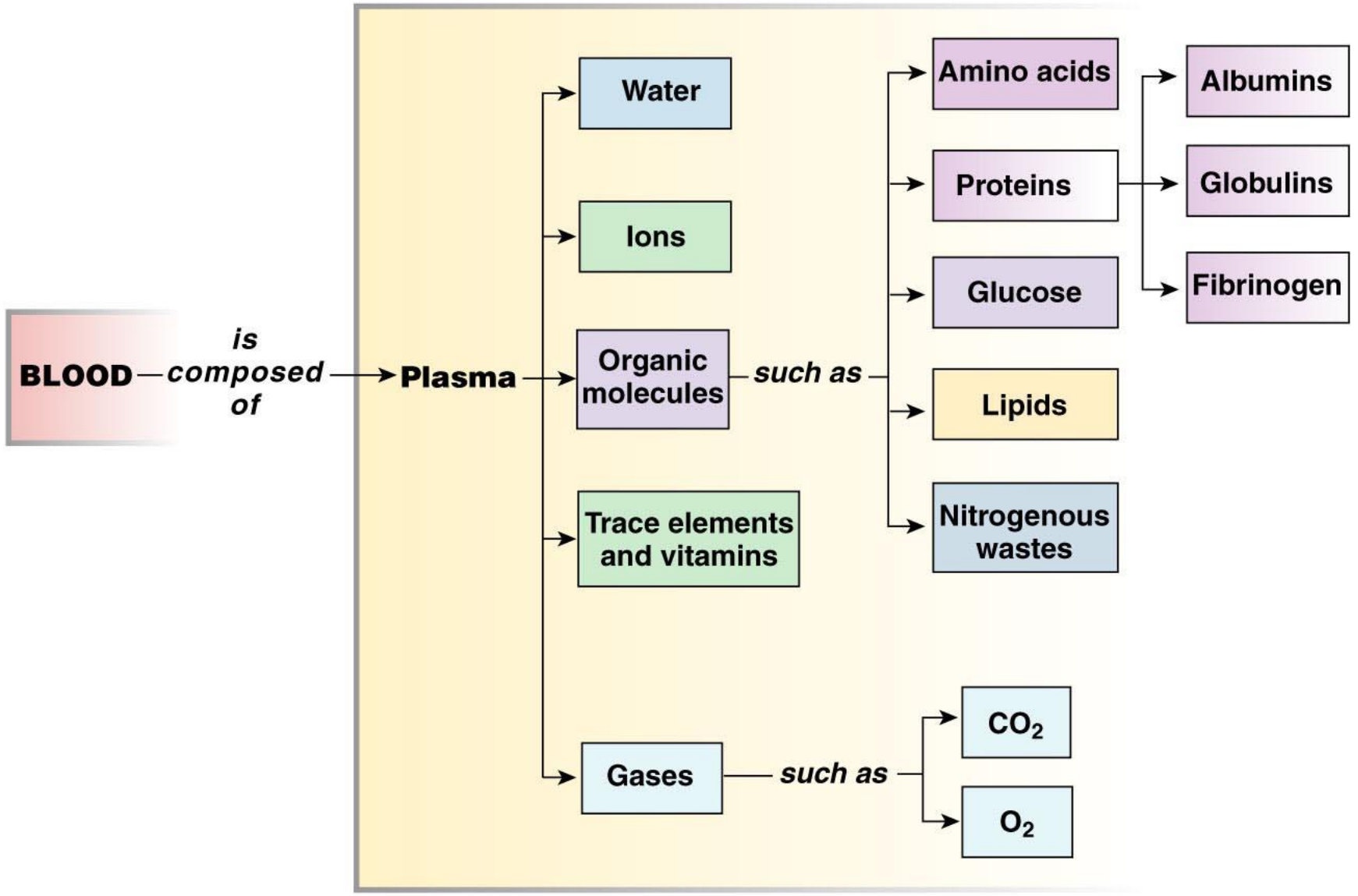


Figure 13.12c of 38

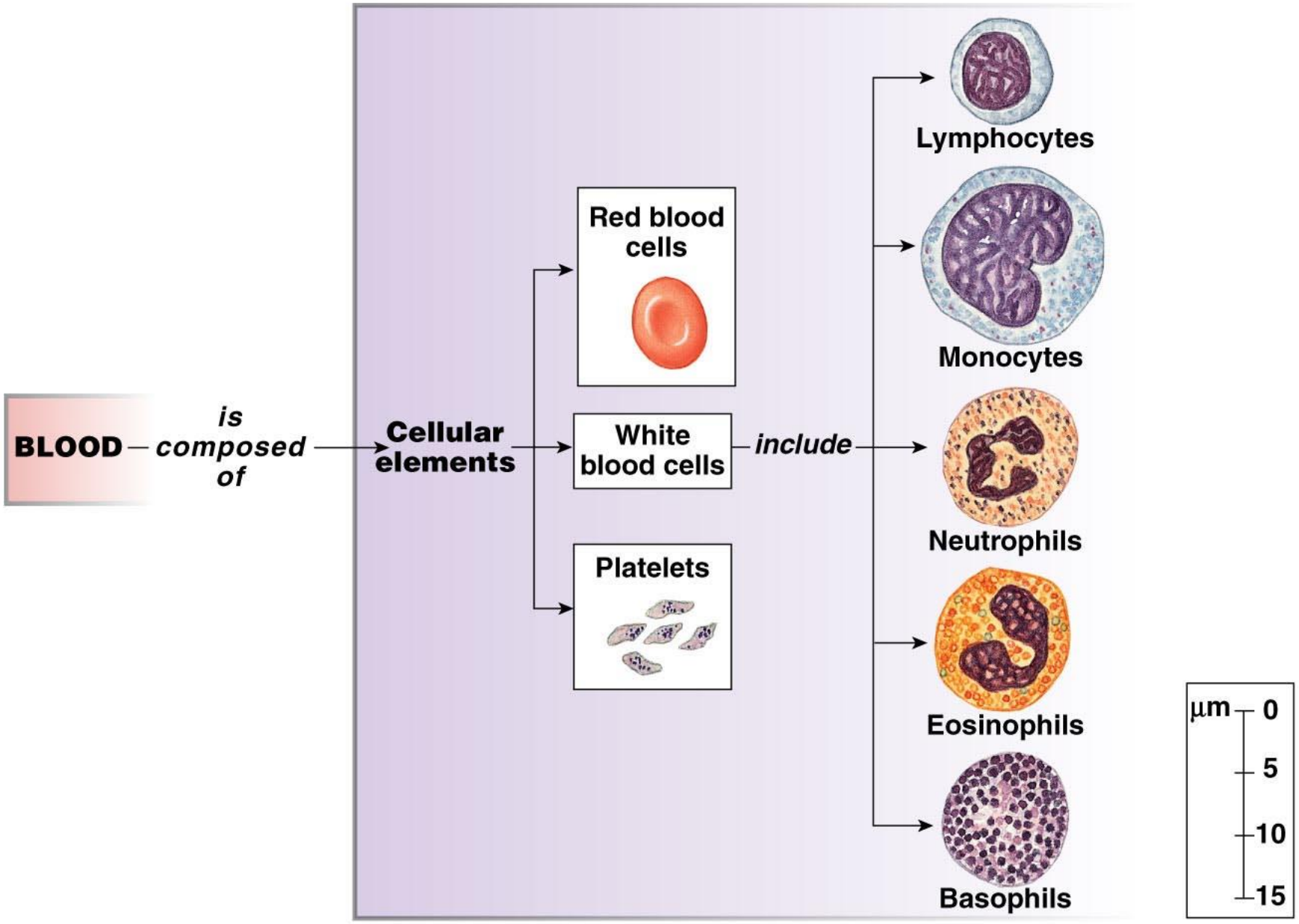
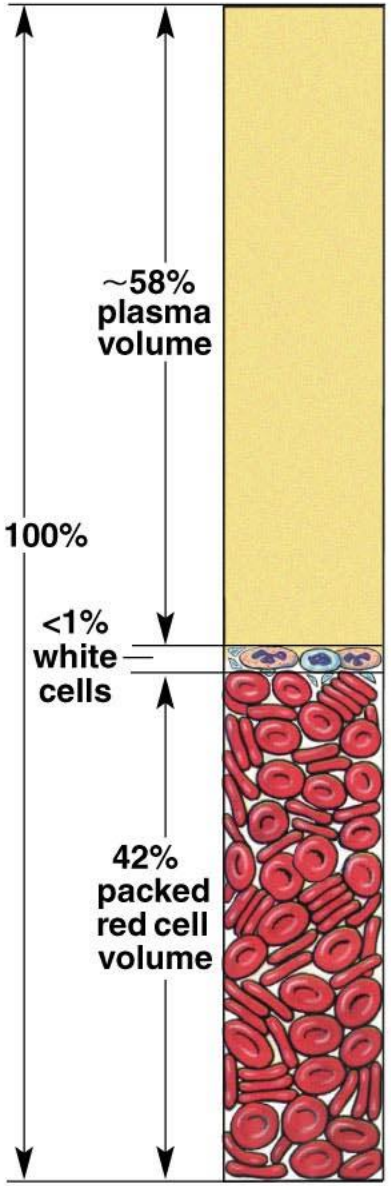


Figure 16-1 – Overview of Blood



	Males	Females
Hematocrit	40–54%	37–47%
Hemoglobin (g Hb/dL* blood)	14–17	12–16
Red cell count (cells/μL)	$4.5–6.5 \times 10^6$	$3.9–5.6 \times 10^6$
Total white cell count (cells/μL)	$4–11 \times 10^3$	$4–11 \times 10^3$
Differential white cell count		
Neutrophils	50-70%	50-70%
Eosinophils	1-4%	1-4%
Basophils	<1%	<1%
Lymphocytes	20–40%	20–40%
Monocytes	2–8%	2–8%
Platelets (per μL)	$200–500 \times 10^3$	$200–500 \times 10^3$
* 1 deciliter (dL) = 100 mL		

Figure 6-3

(a) SEM shows biconcave disk shape of RBCs.

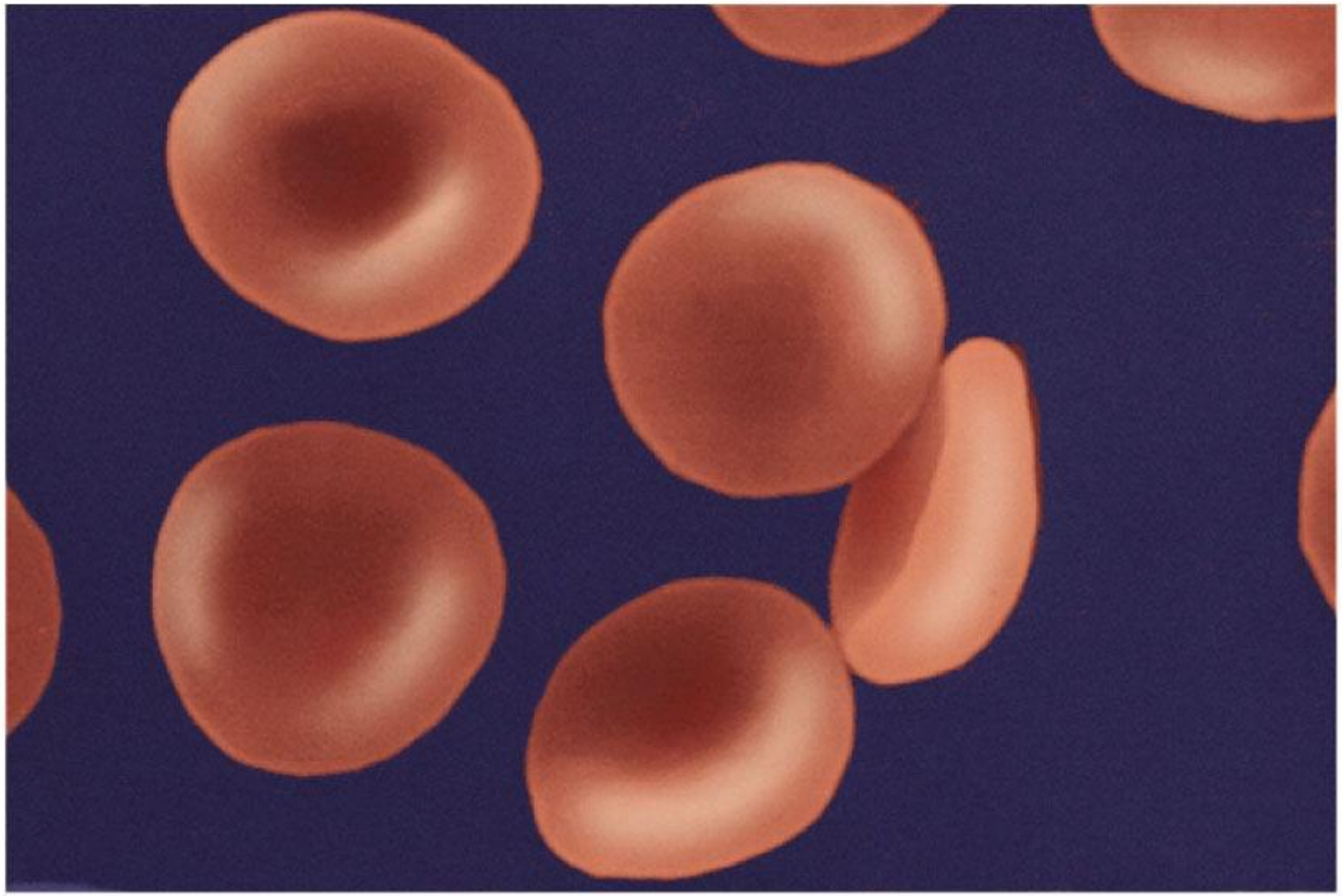
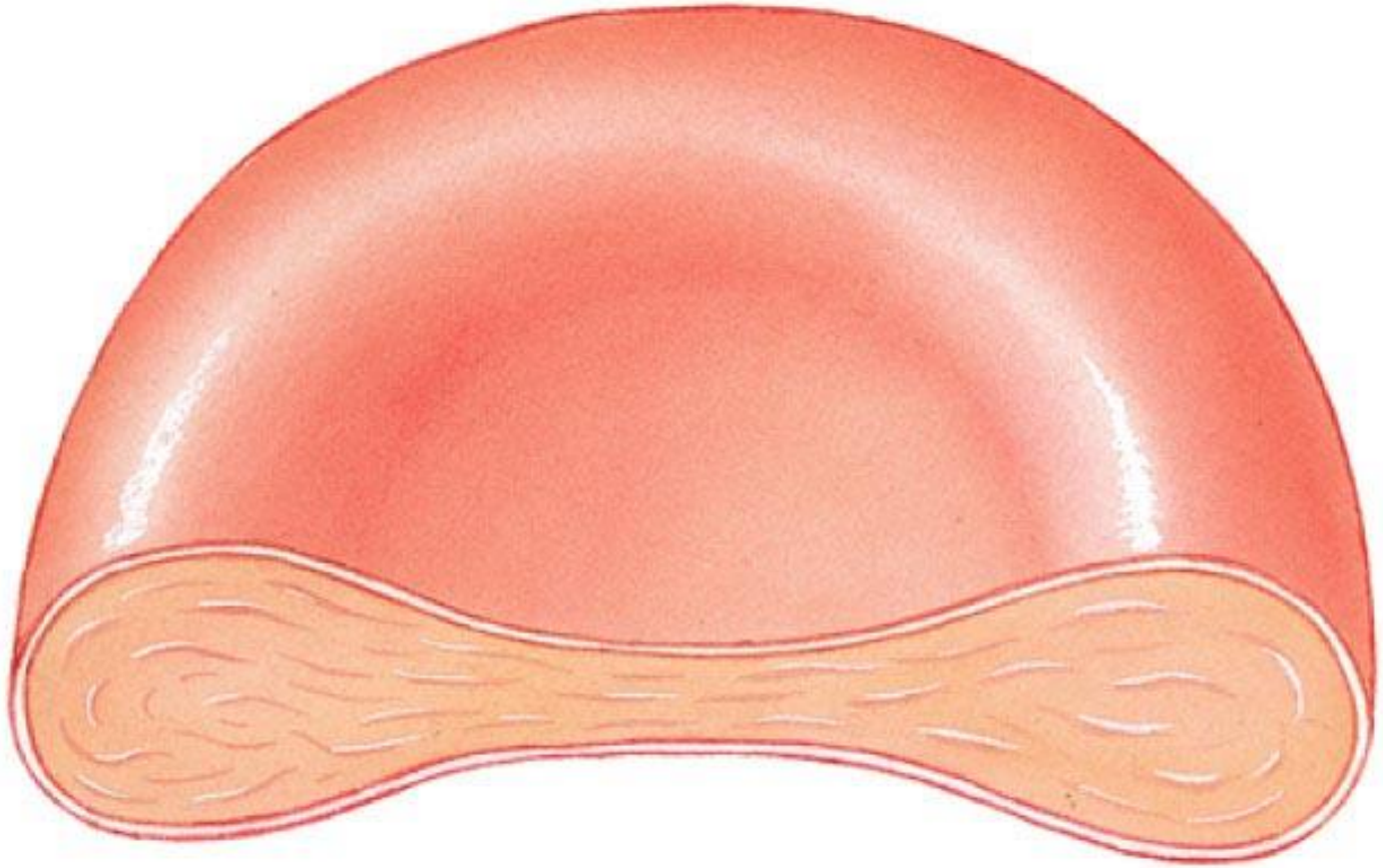


Figure 46.5a

(b) Cross-section of RBC



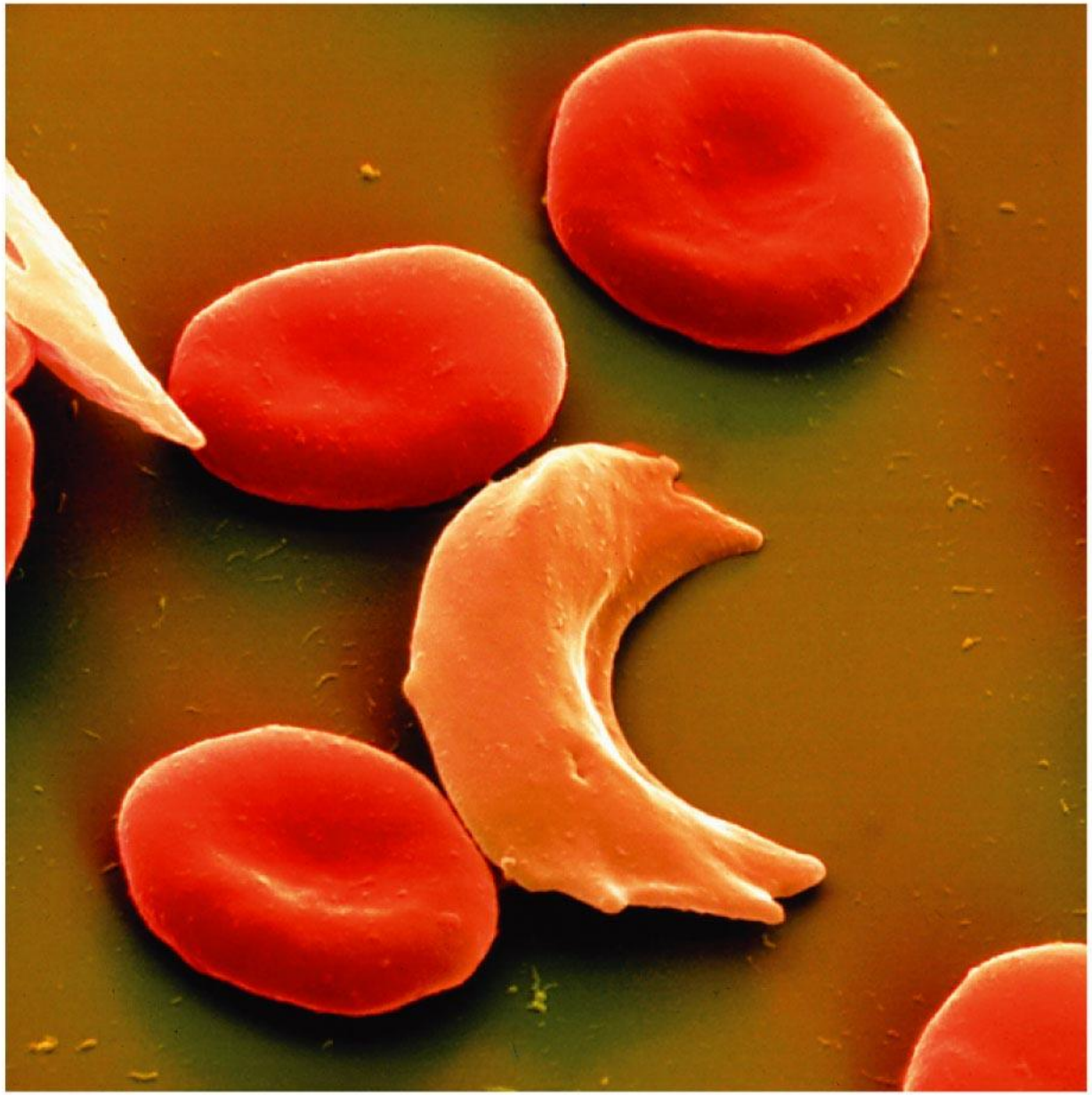


Figure 6-6

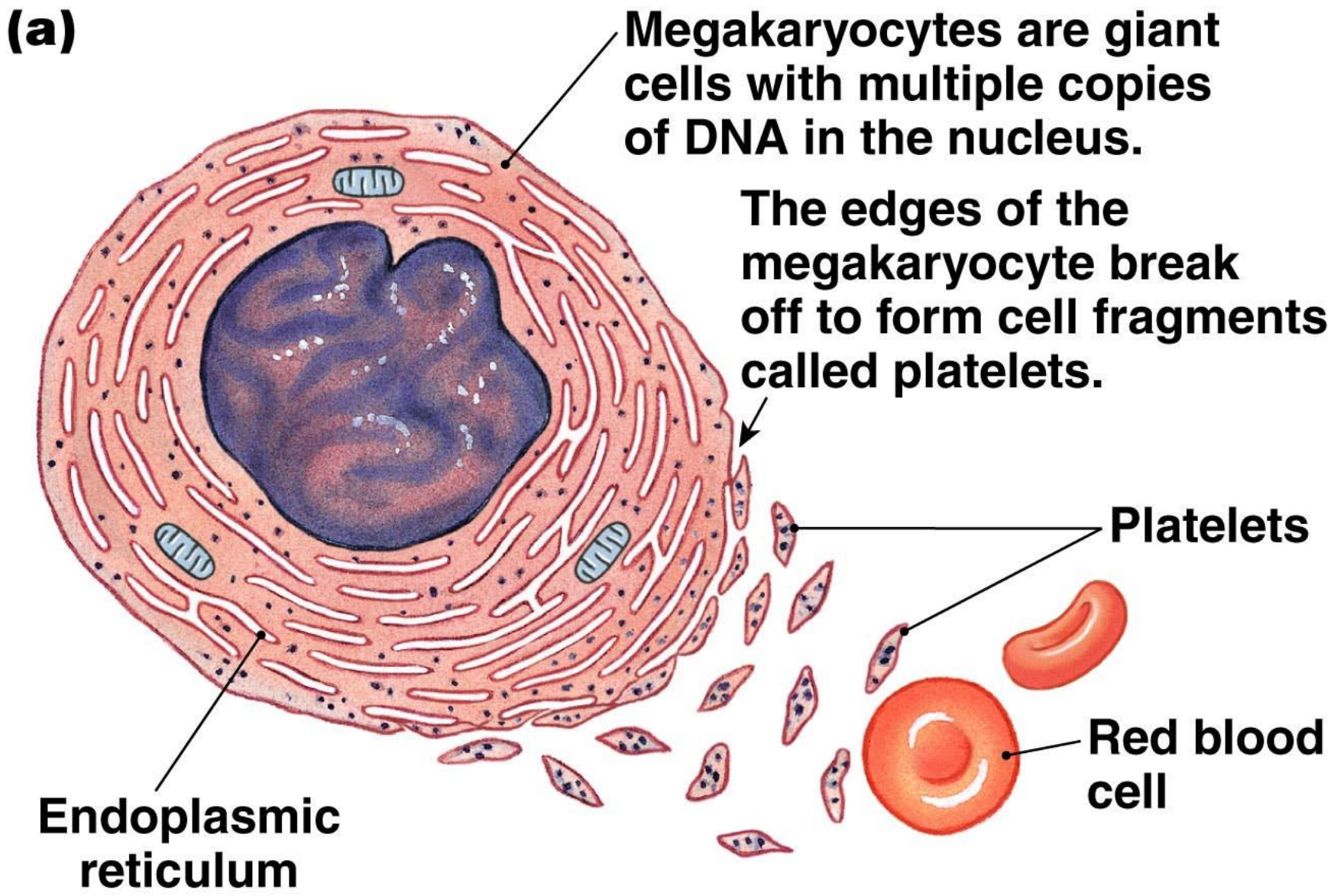


Figure 16.9a

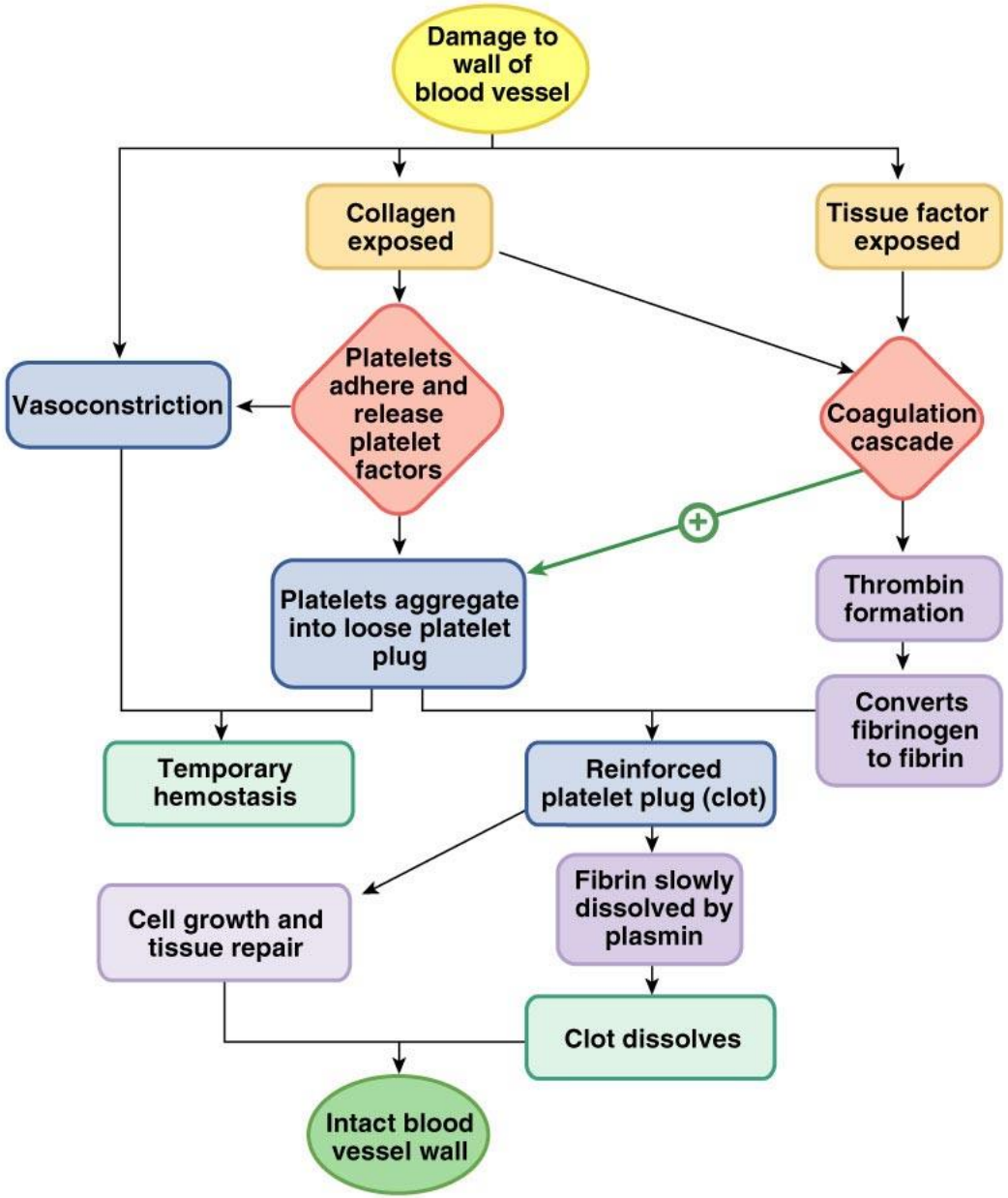


Figure 16.16

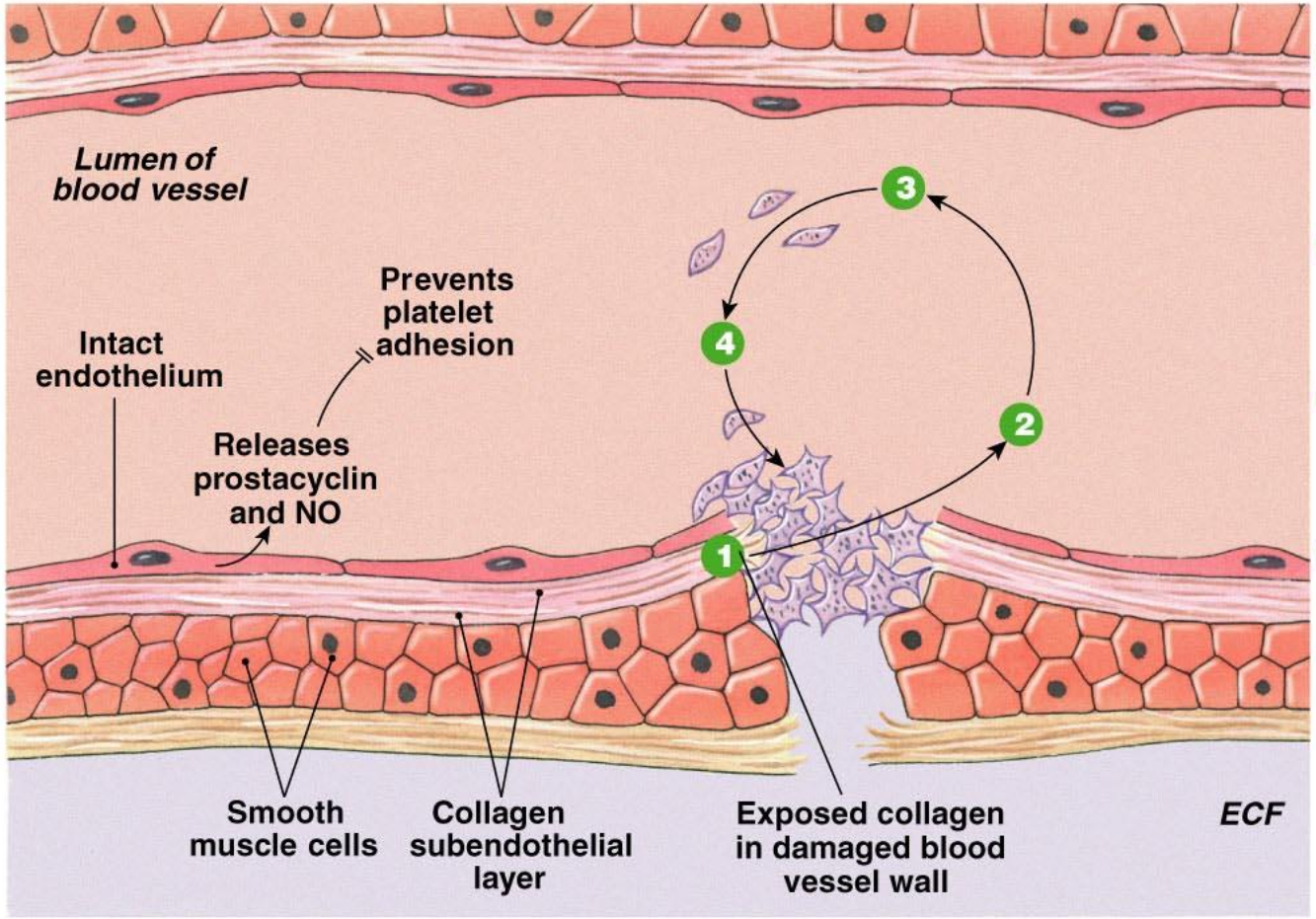


Figure 16.21 Overview

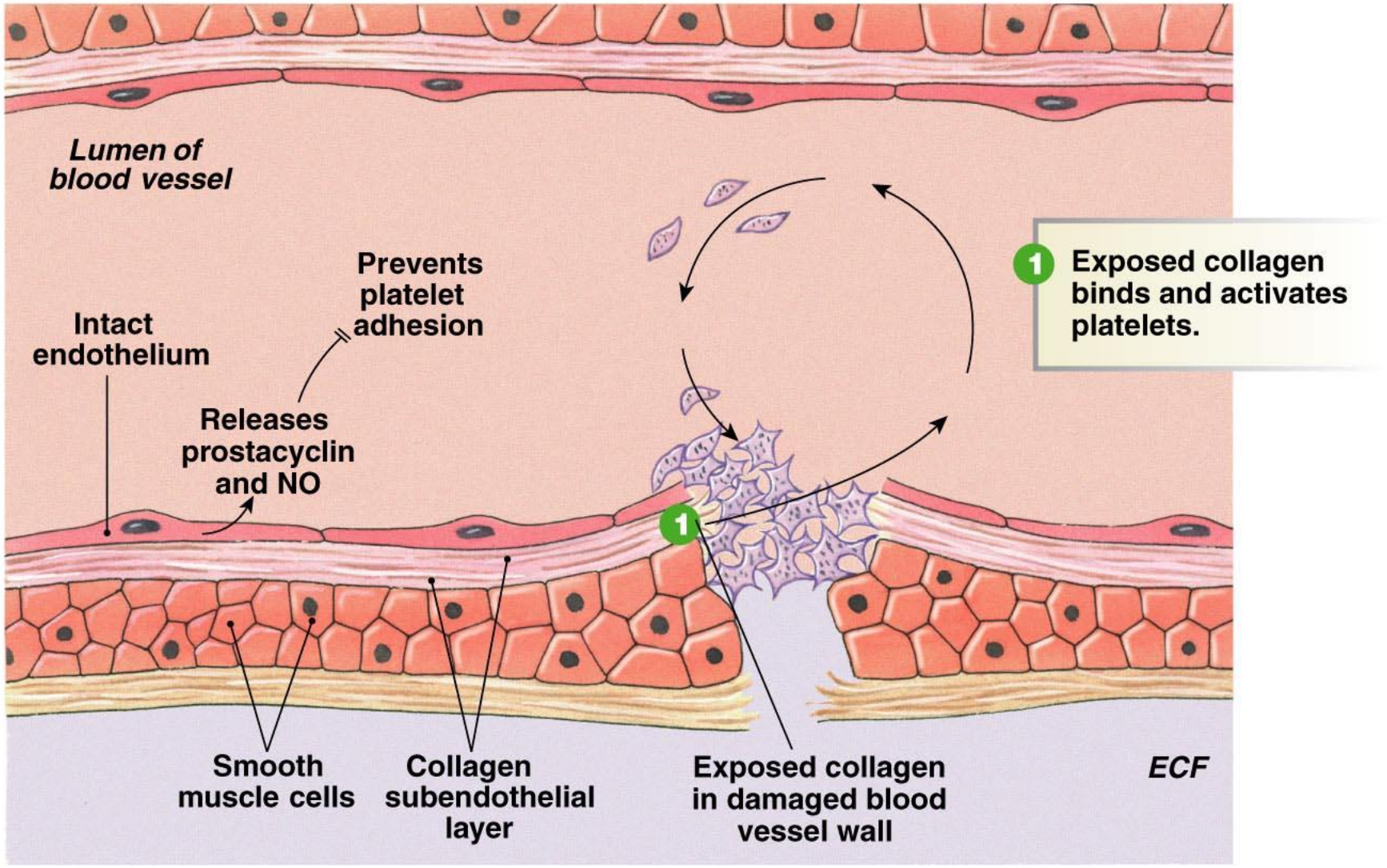


Figure 16.21, Step 1

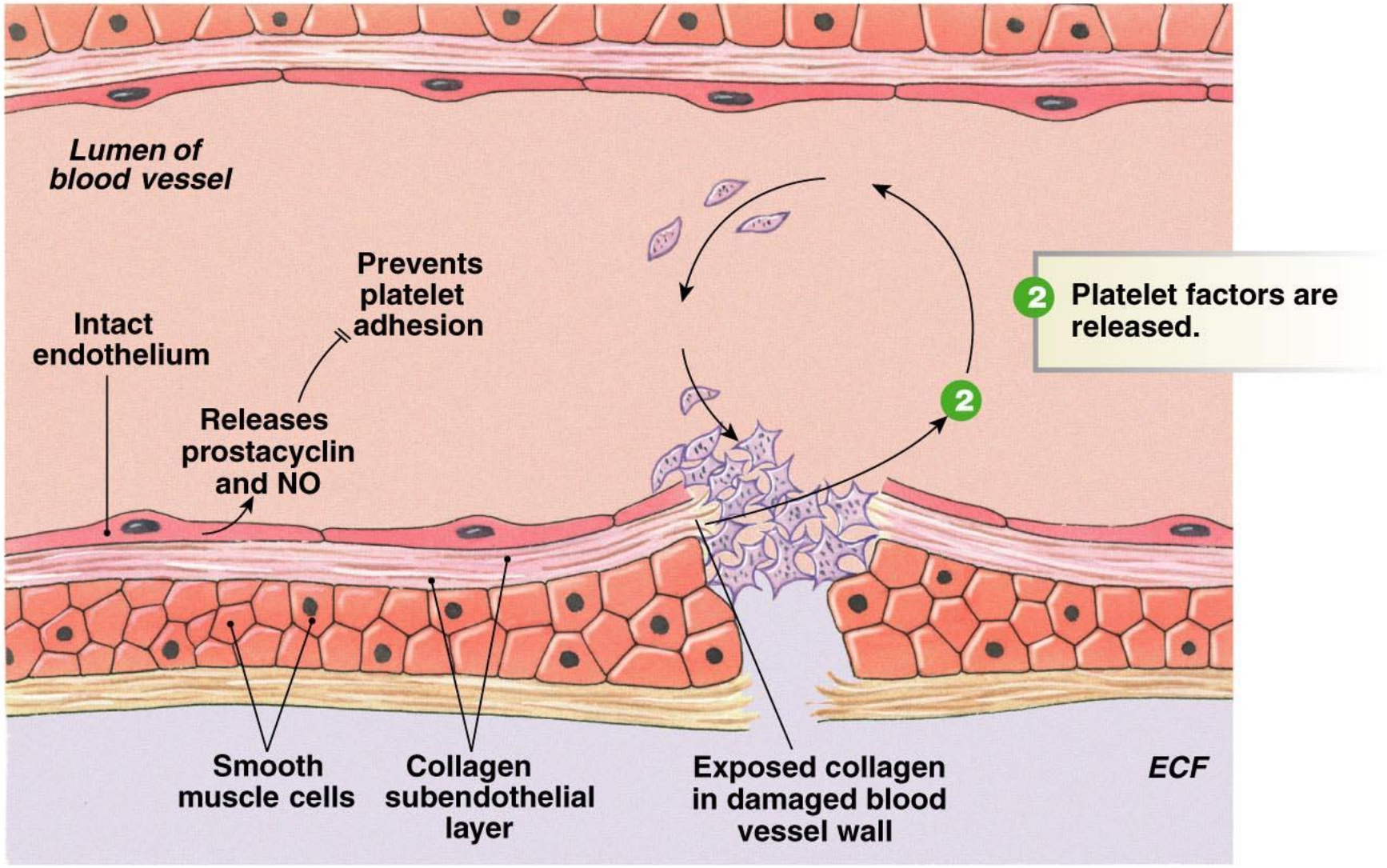


Figure 16-21, step 2

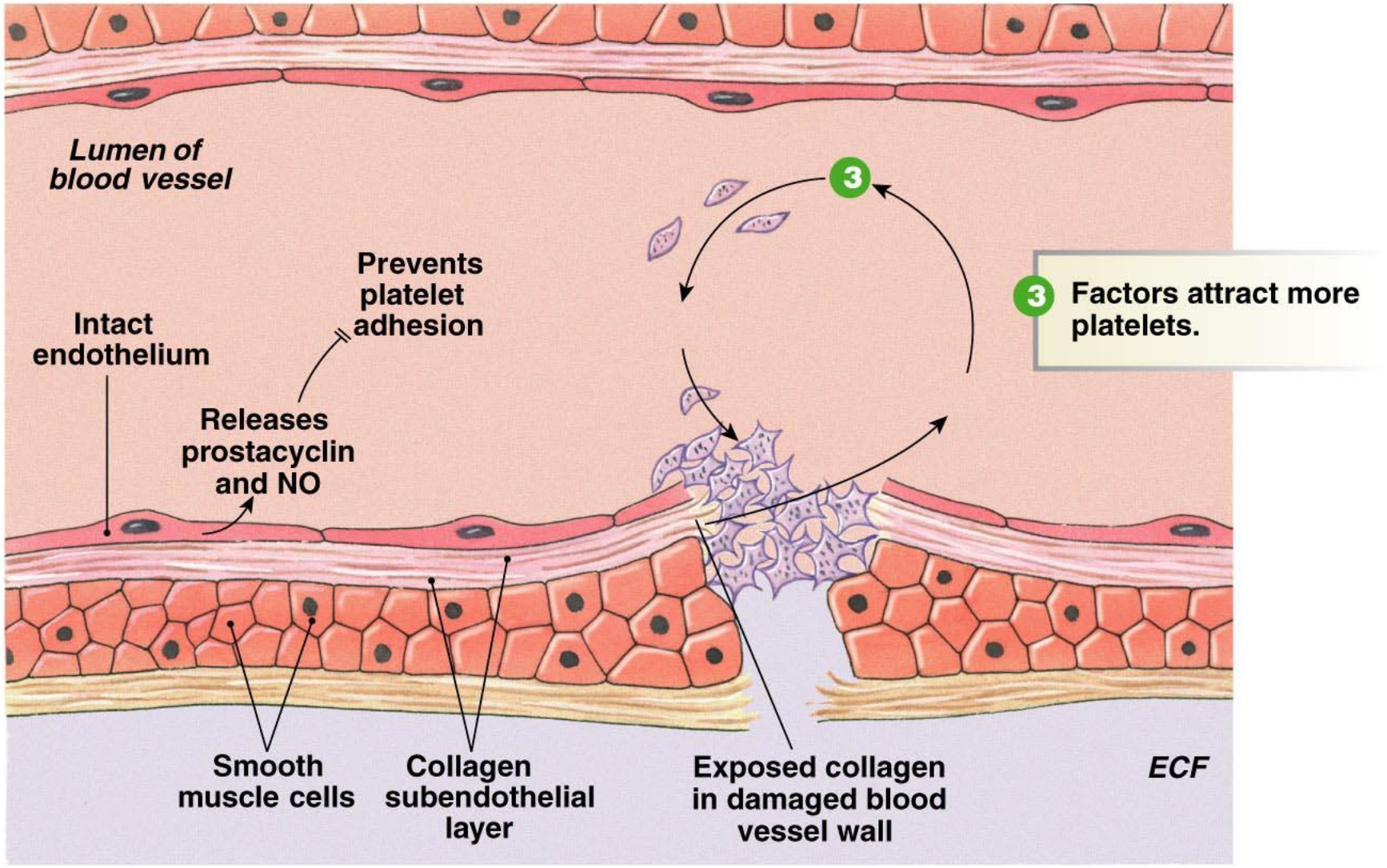


Figure 16-21, step 3

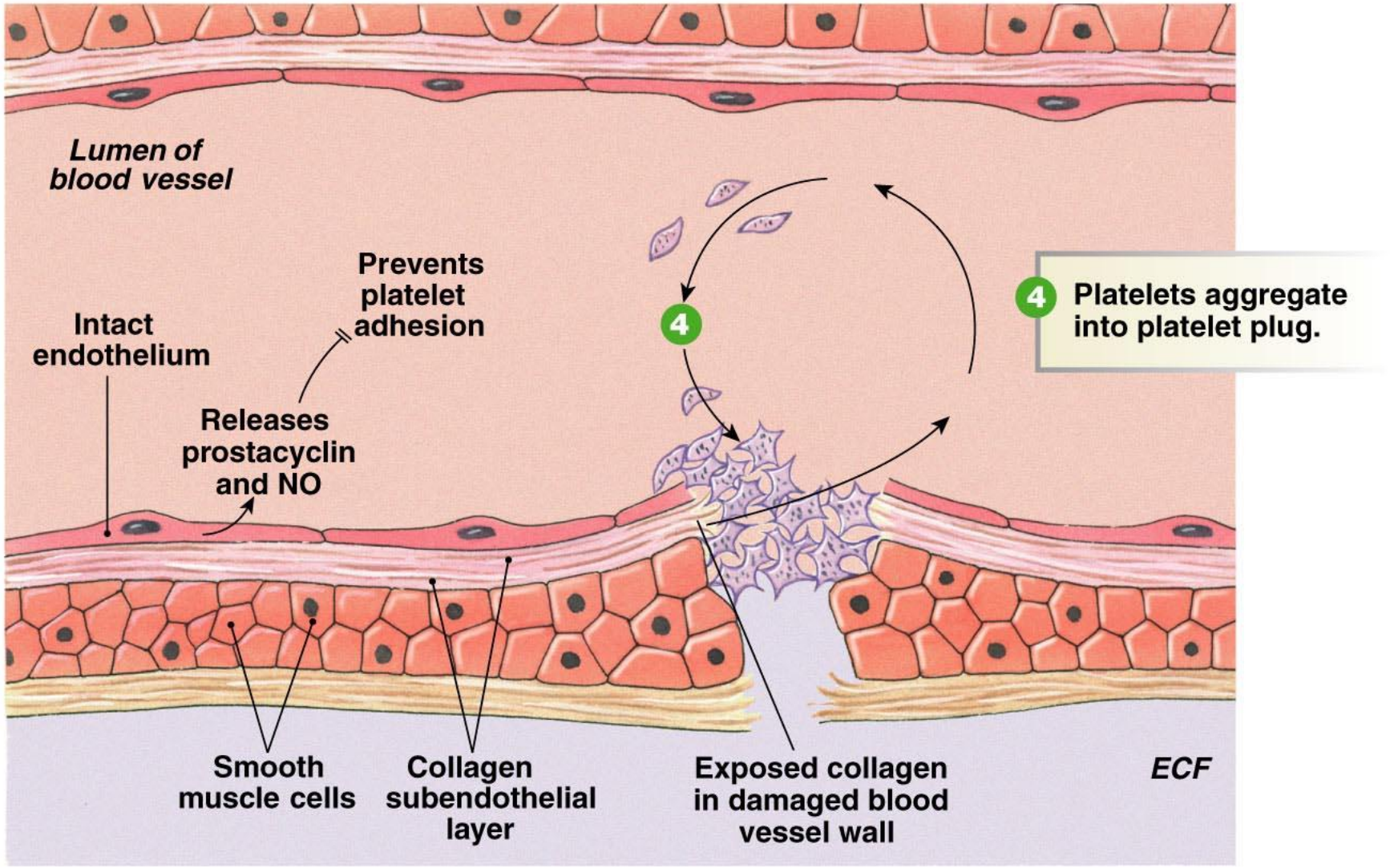
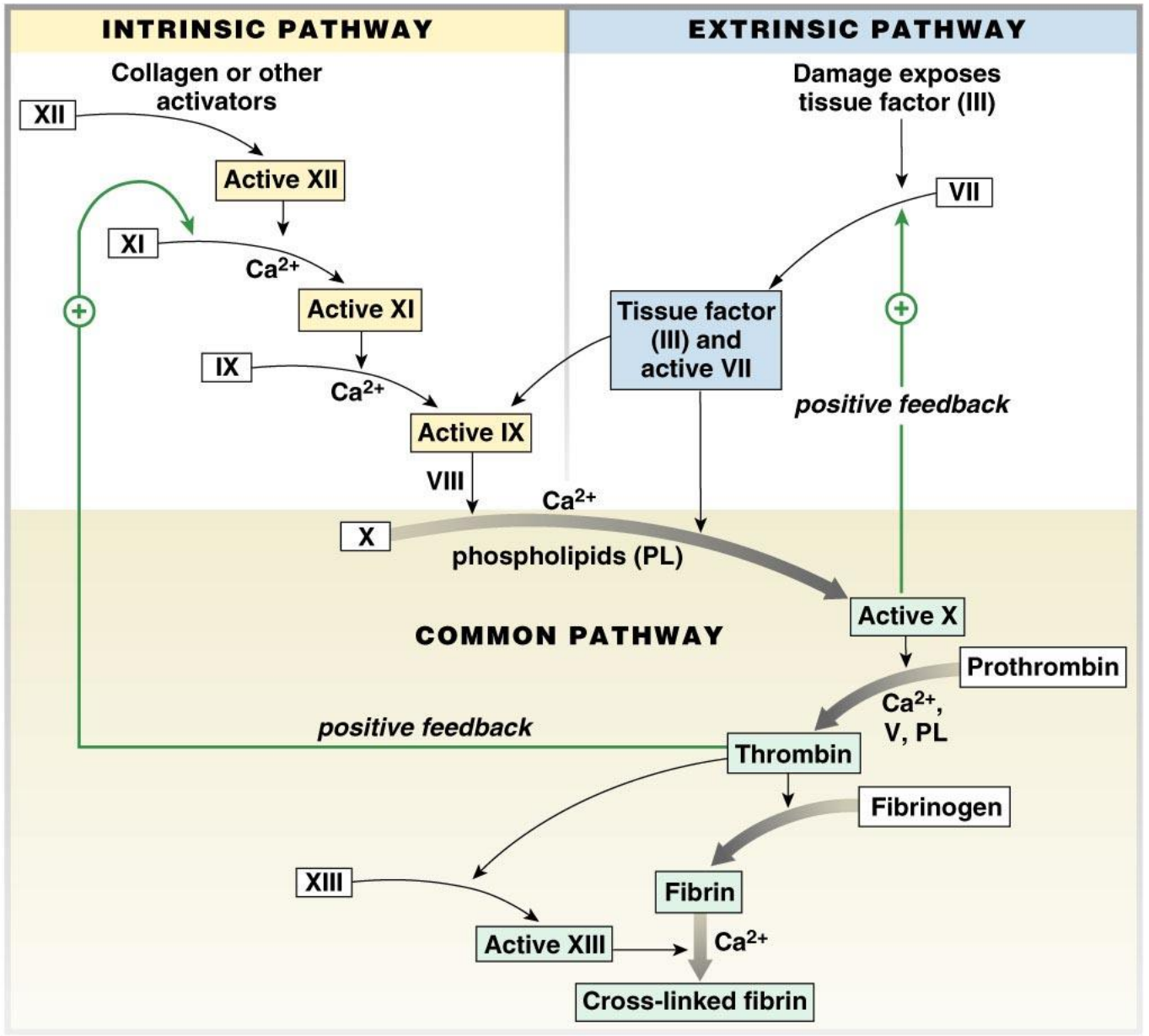


Figure 16-21, step 4

TABLE 16-4 Factors Involved in Platelet Function

CHEMICAL FACTOR	SOURCE	ACTIVATED BY OR RELEASED IN RESPONSE TO	ROLE IN PLATELET PLUG FORMATION	OTHER ROLES AND COMMENTS
Collagen	Subendothelial extracellular matrix	Injury exposes platelets to collagen	Binds platelets to begin platelet plug	——
von Willebrand factor (vWF)	Endothelium, megakaryocytes	Exposure to collagen	Links platelets to collagen	Deficiency or defect causes prolonged bleeding
Serotonin	Secretory vesicles of platelets	Platelet activation	Platelet aggregation	Vasoconstrictor
Adenosine diphosphate (ADP)	Platelet mitochondria	Platelet activation, thrombin	Platelet aggregation	——
Platelet-activating factor (PAF)	Platelets, neutrophils, monocytes	Platelet activation	Platelet aggregation	Plays role in inflammation; increases capillary permeability
Thromboxane A_2	Phospholipids in platelet membranes	Platelet activating factor	Platelet aggregation	Vasoconstrictor; eicosanoid
Platelet-derived growth factor (PDGF)	Platelets	Platelet activation	——	Promotes wound healing by attracting fibroblasts and smooth muscle cells



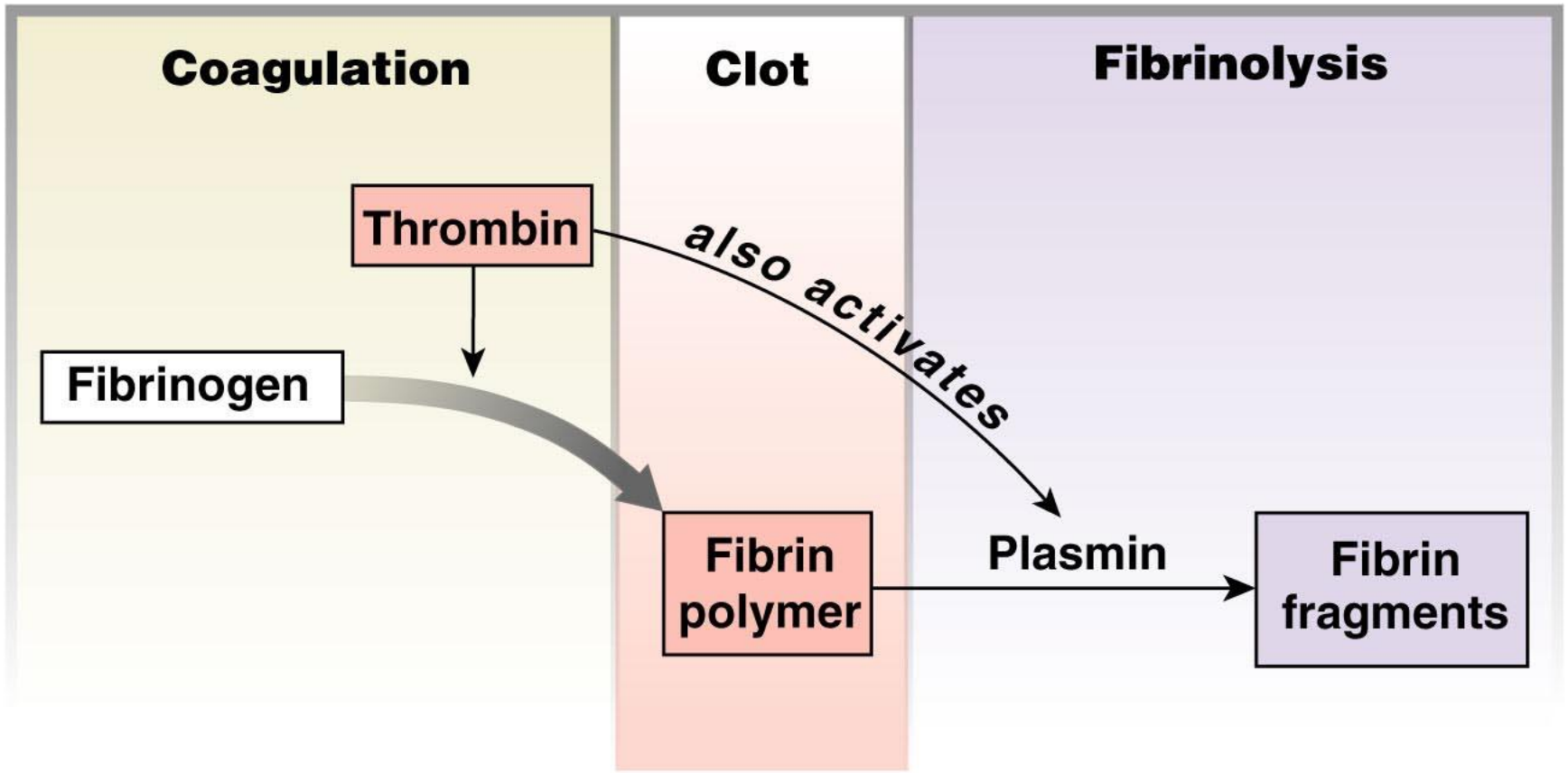


Figure 16.13

TABLE 16-5 Factors Involved in Coagulation

CHEMICAL FACTOR	SOURCE	ACTIVATED BY OR RELEASED IN RESPONSE TO	ROLE IN COAGULATION	OTHER ROLES AND COMMENTS
Collagen	Subendothelial extracellular matrix	Injury that exposes collagen to plasma clotting factors	Starts intrinsic pathway	NA
von Willebrand factor (vWF)	Endothelium, megakaryocytes	Exposure to collagen	Regulates level of factor VIII	Deficiency or defect causes prolonged bleeding
Kininogen and kallikrein	Liver and plasma	Cofactors normally present in plasma pathway	Cofactors for contact activation of intrinsic pathway	Mediate inflammatory response; enhance fibrinolysis
Tissue factor (tissue thromboplastin or factor III)	Most cells except platelets	Damage to tissue	Starts extrinsic pathway	NA
Prothrombin and thrombin (factor II)	Liver and plasma	Platelet lipids, Ca^{2+}, and factor V	Fibrin production	NA
Fibrinogen and fiblin (factor I)	Liver and plasma	Thrombin	Form insoluble fibers that stabilize platelet plug	NA
Fibrin-stabilizing factor (XIII)	Liver, megakaryocytes	Platelets	Cross-links fibrin polymers to make stable mesh	NA
Ca^{2+} (factor IV)	Plasma ions	NA	Required for several steps of coagulation cascade	Never a limiting factor
Vitamin K	Diet	NA	Needed for synthesis of factors II, VII, IX, X	NA

TABLE 16-6 Endogenous Factors Involved in Fibrinolysis and Anticoagulation

CHEMICAL FACTOR	SOURCE	ACTIVATED BY OR RELEASED IN RESPONSE TO	ROLE IN ANTICOAGULATION OR FIBRINOLYSIS	OTHER ROLES AND COMMENTS
Plasminogen and plasmin	Liver and plasma	t-PA and thrombin	Dissolves fibrin and fibrinogen	NA
Tissue plasminogen activator (t-PA)	Many tissues	Normally present; levels increase with stress, protein C	Activates plasminogen	Recombinant t-PA used clinically to dissolve clots
Antithrombin III	Liver and plasma	NA	Anticoagulant; blocks factors IX, X, XI, XII, thrombin, kallikrein	Facilitated by heparin; no effect on thrombin despite name
Prostacyclin (prostaglandin I, or PGI_2)	Endothelial cells	NA	Blocks platelet aggregation	Vasodilator