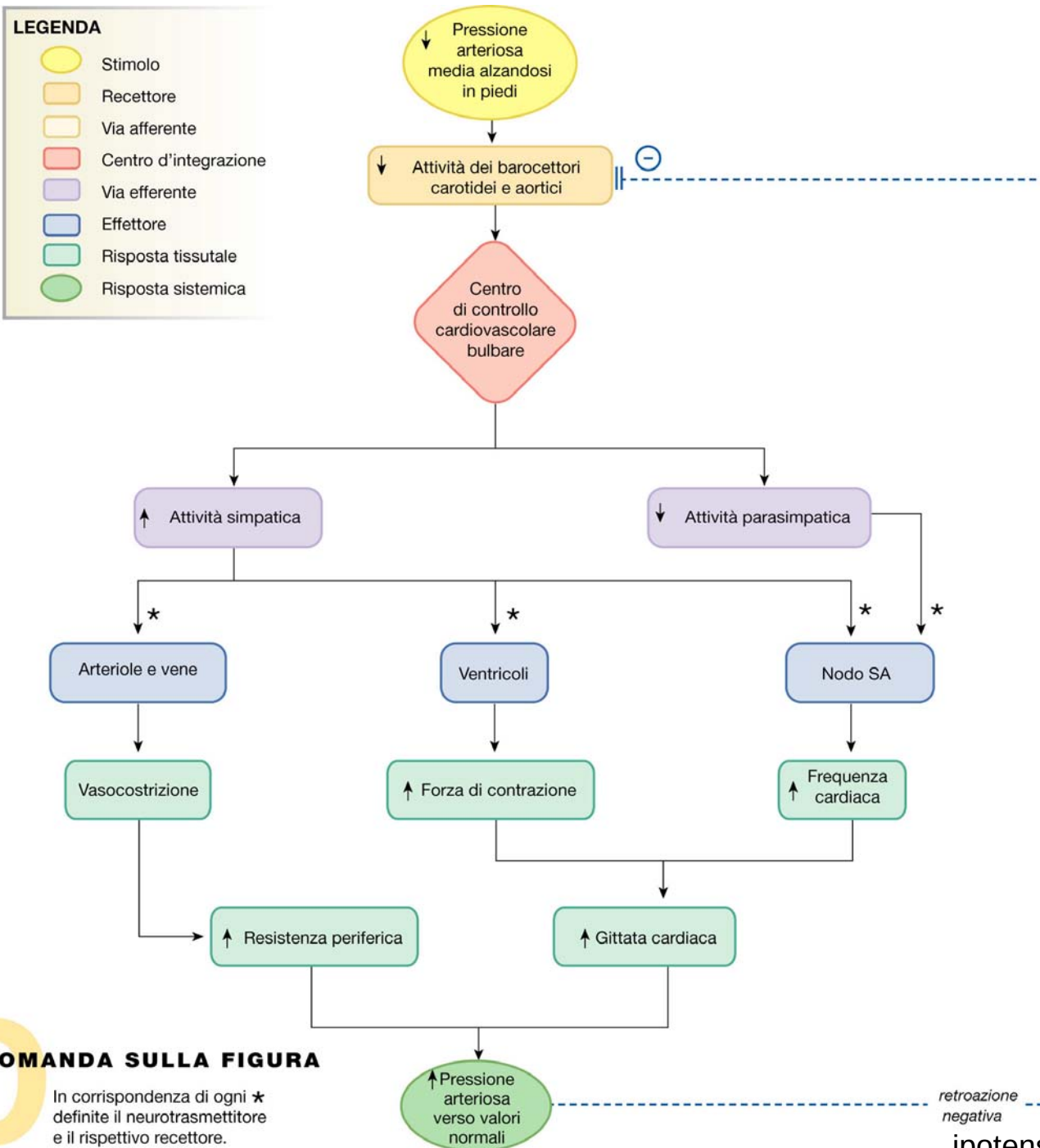
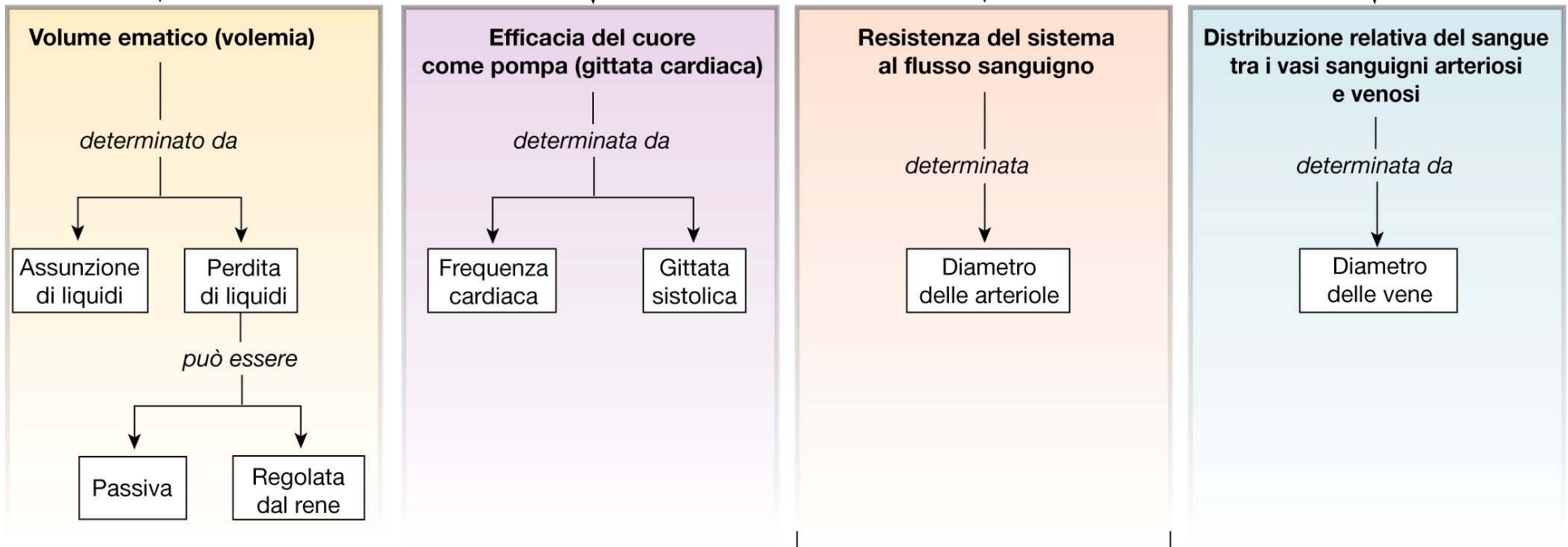




PRESSIONE ARTERIOSA MEDIA

è determinata da



LEGENDA



Stimolo



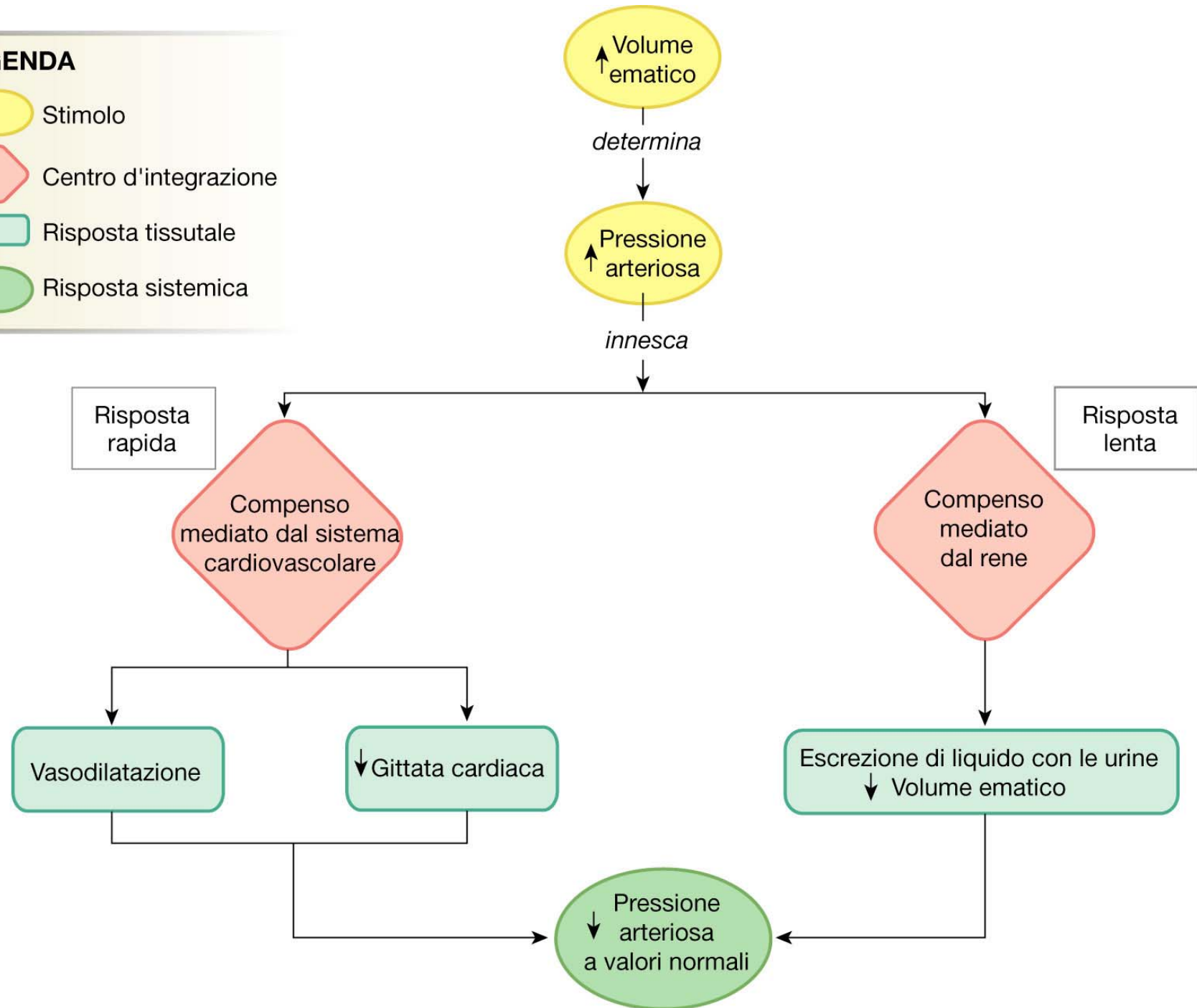
Centro d'integrazione



Risposta tissutale

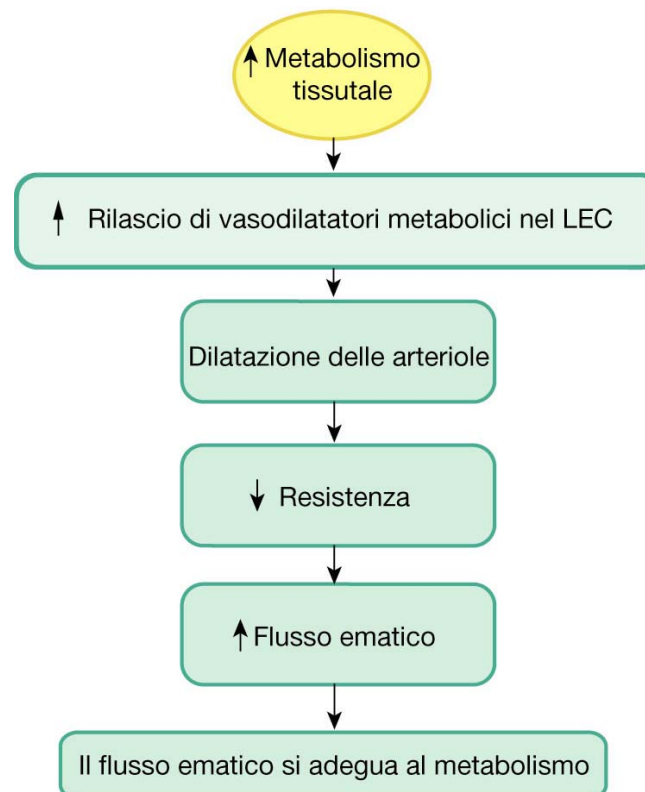


Risposta sistemica



Il diametro delle arteriole può essere determinato da:

- 1. Autoregolazione miogena**
- 2. Metaboliti tissutali (CO_2 , O_2 ,....)**
- 3. Agenti paracrini (Serotonina, Istamina, NO, BK,...)**
- 4. Ormoni (Adrenalina, Angiotensina II, ADH, VIP....)**
- 5. Neuromediatori del SNA (NA, Ach, Sostanza P, ?)**

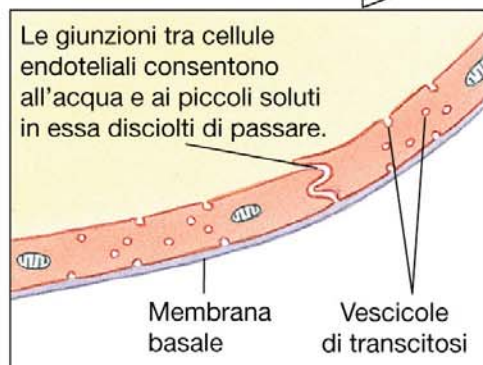
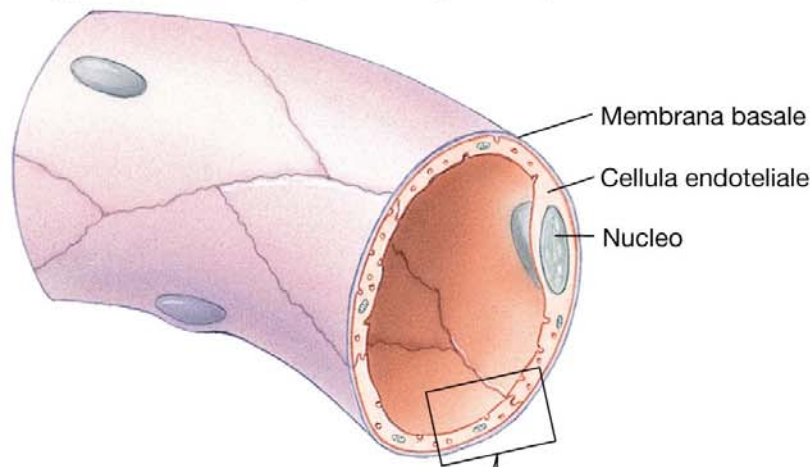


La regolazione dei gradienti pressori avviene principalmente modificando le resistenze periferiche (vasocostrizione/dilatazione delle arteriole)

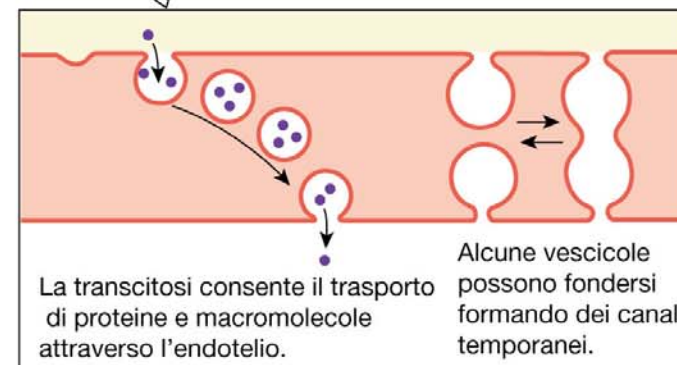
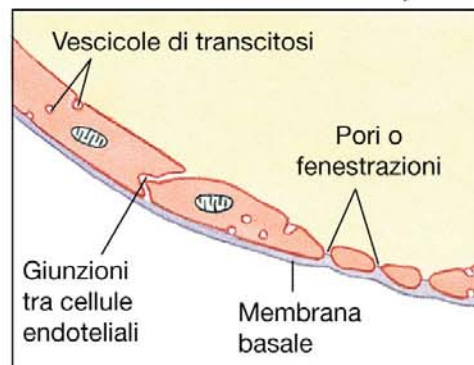
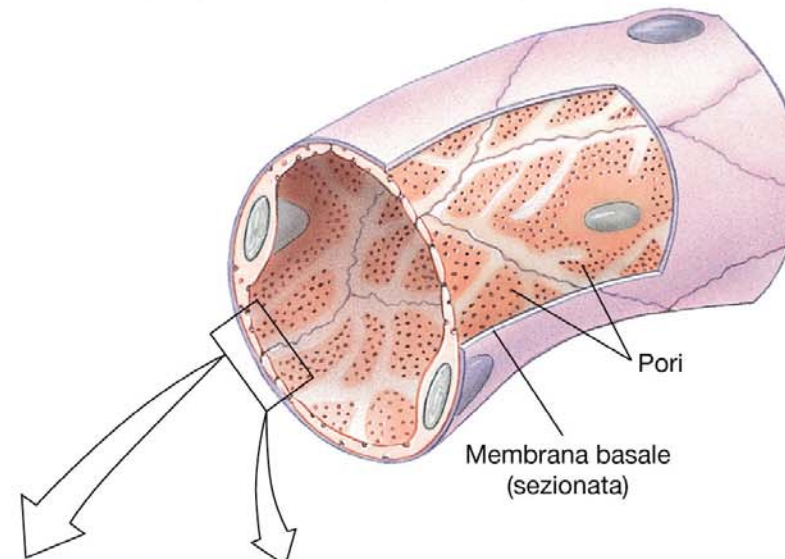
Questo è fondamentale per:

1. Garantire il normale flusso di sangue ai capillari (con velocità e pressione idraulica tale da garantire un corretto scambio)
2. Rispondere a variazioni di Volume del sangue
3. Variare il flusso del sangue in base alle esigenze metaboliche dei vari tessuti

(a) I capillari continui presentano giunzioni permeabili.



(b) I capillari fenestrati presentano pori ampi.



All'estremo arterioso:

$$[(P_c + \pi_{li}) - (P_{li} + \pi_s)] =$$

$$[(32 + 5) - (3 + 25)] = 9 \text{ mmHg}$$

flusso netto verso il liquido interstiziale

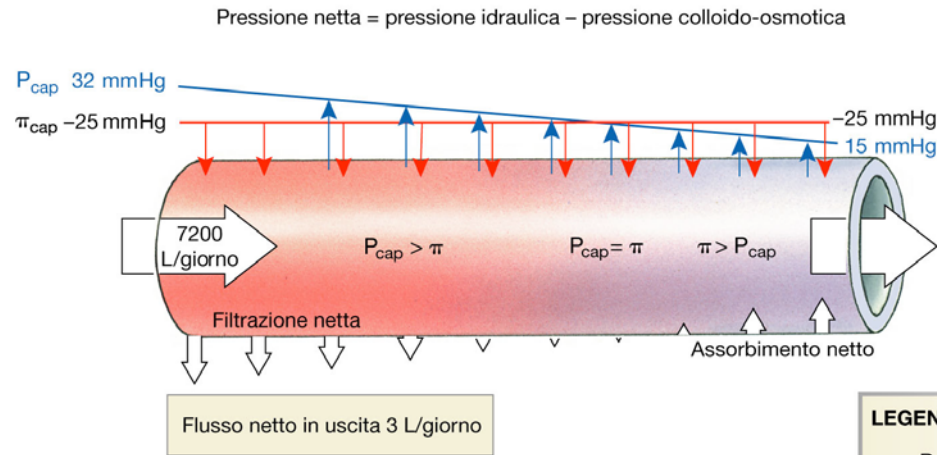
All'estremo venoso:

$$[(P_c + \pi_{li}) - (P_{li} + \pi_s)] =$$

$$[(15 + 5) - (3 + 25)] = -8 \text{ mmHg}$$

flusso netto verso i capillari

(a) Filtrazione nei capillari sistemici

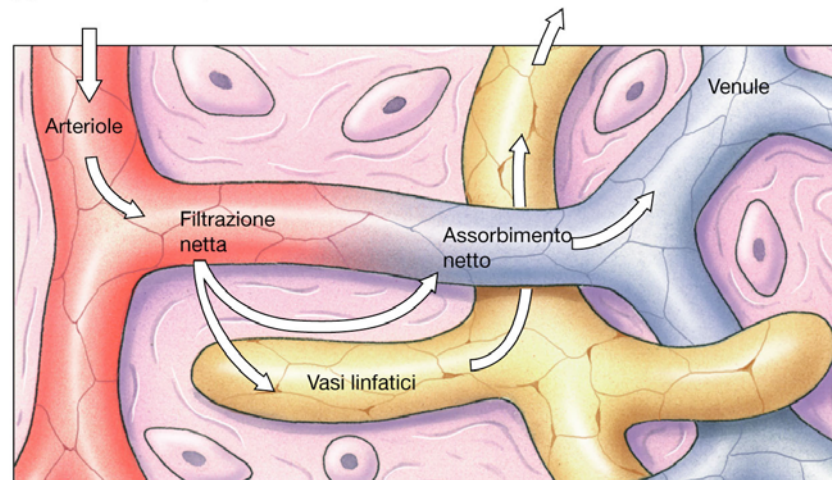


LEGENDA

P_{cap} = Pressione idraulica capillare

π = Pressione colloid-osmotica

(b) Relazione tra capillari e vasi linfatici



L'eccesso di acqua e soluti che escono dal capillare viene recuperato dai vasi linfatici e reimmesso nella circolazione sanguigna.

COSA DOBBIAMO RICORDARE:

17. Sistema cardiocircolatorio III: Sistema Vasale

1. Differenze istologiche tra le varie componenti vasali
2. Ruolo della elasticità delle arterie nella regolazione pressoria
3. Pressione, flusso e resistenza nel sistema vasale
4. La pressione arteriosa media e suoi determinanti
5. Controllo ormonale e nervoso della muscolatura liscia vasale: recettori alfa e beta2
6. Barocettori e riflessi bulbari
7. Relazione volume ematico, pressione e sistema nervoso
8. Sfinteri precapillari, metarteriole e regolazione del flusso capillare locale
9. Gli scambi a livello dei capillari continui e fenestrati
10. La legge di Starling e la filtrazione dei capillari sistemici
11. Ruolo drenante del sistema linfatico

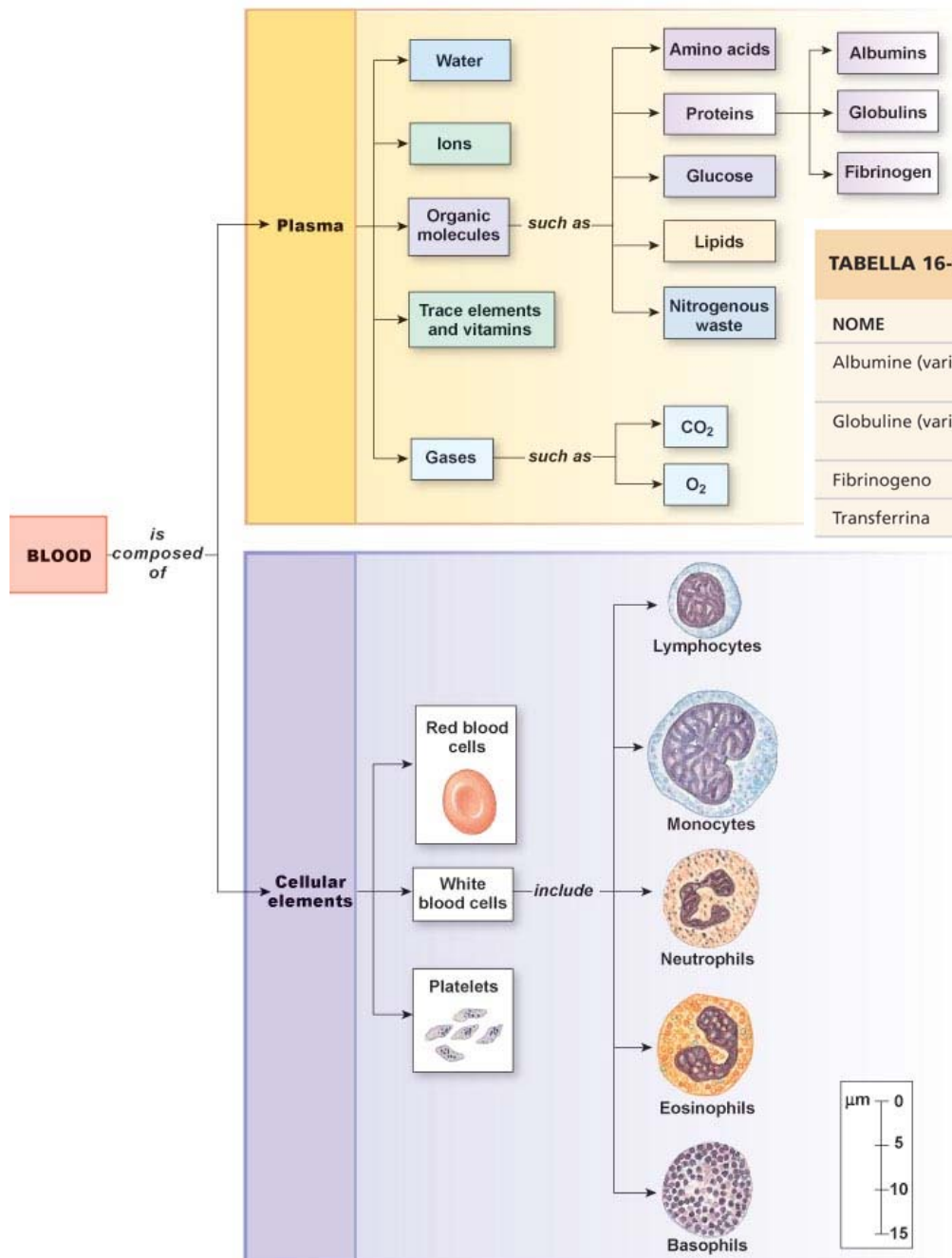
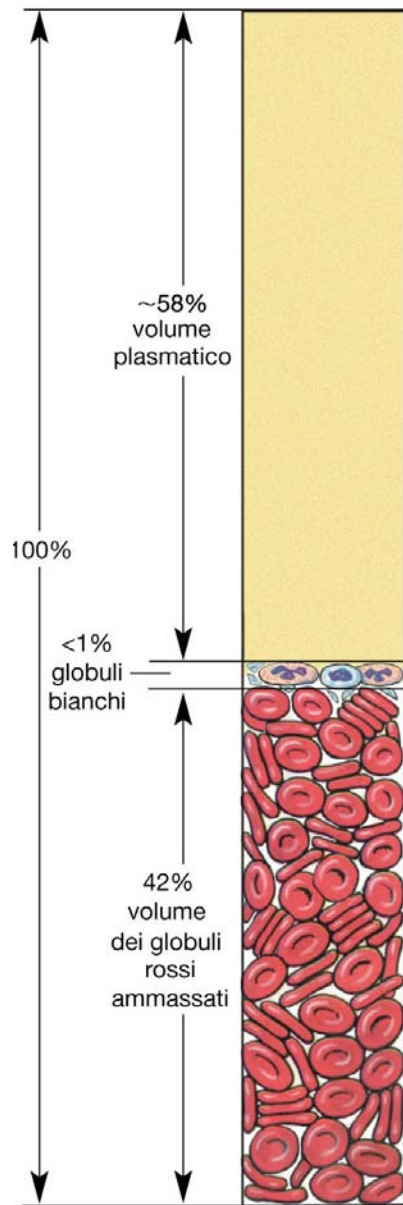
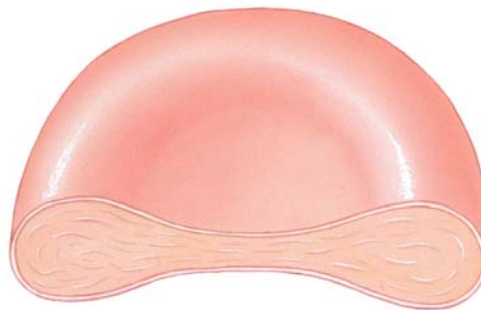


TABELLA 16-1 Funzioni delle proteine plasmatiche

NOME	FONTE	FUNZIONE
Albumine (vari tipi)	Fegato	Principali determinanti della pressione colloidale-osmotica plasmatica; trasportatori di varie sostanze
Globuline (vari tipi)	Fegato e tessuto linfoide	Fattori della coagulazione, enzimi, anticorpi, trasportatori di varie sostanze
Fibrinogeno	Fegato	Forma filamenti di fibrina essenziali per la coagulazione ematica
Transferrina	Fegato e altri tessuti	Trasporto del ferro



	Maschi	Femmine
Ematocrito	40-54%	37-47%
Emoglobina (g/dL sangue)	14-17	12-16
Globuli rossi (cellule/ μL)	$4,5-6,5 \times 10^6$	$3,9-5,6 \times 10^6$
Globuli bianchi totali (cellule/ μL)	$4-11 \times 10^3$	$4-11 \times 10^3$
Formula leucocitaria		
Neutrofili	50-70%	50-70%
Eosinofili	1-4%	1-4%
Basofili	<1%	<1%
Linfociti	20-40%	20-40%
Monociti	2-8%	2-8%
Piastrine (per μL)	$200-500 \times 10^3$	$200-500 \times 10^3$



(b)

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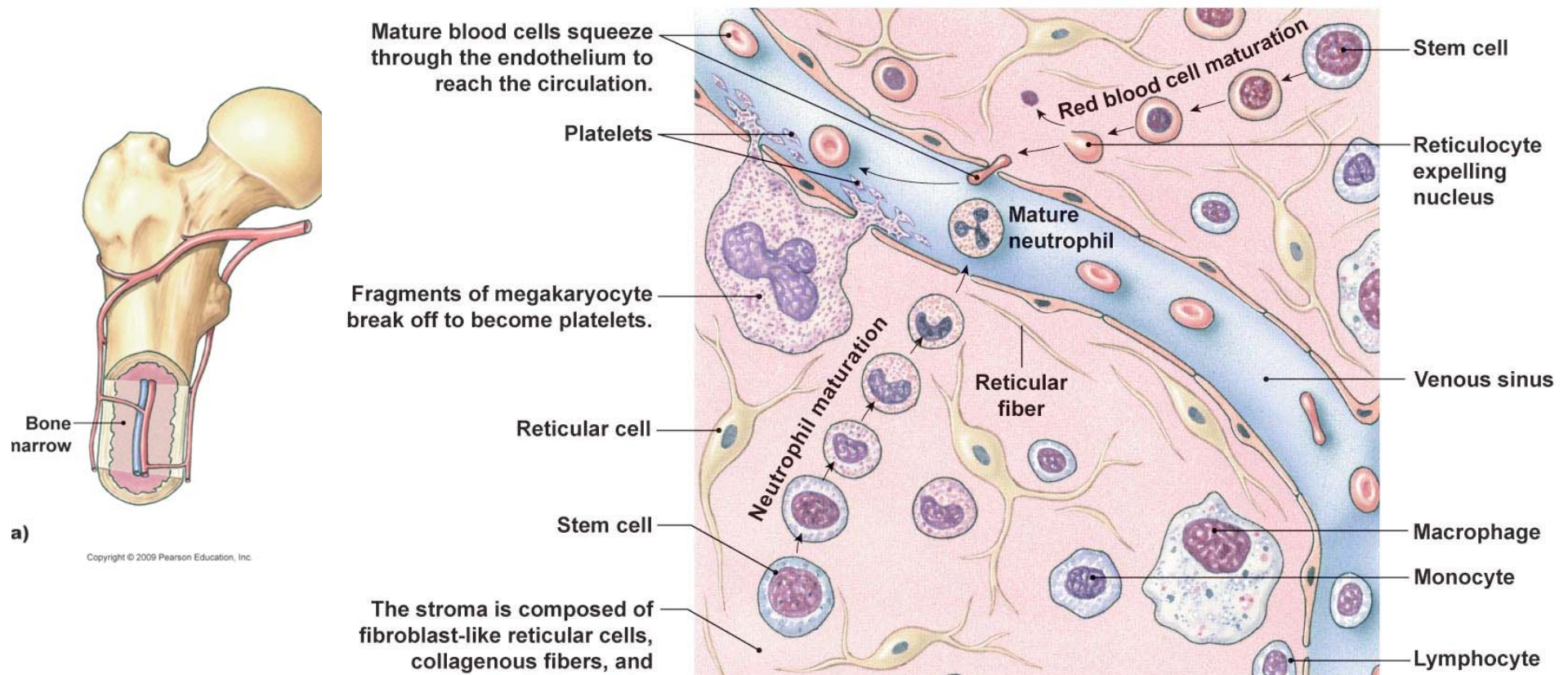
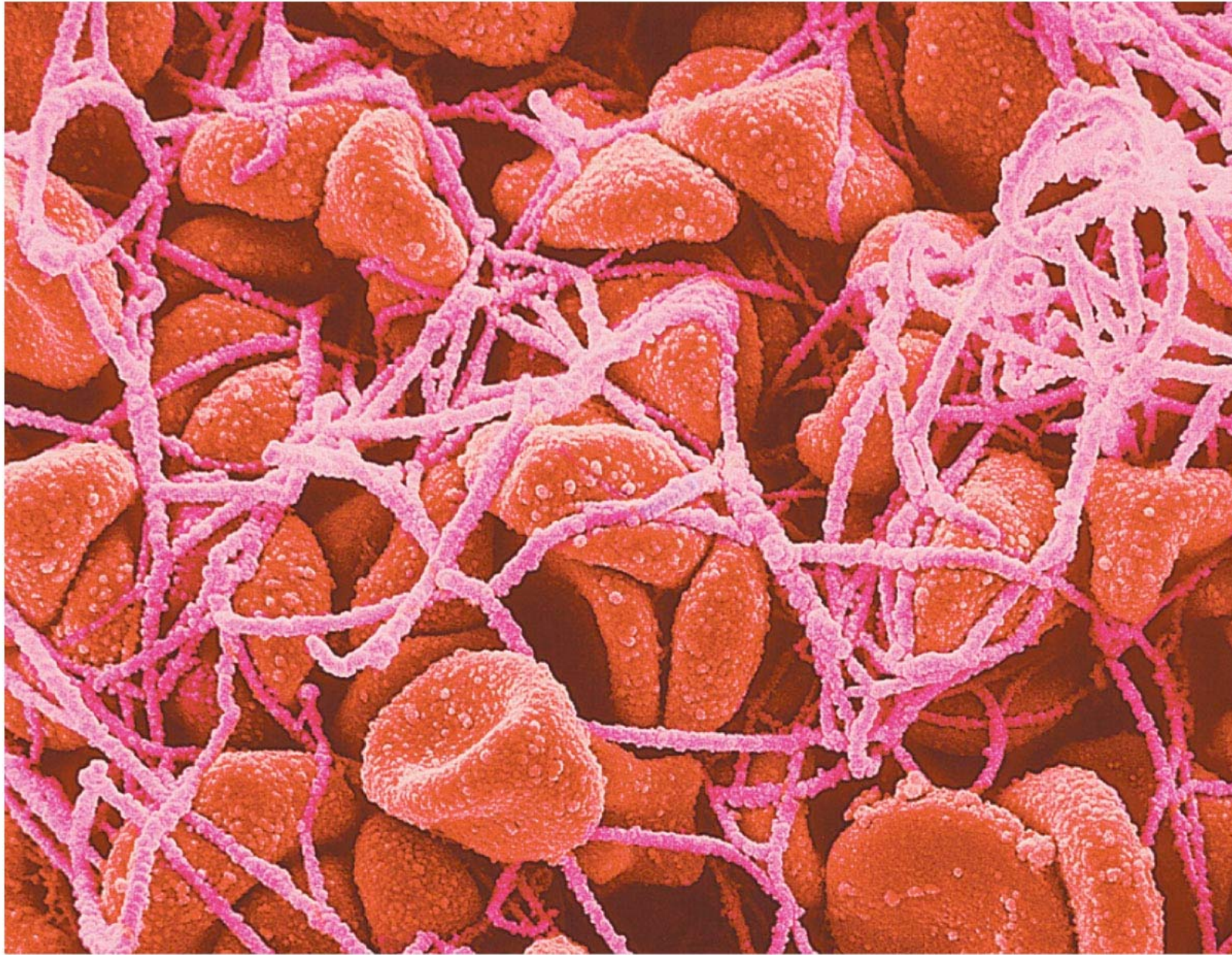


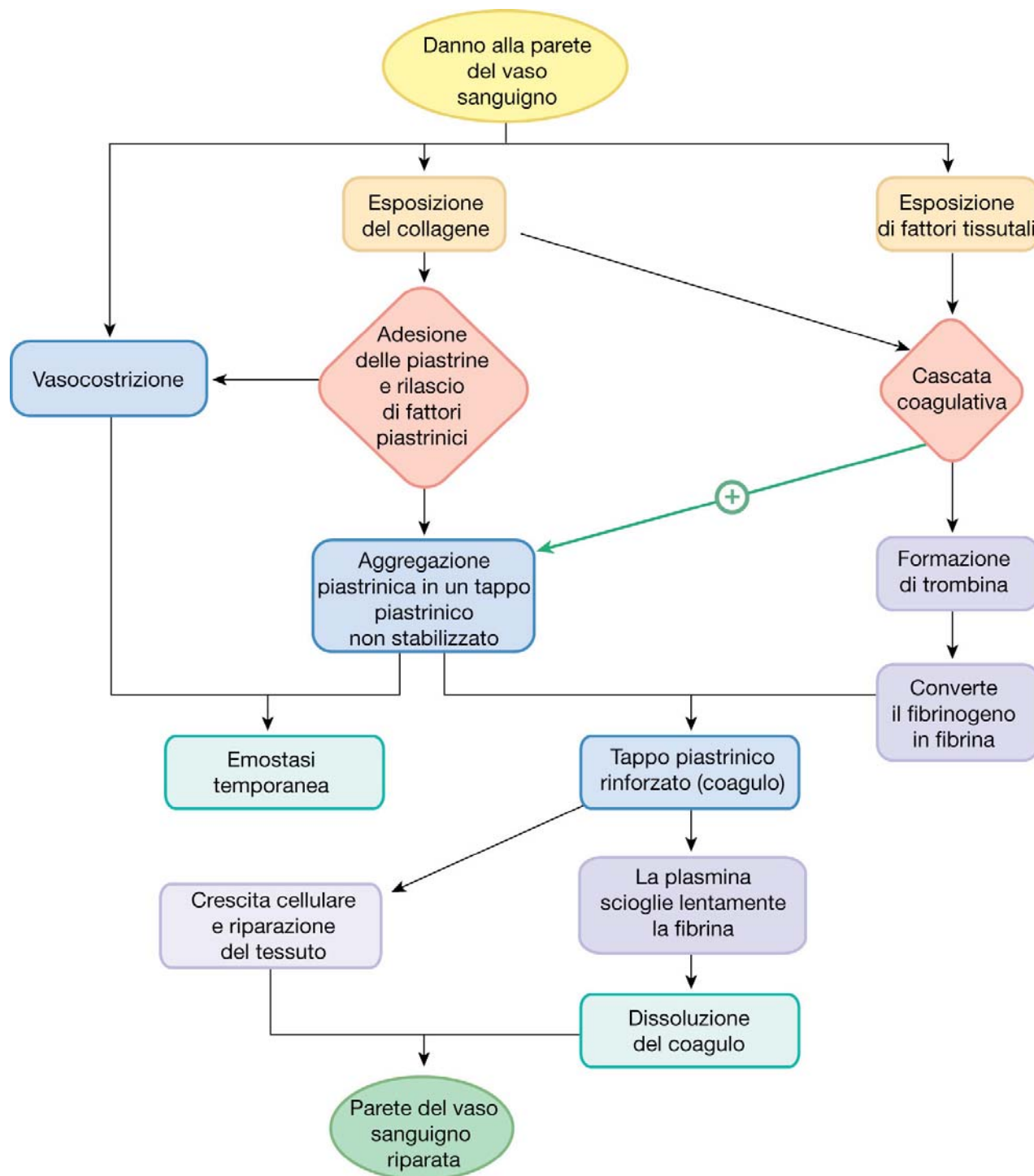
TABLE 16-2

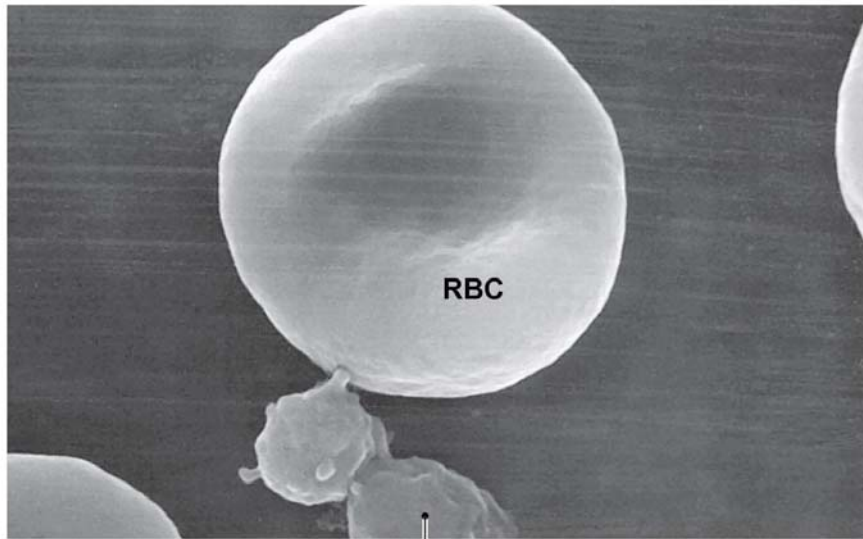
Cytokines Involved in Hematopoiesis

NAME	SITES OF PRODUCTION	INFLUENCES GROWTH OR DIFFERENTIATION OF
Erythropoietin (EPO)	Kidney cells primarily	Red blood cells
Thrombopoietin (TPO)	Liver primarily	Megakaryocytes
Colony-stimulating factors, interleukins, stem cell factor	Endothelium and fibroblasts of bone marrow, leukocytes	All types of blood cells; mobilizes hematopoietic stem cells



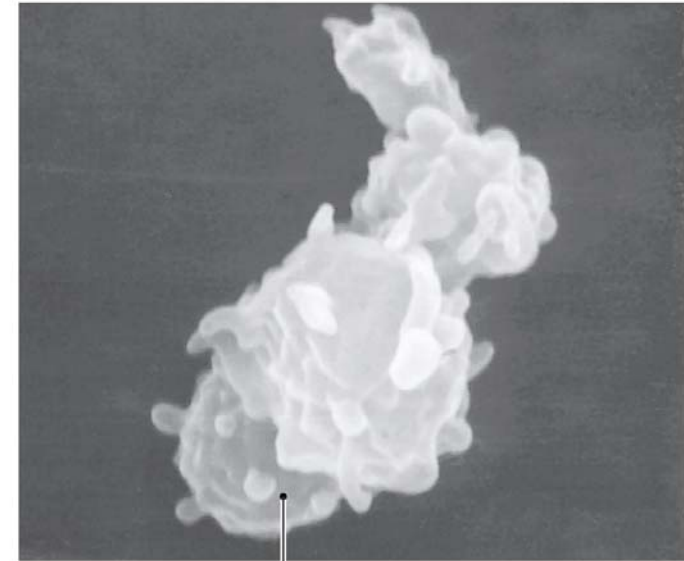
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(b) Inactive platelets are small disk-like cell fragments.

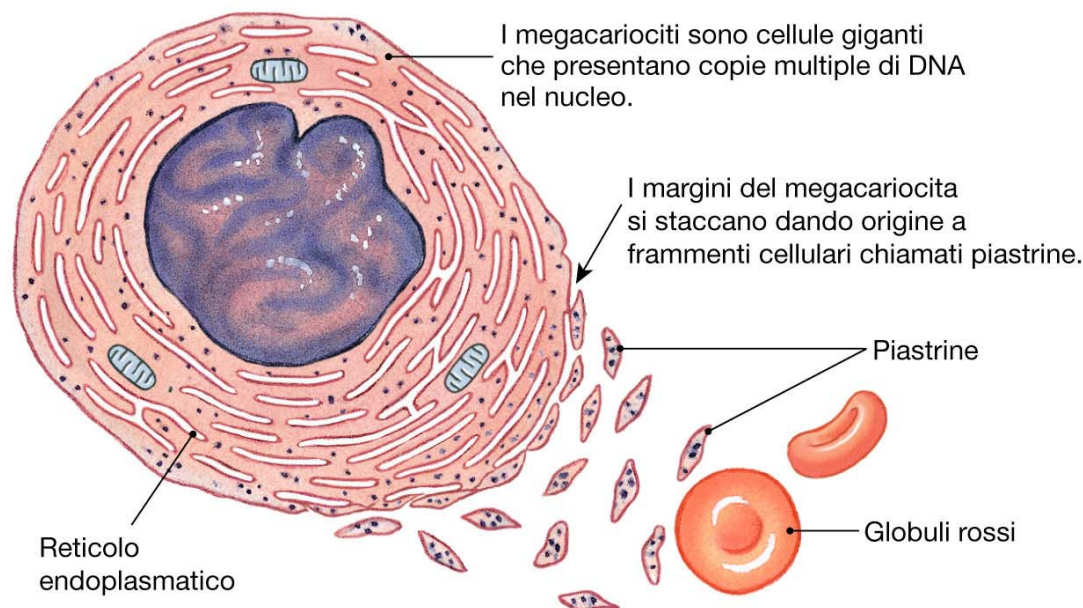
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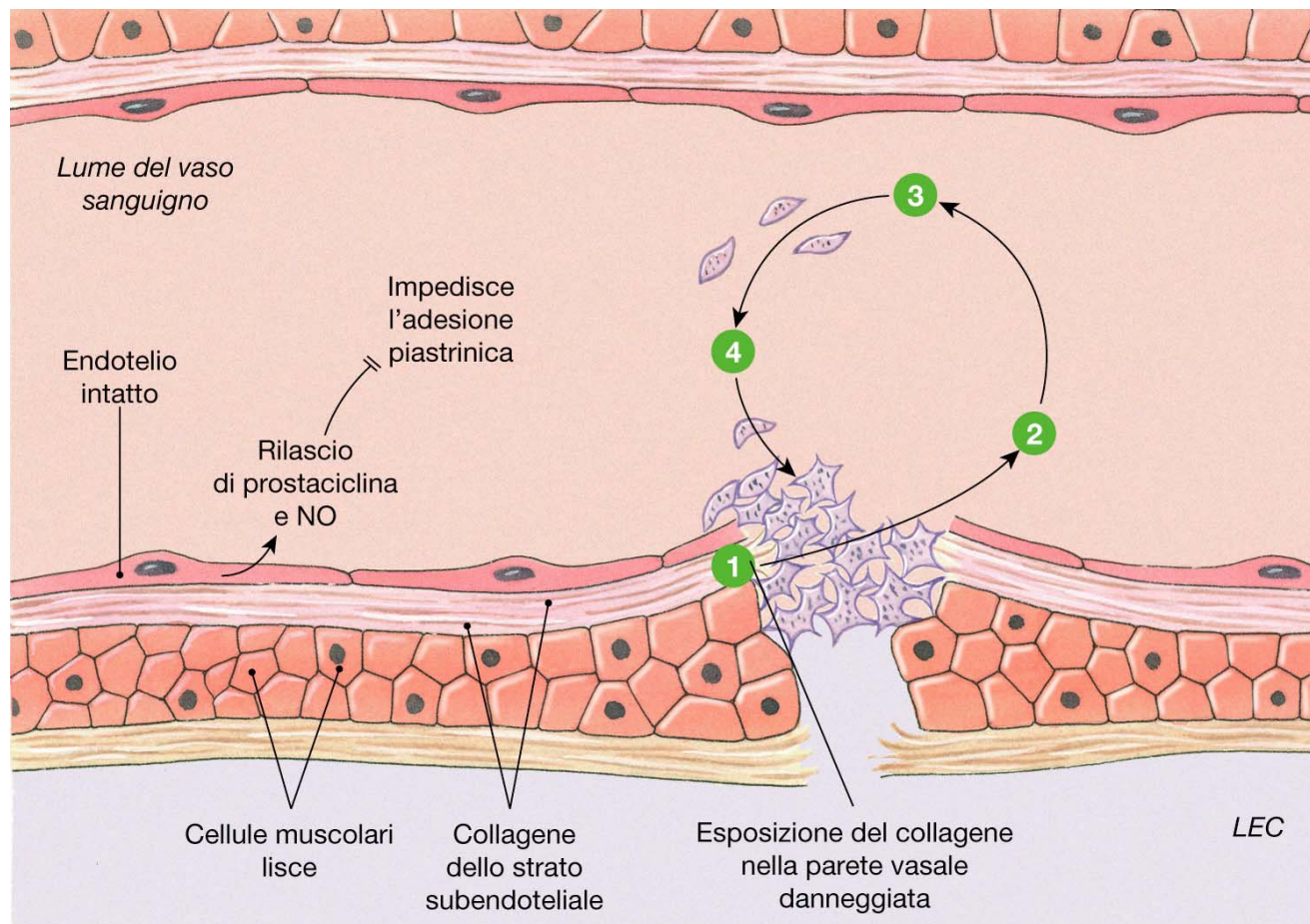


(c) Activated platelets (shown enlarged) develop a spiky outer surface and adhere to each other.

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(a)





1 Il collagene esposto lega e attiva le piastrine.

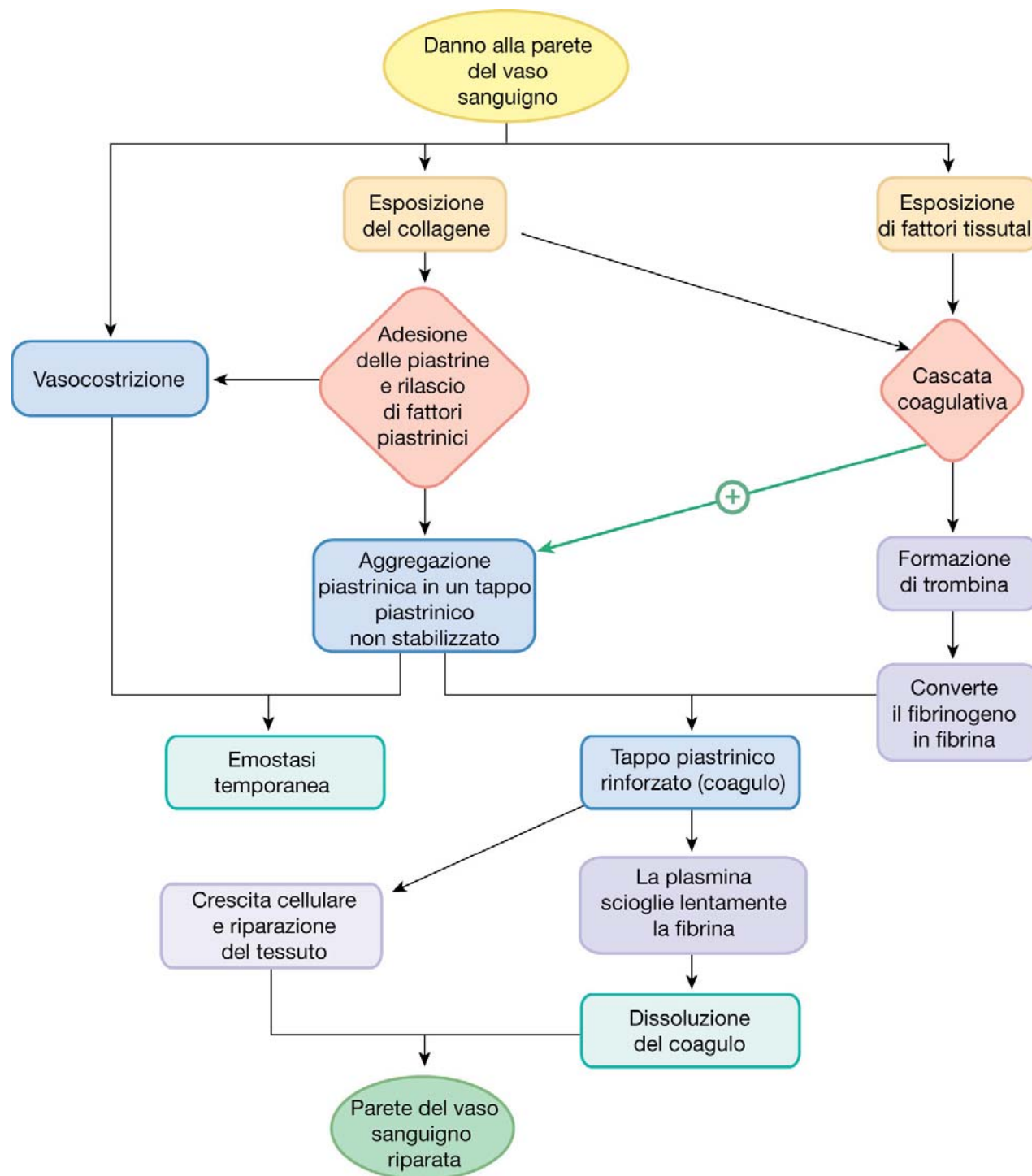
2 Rilascio di fattori piastrinici.

3 Attrazione di nuove piastrine.

4 Aggregazione delle piastrine in un tappo piastrinico.

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	N/A
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	N/A
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	N/A	Promotes wound healing by attracting fibroblasts and smooth muscle cells



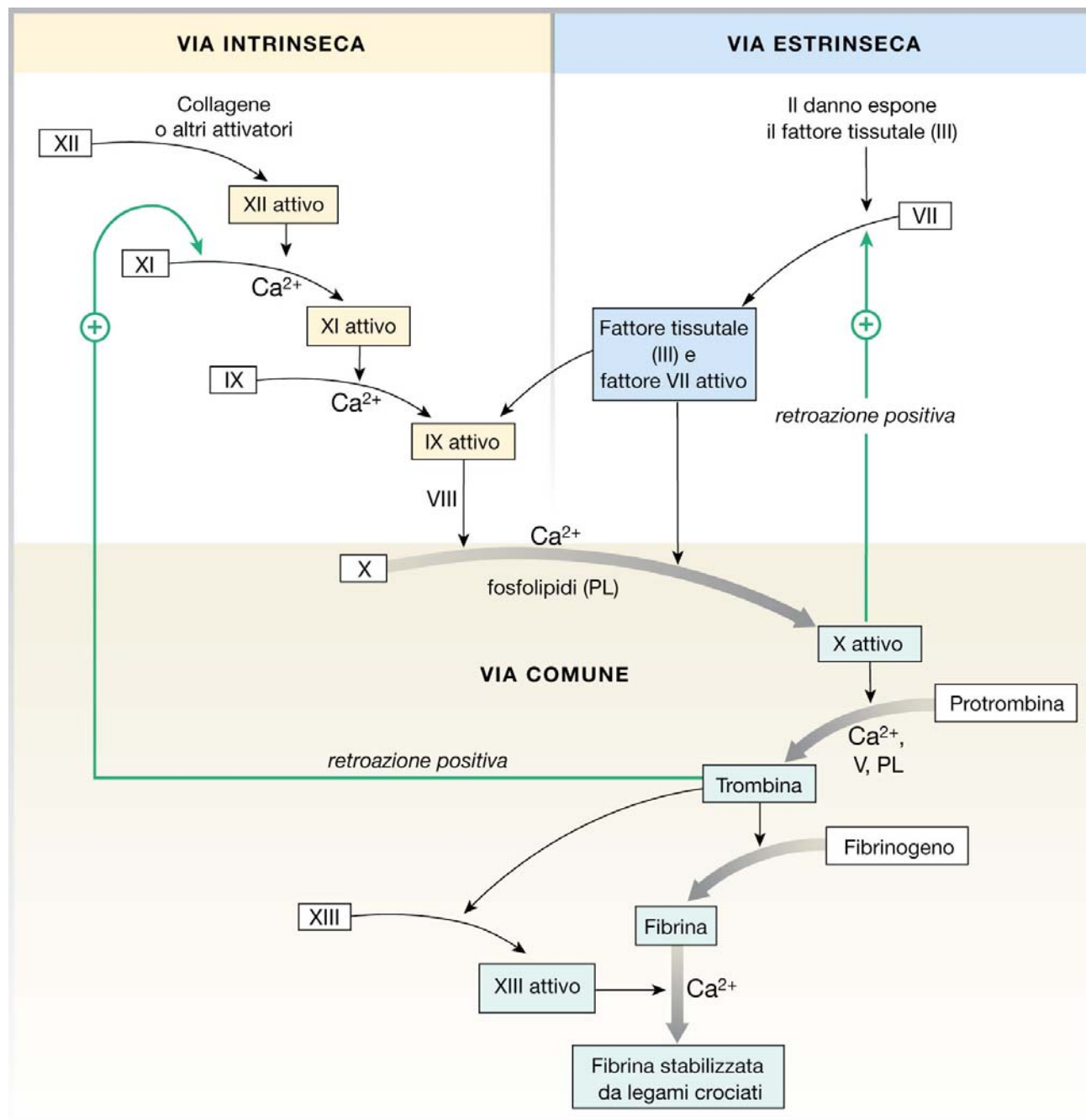


TABLE 16-5**Factors Involved in Coagulation**

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	N/A
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	N/A
Prothrombin and thrombin (factor II)	Liver and plasma	Platelet lipids, Ca^{2+} , and factor V	Fibrin production	N/A
Fibrinogen and fibrin (factor I)	Liver and plasma	Thrombin	Form insoluble fibers that stabilize platelet plug	N/A
Fibrin-stabilizing factor (XIII)	Liver, megakaryocytes	Platelets	Cross-links fibrin polymers to make stable mesh	N/A
Ca^{2+} (factor IV)	Plasma ions	N/A	Required for several steps of coagulation cascade	Never a limiting factor
Vitamin K	Diet	N/A	Needed for synthesis of factors II, VII, IX, X	N/A

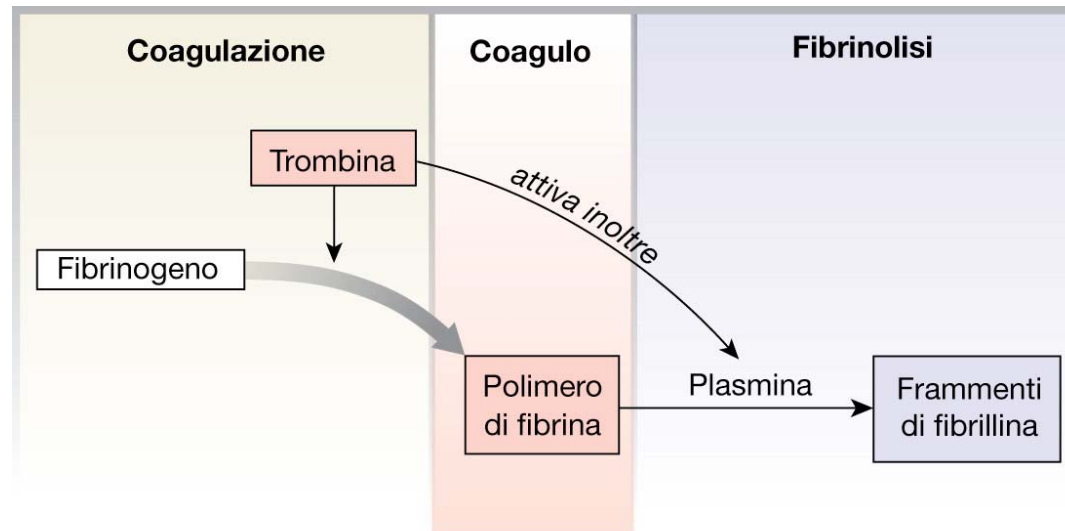
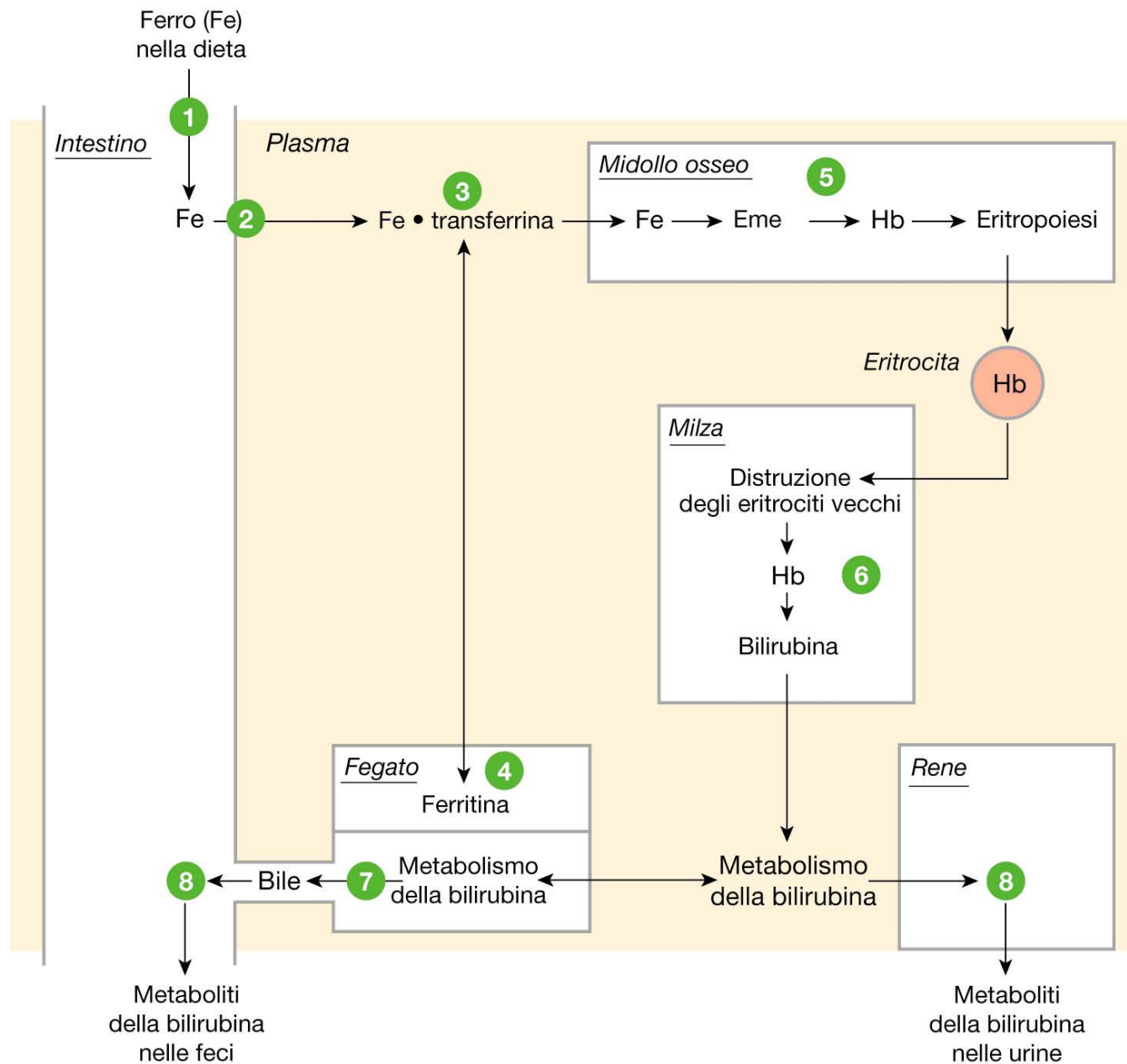


TABLE 16-6

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	tPA and thrombin	Dissolves fibrin and fibrinogen	N/A
Tissue plasminogen activator (tPA)	Many tissues	Normally present; levels increase with stress, protein C	Activates plasminogen	Recombinant tPA used clinically to dissolve clots
Antithrombin III	Liver and plasma	N/A	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	N/A	Blocks platelet aggregation	Vasodilator



- 1 Il ferro (Fe) deriva dalla dieta.
- 2 Il Fe è assorbito mediante trasporto attivo.
- 3 La proteina transferrina trasporta il Fe nel plasma.
- 4 Il fegato accumula l'eccesso di Fe sotto forma di ferritina.
- 5 Il midollo osseo utilizza il Fe per la sintesi di emoglobina (Hb).
- 6 La milza converte l'Hb in bilirubina.
- 7 Il fegato metabolizza la bilirubina e la elimina con la bile.
- 8 I metaboliti della bilirubina sono escreti con l'urina e le feci.

COSA DOBBIAMO RICORDARE:

17. Il Sangue

1. Composizione chimica del Plasma: componente proteica
2. La frazione particolata del sangue: valori fisiologici
3. Cenni sulla origine delle cellule del sangue
4. Coagulazione: adesione delle piastrine e rilascio dei fattori
5. Coagulazione: cascata coagulativa
6. Trombina, fibinogeno, fibrina e stabilizzazione del coagulo
7. Plasmina e rimozione del coagulo
8. Ripetizione accurata della biochimica della emoglobina, con particolare riguardo a: metabolismo del ferro e dell'eme, struttura quaternaria, effetto cooperativo, ruolo di pH nelle modificazioni dell'affinità ai gas