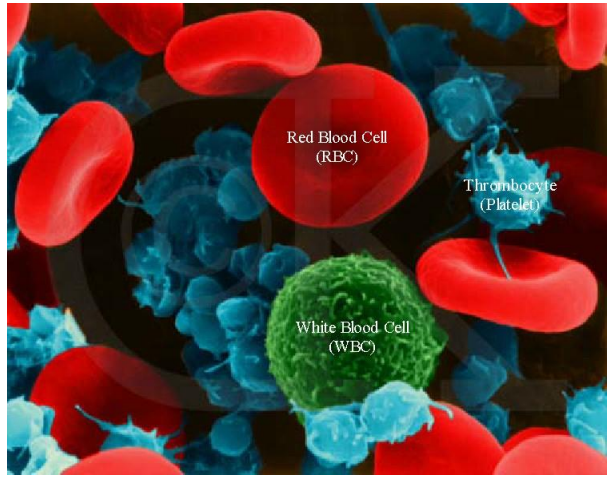
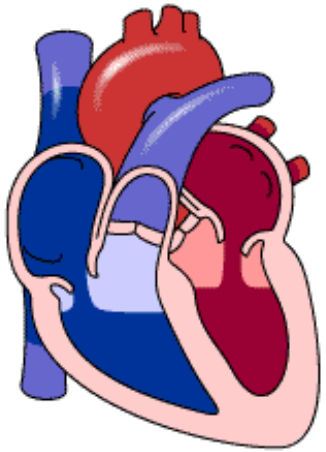
PATHWAYS AND VESSELS

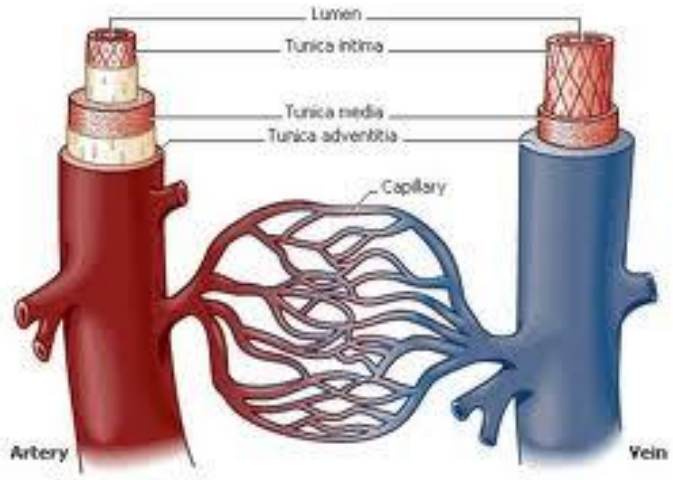
Unit 3: Transportation and Respiration

The circulatory system is made up of three main elements:

- A pump – **heart**
- Channels- **blood vessels**
- Fluid – **blood**

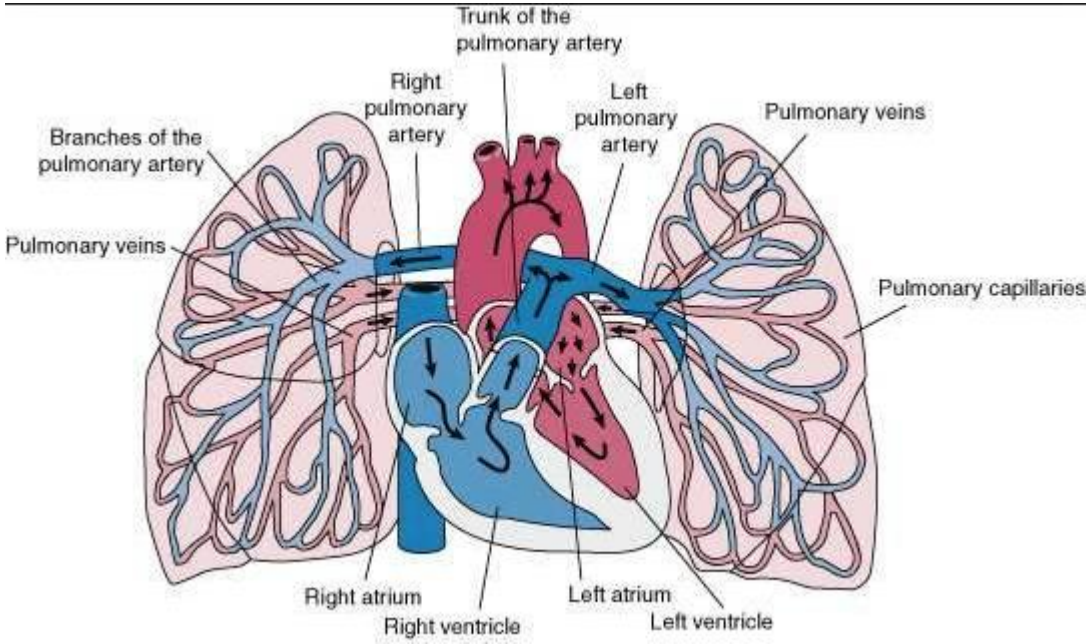






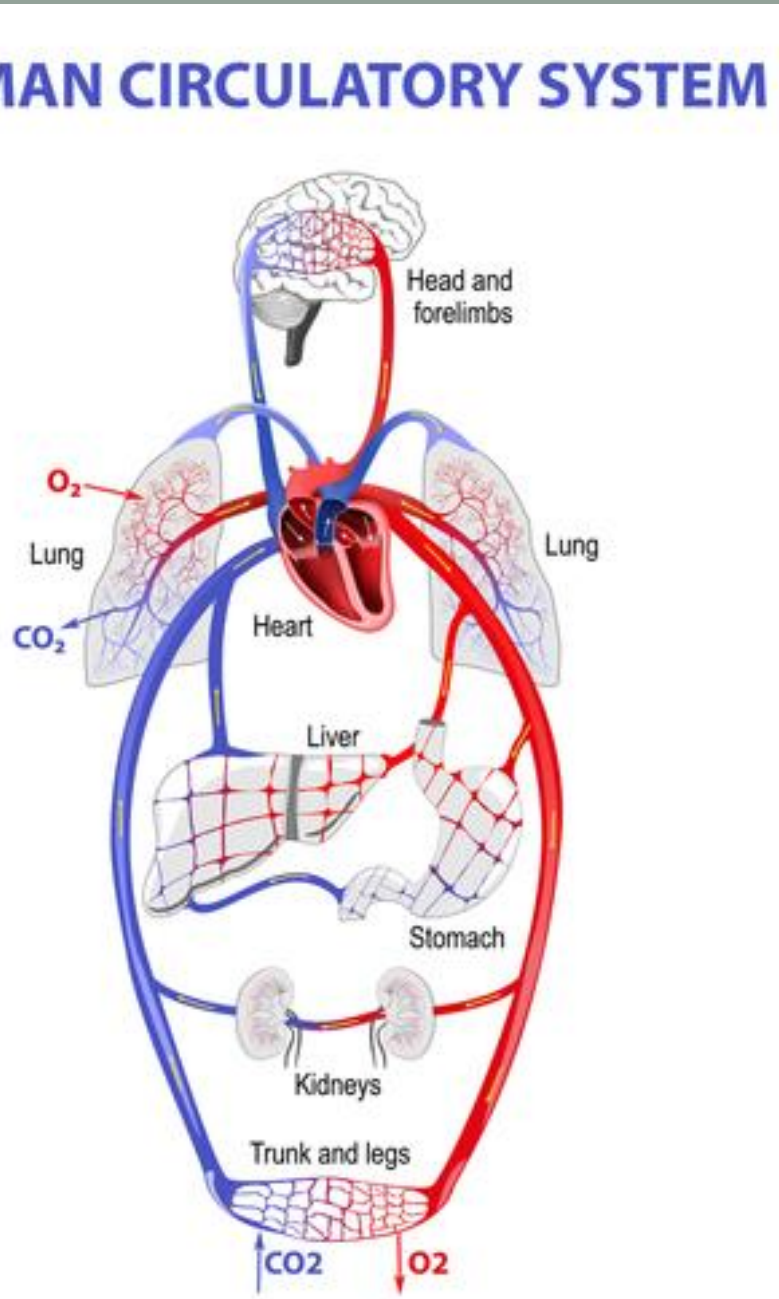
Blood Vessels

- Blood vessels are the tubes that transport blood around the body. The vessels make up two closed systems that begin and end at the heart. One system, the pulmonary vessels, transports blood from the heart to the lungs and back.



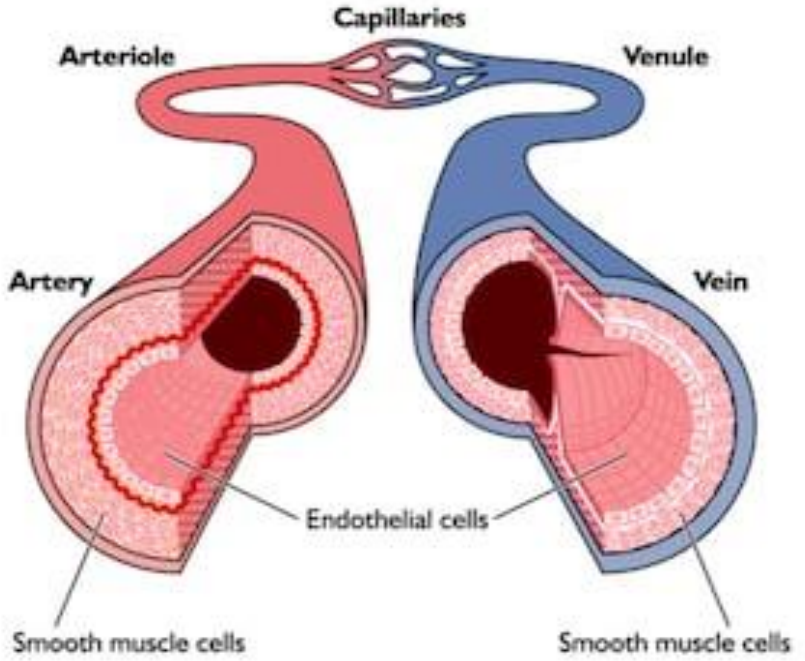
Blood Vessels

The __systemic__ vessels carry blood from the heart to the tissues in all parts of the body and then returns the blood back to the heart.



Blood Vessels

Based on their structure and function, blood vessels are classified as either arteries, capillaries, or arteries.

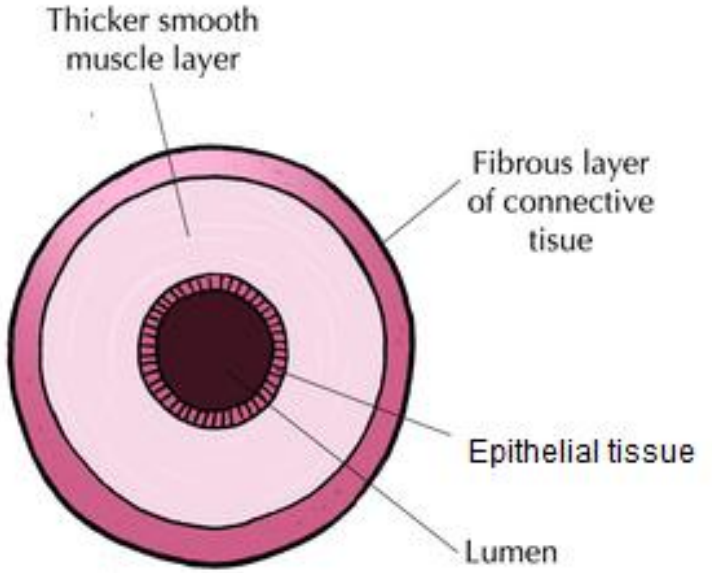


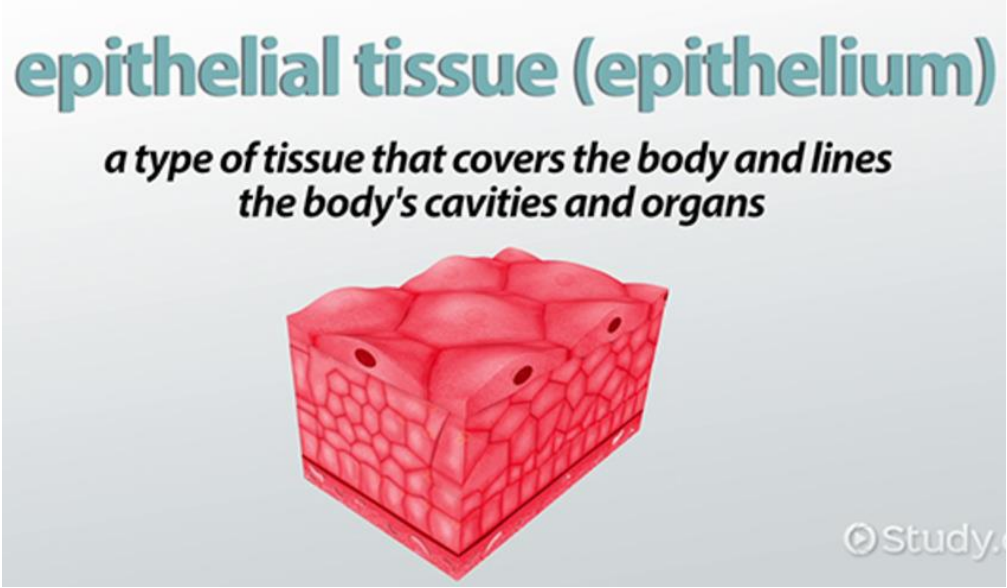
- These make up a 100,000 km network of blood vessels!!!

Earth's circumference is 40,075 km

Arteries

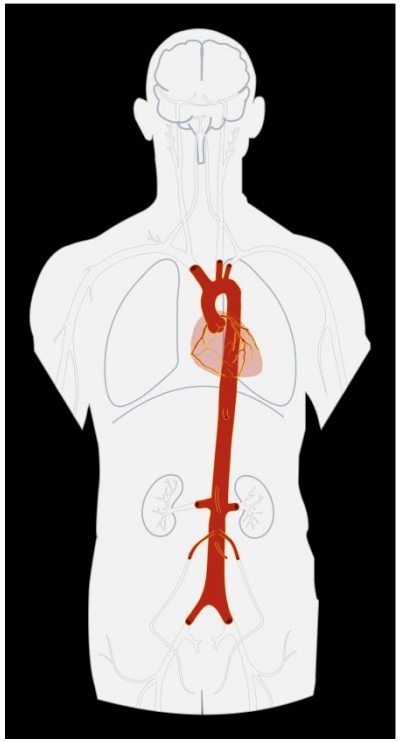
- Carry blood _away_ from heart
- In most arteries, blood is bright red and _oxygenated_
- Transport _nutrients_ and _oxygen_
- White in colour; no valves

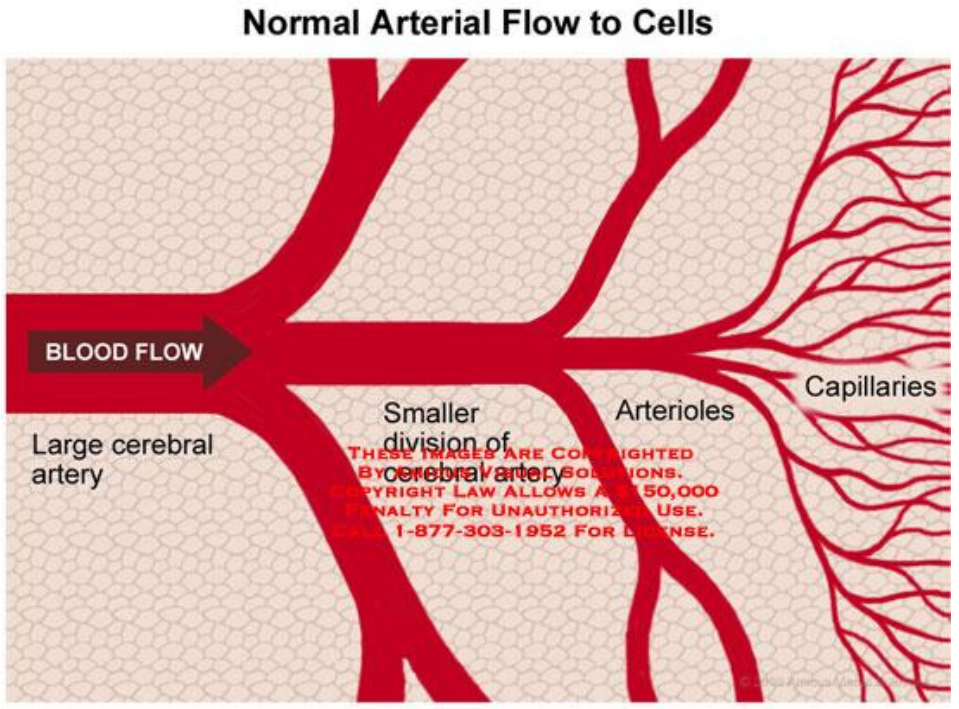




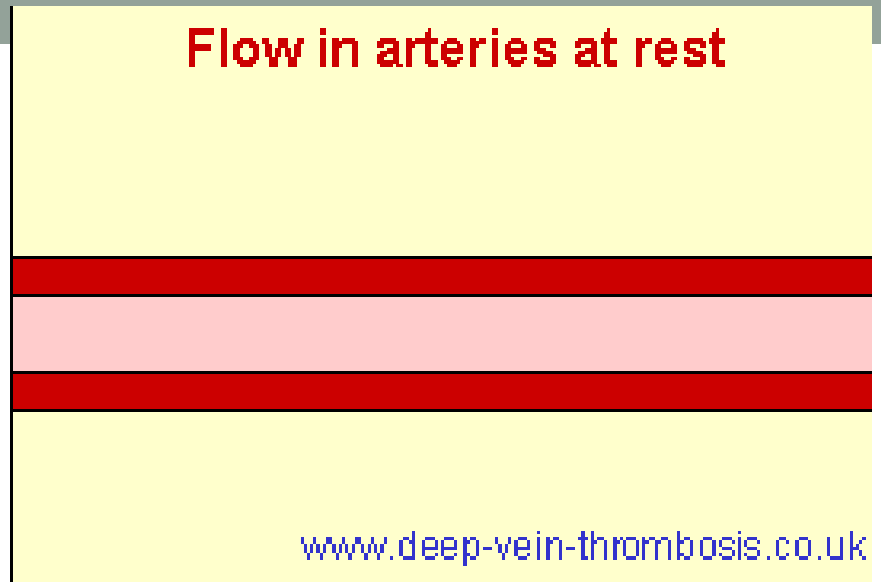
Arteries

- The _aorta_ is the largest artery (~2.5 cm in diameter)
- As arteries get smaller, they become arterioles (0.2 mm in diameter)





Arteries



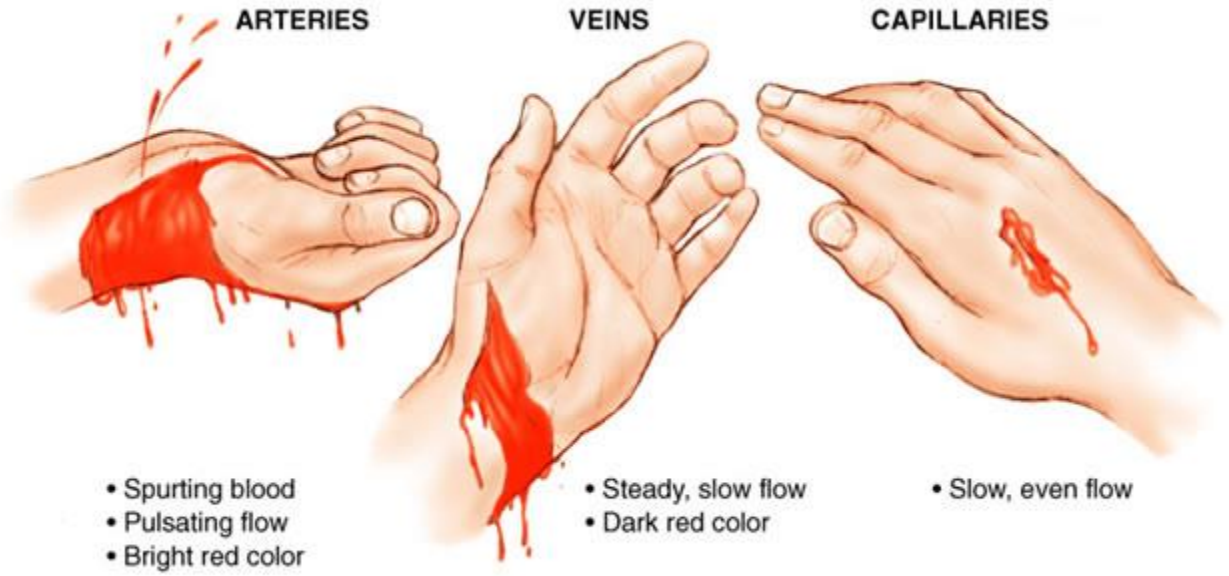
- The walls are thick, strong, muscular and elastic
- Like a balloon, they can expand to accept a surge of blood and then shrink to their original size when the pressure is released (have a pulse)
- This helps to keep the blood flowing in the correct direction and provides an extra pumping motion to help force the blood through the vessels

Arteries

- Your pulse is a surge of blood being forced out of the heart into the arteries followed by the return to normal shape.

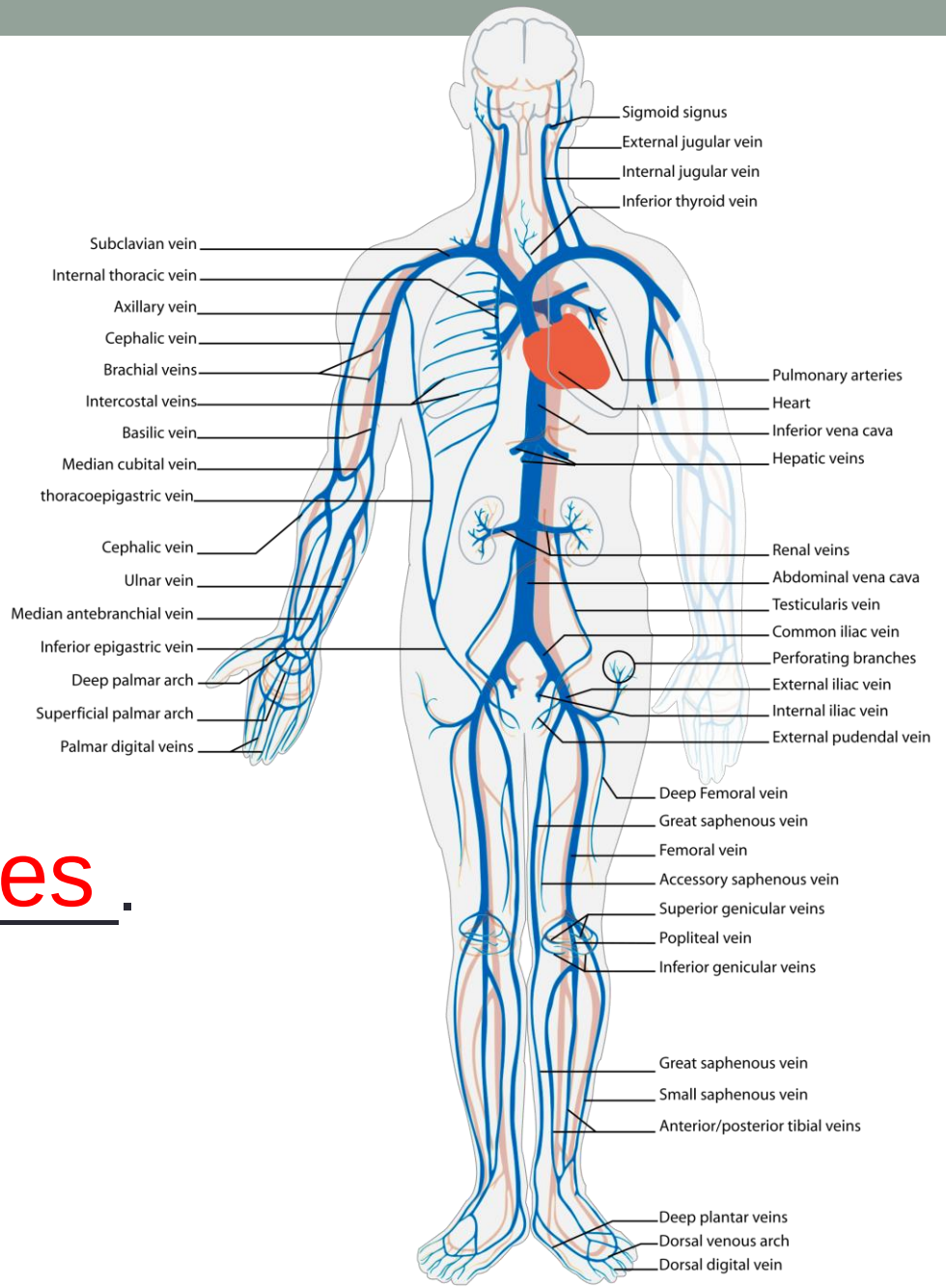
Arteries

- Because the blood in arteries is under __high pressure__, it is far more dangerous to bleed from an artery than a vein.



Veins

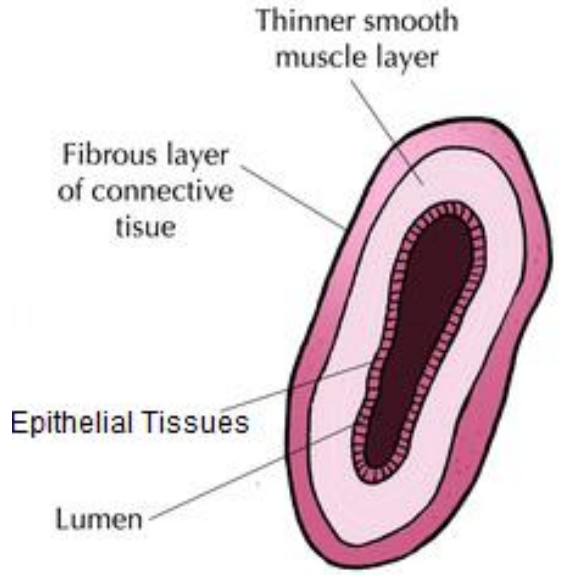
- Carry blood towards the heart
- In most veins the blood is deep red and deoxygenated
- They transport CO_2 and wastes.



Veins

- Have a __weaker__ and __thinner__ layer of muscle than arteries but have a __larger__ inner circumference. This means they cannot expand as much as arteries, but can hold more blood.

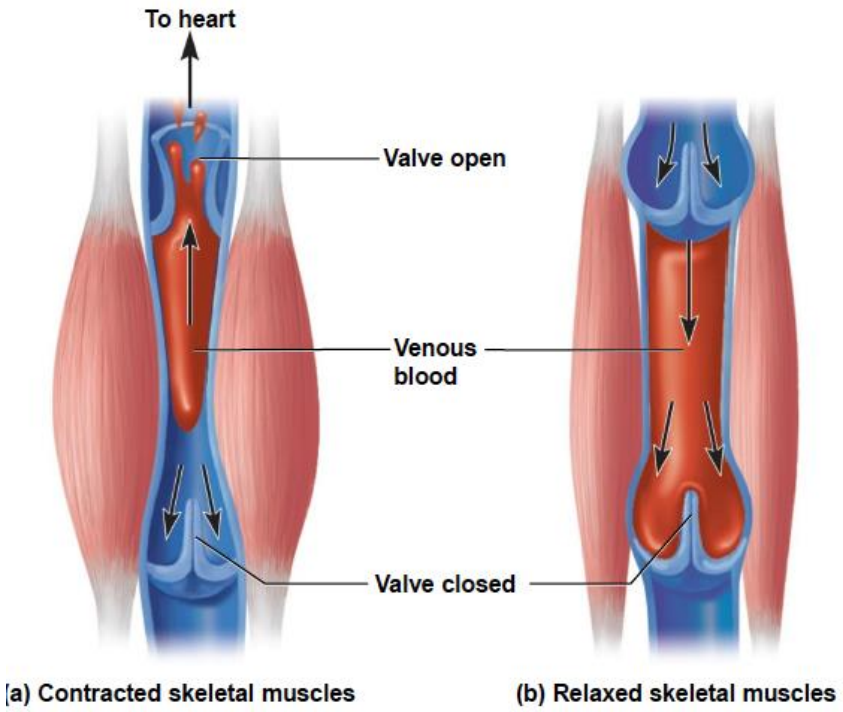
- No pulse

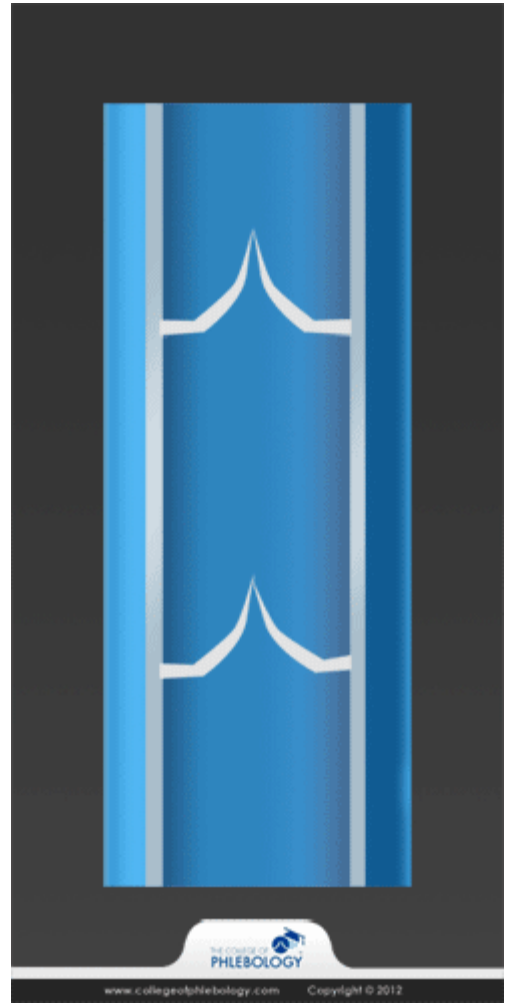


b) Vein

Veins

- Veins turn into smaller venules.
- When blood reaches the veins, pressure is low. Moved by the squeezing action of muscles.
- Veins are grey-white in color and have flap-like valves (like gates). The valves keep the blood from flowing backwards.





What happens when blood flows backward?

- Valve Disease
- when a valve doesn't close properly and blood leaks backward
- Or when a valve doesn’t open all the way, so not enough blood passes through
- If too much blood flows backward, only a small amount can travel forward to your body's organs. Your heart

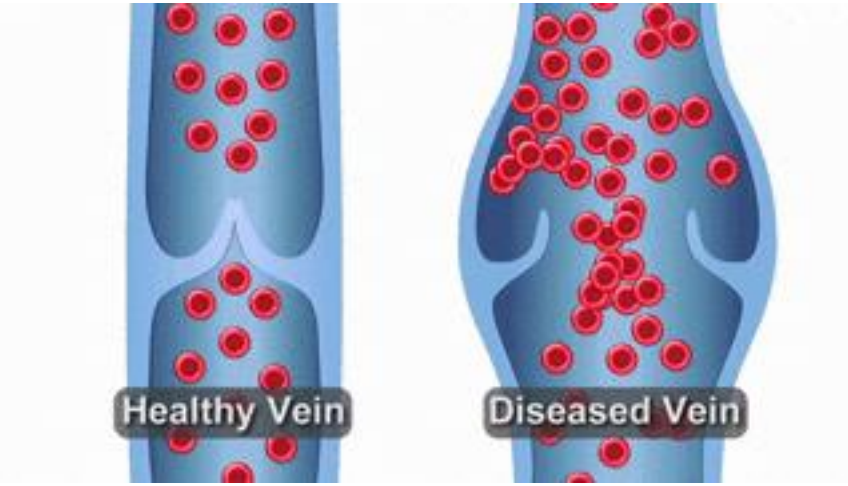
tries to make up for this by

working harder, but with time

your heart will become

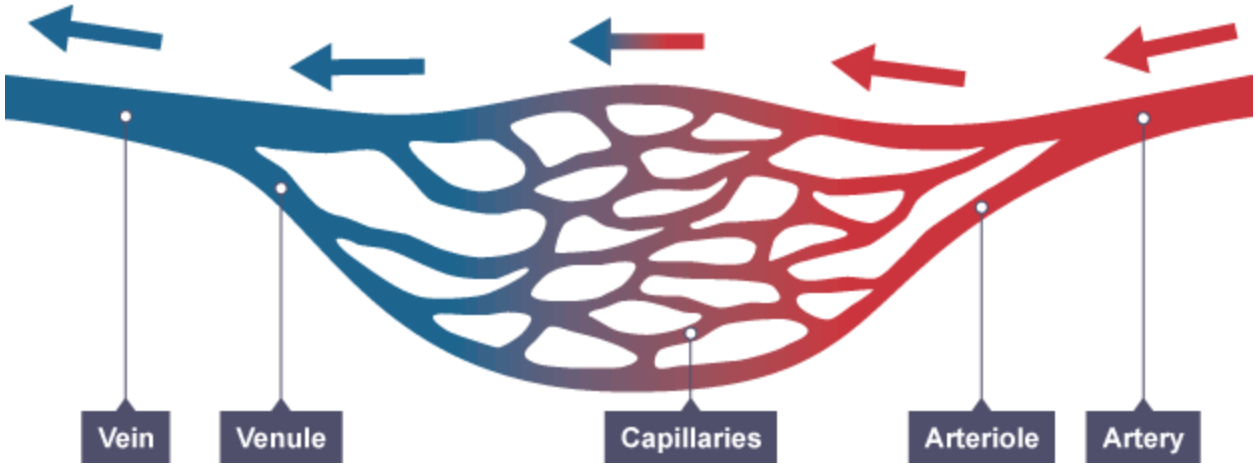
enlarged and less able to

pump blood through your body.



Capillaries

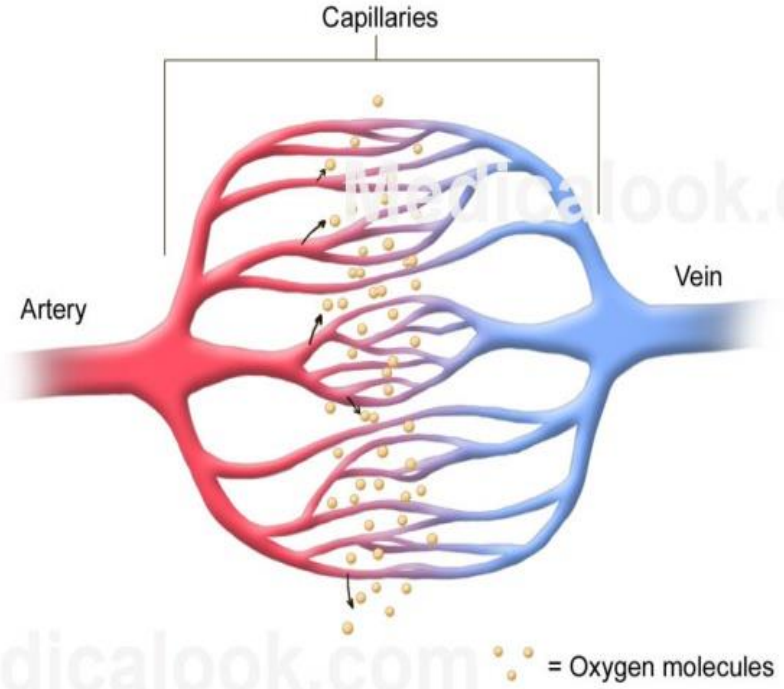
- The most common type of blood vessel.
- They connect _arterioles_ and _venules_.



One layer of Epithelial Cells

Capillaries

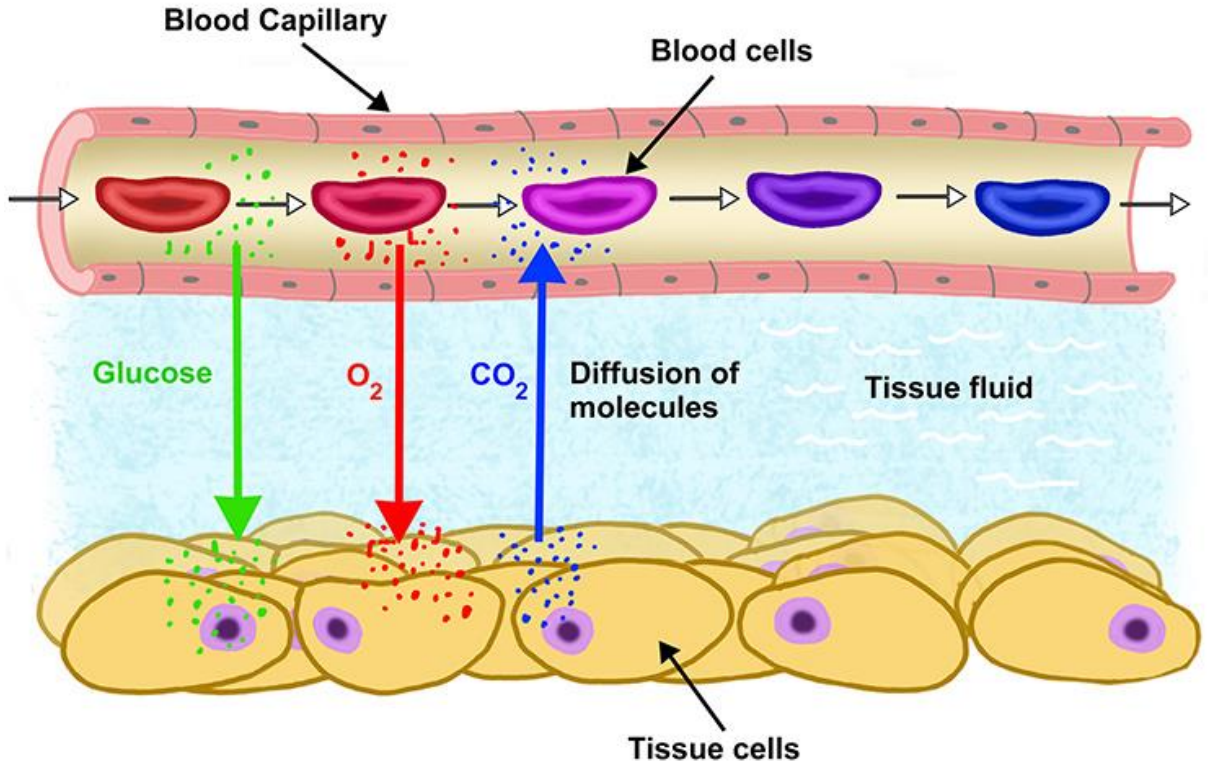
- Thin , permeable walls consist of a single layer of cells.
- So narrow that red blood cells pass through in single file .
- Low pressure

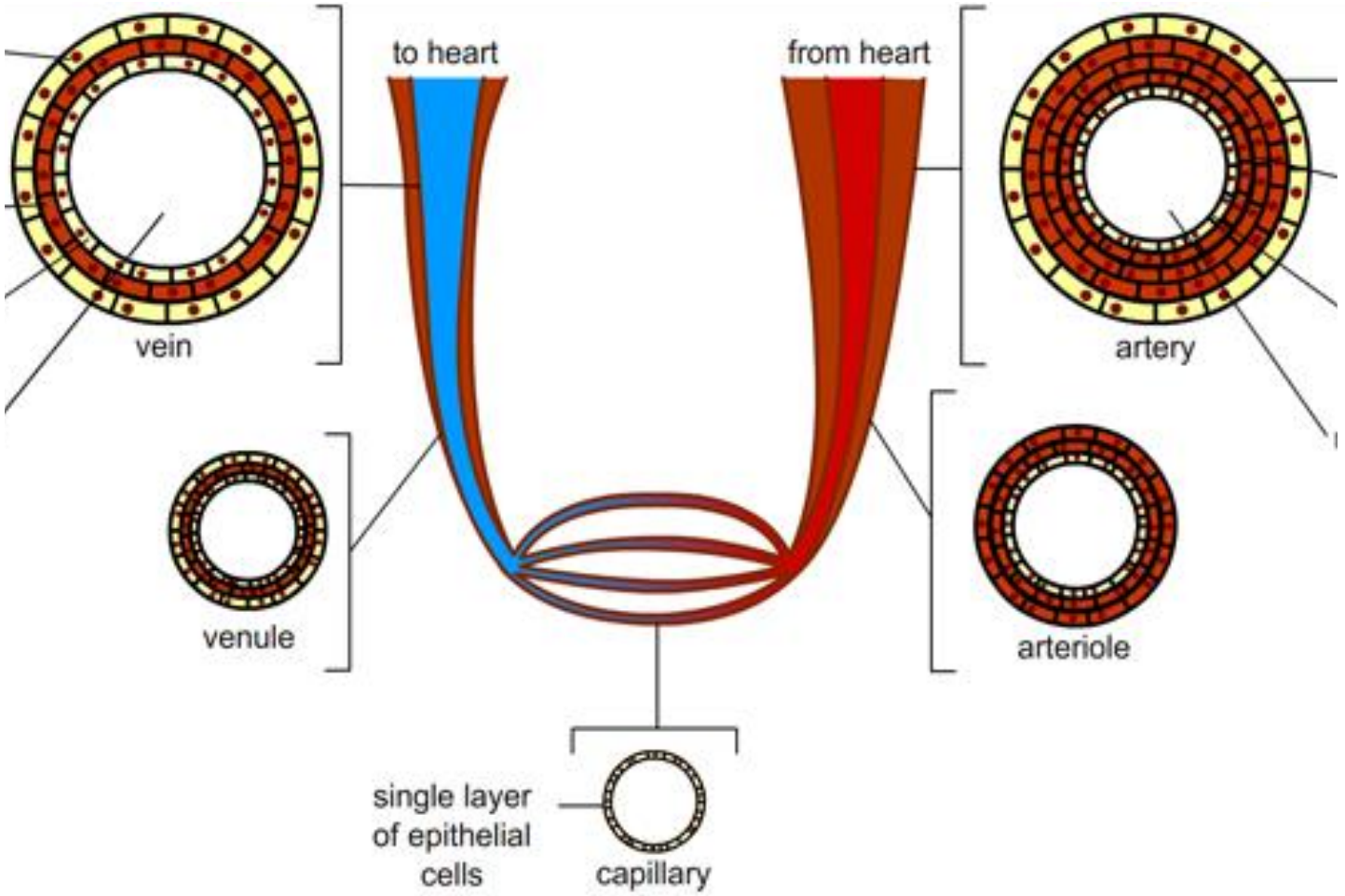


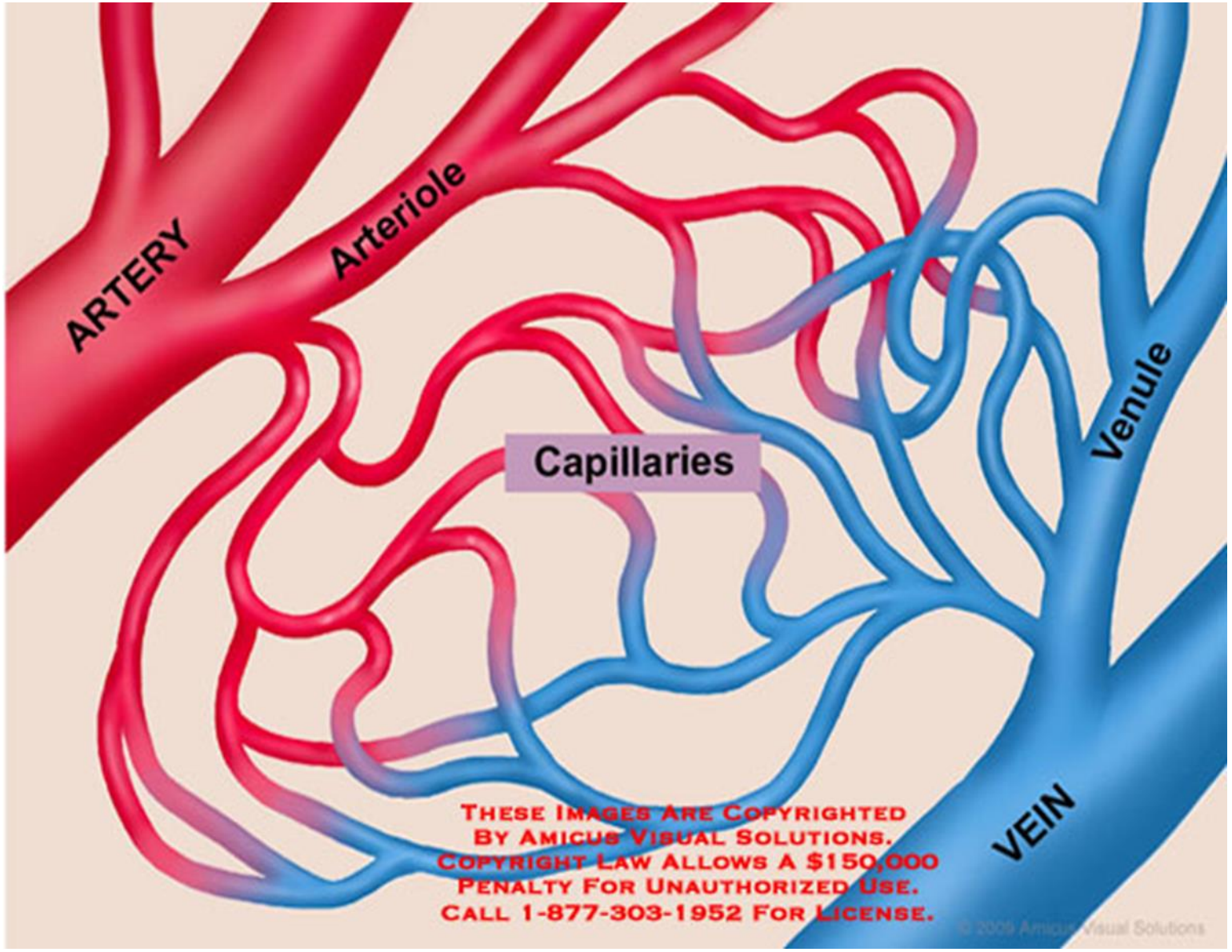
One layer of Epithelial Cells

Capillaries

- Nutrients and oxygen move out of the blood into the cells by diffusion. Carbon dioxide and waste move out of the cells into the blood in the same way.




to heart
from heart
vein
artery
venule
arteriole
single layer of epithelial cells
capillary


ARTERY
Arteriole
Capillaries
Venule
VEIN
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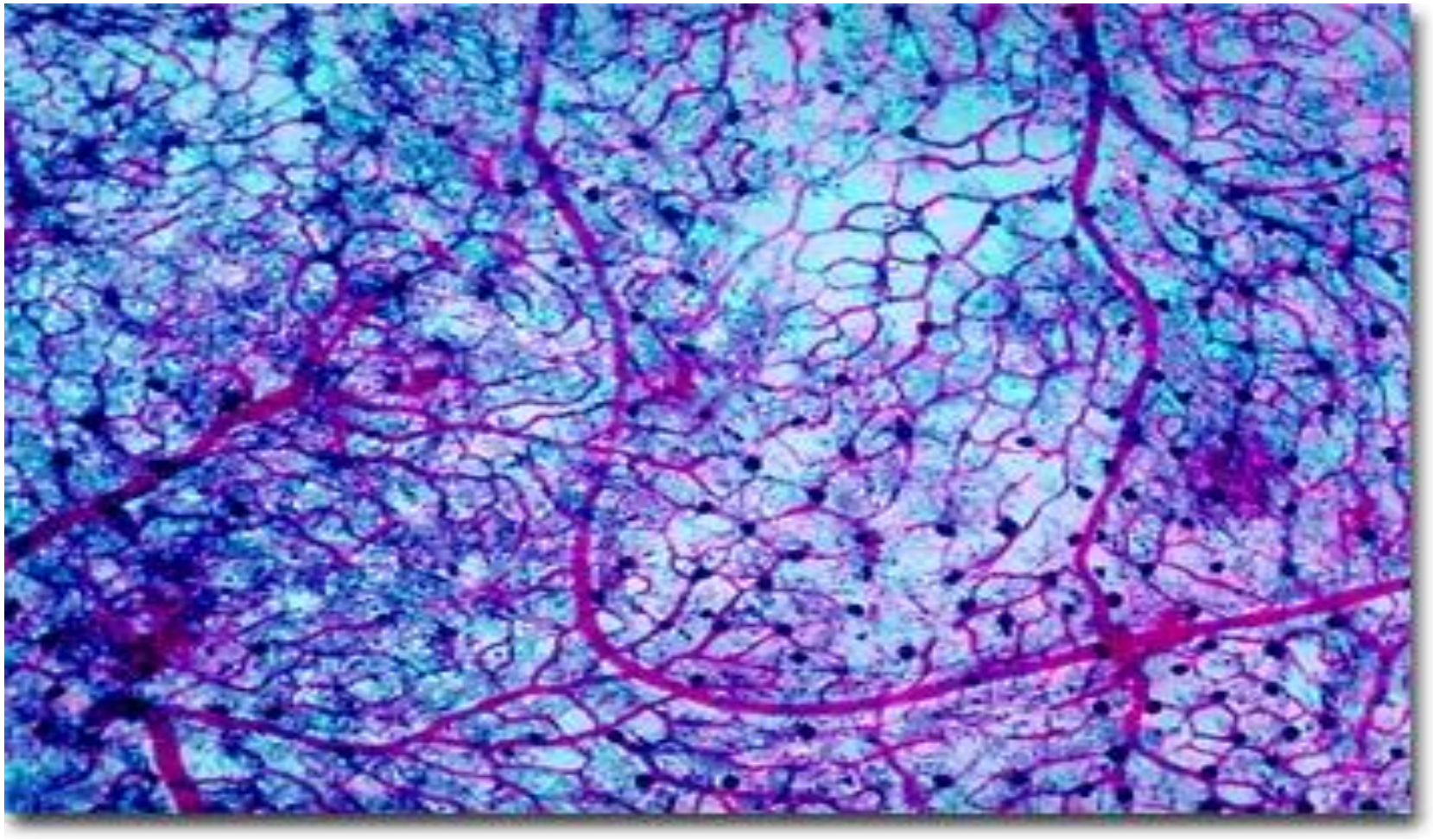

- Injected skin capillaries

Compare and Contrast