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BLOOD VESSELS

ARTERIES VEINS

CAPILLARIES

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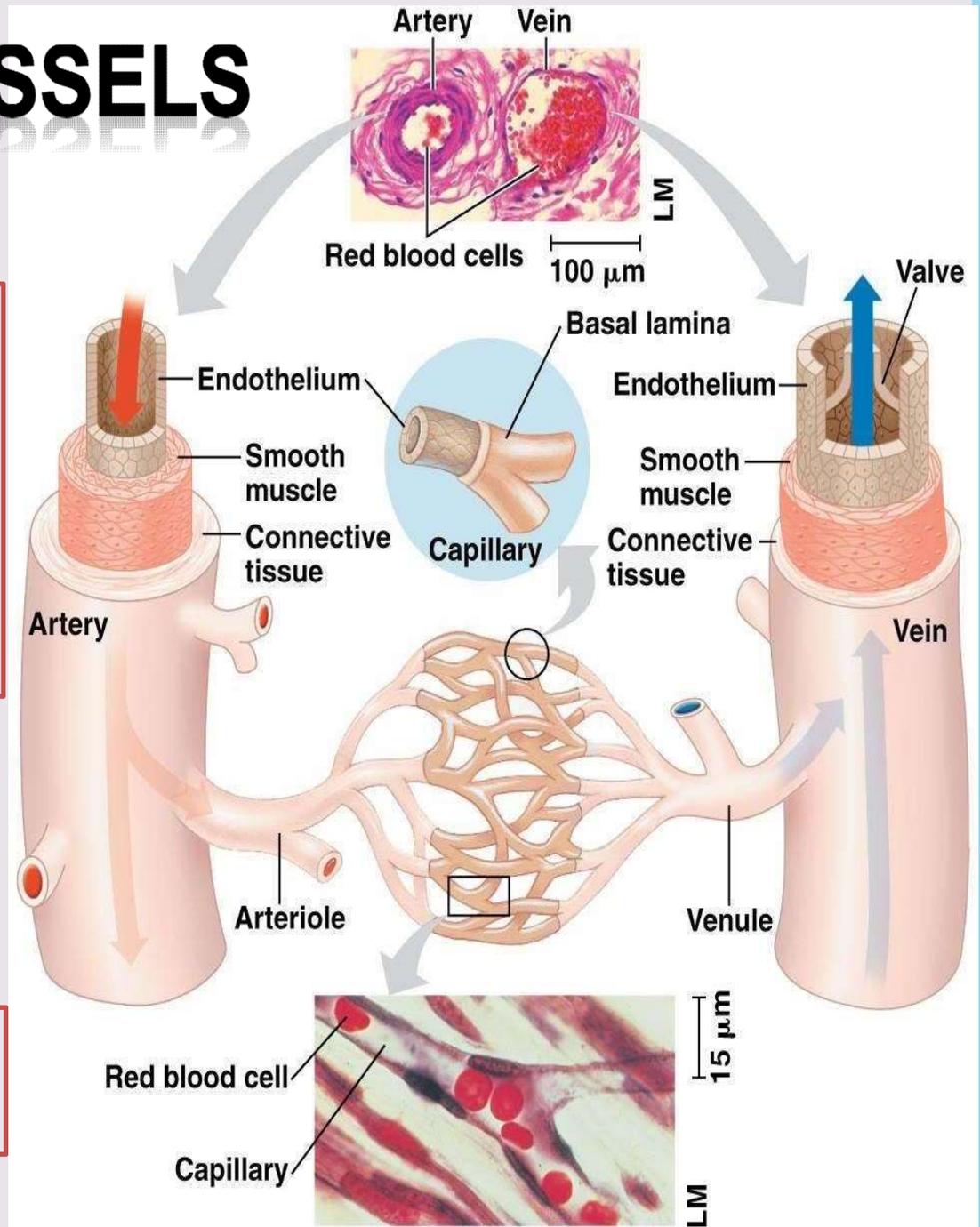
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BLOOD VESSELS

3 major types
Arteries
Capillaries
Veins

2 sub-types
Arterioles **Venules**

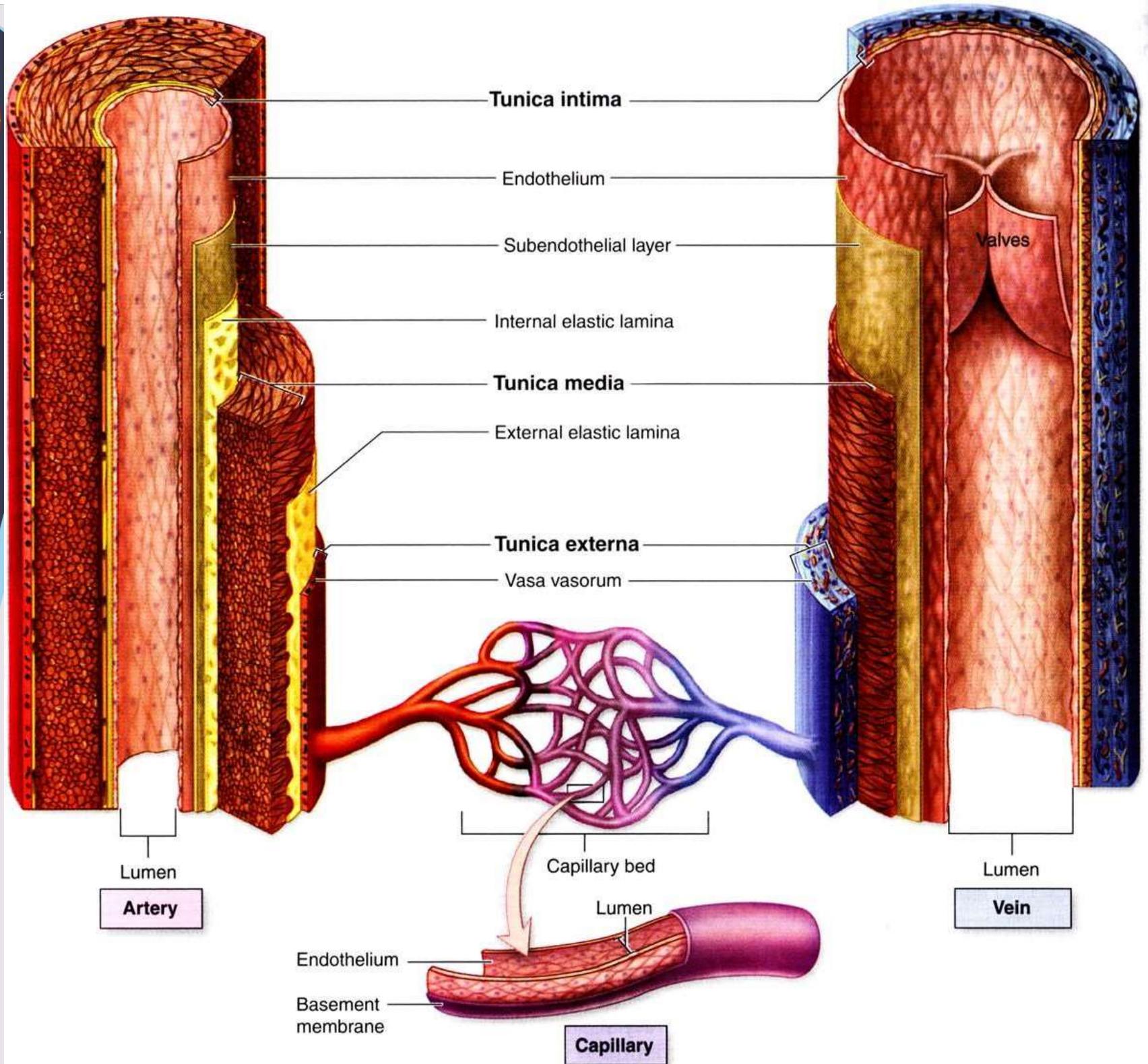
60,000 miles or
100,000km of blood
vessels



STRUCTURE OF VESSELS



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BLOODS TRAVEL THRU VESSELS



- As the **heart contracts**, it forces blood into the **large arteries** leaving the ventricles.
- The blood then move to **smaller arteries**, finally reaching their smallest branches, the **arterioles** (little arteries), which feed into the **capillary beds** (collection of capillaries) of body organs and tissues.
- Blood drains from the capillaries into **venules** (little veins), and then on into larger and larger veins that merge to form the large veins that ultimately empty into the heart.



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- Carry blood **away** from the heart.
- “Branch” or “diverge” as they form smaller and smaller division.
- **Thick-walls** to withstand **pressure** produced when heart pushes blood into the arteries. **Elastic fibers** (tunica media) allow the artery to **stretch** under pressure.
- **Aorta**: Largest artery vessels
- **Arteriole**: Smallest artery vessel that connect arteries to capillaries

Pulmonary circulation

- Carry **poor oxygen blood** from heart to the lungs.

Systemic circulation

- Carry **rich oxygen blood** from heart to the organs and tissues.

ARTERIES



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- Carry blood **toward** the heart.
- “Join” or “merge” into successfully larger vessels approaching the heart.
- Have **valves** which act to stop the blood from going in the wrong direction.
- **Body muscles** surround the veins so that when the muscles contract, the veins are squeeze and the blood been pushed along the vessels.
- **Vena cava**: SVC (blood from upper body) & IVC (blood from lower body).
- **Venules**: Smallest vein vessels that connect veins to capillaries

Pulmonary circulation

- Carry **rich oxygen blood** from lungs to the heart

Systemic circulation

- Carry **poor oxygen blood** from capillaries to the heart

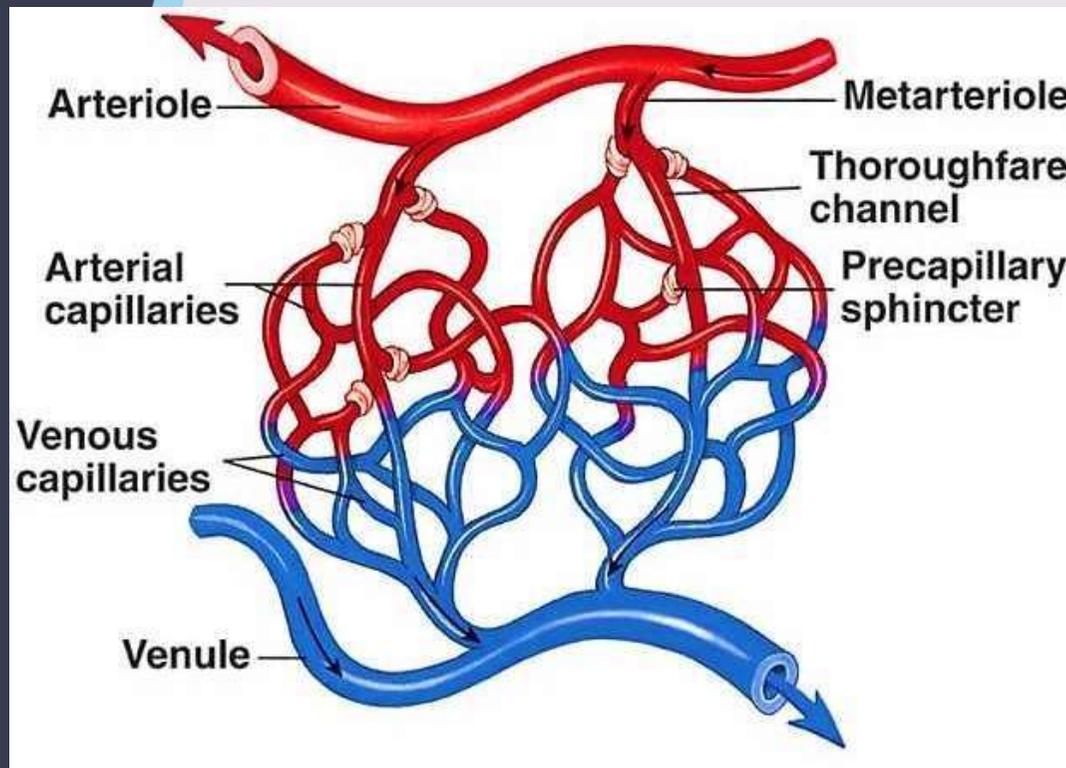
VEINS



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- **Connect** arteries and veins.
- **Contact** tissue cells and directly serve cellular needs.
- **Exchange** between blood and tissue cells occur.
- Exchange:
 - **Drop** off oxygen and nutrients from heart by arteries
 - **Pick** up CO₂ and other waste products and send to heart by veins .
- Walls are one cell thick and very narrow.



CAPILLARIES



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- Flow of blood from arteriole to venule = **microcirculation**
- Capillary beds consist of two types of vessels:
 1. **Vascular shunt:** metarteriole-thoroughfare channel (short vessel that directly connect arteriole and venule.
 2. **True capillaries:** actual exchange vessels.
- **Metarteriole:** Vessel structurally intermediate between arteriole and capillary.
- **Thoroughfare channel:** Vessel structurally intermediate between capillary and venule.
- **Precapillary sphincters:** Surround the root of each true capillaries at the metarteriole and act as a valve.

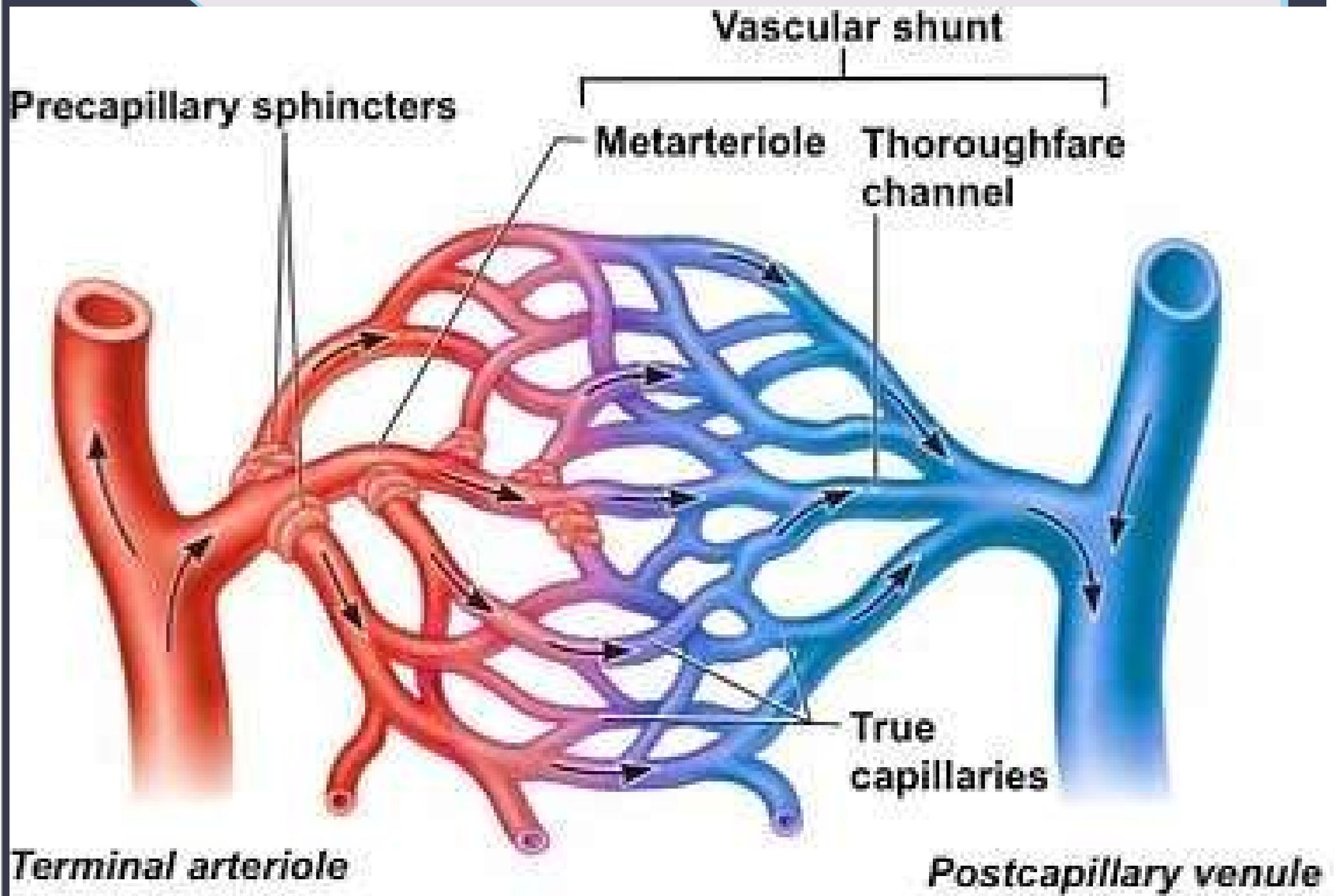
WHAT ARE IN CAPILLARIES?



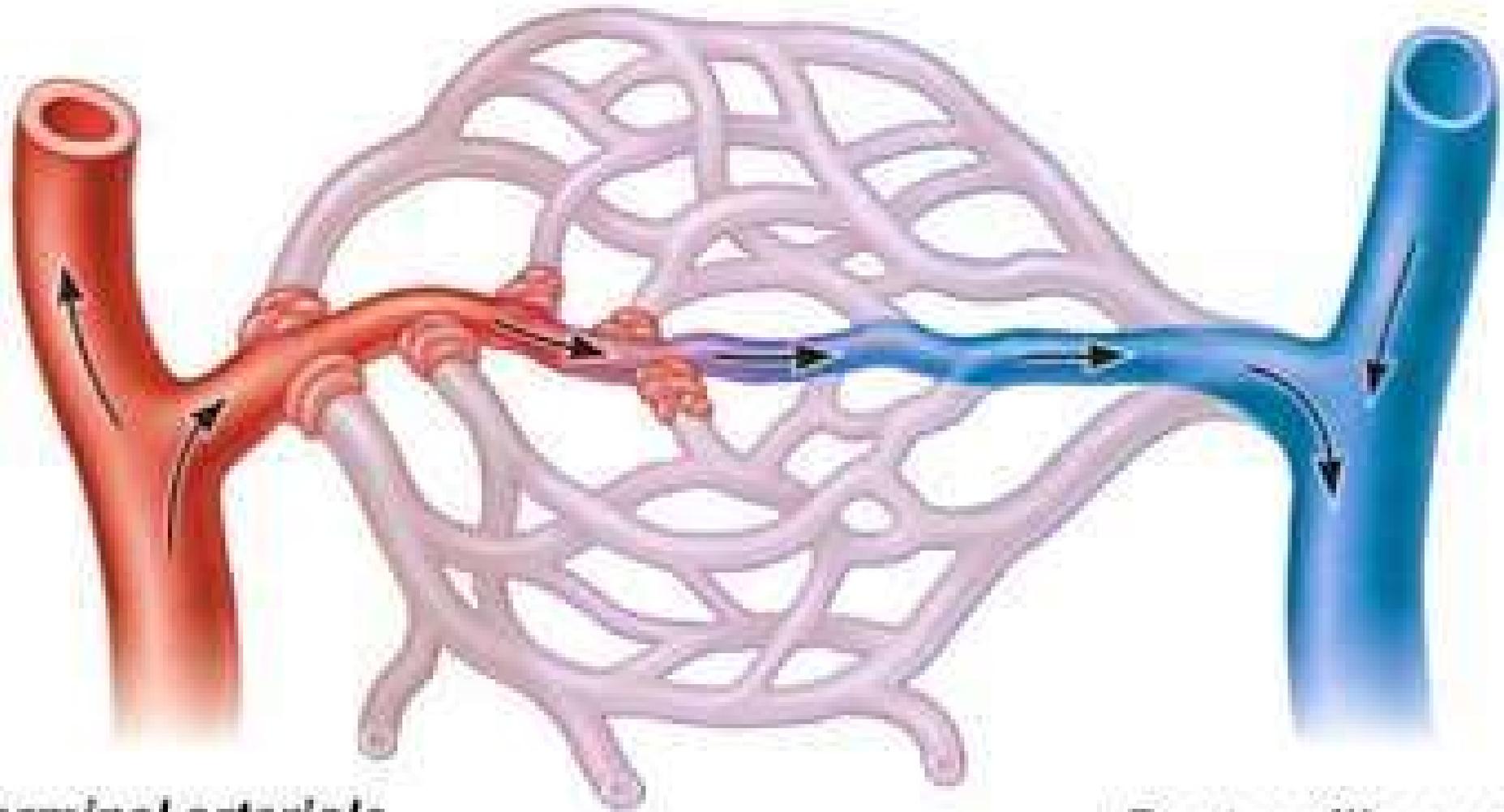
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1. Blood flowing through the terminal arteriole may go **either** through the true capillaries or vascular shunt.
2. It is **depend** on the precapillary sphincters.
3. **Sphincter open** (relax): Blood flow through the true capillaries and takes part in gas exchange with tissue cells.
 - The terminal arteriole feeding the bed leads into true capillaries and joins at postcapillary venule that drains the bed.
4. **Sphincter close** (contract): Blood flow through the vascular shunt and bypasses the tissue cells.
 - The terminal arteriole feeding the bed leads into metarteriole and continue to thoroughfare channel and joins at postcapillary venule that drains the bed.



(a) Sphincters open—blood flows through true capillaries.



Terminal arteriole

Postcapillary venule

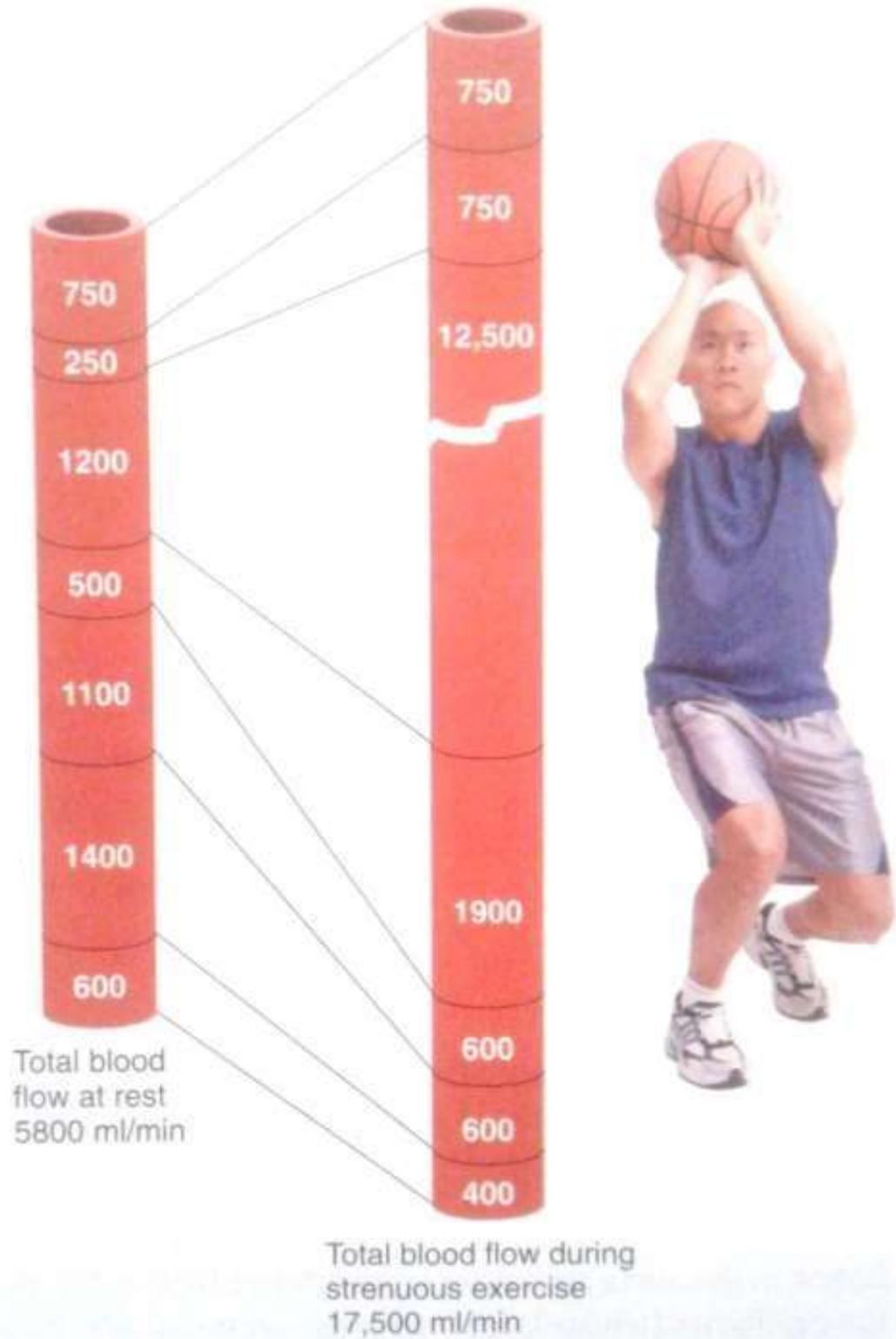
(b) Sphincters closed—blood flows through metarteriole – thoroughfare channel and bypasses true capillaries.



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Brain
Heart
Skeletal
muscles
Skin
Kidney
Abdomen
Other

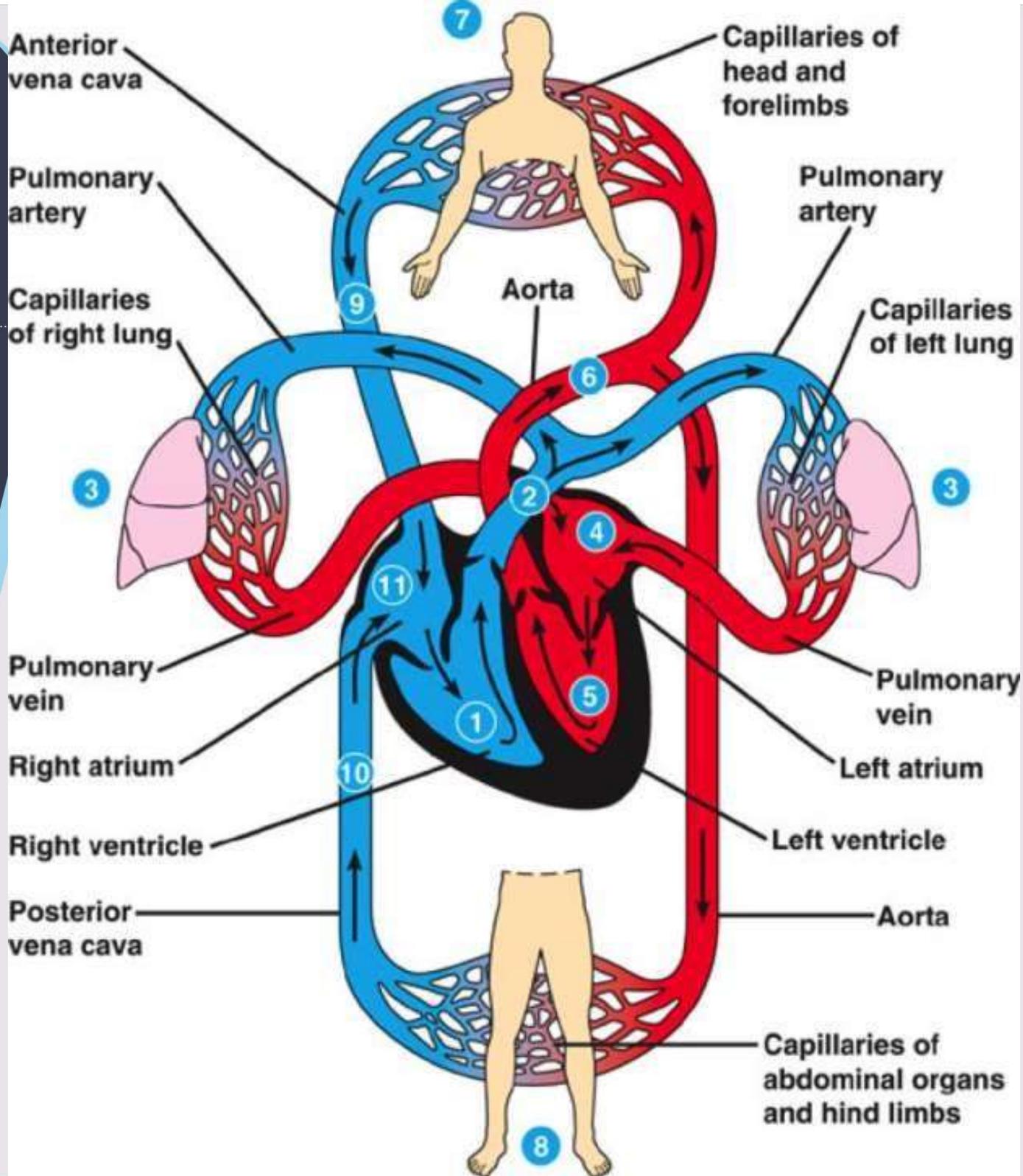


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SYSTEMIC CIRCUIT