



# The module: Cardiovascular system

Session 1, Lecture 2

Duration : 1 hr

## Histology of the Cardiovascular System Structure of Blood Vessels (Types of Arteries, Veins & Capillaries)

Module staff: Rehab A. Jaafar

1. **Dr Nawal Mustafa Abdulla**
2. Dr Asaad Hassan
3. Dr Maiami Kadhum
4. Dr Ahmed Sami
5. Dr Ahmed Hakim
6. Dr Mohammed Taha
7. Dr Nada Hashim
8. Dr Hadeel Salman



As in work book



For more discussion, questions or cases need help please post to the session group



# Learning Outcomes

**1**

**Describe how blood vessels (arteries, arterioles, capillaries, venules and veins) are named.**

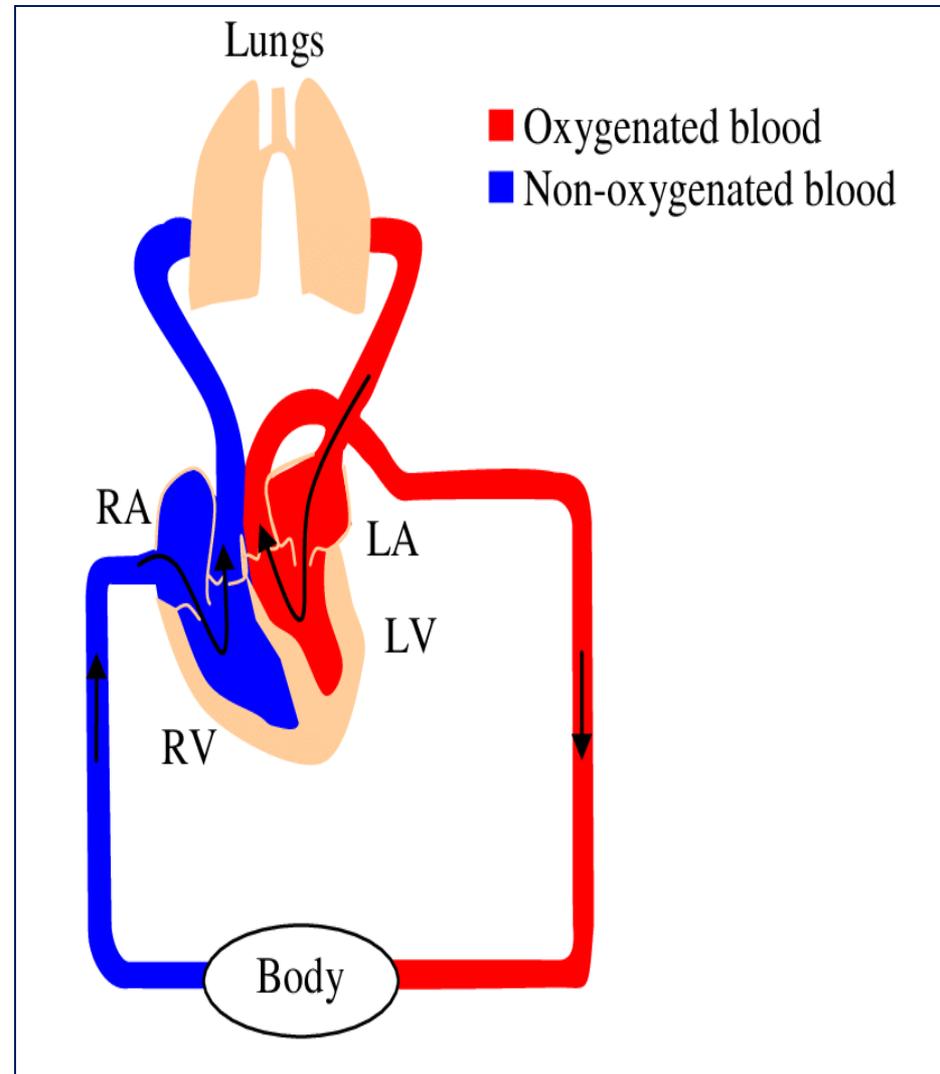
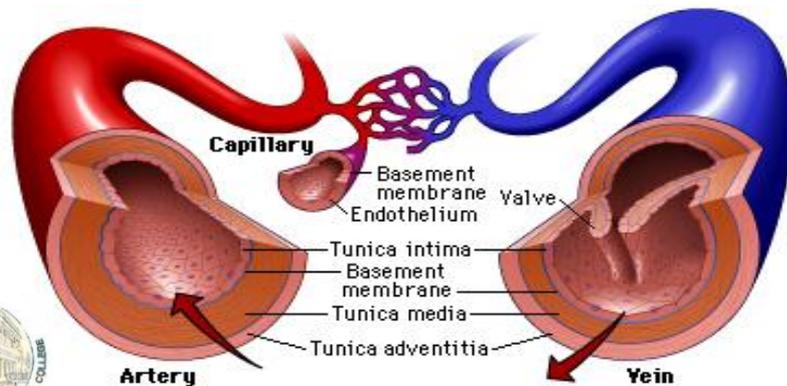
**2**

**Describe the structure of different types of blood vessels in relation to their function in supplying blood to and from the tissues of the body.**



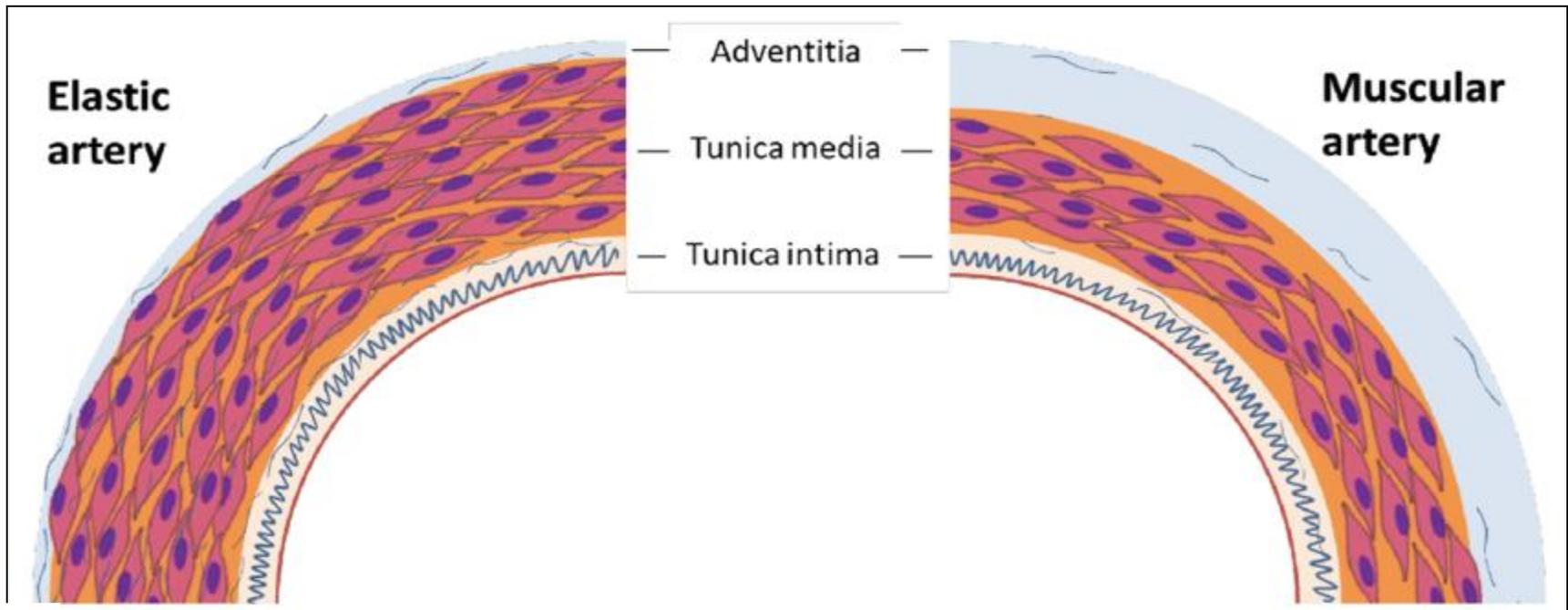
# Blood vessels

- **Arteries** are blood vessels that carry blood away from the heart to supply the organs and tissues of the body.
- **Veins** are blood vessels that carry blood towards the heart.



# Types of arteries

Different arteries contain varying amounts of *elastic fibres* and *smooth muscle fibres* in their walls; thus they are named elastic (conducting) and muscular (distributing) arteries



# Types of arteries

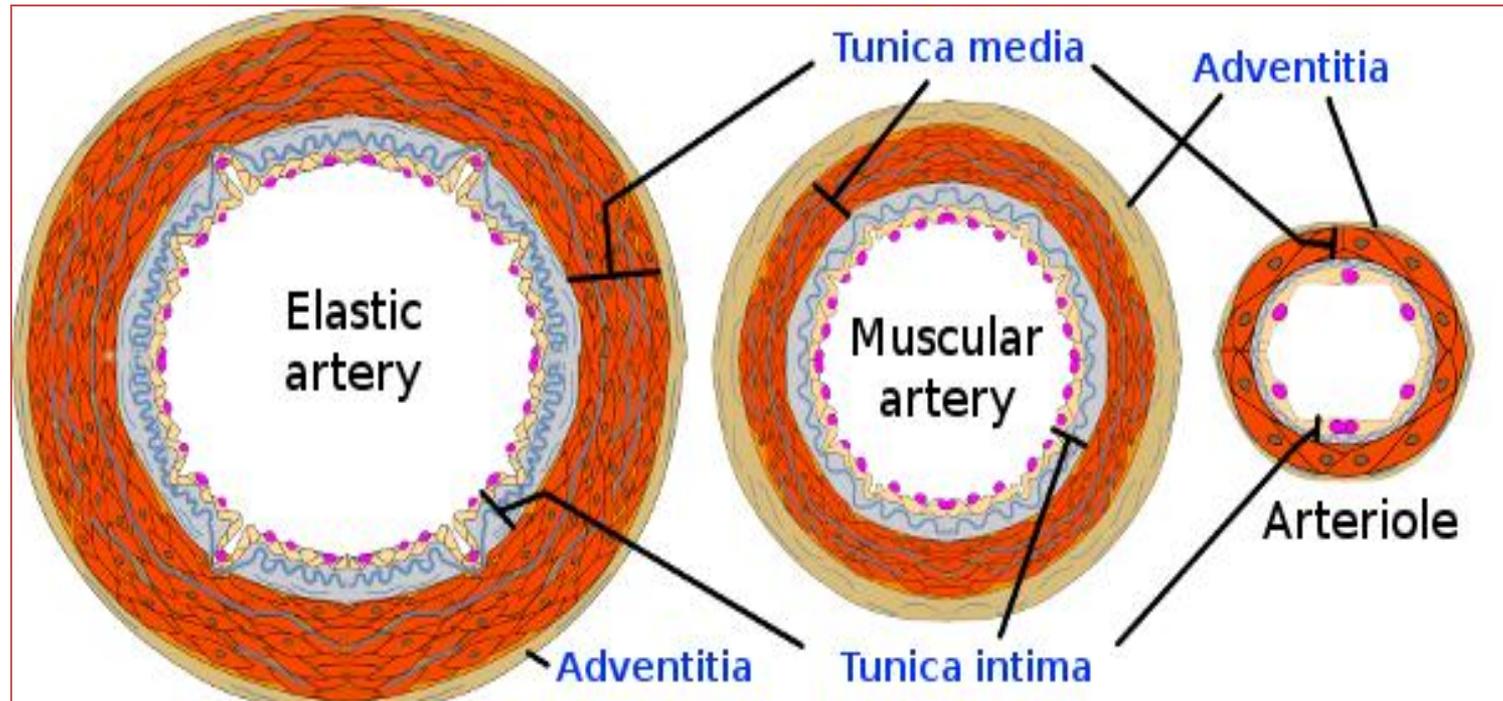
The muscular arteries branch into **arterioles** whose function is to regulate the amount of blood reaching an organ or tissue and more generally in regulating blood pressure.

The diameter of the muscular arteries and arterioles is controlled by the autonomic nervous system.

The arterioles branch into smaller vessels (**metarterioles**), which carry blood into the smallest vessels in the body, the **capillaries**.

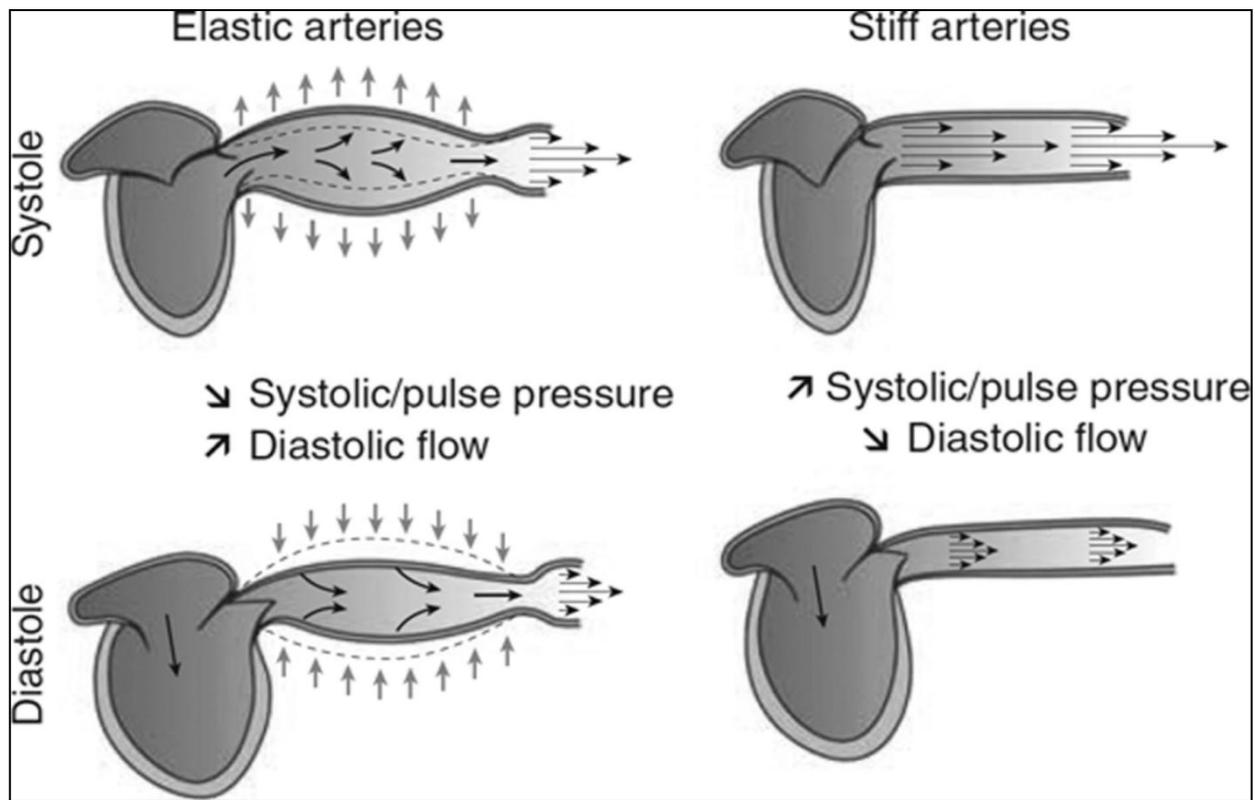


# Types of arteries



# Elastic (conducting) arteries

- The walls of the elastic arteries expand slightly with each heartbeat



# Elastic (conducting) arteries

**Elastin Fibers:  
Elastic Arteries**

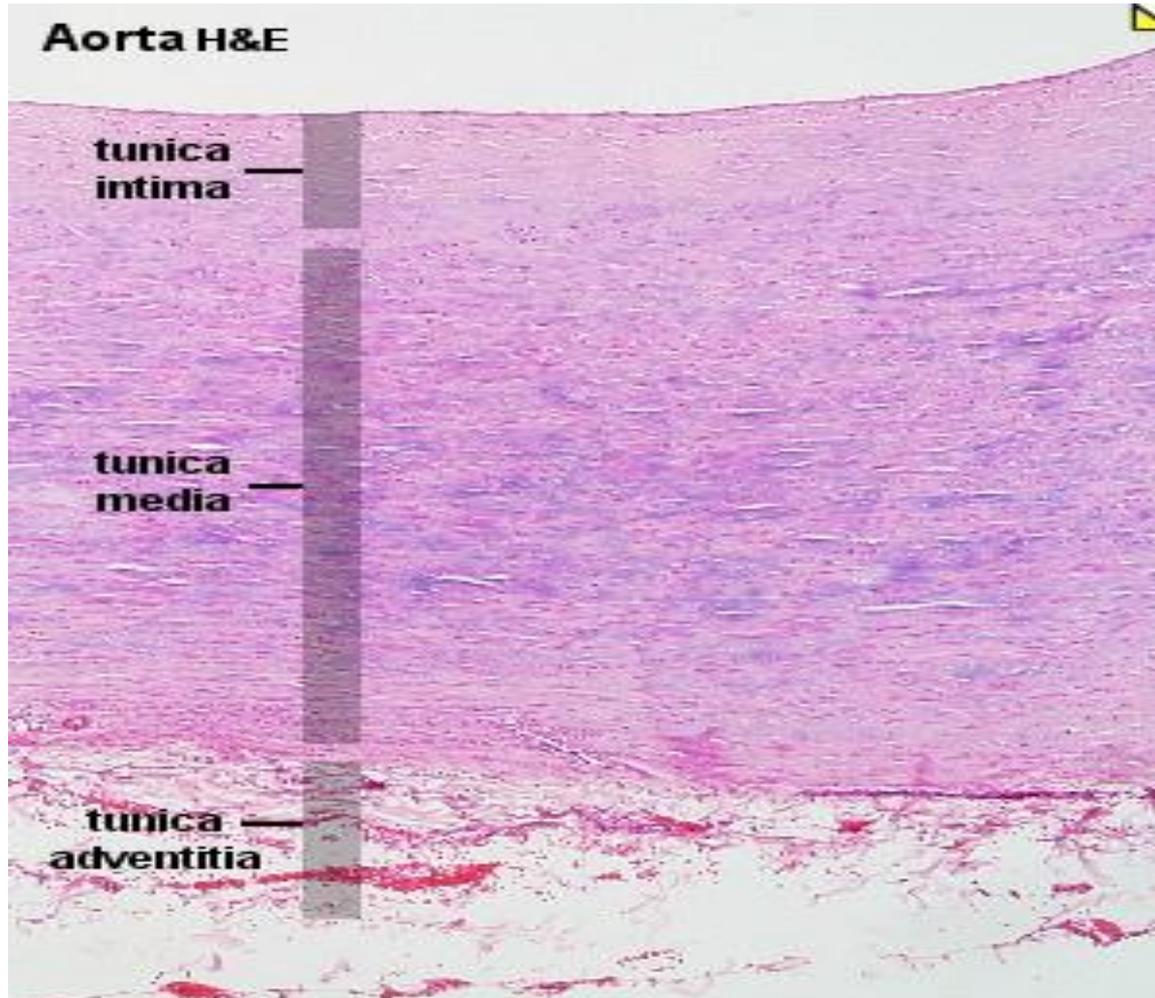


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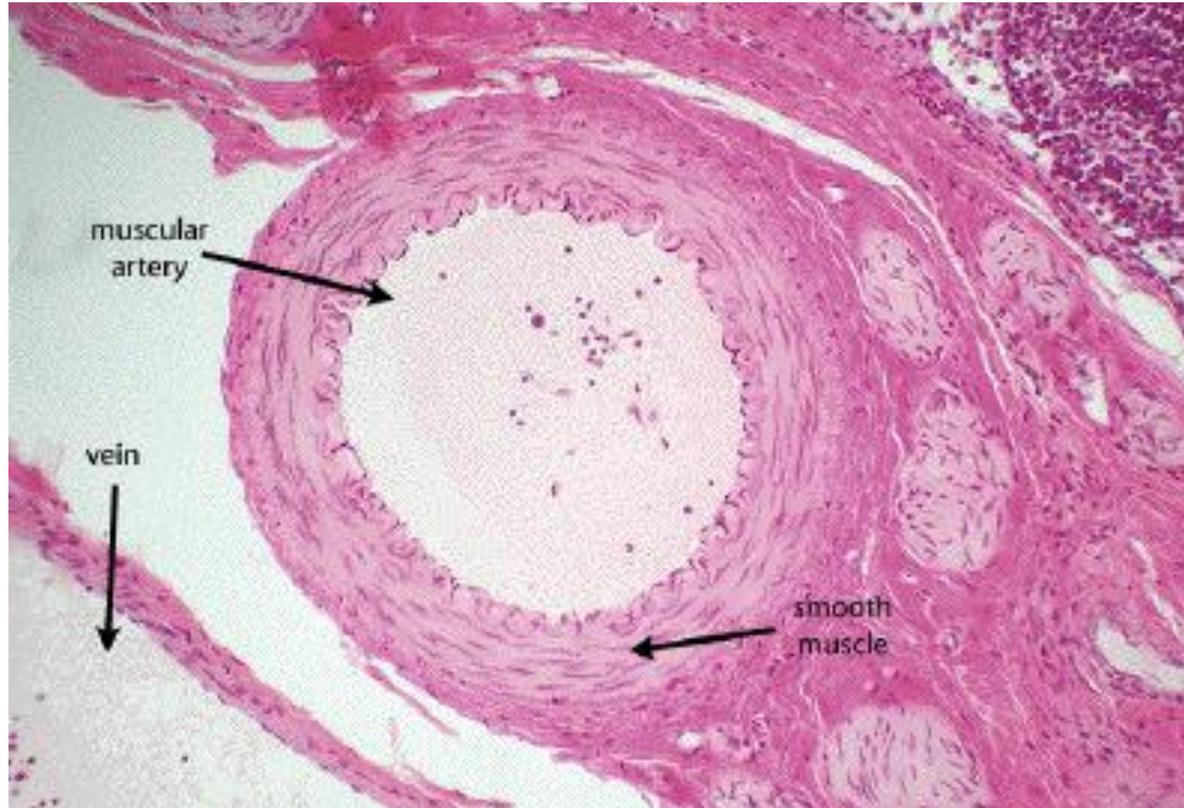
**Fig 10-5**



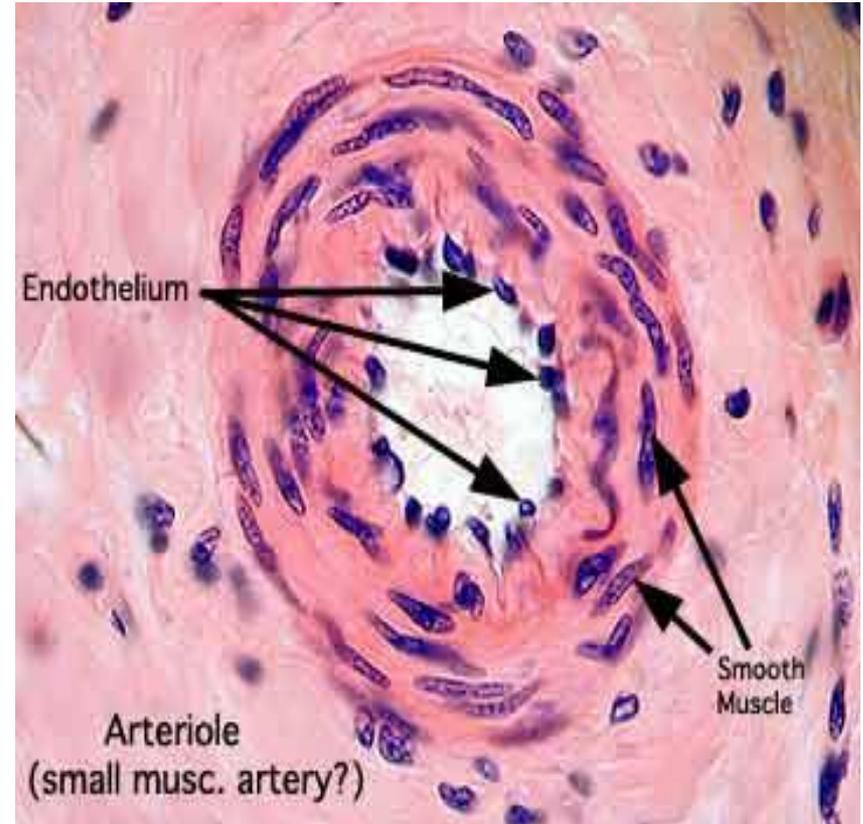
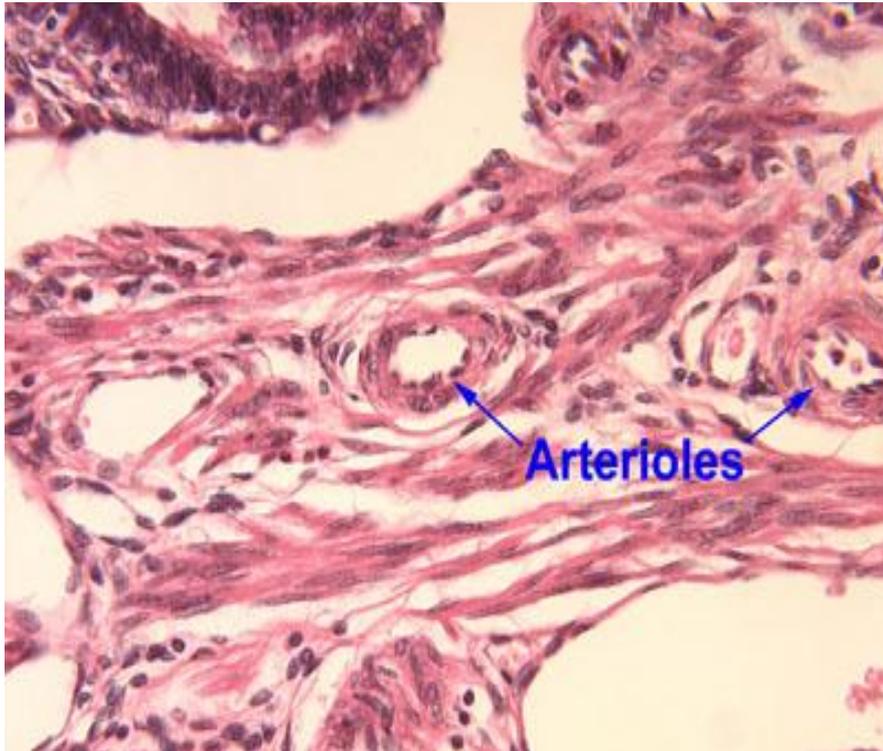
# Elastic (conducting) arteries



# Muscular(distributing) arteries

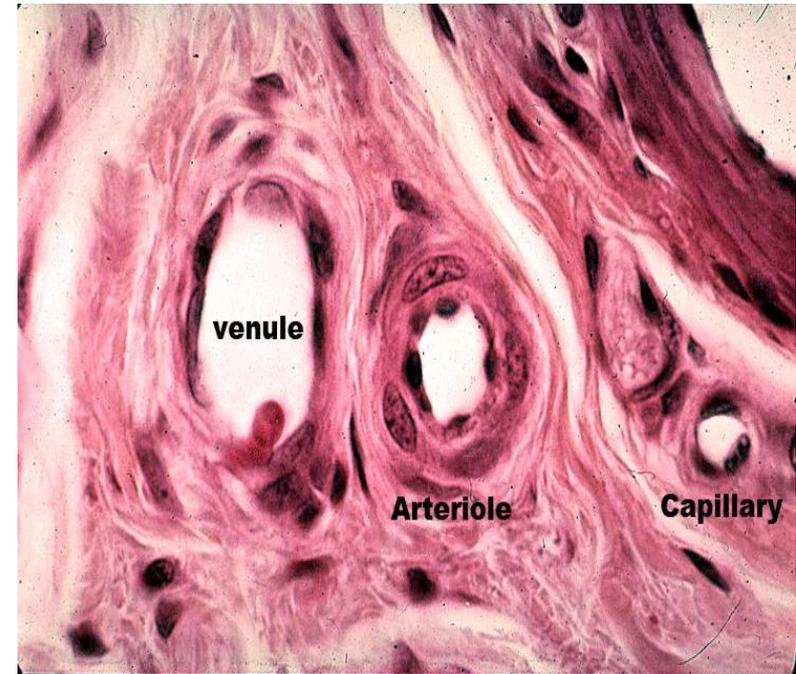
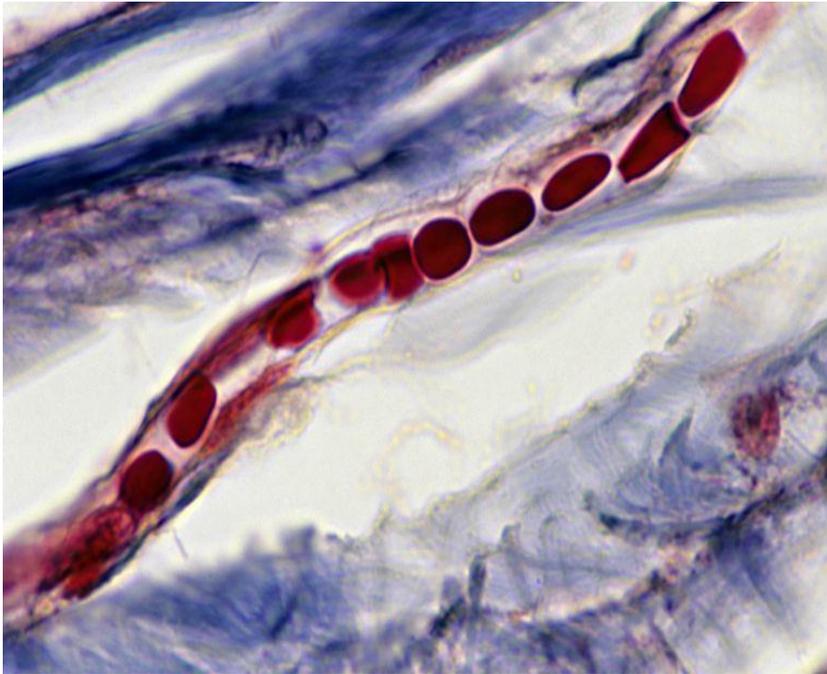


# The arterioles

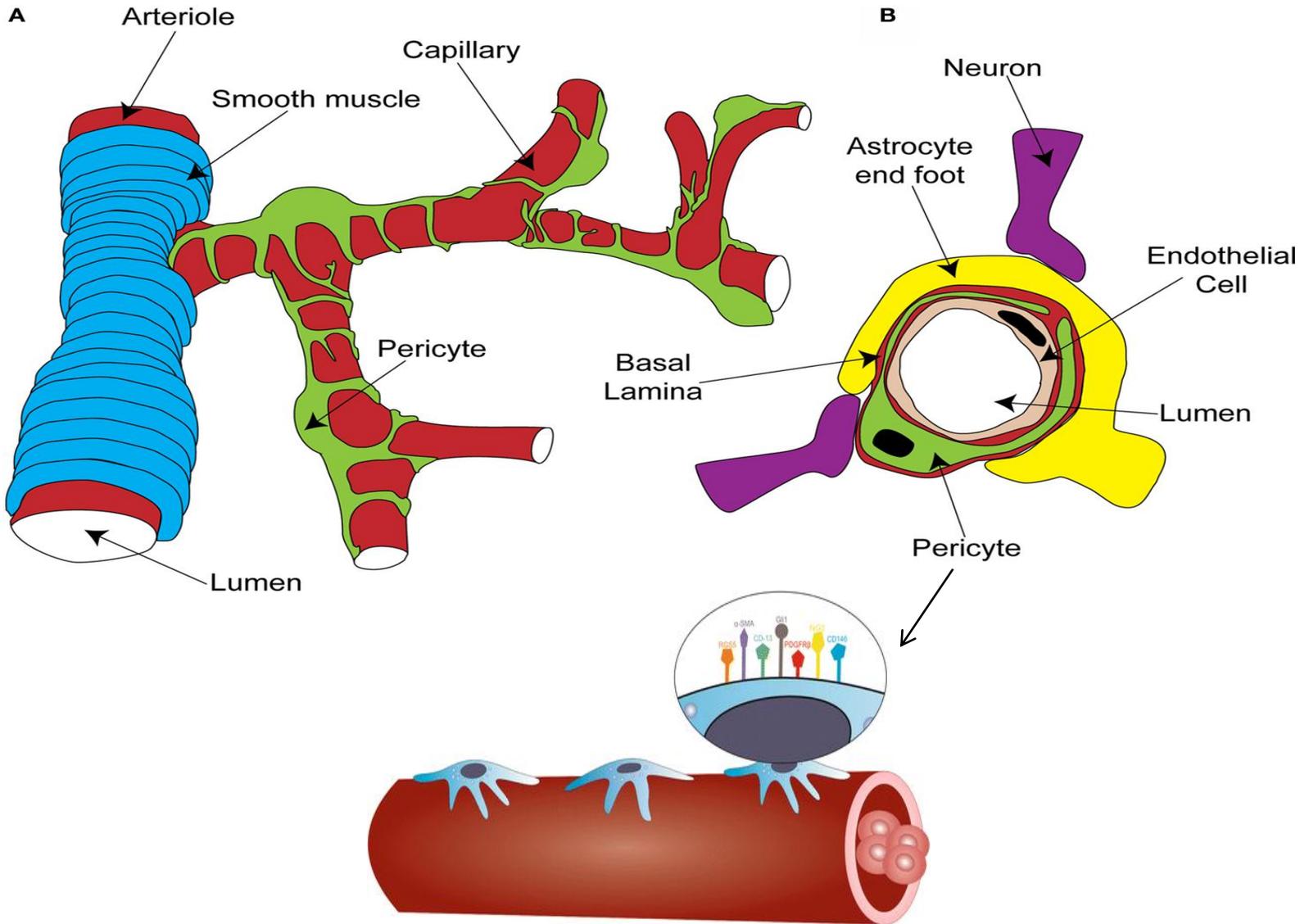


# The capillaries

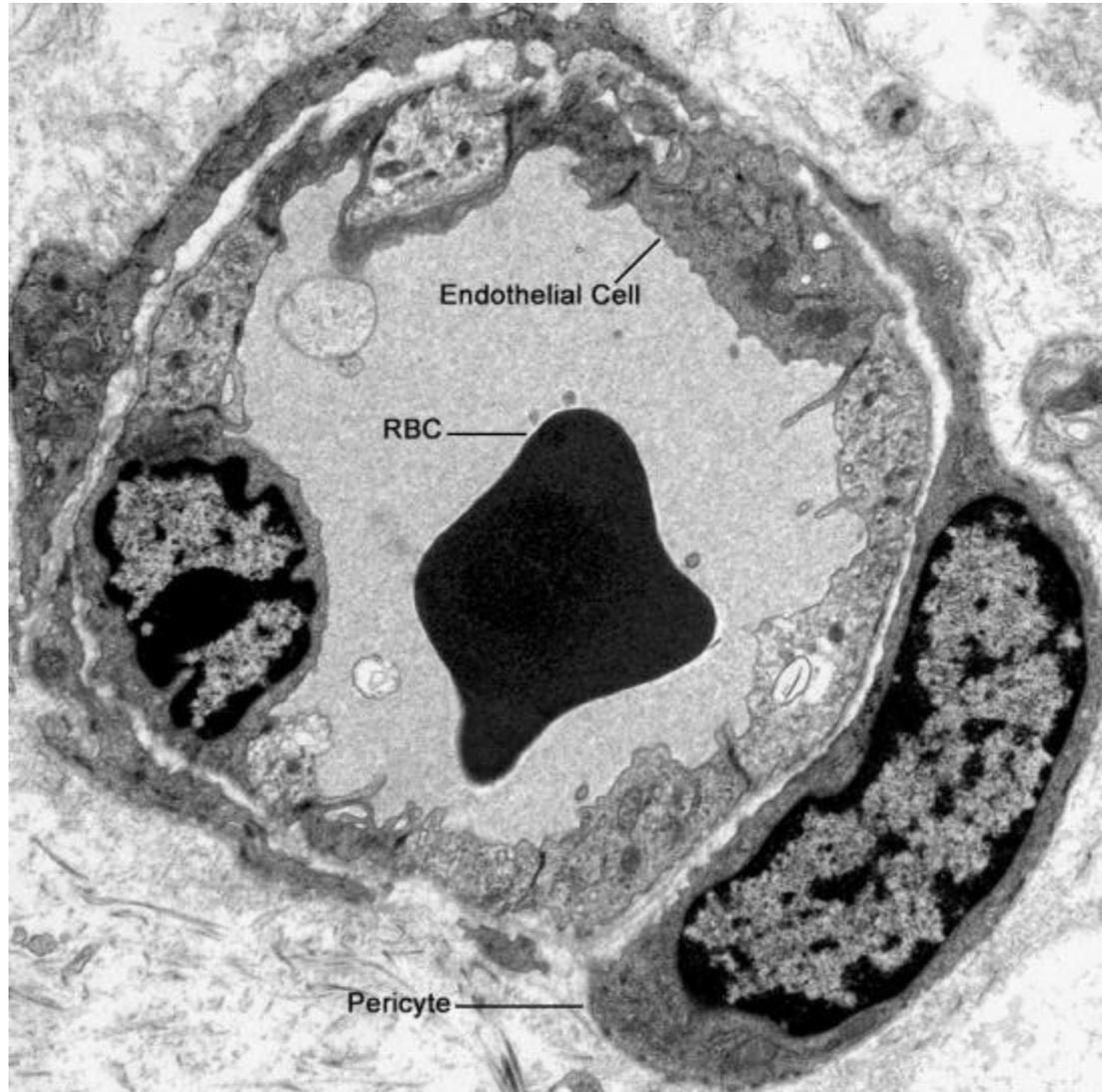
A capillary wall is mostly one cell thick and allows exchange of substances between blood and tissues.



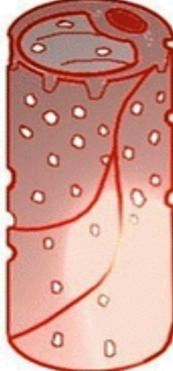
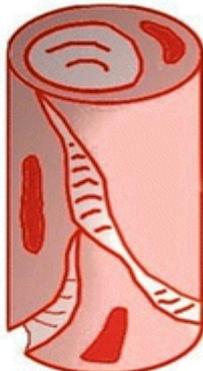
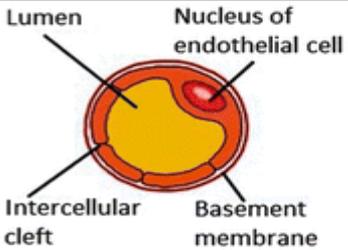
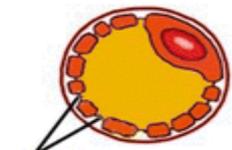
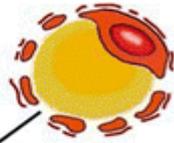
# The capillaries



# The capillaries



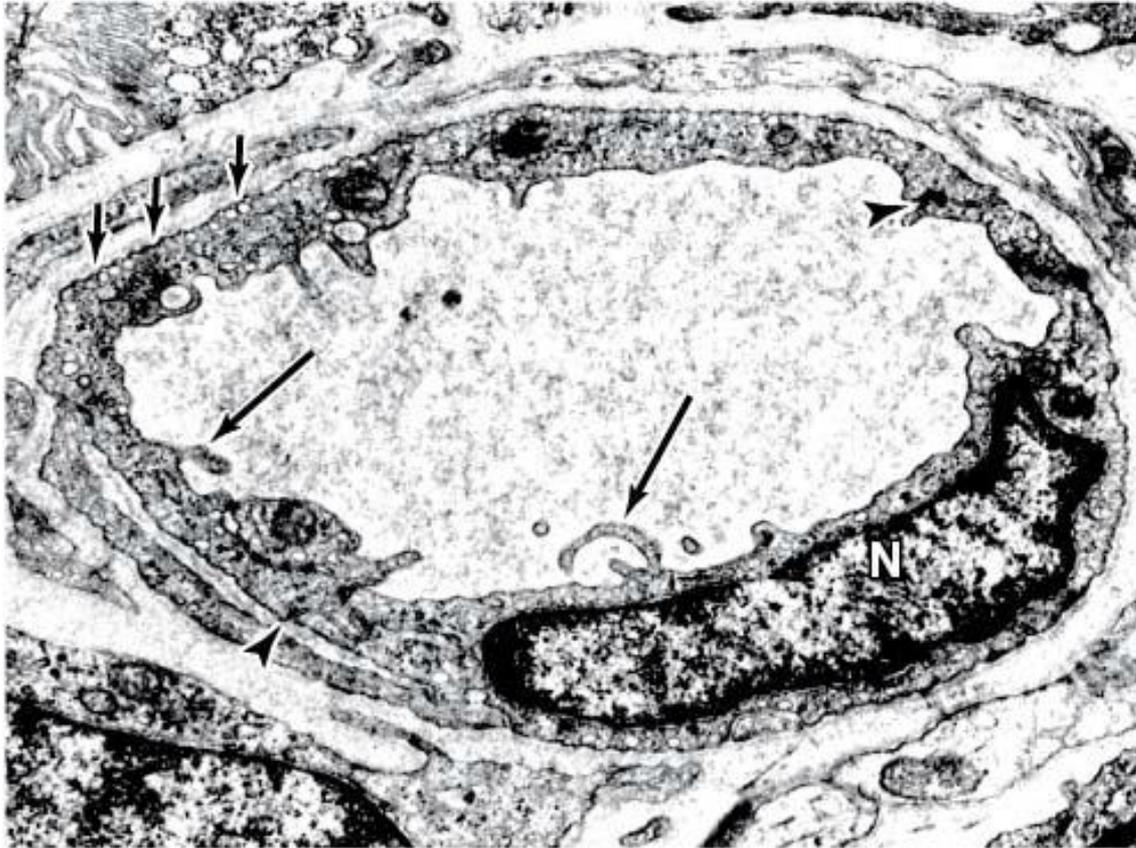
# The capillaries

CAPILLARY TYPES		
		
 <p>Lumen</p> <p>Nucleus of endothelial cell</p> <p>Intercellular cleft</p> <p>Basement membrane</p>	 <p>Fenestrae</p>	 <p>Intercellular cleft</p>
<b>CONTINUOUS CAPILLARY</b>	<b>FENESTRATED CAPILLARY</b>	<b>DISCONTINUOUS Sinusoidal capillary</b>
Examples: nervous system and muscle.	Examples: glomerular and gut mucosa.	Examples: liver and marrow.



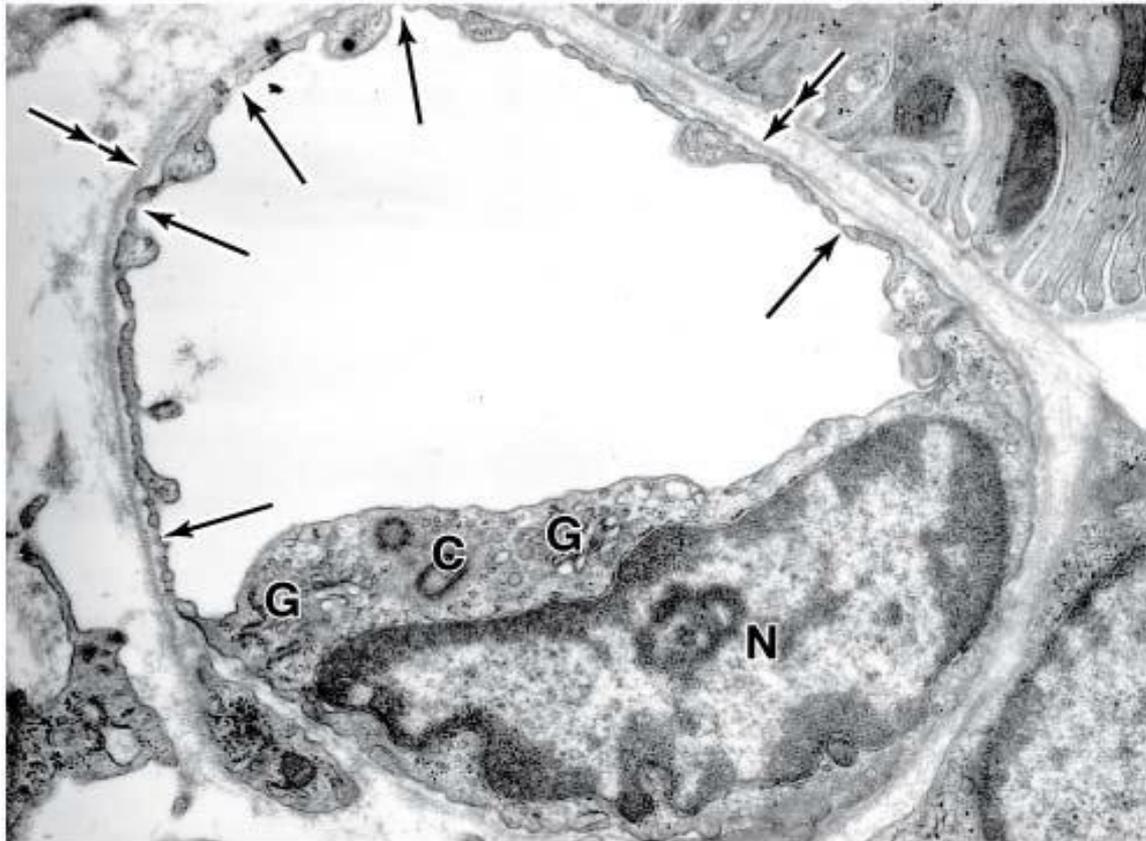
# Continuous capillaries

Continuous capillaries exert the tightest control over what molecules leave across their walls



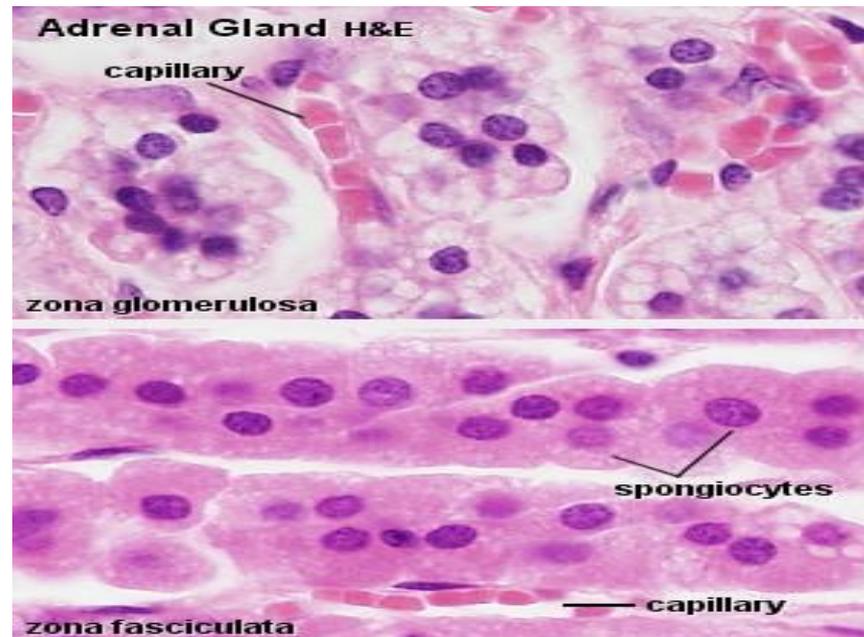
# Fenestrated capillaries

Fenestrated capillaries are specialized for uptake of molecules such as hormones in endocrine glands or for outflow of molecules such as in the kidney's filtration system

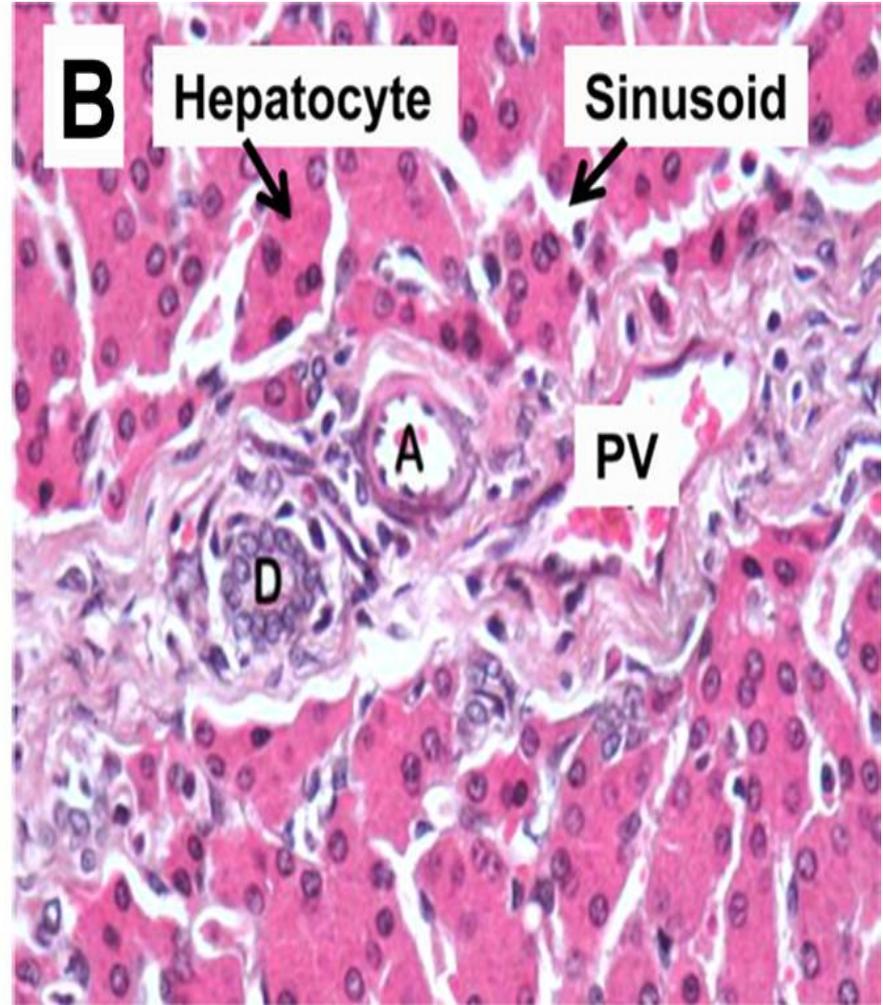
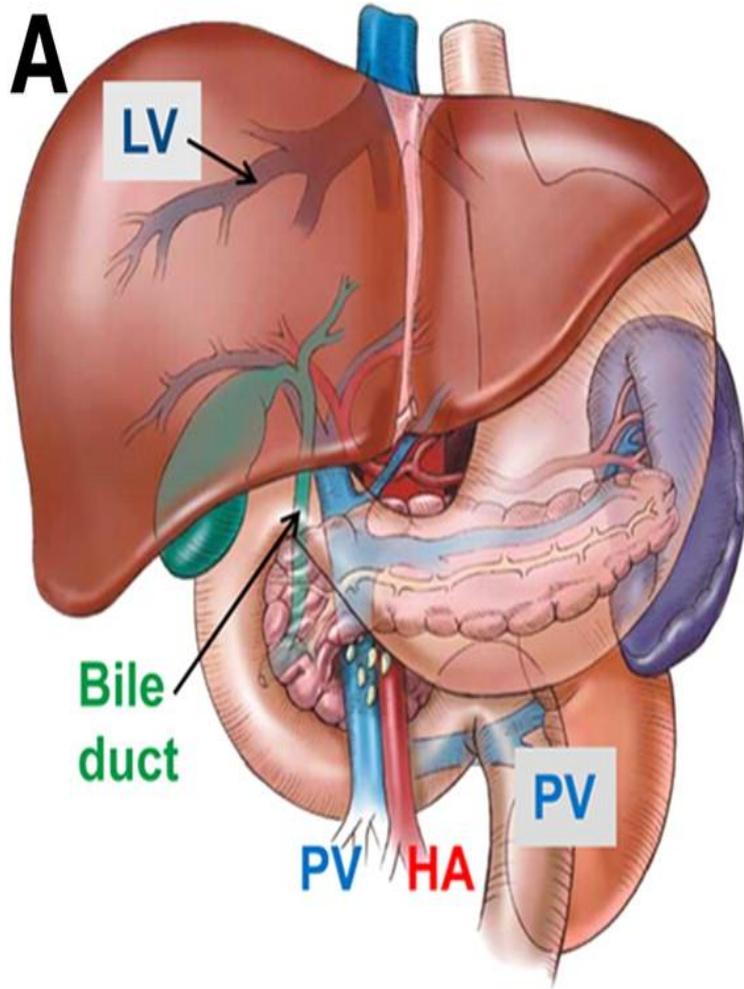


# Sinusoidal capillaries

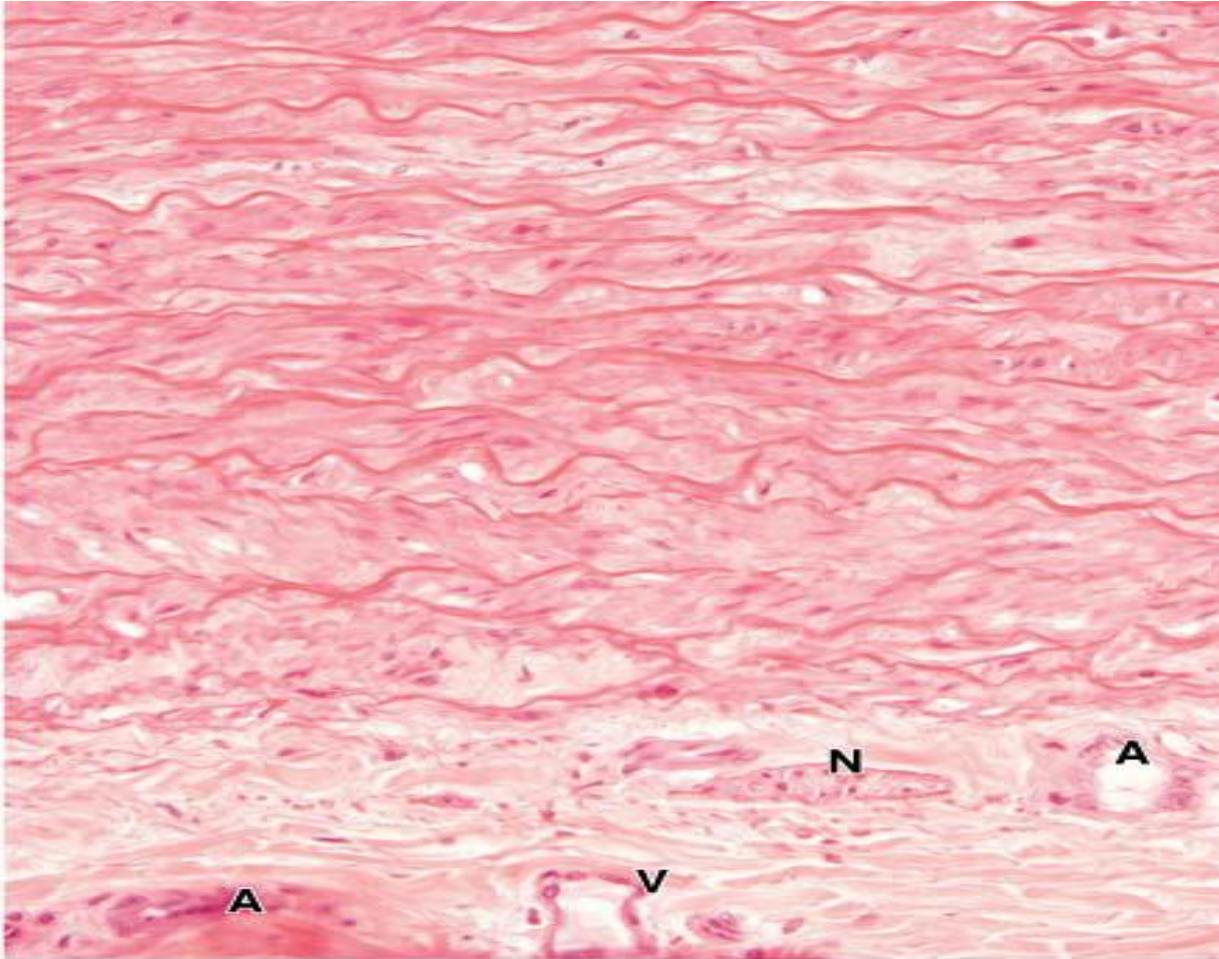
**Sinusoidal capillaries or sinusoids generally have much greater diameters than most capillaries and are specialized not only for maximal molecular exchange between blood and surrounding tissue, but also for easy movement of blood cells across the endothelium.**



# Sinusoidal capillaries



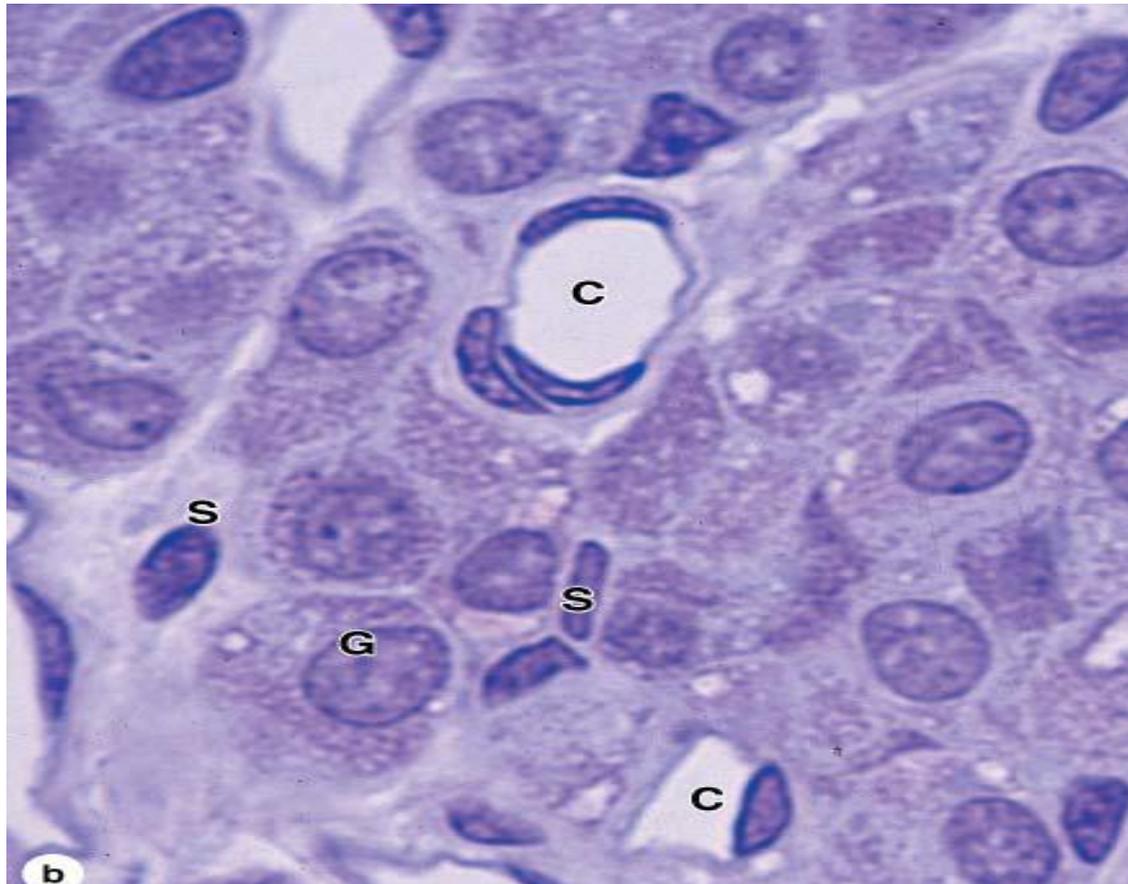
# Vasa vasorum (vessels of vessels)



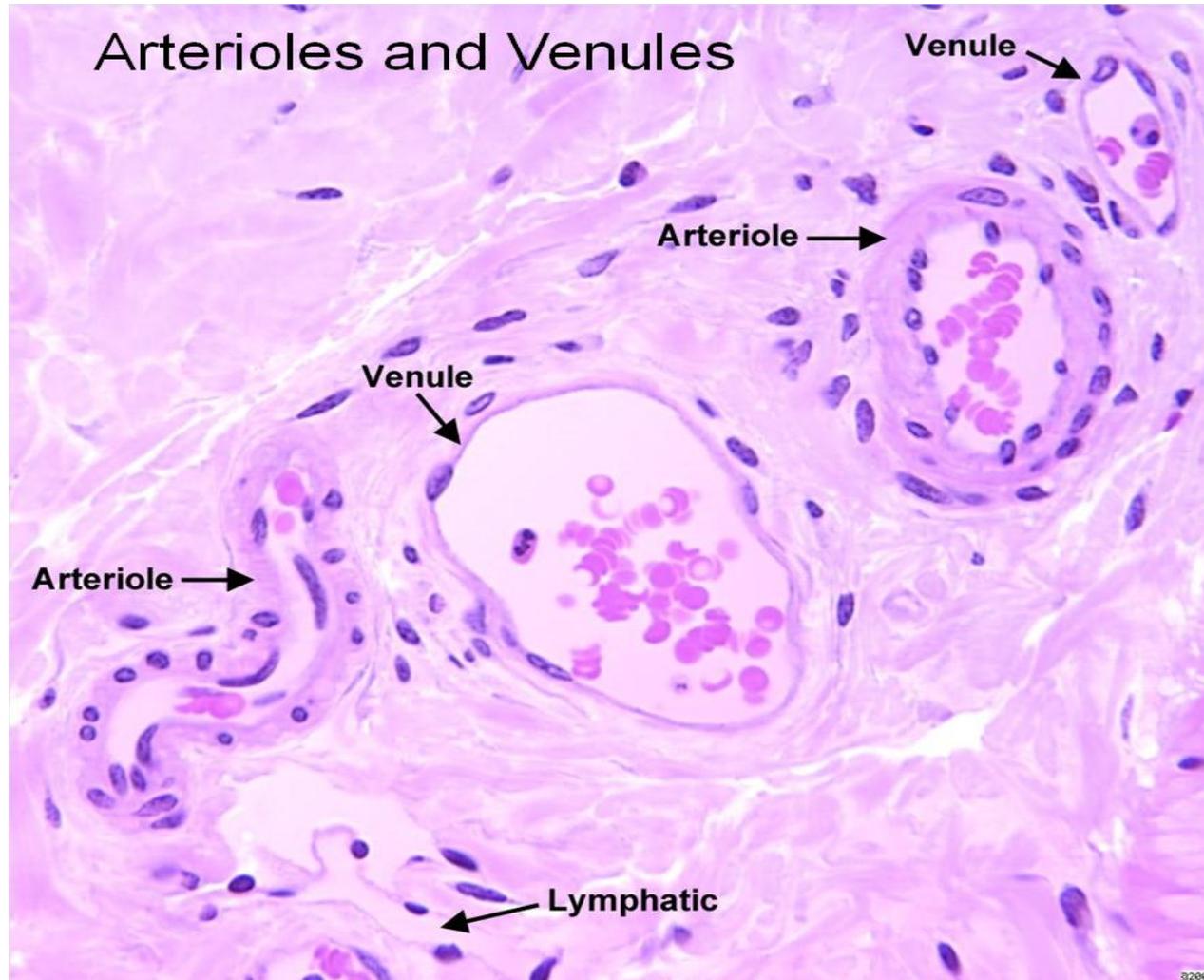
Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>  
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# Glomus body

Specialized regions in the walls of specific arteries contain cells that act of chemoreceptors providing information to the brain regarding blood chemistry.

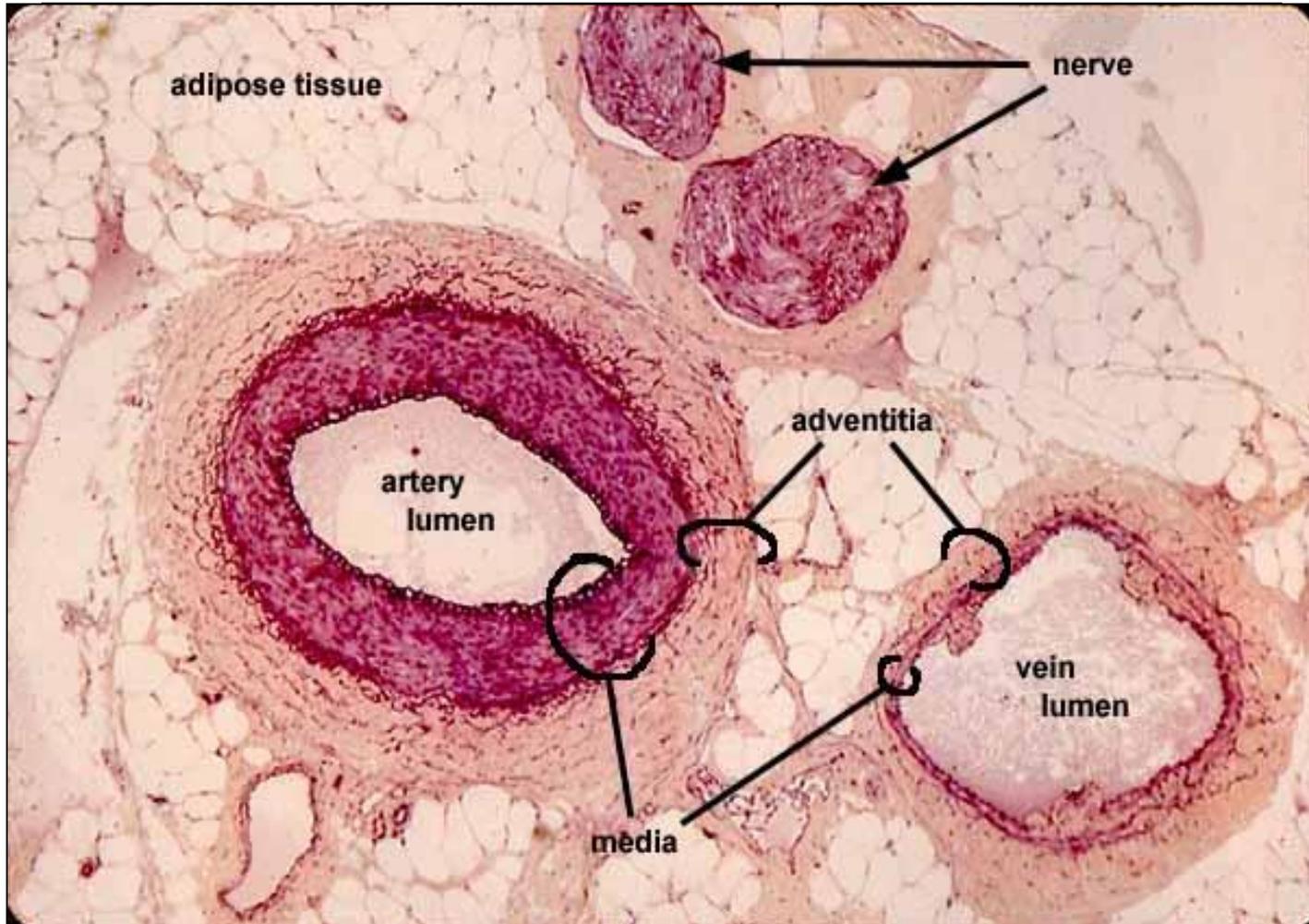


# The venules



# The veins

The construction of a vein is essentially similar to that of an artery, except that its wall is thinner and its lumen wider and irregular



# The veins

**The veins usually contain semilunar paired valves that permit blood to flow in only one direction.**

**Those veins are narrower than 1 mm in diameter and those in the thoracic and abdominal cavities do not have valves.**

**The veins collapse if blood pressure is not maintained.**



# The veins

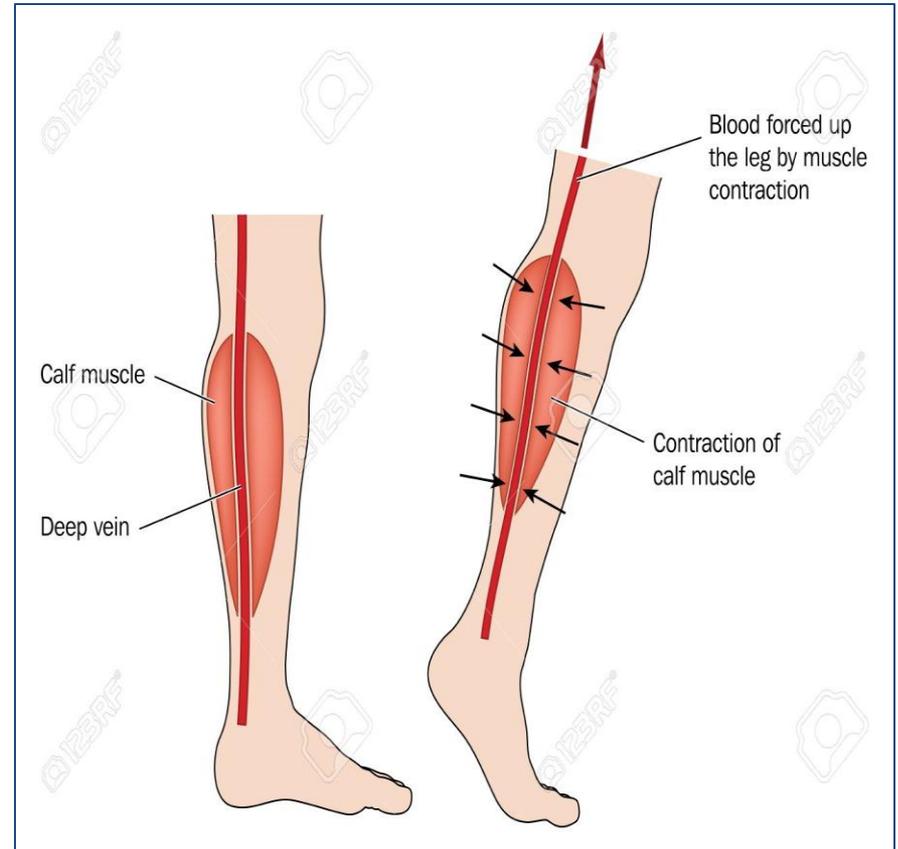
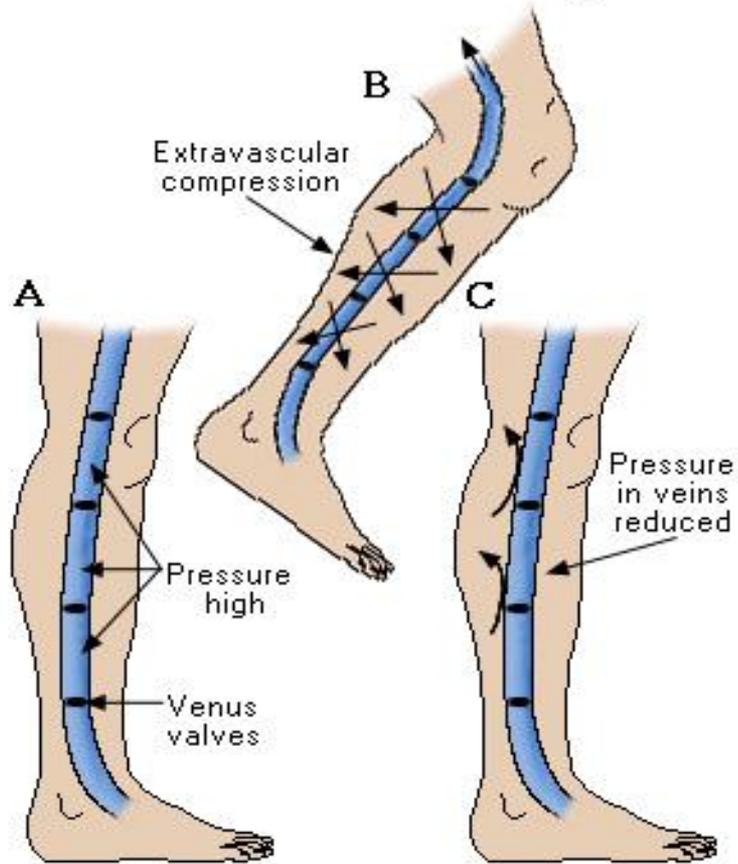
**The blood flow in arteries is the result of cardiac systolic pressure.**

**Blood flow in veins is, to a great extent, determined by the "muscle-pump" action in the leg and pressure factors in the abdominal and the thoracic cavities.**

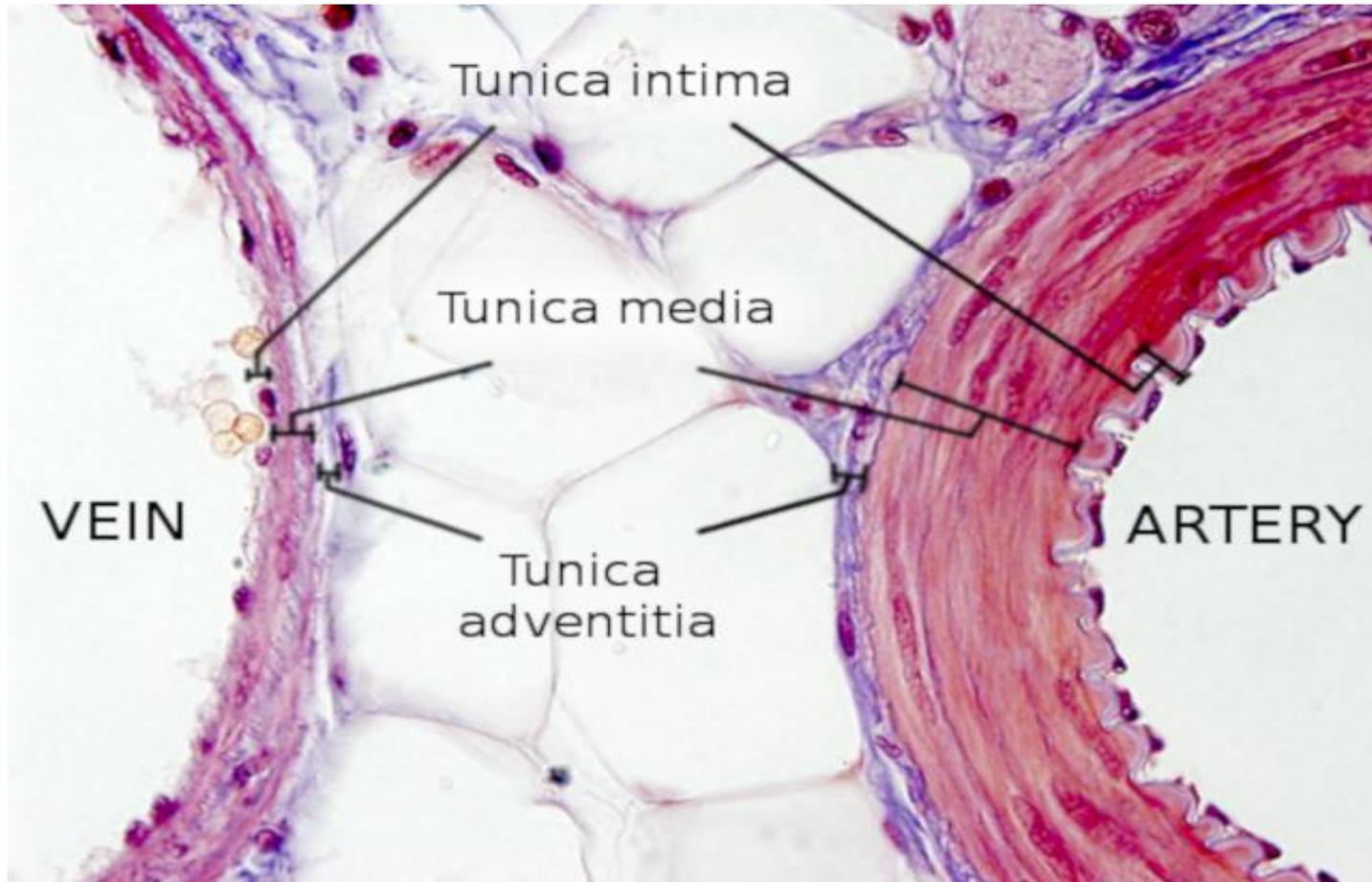


# The veins

## The Skeletal Muscle Pump



# The main differences between arteries and veins



# The main differences between arteries and veins

	Artery	Vein
1-Direction of blood flow.	From the heart towards the body.	From the body towards the heart.
2-Ending .	Ends in capillaries .	Originate from capillaries and ends in sinus venosus of the heart.
3-Type of blood.	Except the pulmonary artery all other arteries carry oxygenated blood .	Except the pulmonary vein all other veins carry deoxygenated blood .
4-Wall.	Thick , stout and elastic.	Thin , soft and non-elastic
5-Lumen.	Narrow	Wide
6-Valve.	Absent	Present



# Cardiac muscle

