



AL-Mustaqbal University College

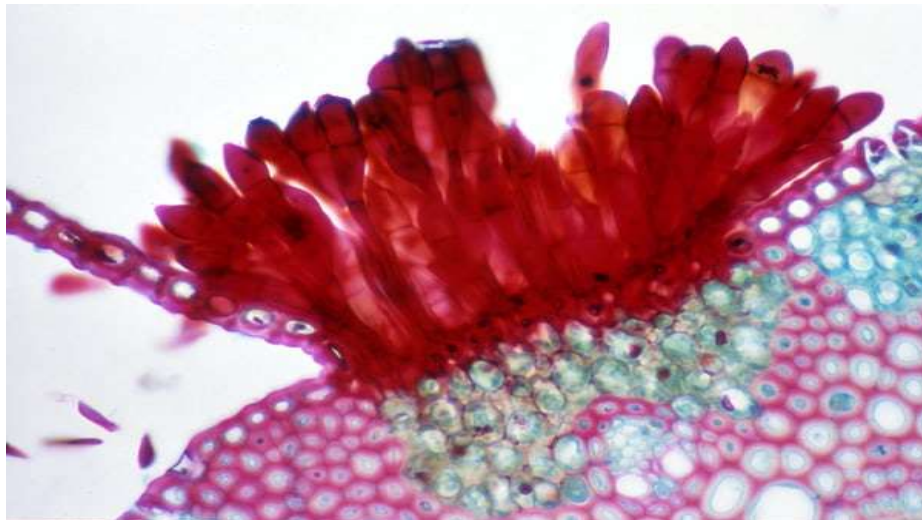
Pharmacy Department

First stage

Practical Histology

(Circulatory system)

First Lab



Lecturer: M.Sc. Noor Muhsen AL-Ammary

Circulatory system

In the human **circulatory system**, oxygenated blood is transported away from the heart through the arteries. The arteries branch into smaller blood vessels called arterioles, where they end in capillaries or where a capillary network begins. In turn, the capillaries lead to larger vessels, the venules, which then lead to the veins. The venules then transport the deoxygenated blood from the periphery back to the heart.

I. There are two major components of the circulatory system.

A. The cardiovascular system which includes:

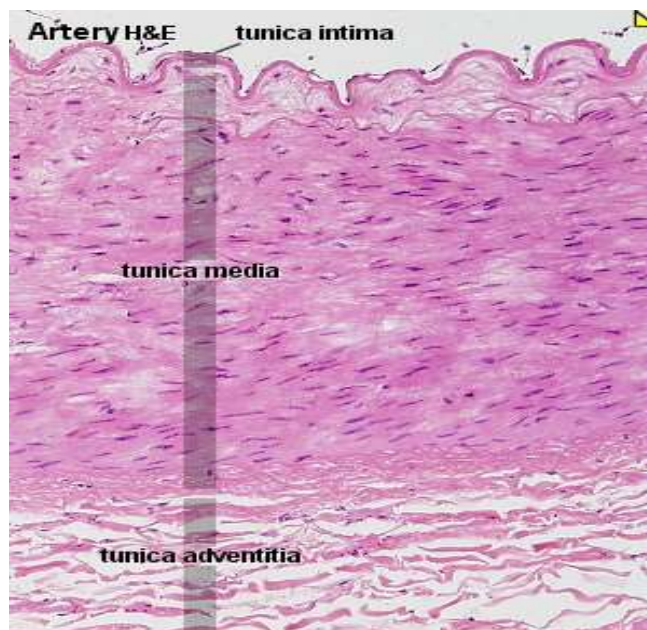
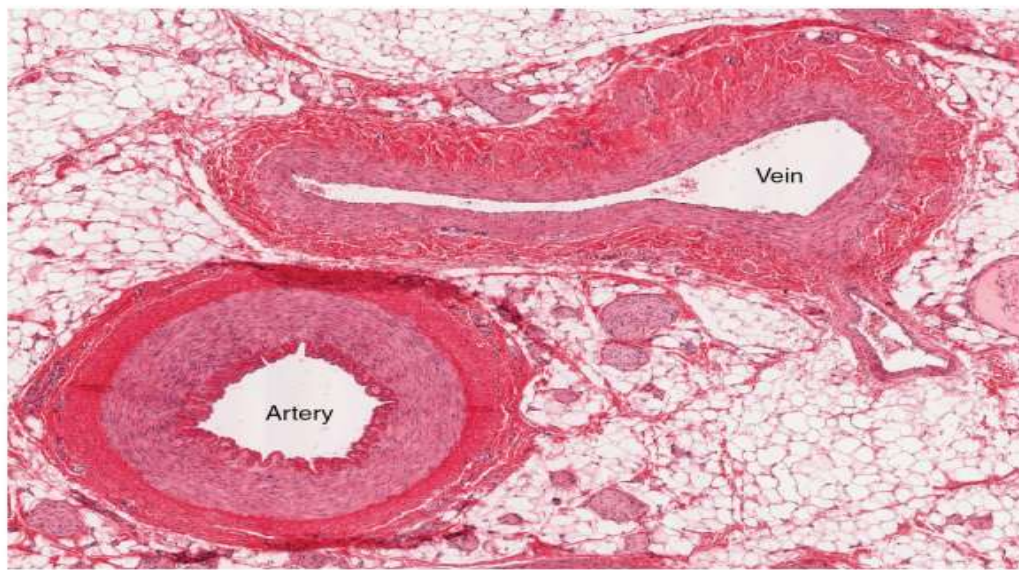
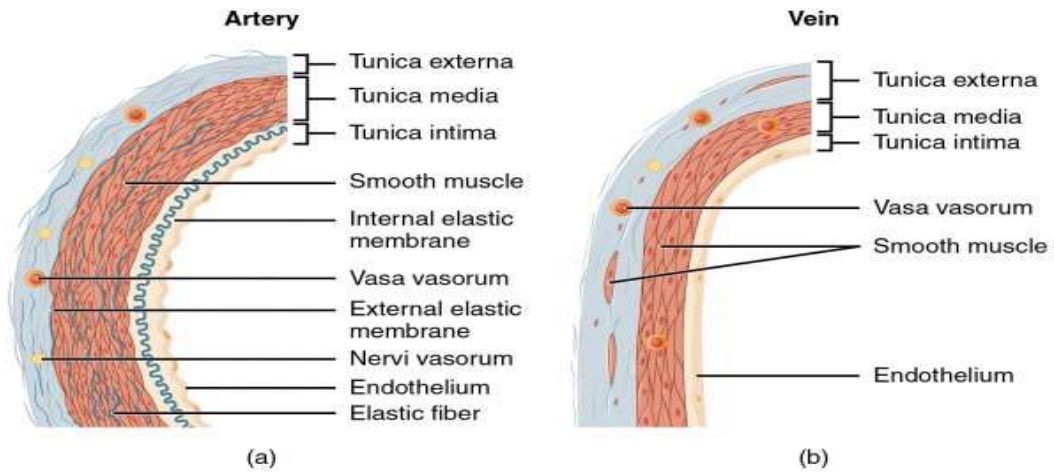
- Heart
- Arteries
- Arterioles
- Capillaries
- Venules
- Veins

B. The lymph vascular system

Structural similarities of the blood vessels

Walls of both arteries and veins have the same three-layered structure. Moving from the inside out, these layers, called **tunics** (singular tunica), are:

- The tunica intima (the intima or interna)
- The tunica media (the media or muscularis)
- The tunica externa adventitia (the adventitia)



Comparison of layers in arteries and veins

	Arteries	Veins
General appearance	Thick walls with small lumens	Thin walls with large lumens
	appear rounded	appear flattened
Tunica intima	Endothelium usually appears wavy due to constriction of the smooth muscle.	Endothelium appears smooth.
	Internal elastic membrane is present in larger vessels.	Internal elastic membrane lacking
Tunica media	Usually, this is the thickest layer in arteries.	Normally thinner than the tunica externa
	Smooth muscle cells and elastic fibers predominate (their proportion varies in keeping with the distance to the heart).	Smooth muscle cells and collagenous fibers predominate.
	In larger vessels, there is an external elastic membrane.	The external elastic membrane is non-existent.
Tunica externa	In all but the larger arteries, this layer is usually thinner than the tunica media.	Normally the thickest layer of the veins
	Collagenous and elastic fibers	Collagenous and smooth fibers predominate.

Arteries

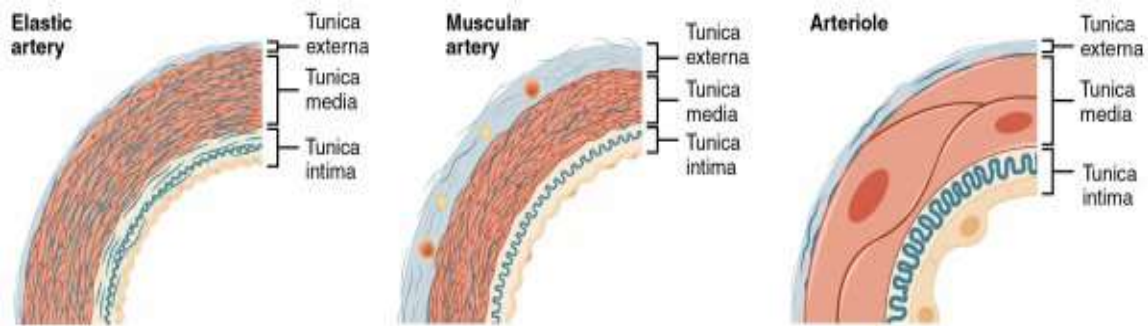
An **artery** is a blood vessel that conducts blood away from the heart. All arteries have relatively thick walls that can withstand the high pressure of blood ejected from the heart.

Histology and differentiation of arteries

Arteries transport oxygenated blood from the heart to the periphery of the body; this is why the arterial system is high pressure.

The arterial part of the circulatory system can be subdivided histologically into 2 types:

	Elastic-type arteries	Muscular-type arteries
Structural features	<ul style="list-style-type: none">-Wide intima, strong stratum subendothelial to compensate for the mechanical strain.-There is the presence of many elastic fiber networks in the media.	Strong media rich in muscle cells
Function	<p>Windkessel function:</p> <p>The ability of vessel walls to stretch enables blood that is ejected during systole to be stored.</p> <p>During diastole, blood is carried to the periphery by means of elastic retracting forces of the artery wall.</p>	Distribution of blood to organs and tissue: regulation of pressure within the media



Veins

A **vein** is a blood vessel that conducts blood toward the heart. Veins have thin-walls, and compared to arteries, large and irregular lumens. Venules are the smallest veins that form when capillaries merge together. Veins are categorized differently than arteries and capillaries, but can be broken down into four other subtypes:

- **Pulmonary**
- **Systemic**
- **Superficial**
- **Deep**

Pulmonary veins are responsible for carrying oxygen rich blood from the lungs to the heart. Systemic veins carry deoxygenated blood from the rest of the body back to the heart. Superficial veins lie near the skin's surface and lack corresponding arteries, while deep veins are found within muscle tissue and do have a corresponding artery.

The blood pressure in veins is very low, resulting in the blood needing to be lifted toward the heart by neighboring muscle. Veins also have **valves** that prevent the backflow of blood toward the capillaries.