**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 .**

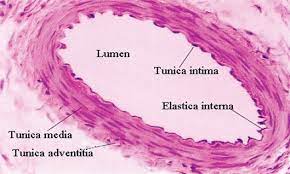
**2 – Fenestrated Capillaries : These capillaries have pores , 10 – 80 micrometers in diameter , present in renal glomerulus , lungs , intestine , endocrine glands .**

**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 .**

