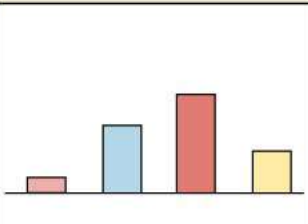
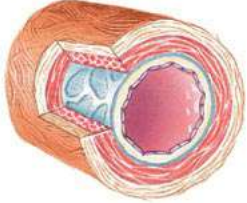
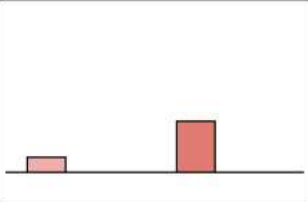



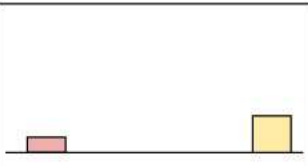

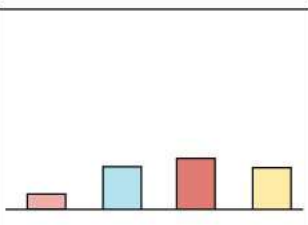



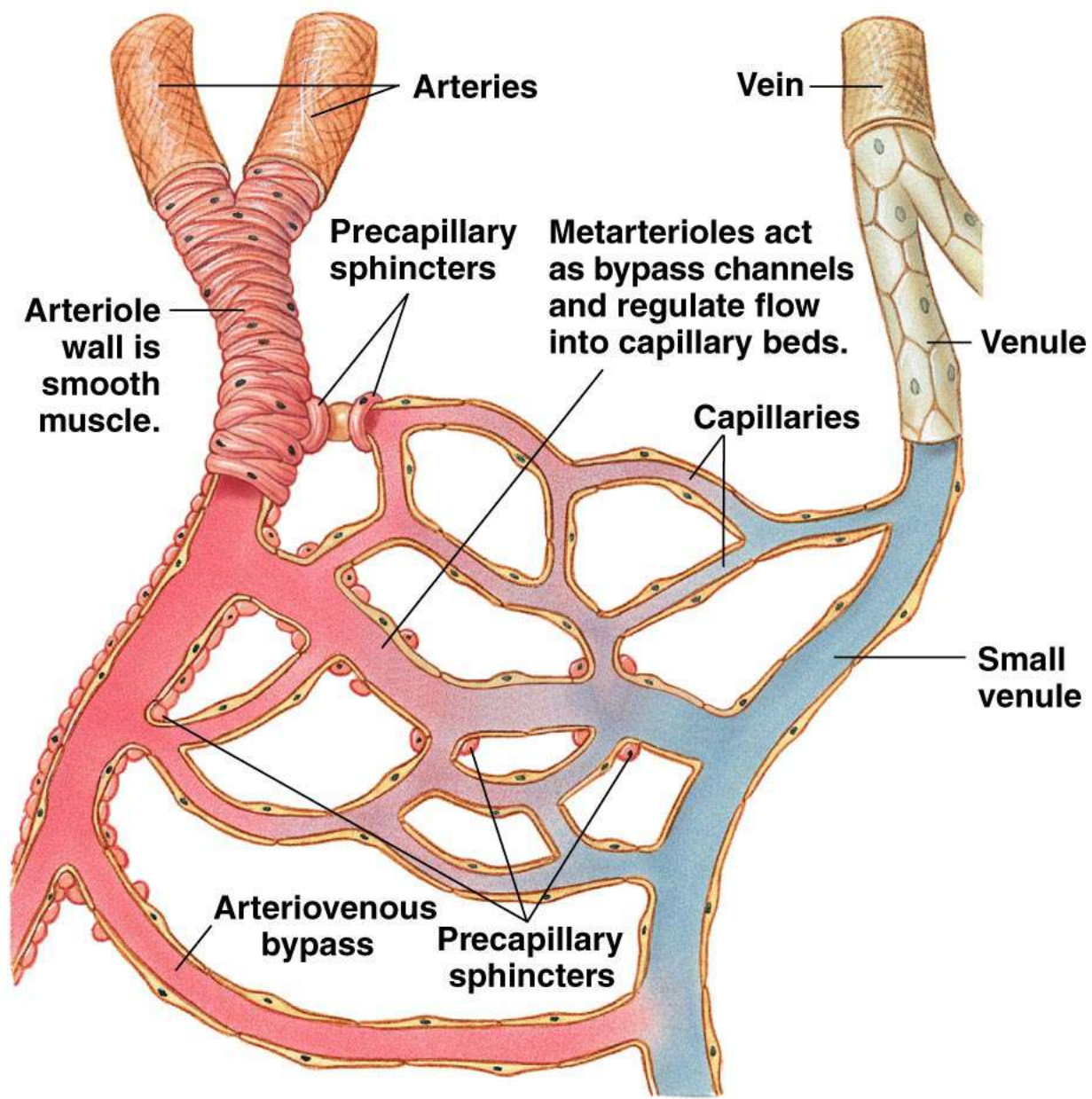
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Figure 15-1

	Mean diameter	Mean wall thickness	Endothelium Elastic tissue Smooth muscle Fibrous tissue	
Artery	4.0 mm	1.0 mm		
Arteriole	30.0 μm	6.0 μm		
Capillary	8.0 μm	0.5 μm		
Venule	20.0 μm	1.0 μm		
Vein	5.0 mm	0.5 mm		

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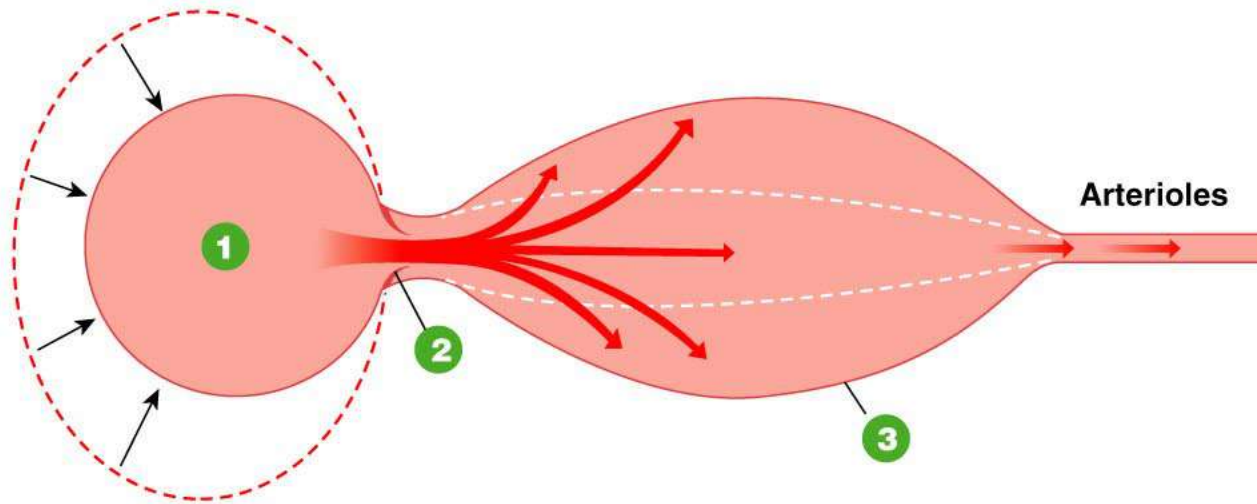
Figure 15-2



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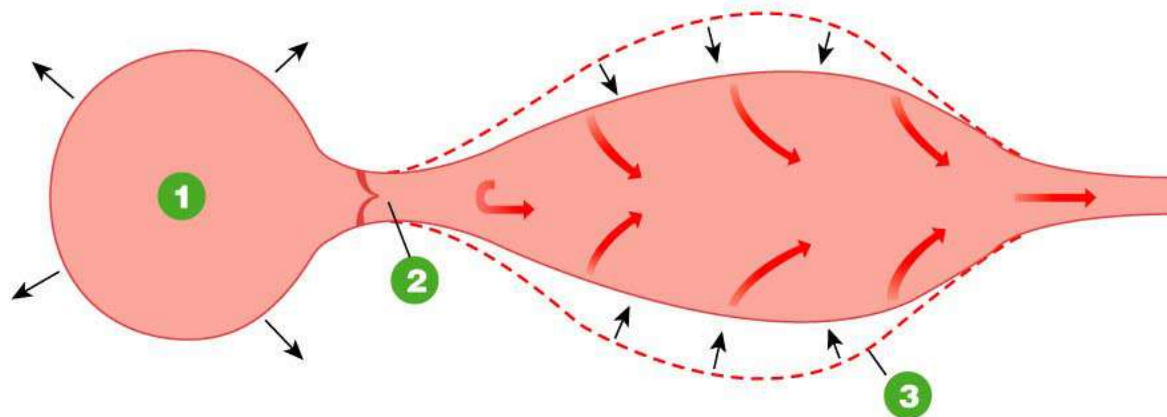
Figure 15-3

### (a) Ventricular contraction



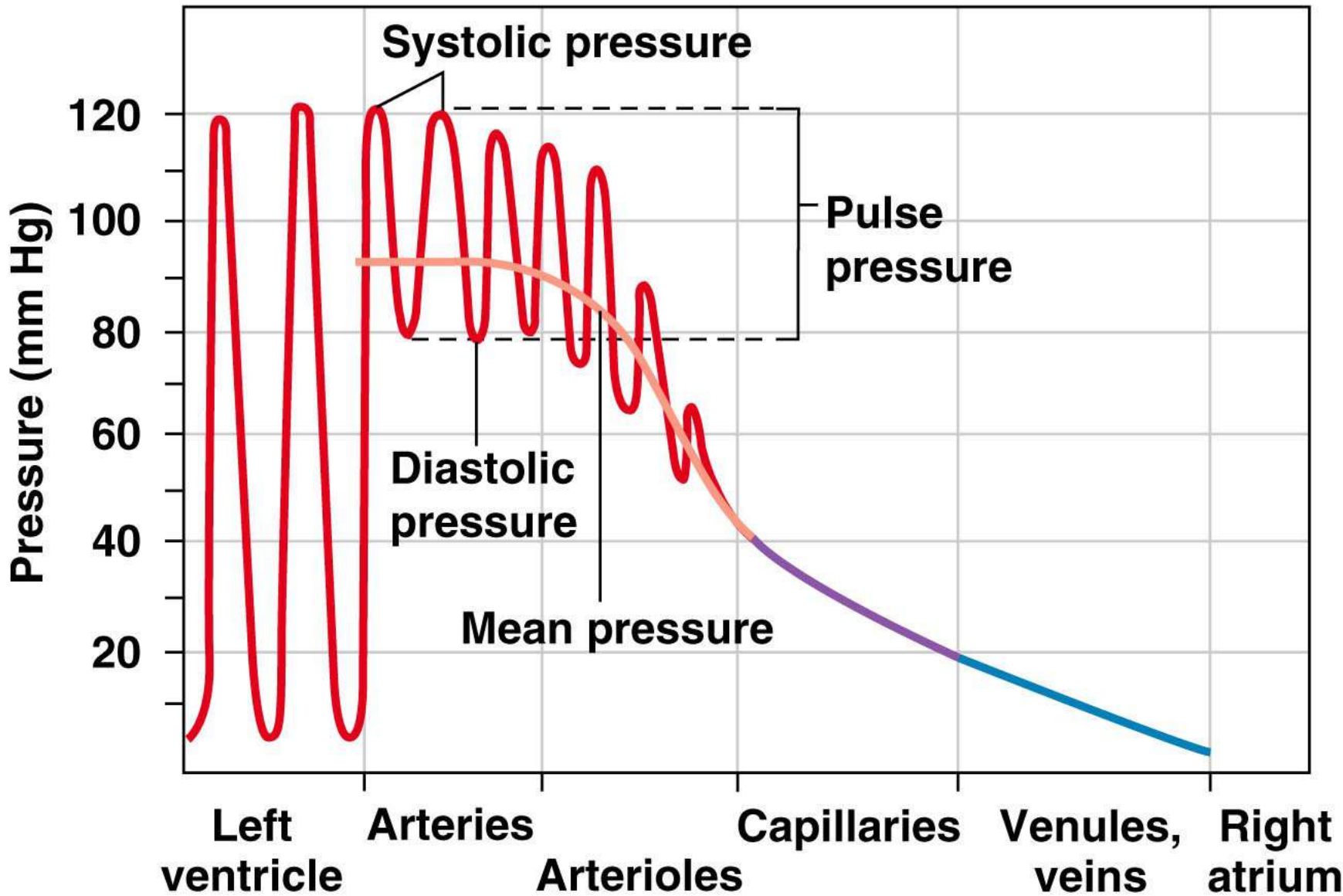
- 1 Ventricle contracts.
- 2 Semilunar valve opens.
- 3 Aorta and arteries expand and store pressure in elastic walls.

### (b) Ventricular relaxation



- 1 Isovolumic ventricular relaxation occurs.
- 2 Semilunar valve shuts, preventing flow back into ventricle.
- 3 Elastic recoil of arteries sends blood forward into rest of circulatory system.

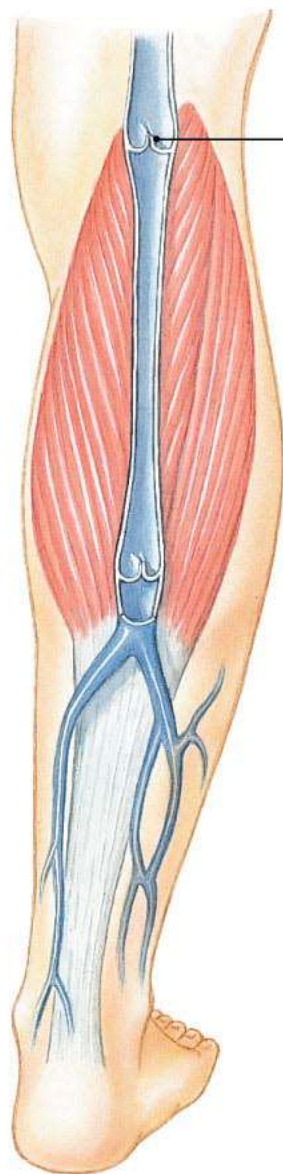




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Figure 15-5

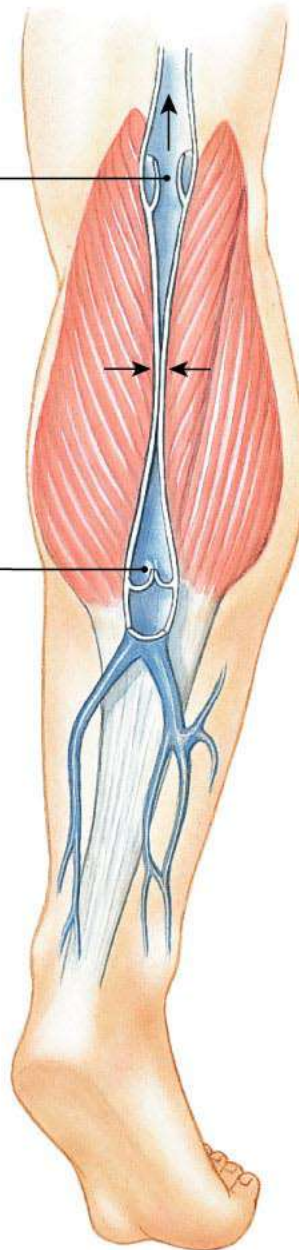
Valves in the veins prevent backflow of blood.



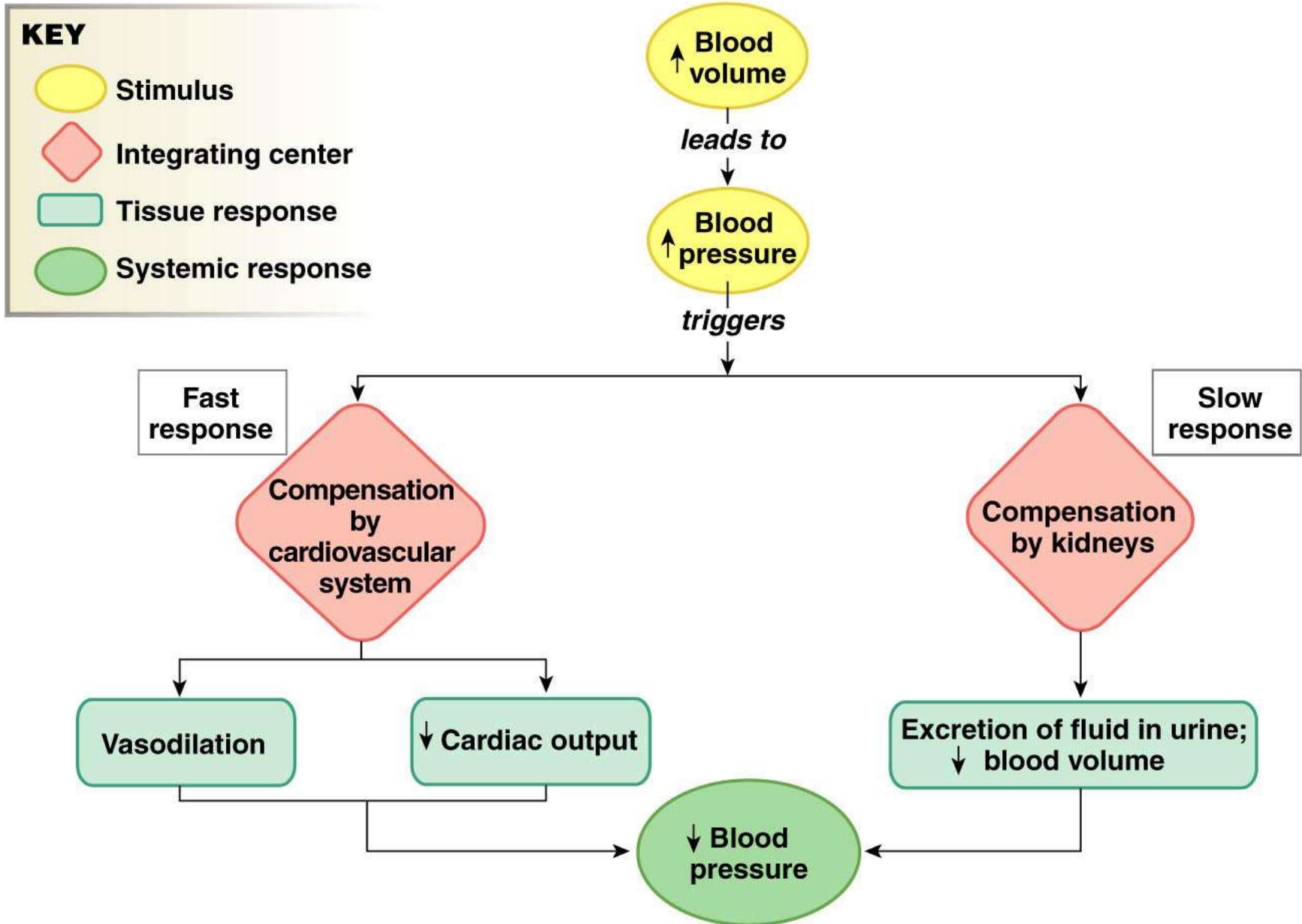
Valve closed

Valve open

Valve closed

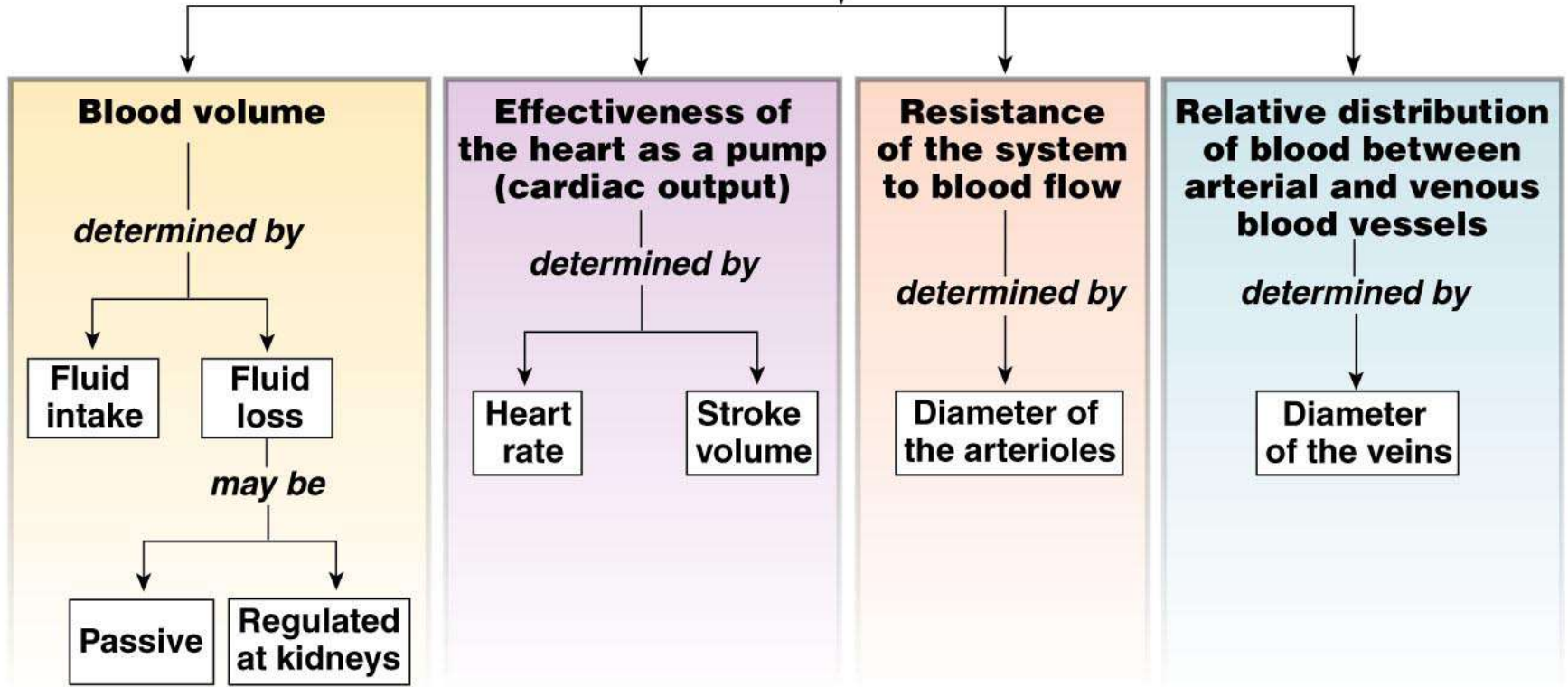


When the skeletal muscles compress the veins, they force blood toward the heart (the skeletal muscle pump).



**MEAN ARTERIAL BLOOD PRESSURE**

*is determined by*

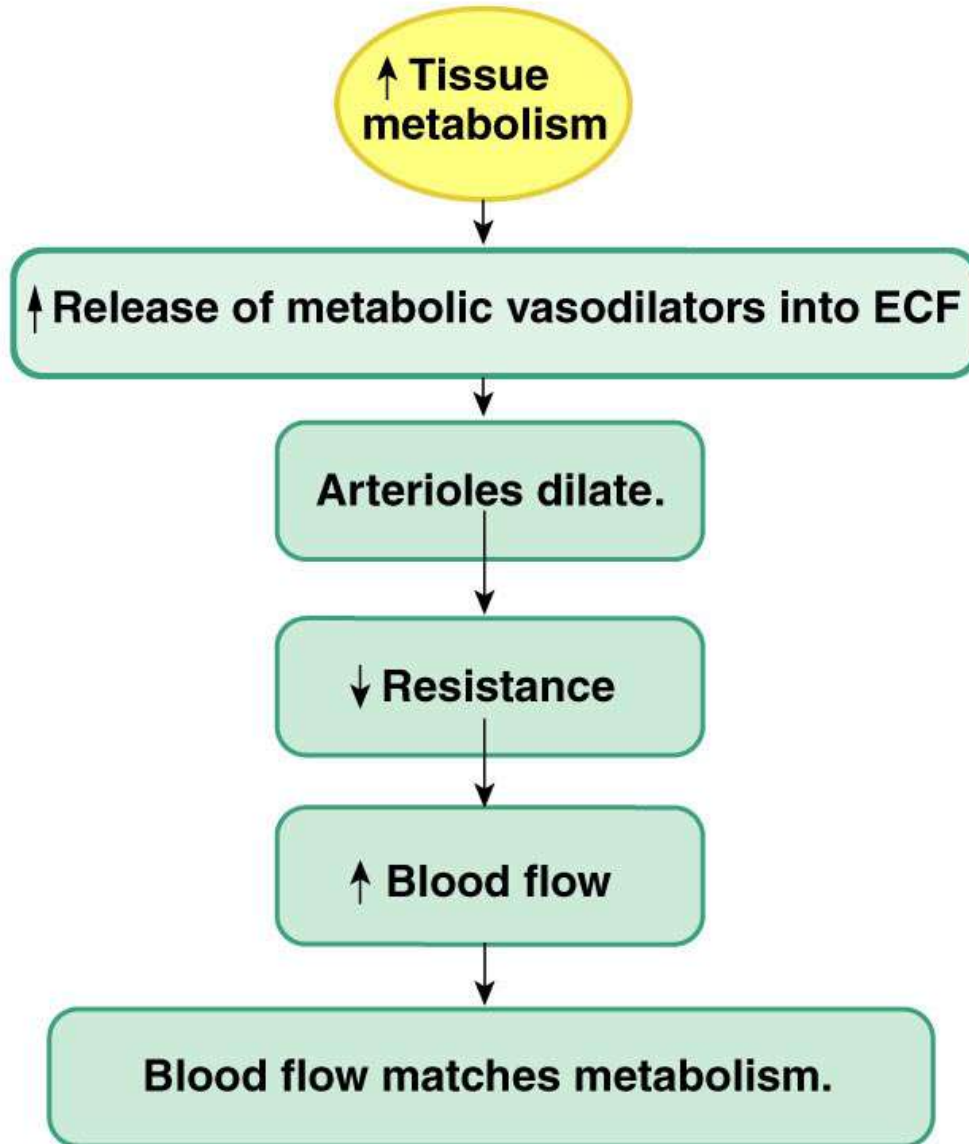


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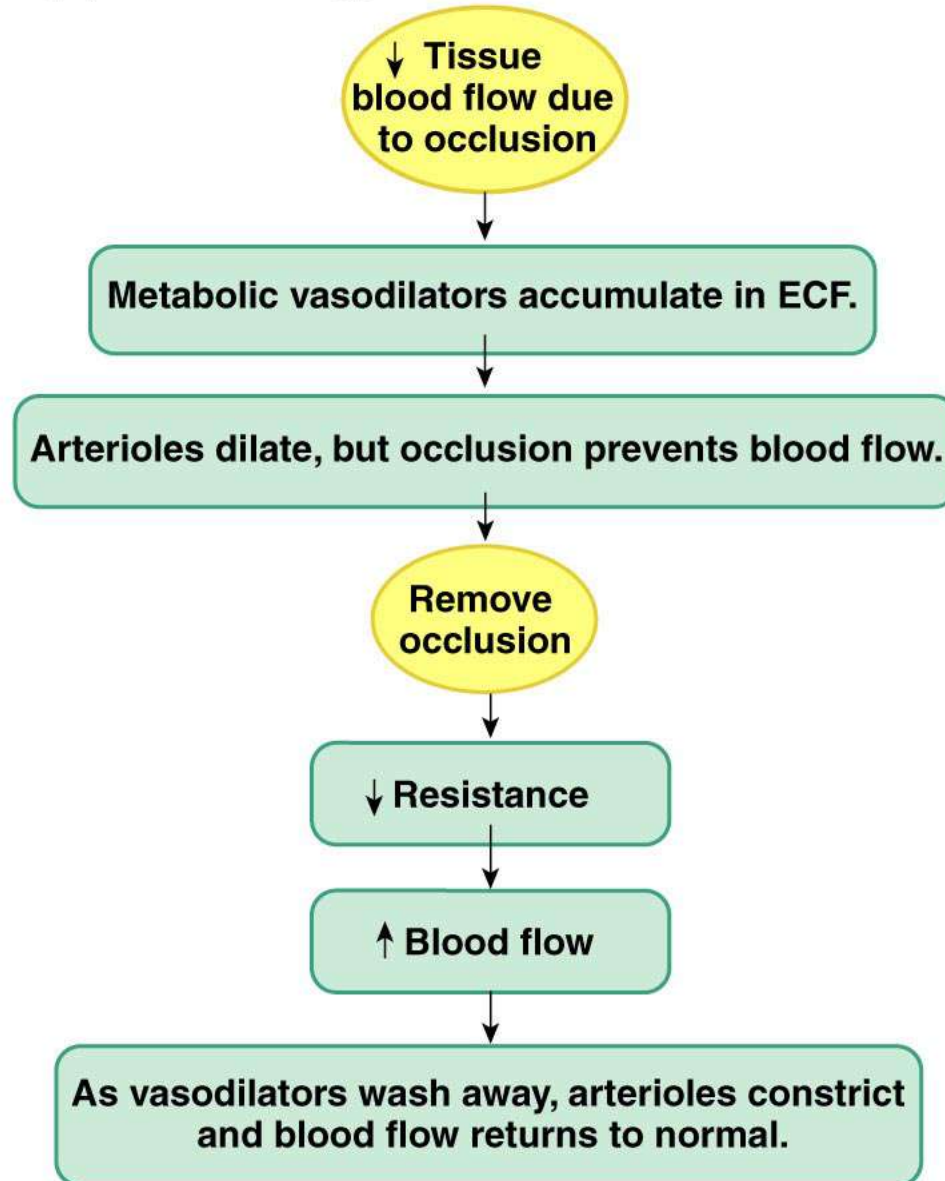
Figure 15-10



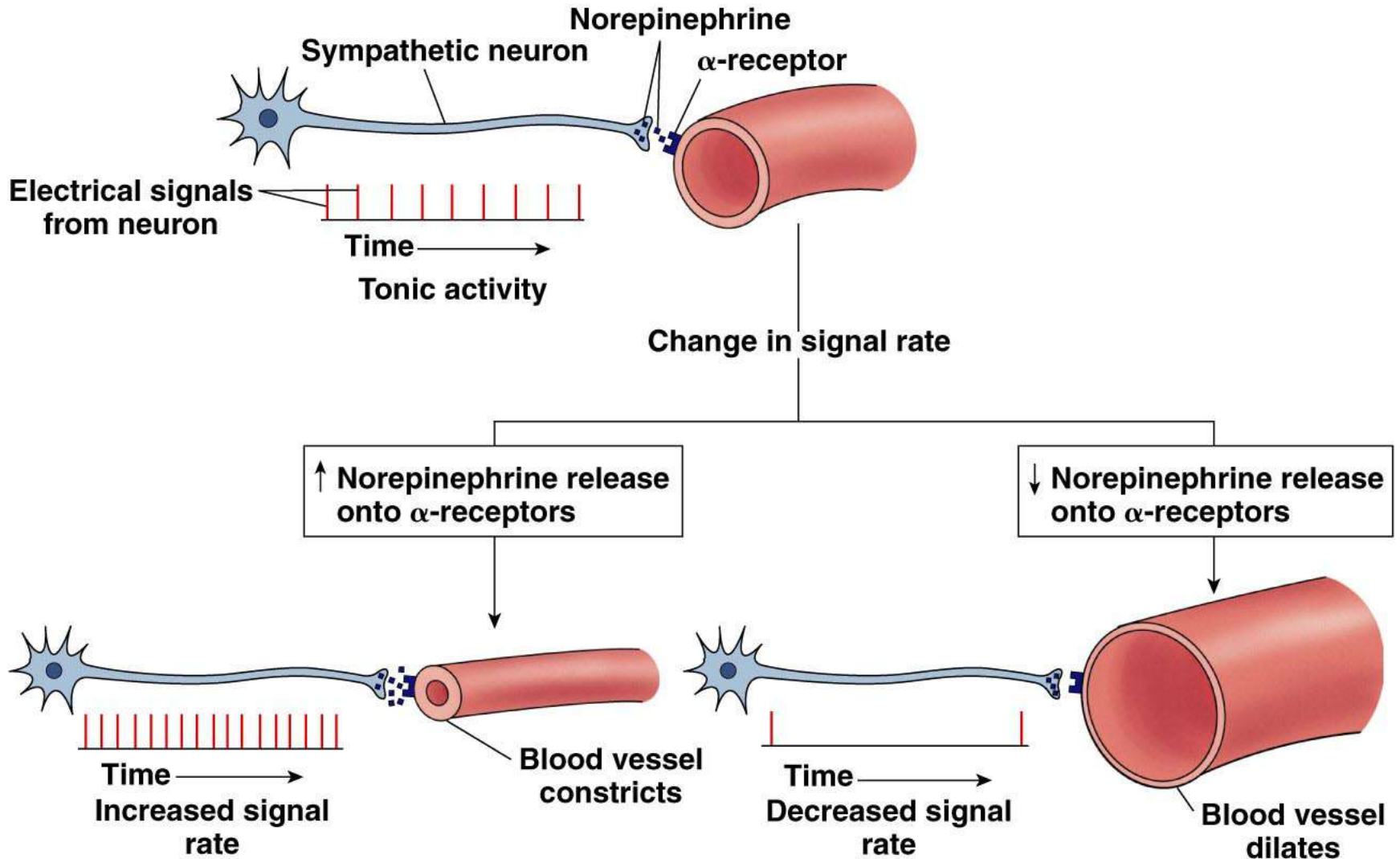
### (a) Active hyperemia

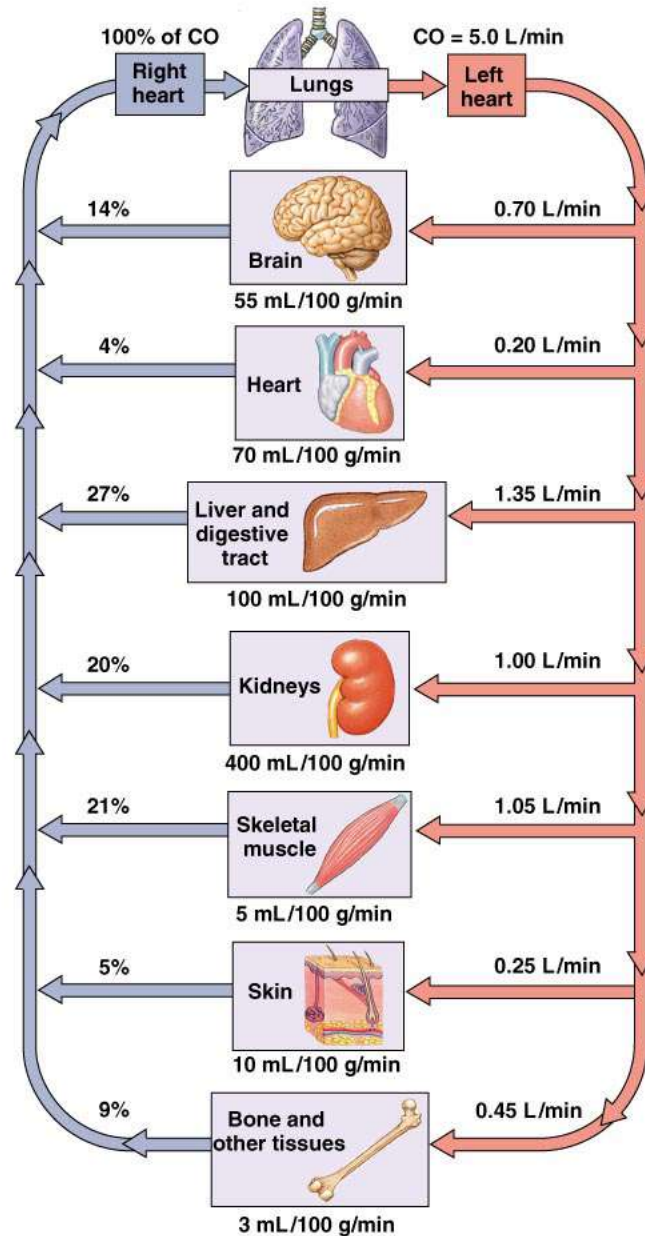


## **(b) Reactive hyperemia**



Arteriole diameter is controlled by tonic release of norepinephrine.



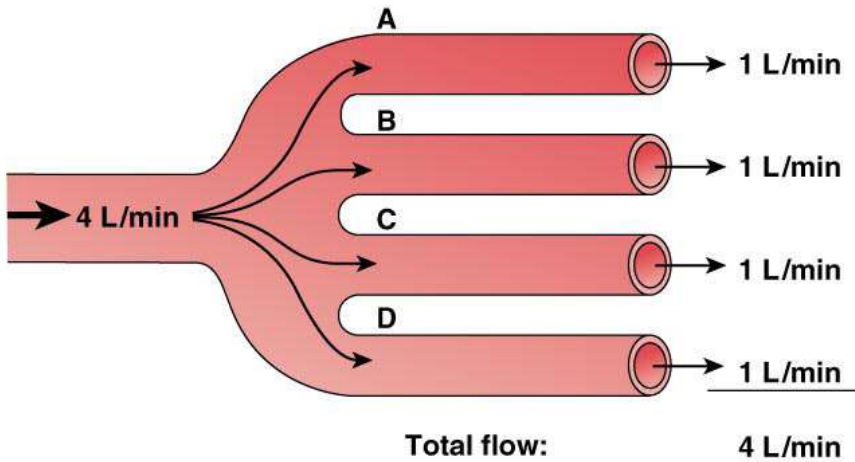


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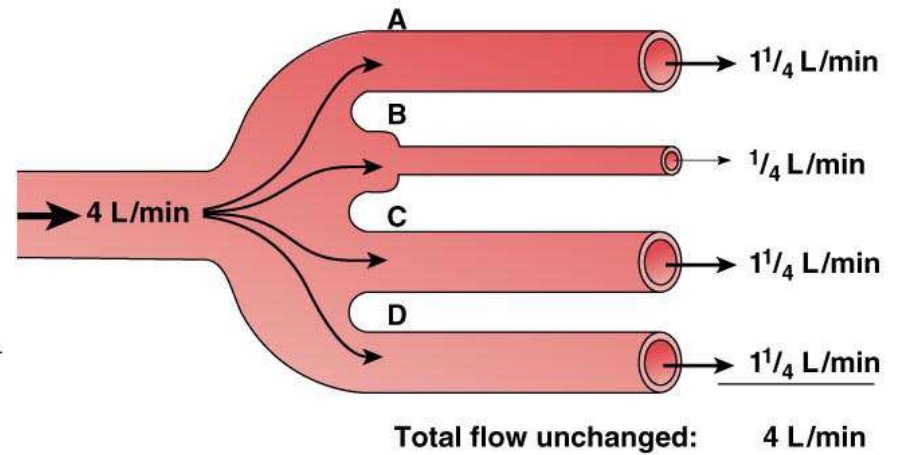
Figure 15-13



**(a)** Blood flow through four identical vessels (A–D) is equal. Total flow into vessels equals total flow out.

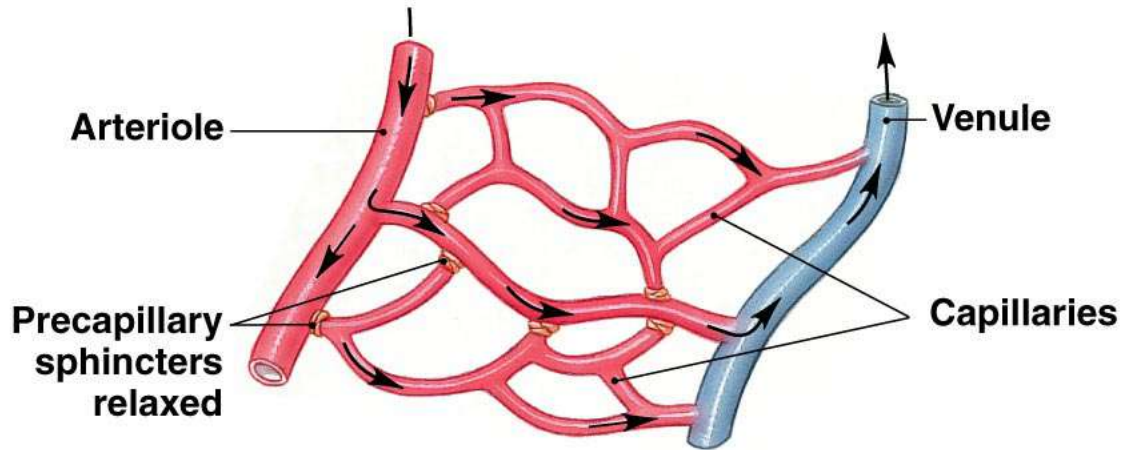


**(b)** When vessel B constricts, resistance of B increases and flow through B decreases. Flow diverted from B is divided among the lower-resistance vessels A, C, and D.

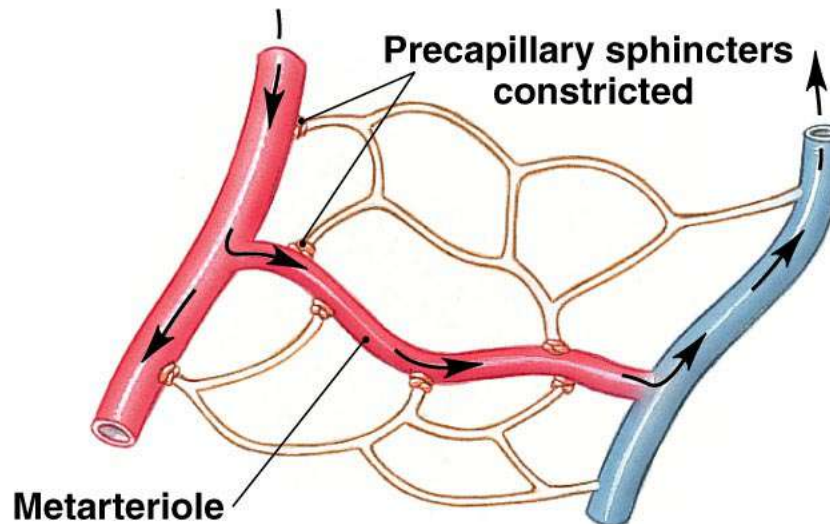


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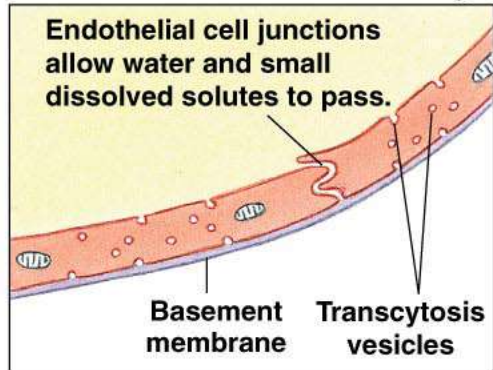
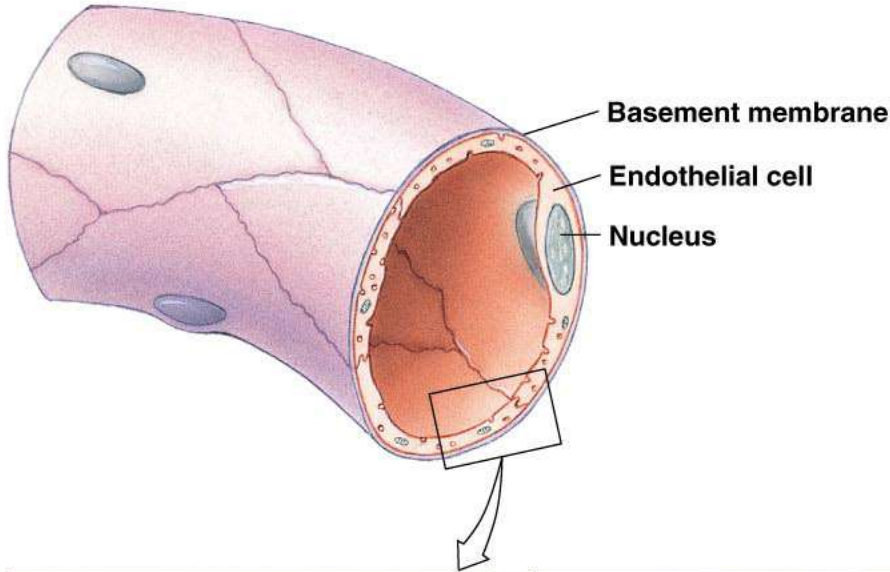
**(a)** When precapillary sphincters are relaxed, blood flows through all capillaries in the bed.



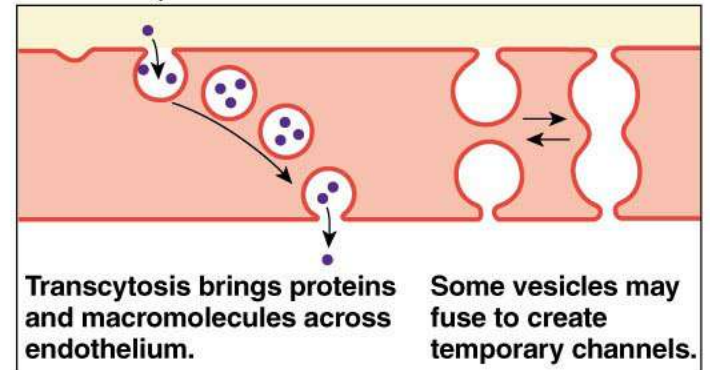
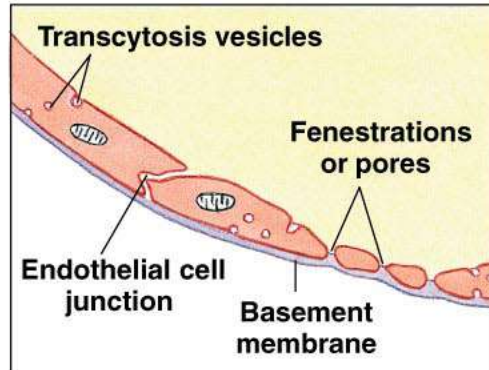
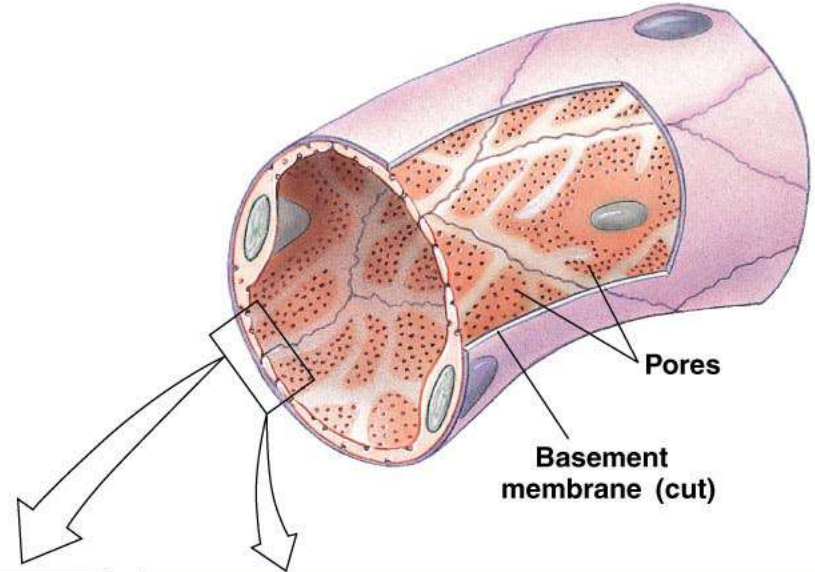
**(b)** If precapillary sphincters constrict, blood flow bypasses capillaries completely and flows through metarterioles.



**(a) Continuous capillaries have leaky junctions.**

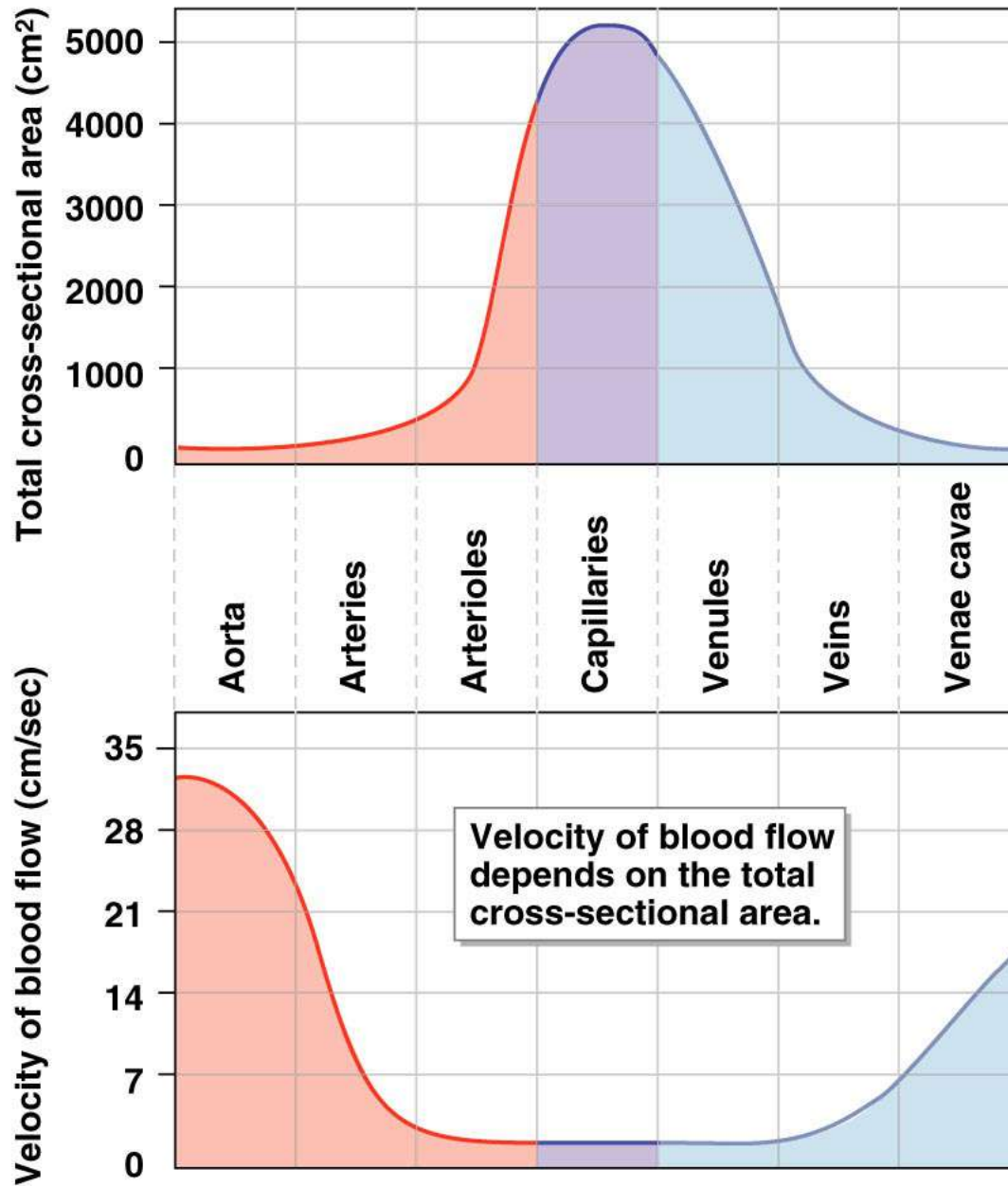


**(b) Fenestrated capillaries have large pores.**



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**Figure 15-16 - Overview**

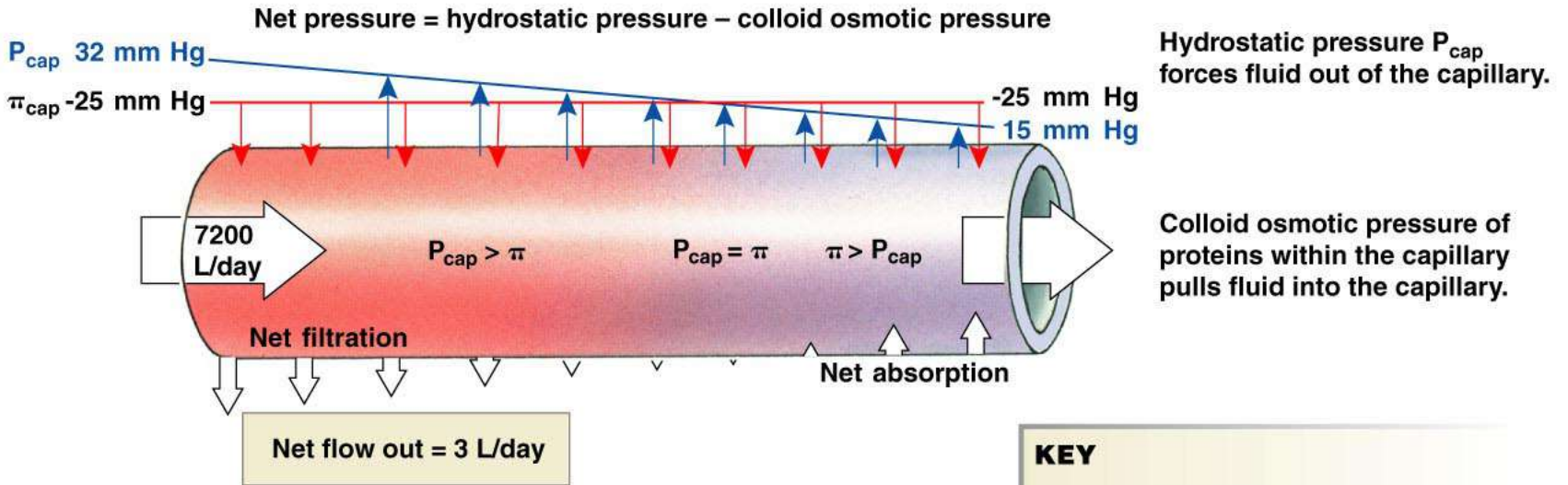


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Figure 15-17



**(a) Filtration in systemic capillaries**



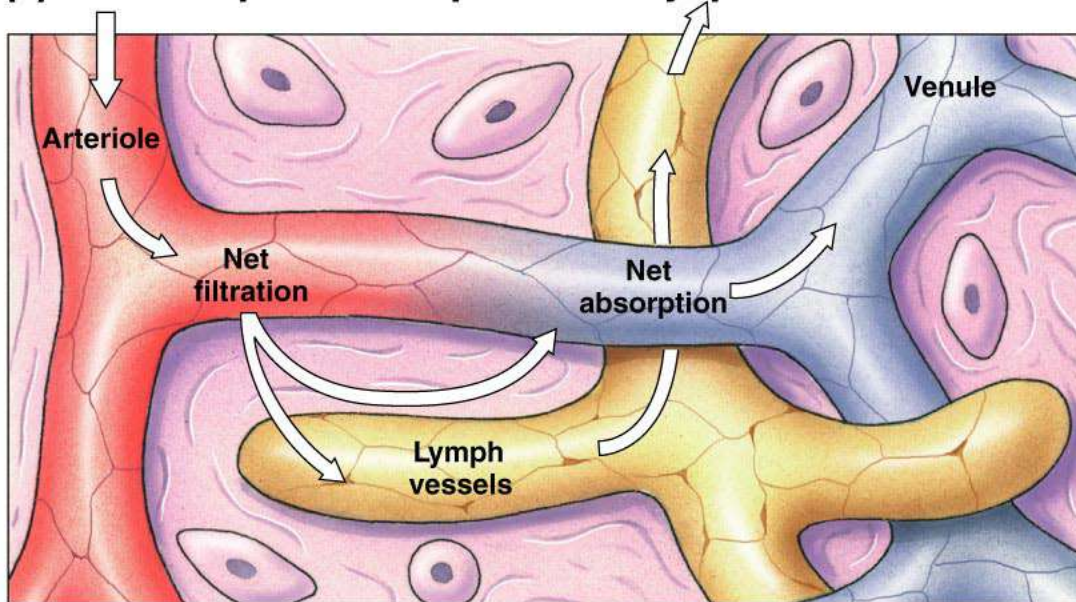
**KEY**

$P_{cap}$  = Capillary hydrostatic pressure

$\pi$  = Colloid osmotic pressure

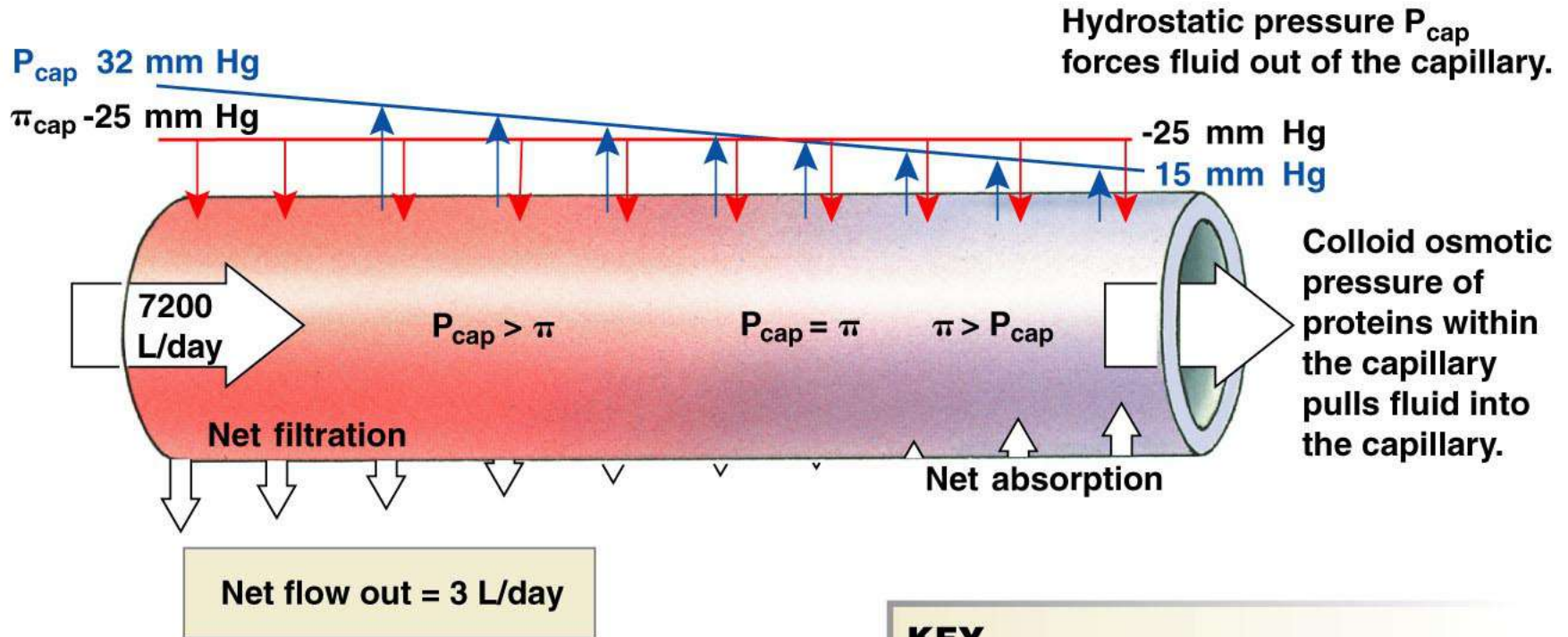
The excess water and solutes that filter out of the capillary are picked up by the lymph vessels and returned to the circulation.

**(b) Relationship between capillaries and lymph vessels**



### (a) Filtration in systemic capillaries

Net pressure = hydrostatic pressure – colloid osmotic pressure



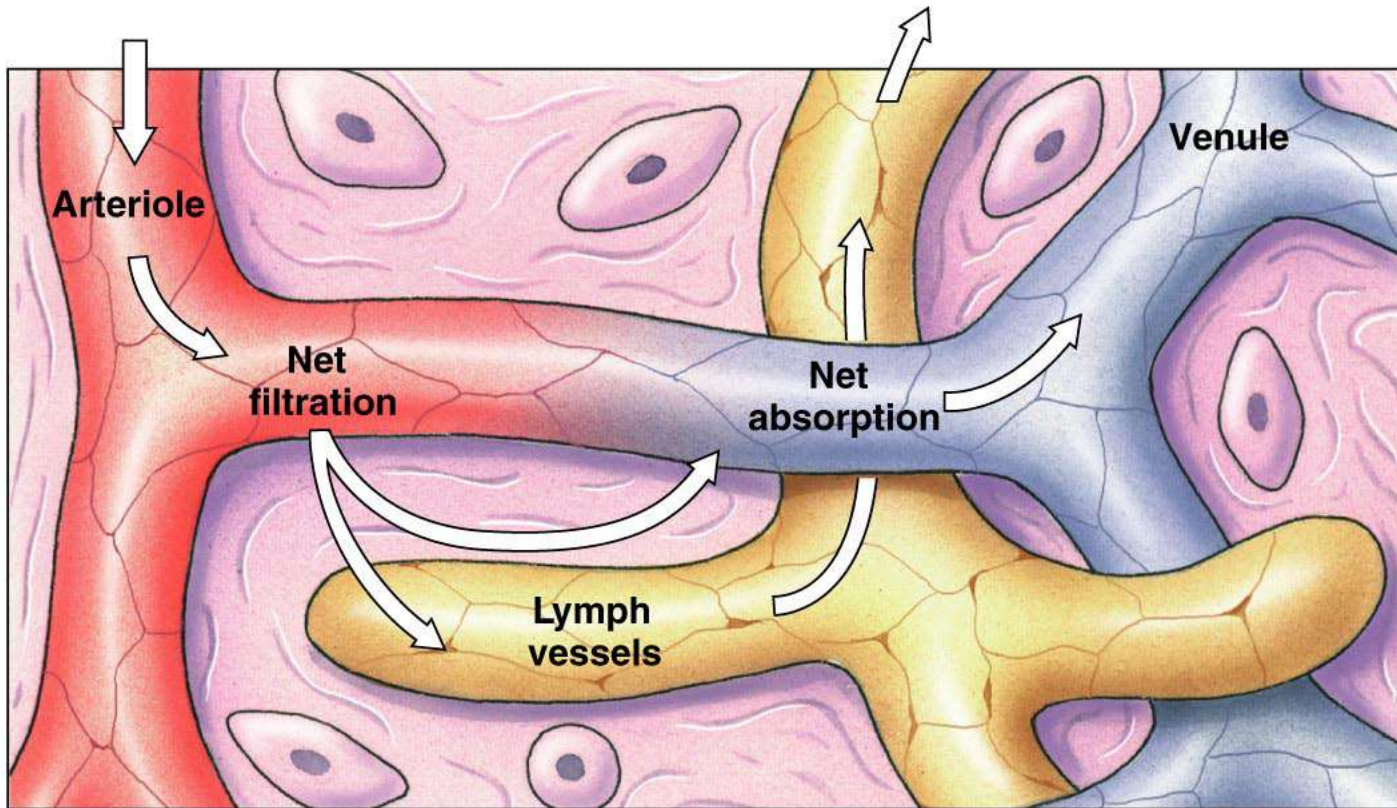
#### KEY

$P_{cap}$  = Capillary hydrostatic pressure

$\pi$  = Colloid osmotic pressure

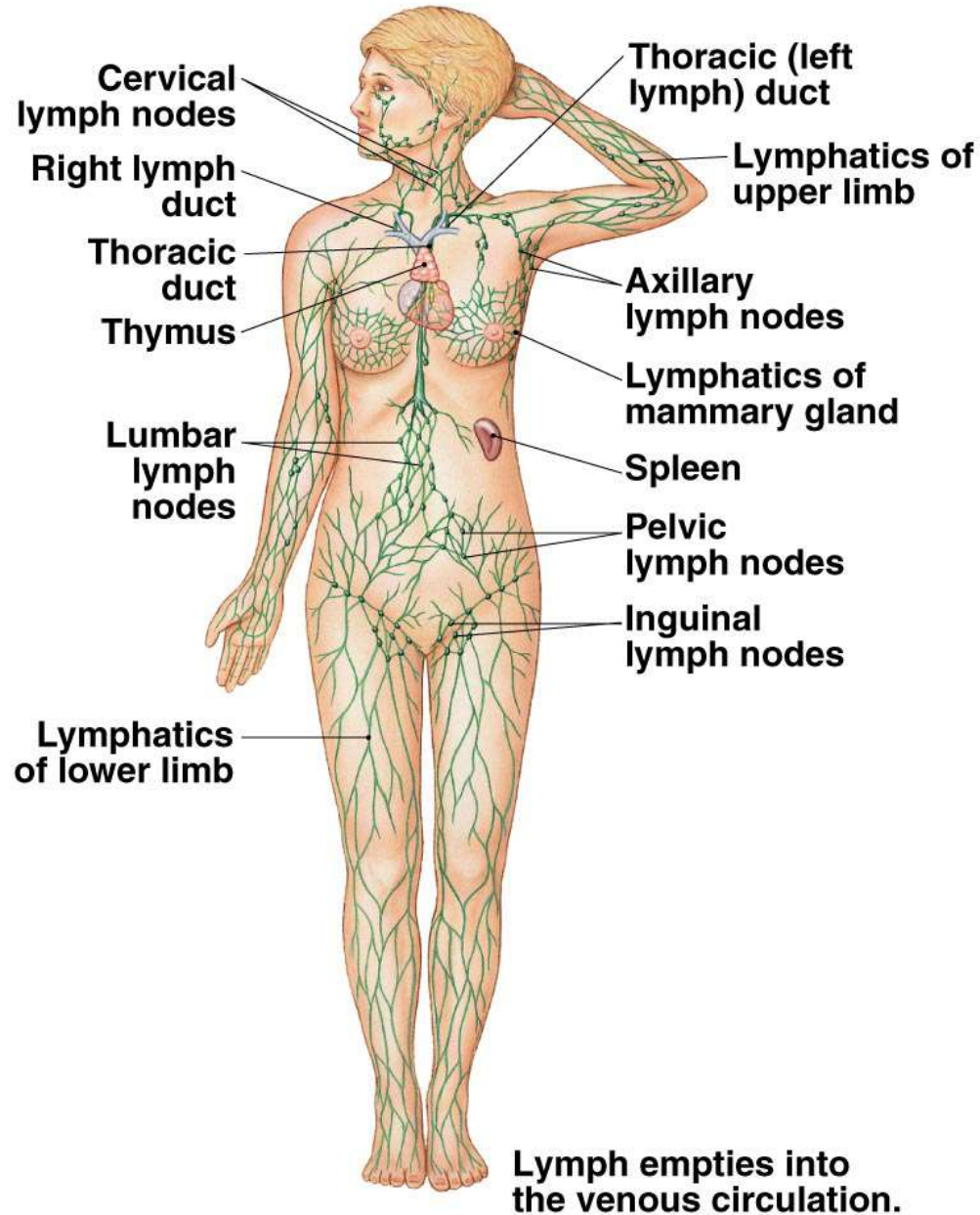


**(b) Relationship between capillaries and lymph vessels**

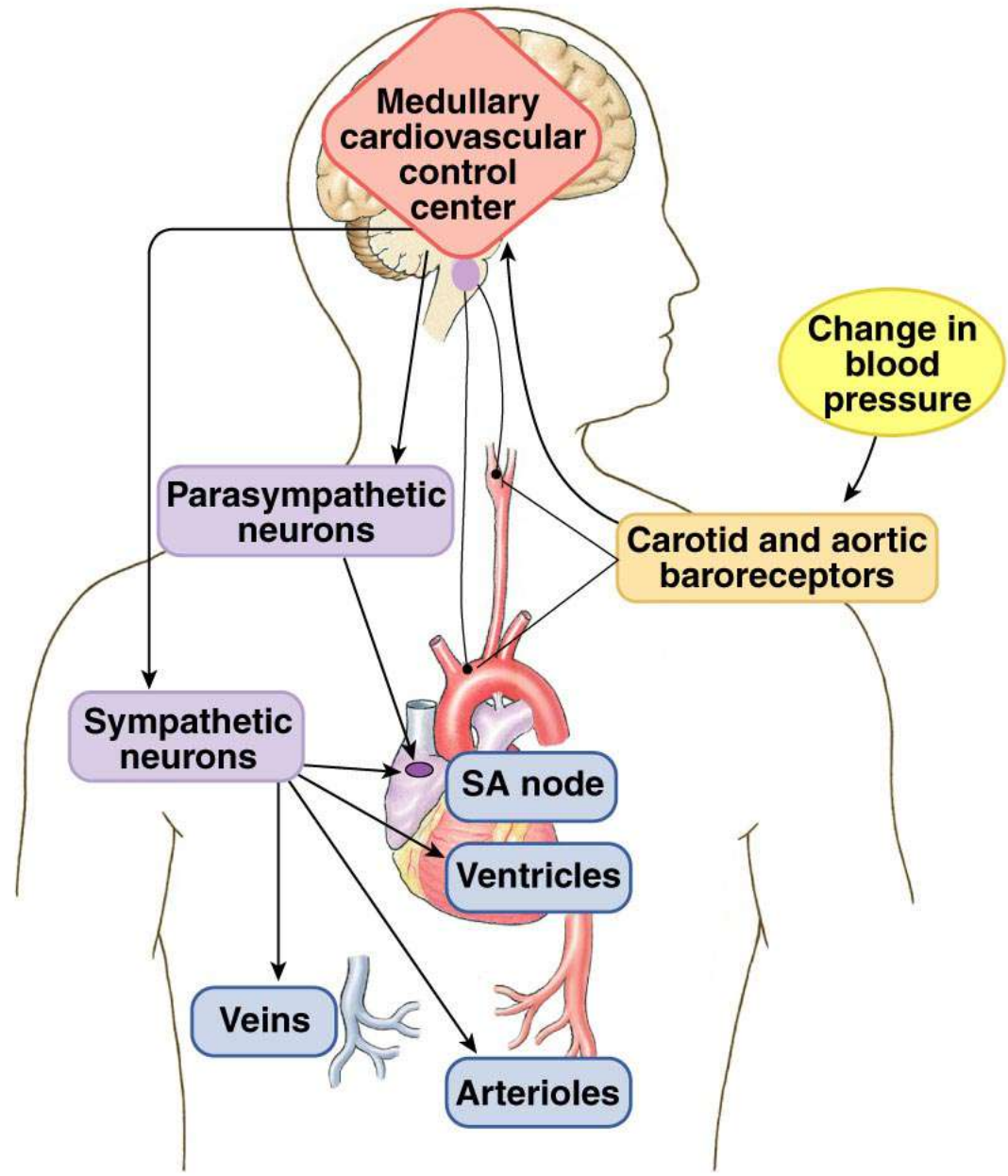
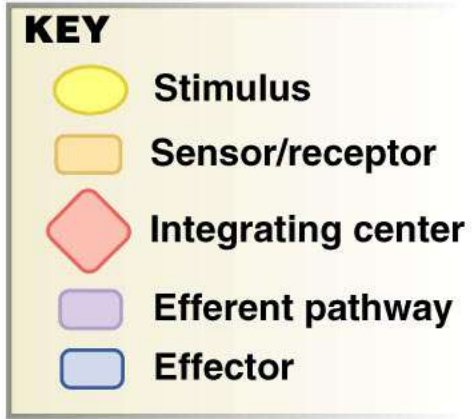


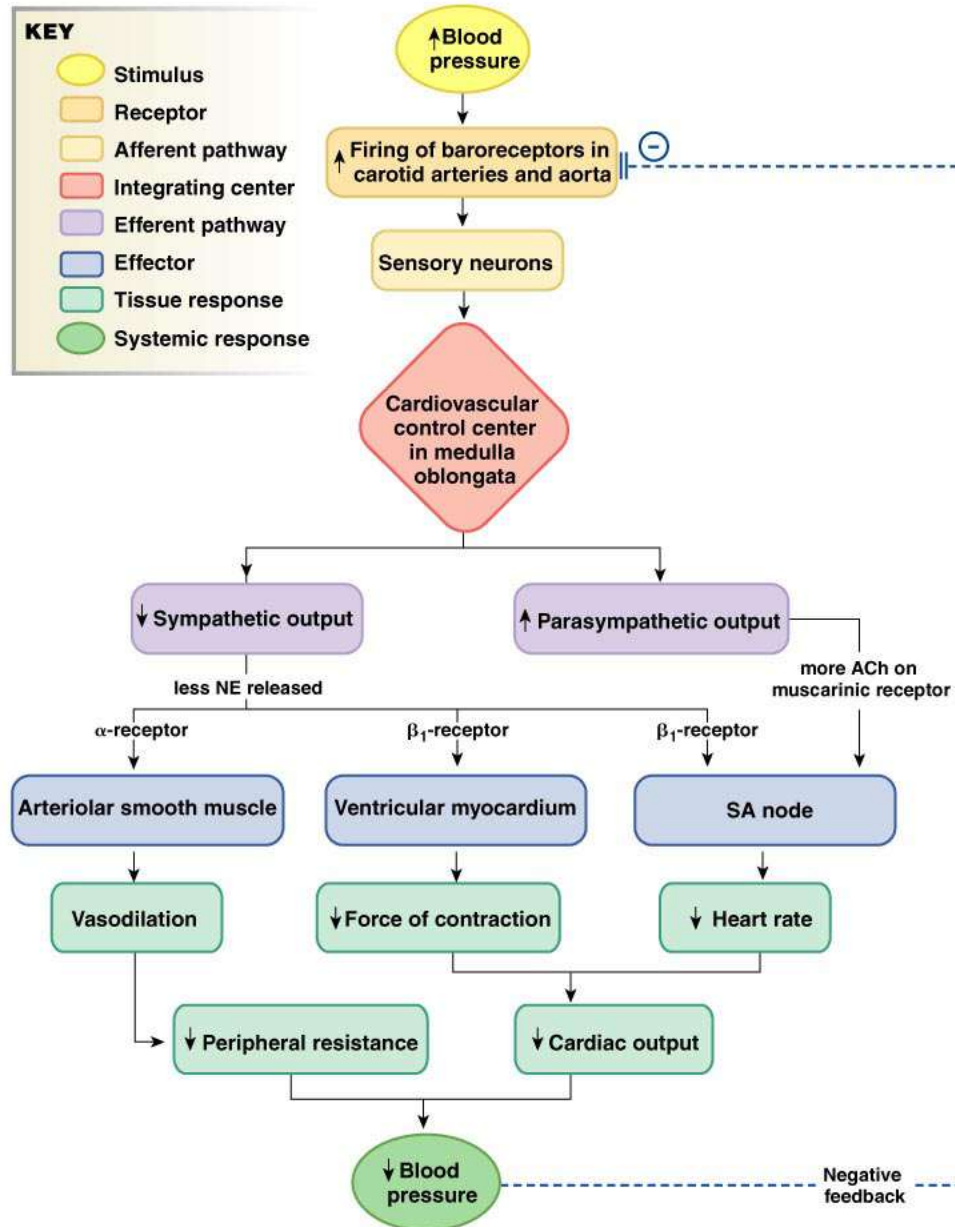
The excess water and solutes that filter out of the capillary are picked up by the lymph vessels and returned to the circulation.

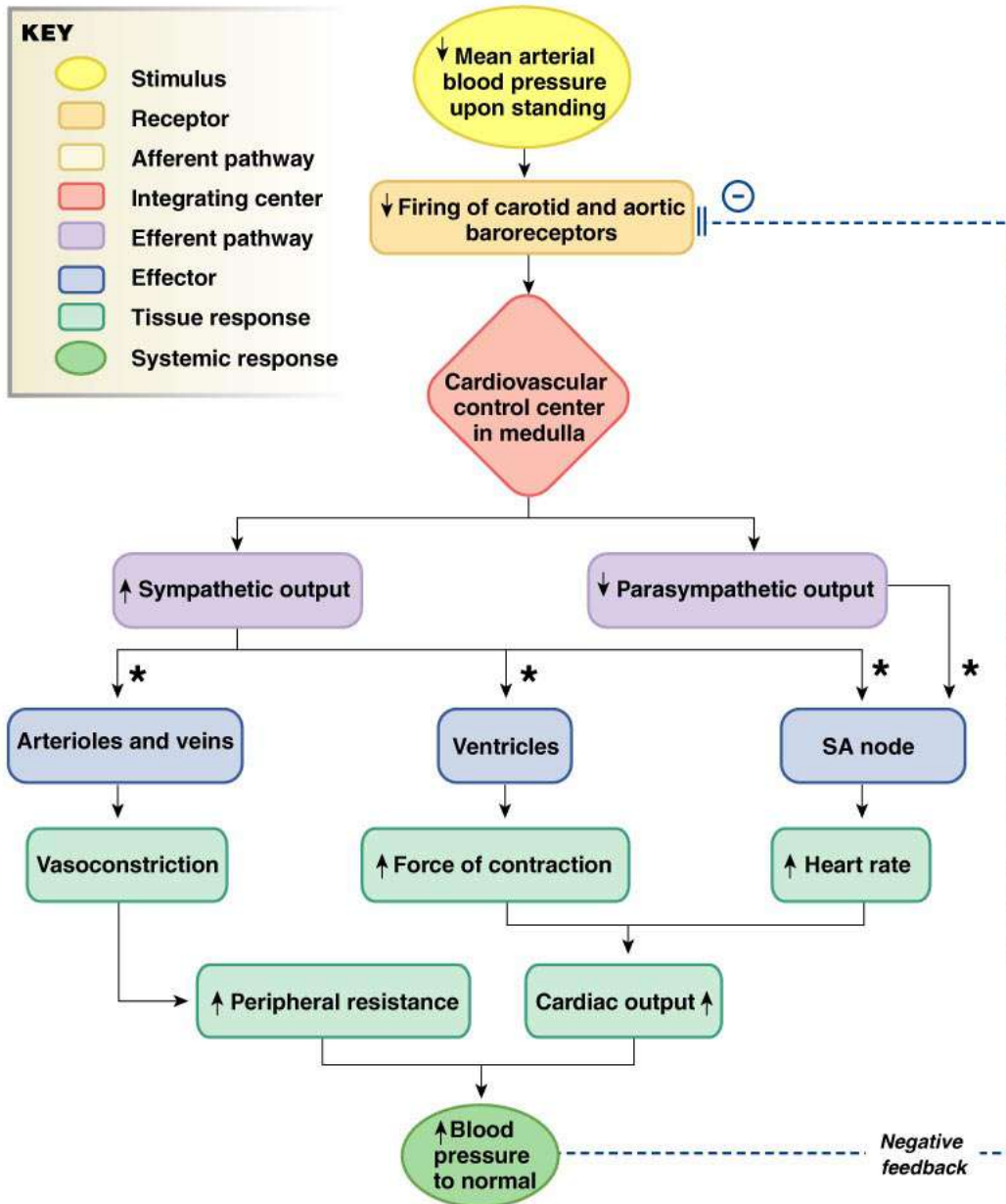
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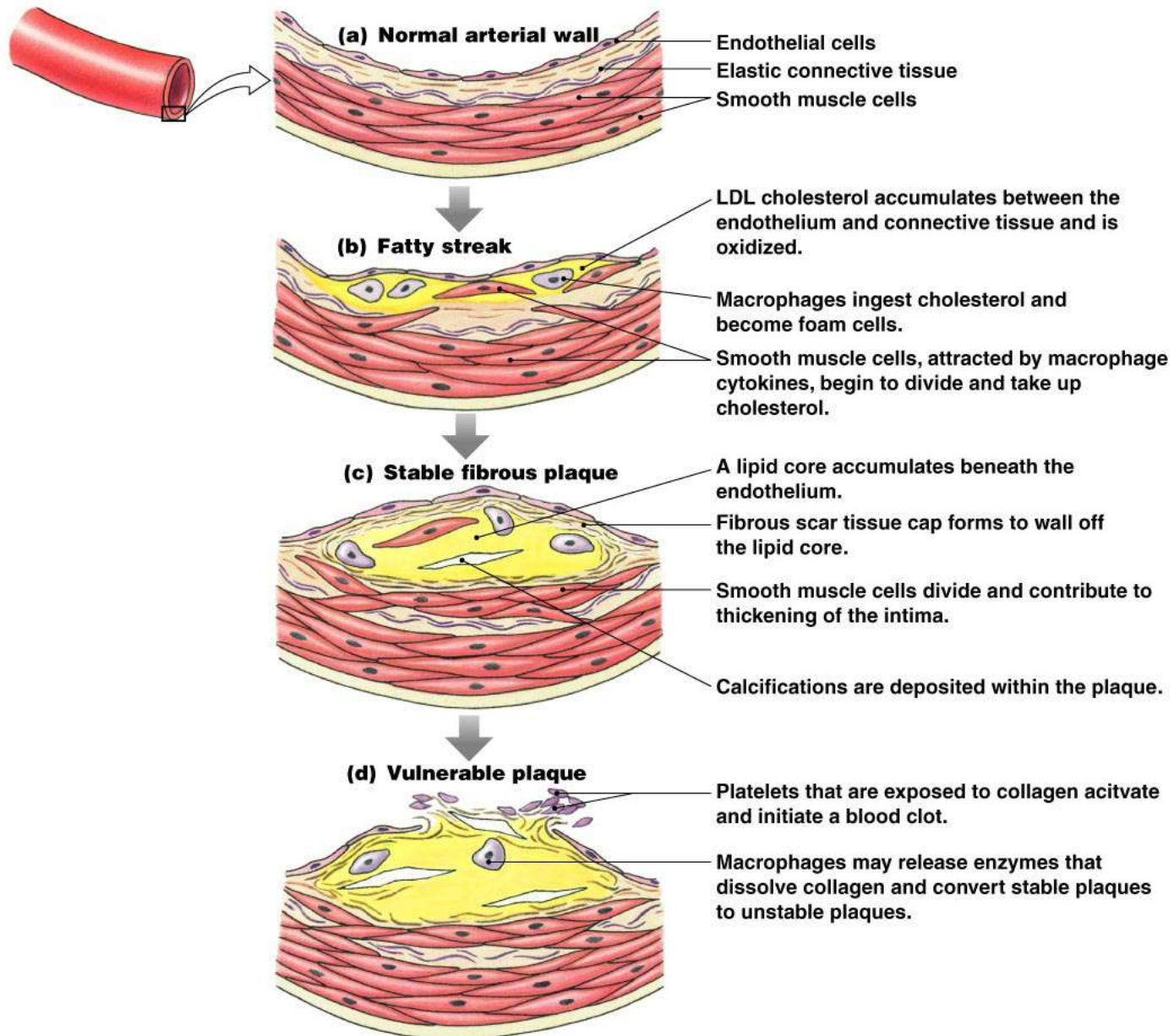




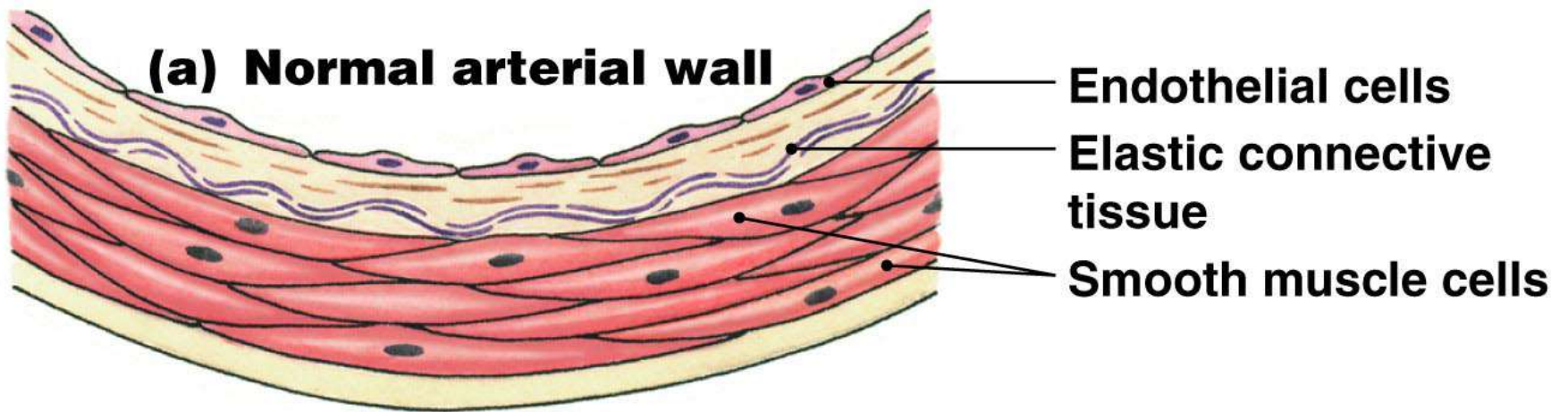




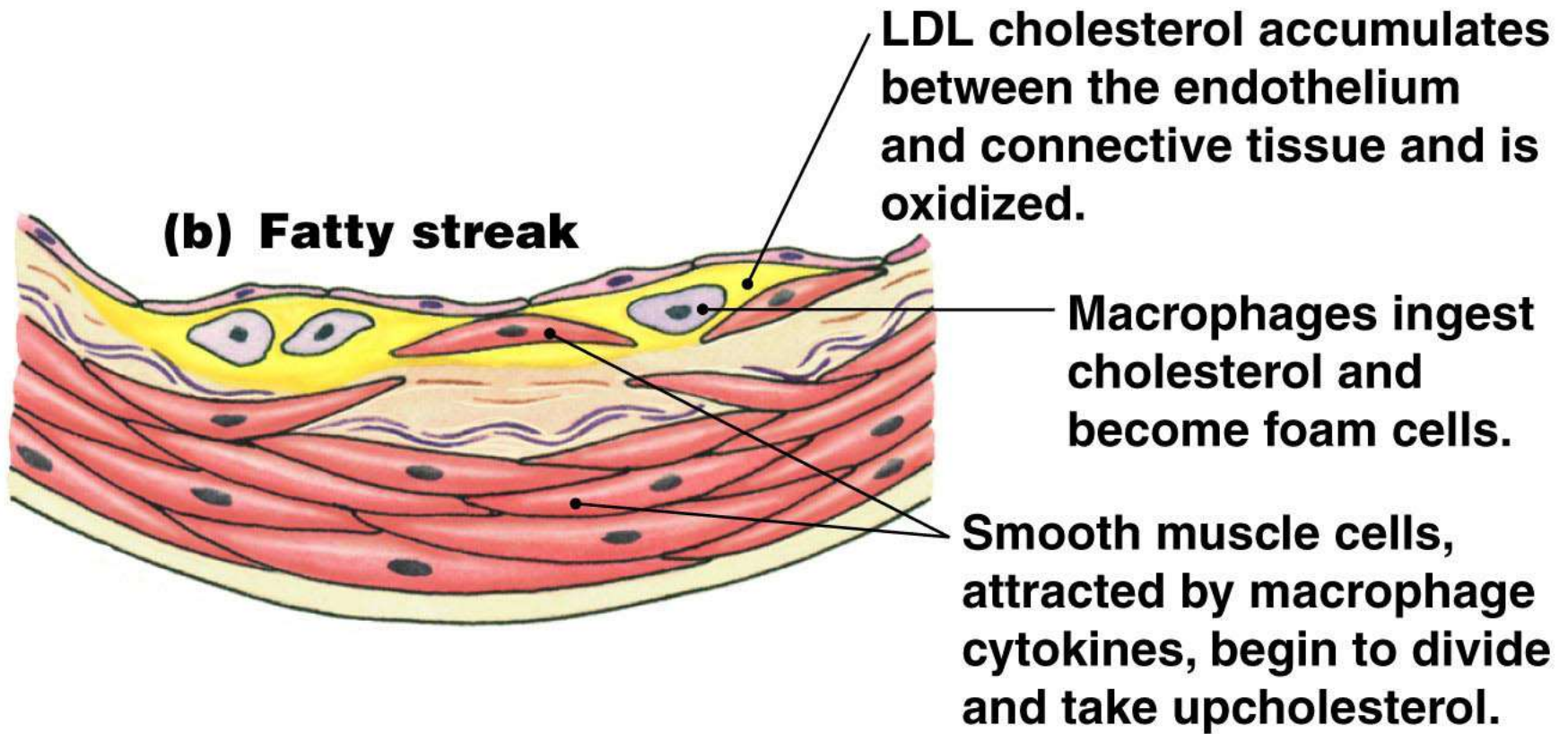






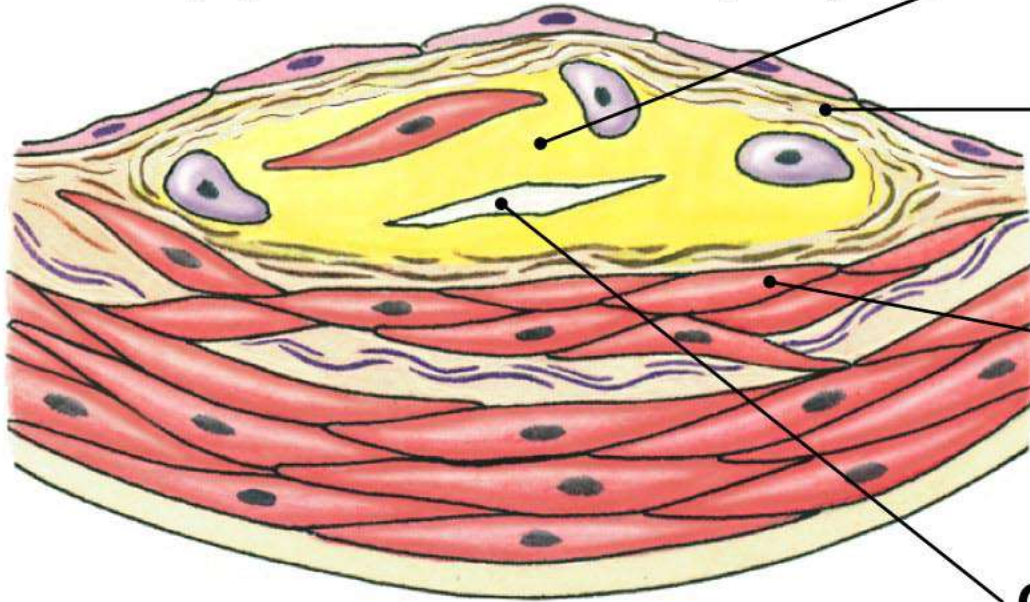


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**(c) Stable fibrous plaque**



**A lipid core accumulates beneath the endothelium.**

**Fibrous scar tissue cap forms to wall off the lipid core.**

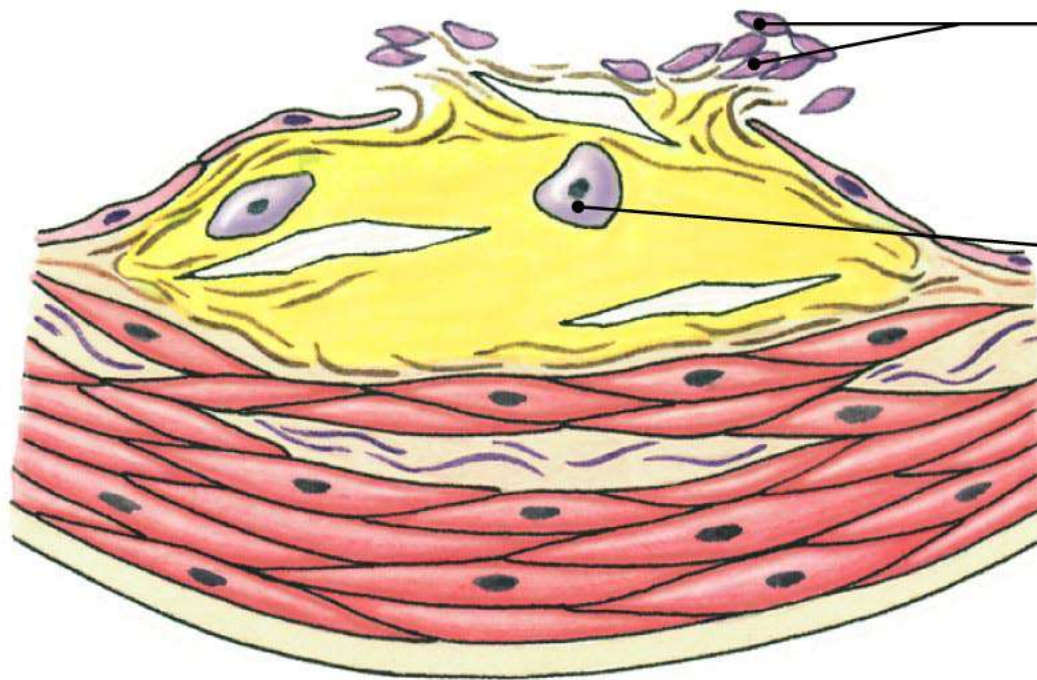
**Smooth muscle cells divide and contribute to thickening of the intima.**

**Calcifications are deposited within the plaque.**

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**(d) Vulnerable plaque**



**Platelets that are exposed to collagen activate and initiate a blood clot.**

**Macrophages may release enzymes that dissolve collagen and convert stable plaques to unstable plaques.**

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