

ADAM. المحاضرة السابعة / المرحلة
الثانية / قسم هندسة الاجهزة الطبية

الاستاذ الدكتور خيري عبدالله

Vascular System

There are five types of blood vessels : Arteries ,
Arterioles , Capillaries , Venules , Veins .

Blood vessels :

1 - Arteries carry blood away from heart through aorta which is branched to arteries then arterioles to capillaries . The capillaries merge to bring blood into venous system .

2 - Arteries transport blood cells , nutrition , oxygen and hormones to the tissue and all organ of the body .

3 - Veins carry waste products and carbon dioxide away from tissues .

4 - Arteries and Veins have 3 layers , except capillaries single layer .

Histology of blood vessels :

Arteries and veins have three layers :

1 – Tunica Intima .

2 – Tunica Media .

3 – Tunica Adventitia

Tunica intima : inner layer , one layer of epithelial cells blood vessels . It is a simple squamous epithelium , resting on basement membrane .

Tunica Media :

1 – It is the middle layer .

2 – It is consist of concentric elastic fibers and smooth muscle cells . In large blood vessels elastic fibers and smooth muscle cells are separated in two layers .

2 – Tunica media is thicker in arteries than veins .

Tunica Adventitia :

1 – It is outer most layer consist of simple squamous epithelial cells resting on basement membrane .

2 – It is thicker in veins than arteries , plenty of connective tissue .

3 – Blood vessels (Vasa vasorum) and nerve are present in this layer .

Capillaries :

1 – Capillaries are numerous and the smallest blood vessels 5 – 10 micrometers in diameter .

2 – Capillaries are composed of only intima , thin wall .

3 – It form the connection between arteries and veins .

4 - It is the site of exchange of many substances with surrounding tissues (water , Oxygen , Carbon dioxide , urea , glucose , Lactic acid , Uric acid , Creatinine) .

Types of Capillaries : three types

1 – Continuous Capillaries : means without pores , just one layer of endothelial cells (simple squamous epithelial cells) , present in brain (blood – brain barrier) , and in skin (blood – skin barrier) .

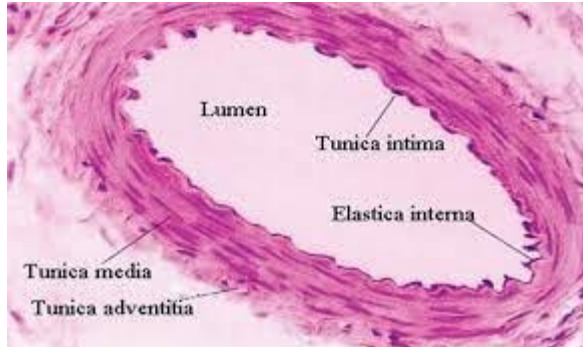
2 – Fenestrated Capillaries : These capillaries have pores , 10 – 80 micrometers in diameter , present in renal glomerulus , lungs , intestine , endocrine glands .

3 – Sinusoidal Capillaries (discontinuous capillaries) :

It is special type of capillaries , it is open in sinusoids of liver , spleen and bone marrow , 30 – 40 micrometer in diameter .

Veins :

Capillaries merge into venules which merge into veins . Veins collect or drain blood from tissues and organs and return to



the heart through superior and inferior vena cava , both of them empty into the right atrium of the heart .

Coronary vessels :

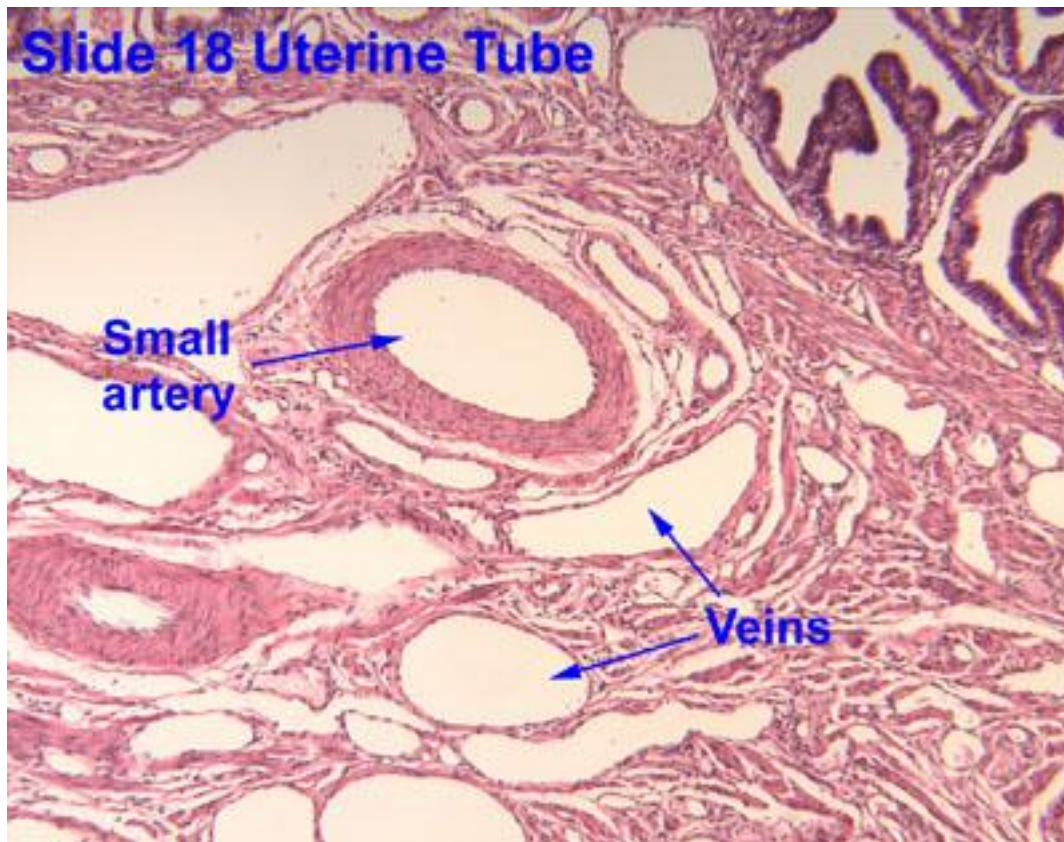


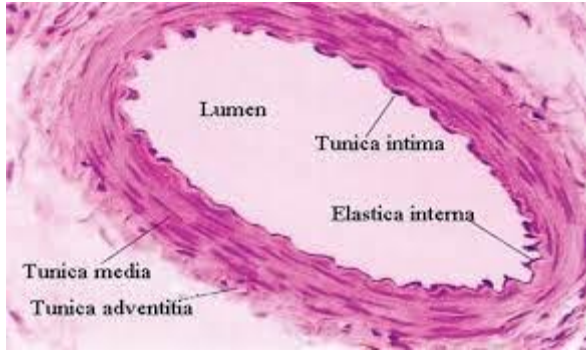
Coronary Vessels :

Heart is supplied with oxygen and nutrient through small coronary arteries (right and left) , these branches merged from aorta , then blood returns back to the right atrium by coronary veins .

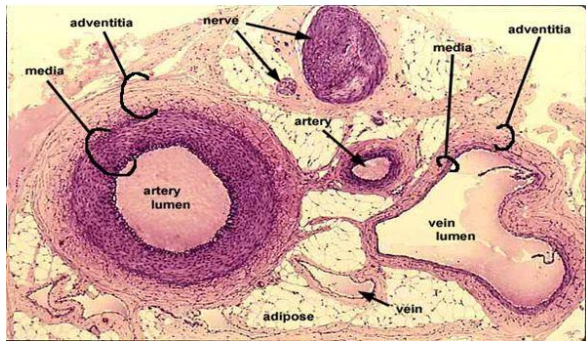
Pulmonary circulation :

Circulatory system of lungs , blood pumped via pulmonary arteries to the lungs and return oxygenated to the heart via pulmonary veins . Gas exchange occurs in the lungs where CO₂ is released from the blood and oxygen absorbed . The pulmonary vein returns with oxygen rich in blood to the left atrium .

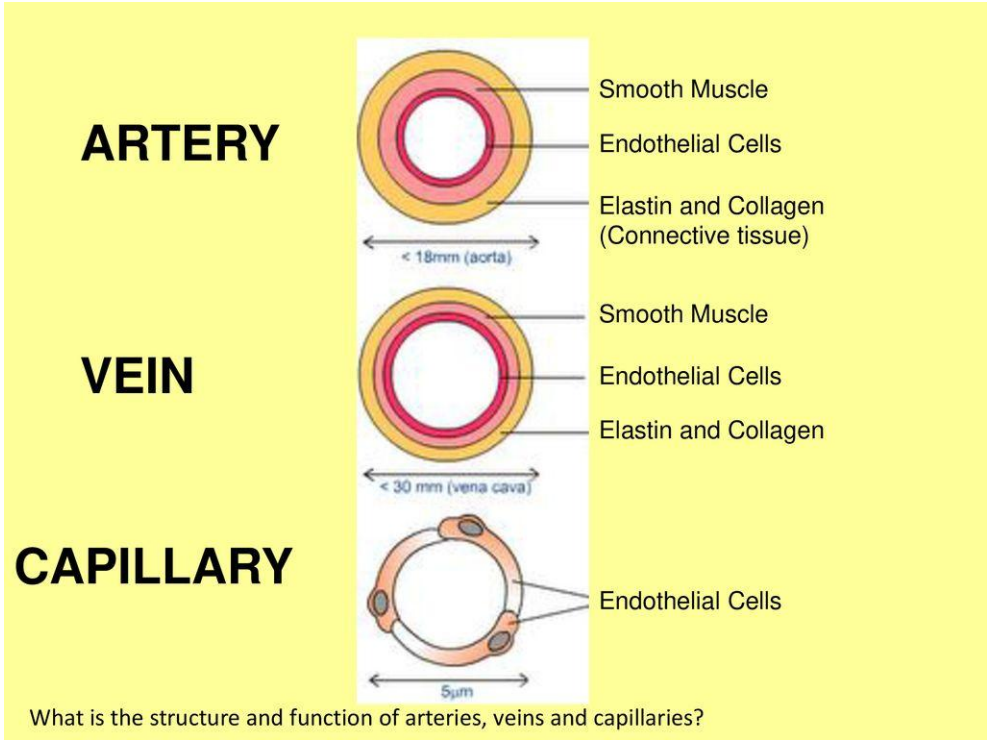
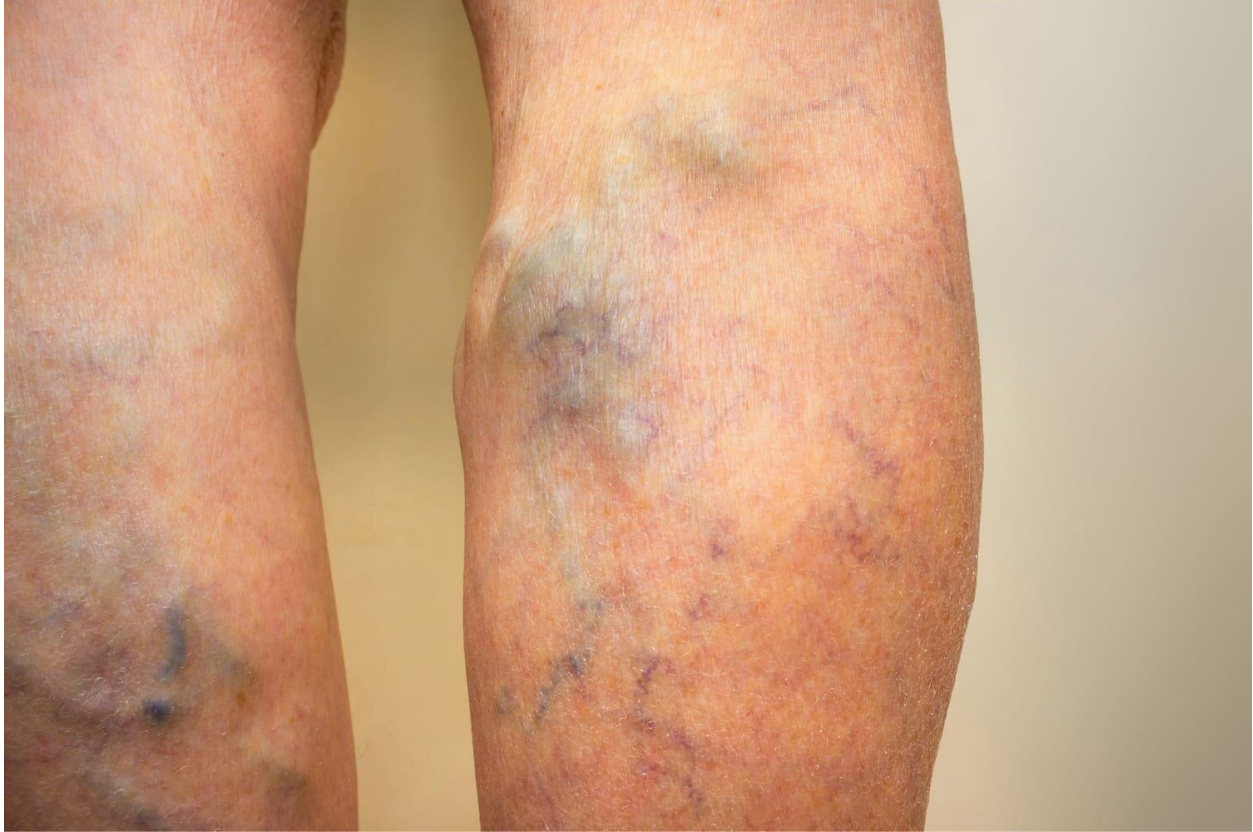




HISTOLOGY OF BLOOD VESSELS



DR. ABDUL WAHEED ANSARI
CHAIRPERSON & PROF. ANATOMY
RAK COLLEGE OF MEDICAL SCIENCES
RAK MEDICAL & HEALTH SCIENCES UNIVERSITY,
U.A.E



What is the structure and function of arteries, veins and capillaries?



Pacemaker : It is a device placed (implanted) in the chest to control heartbeats (cases / Atrial fibrillation , tachycardia , bradycardia) .

