Microcirculation

DR. Arwa Rawashdeh

Arteries

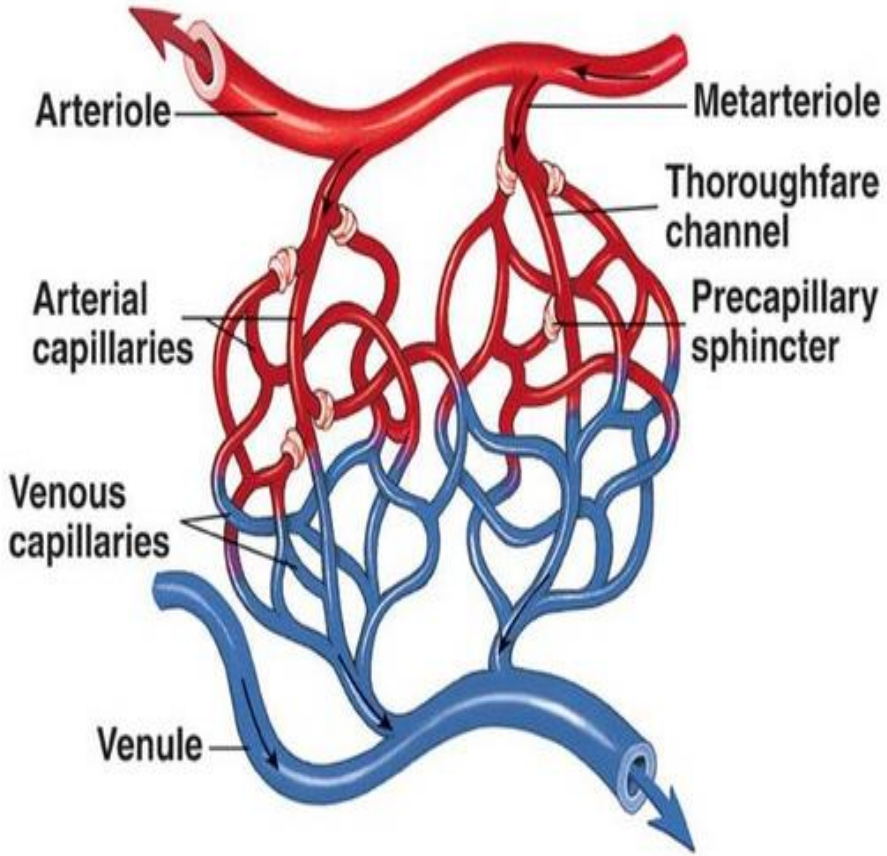
- Elastic
- Muscular
- Arterioles
- Metarterioles

Veins

Large

Medium

Venules



Capillary unit

- Here is the crux of all our information today so this is a capillary unit in a tissue, and this will be found anywhere in the body its ubiquitous and this is going to supply our tissues with all nutrient and oxygen and all that other nutrient needs to function

- What we are going to discus these arteriole, precapillary sphincters and the metarteriole and you can see these banded with smooth muscle and these precapillary sphincter are smooth muscle

- and the function of these are a little bit different; the metarteriole is basically a vascular shunt for when these capillary sphincters are open or closed , serve either as thoroughfare channels to the venules, which bypass the capillary bed, or as conduits to supply the capillary bed. There are often cross-connections between the arterioles and venules as well as in the capillary network.
- arterioles are terminal endpoint of systemic circulation with regard tissue perfusion

Anastomosis

- Alternative for blood flow

Arterial anastomosis circle of Willis

Venous anastomosis basilic cephalic and median cubital vein

Arteriovenous anastomosis metarteriole thoroughfare channel

BLOOD FLOW

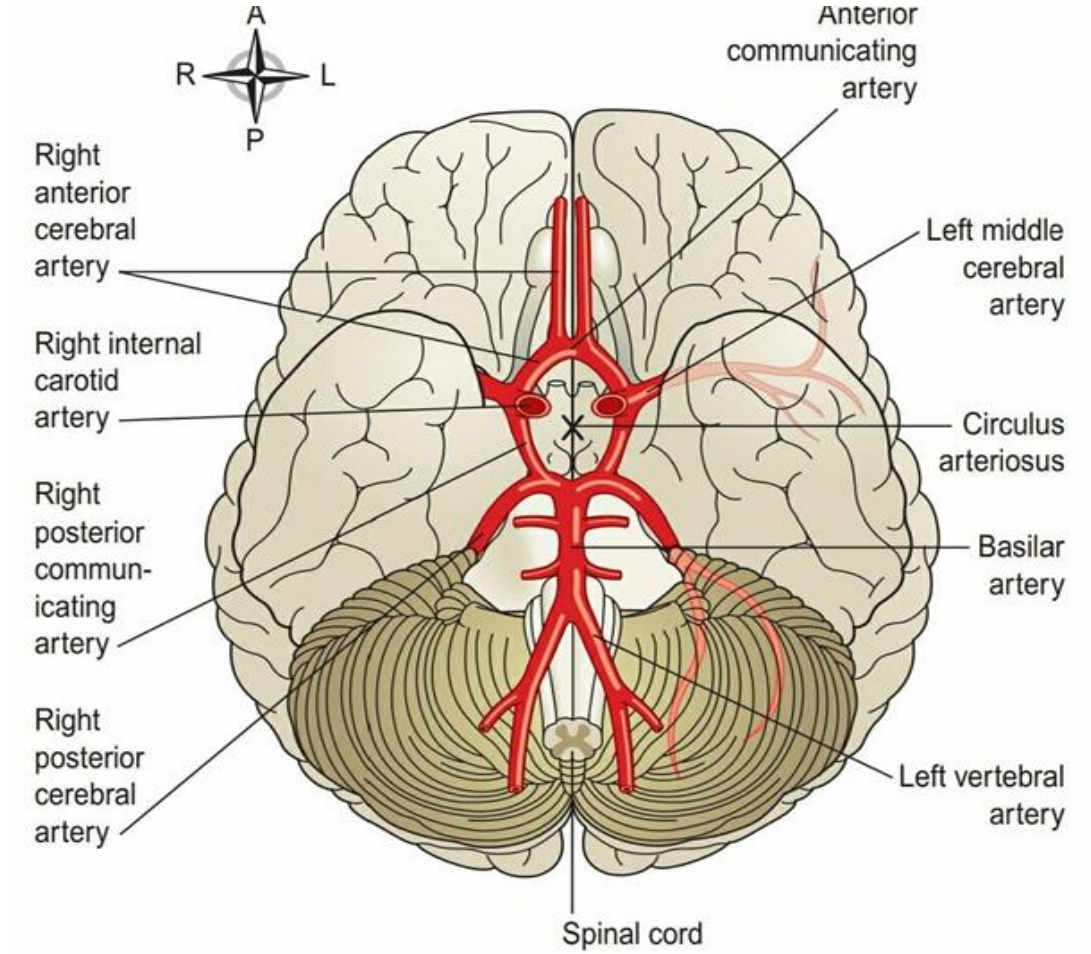
Skeletal muscles: Active hyperemia vasodilators exercising (CO_2, H^+, lactic acid)

Brain: High MAP vasoconstriction myogenic mechanism

LOW MAP vasodilation

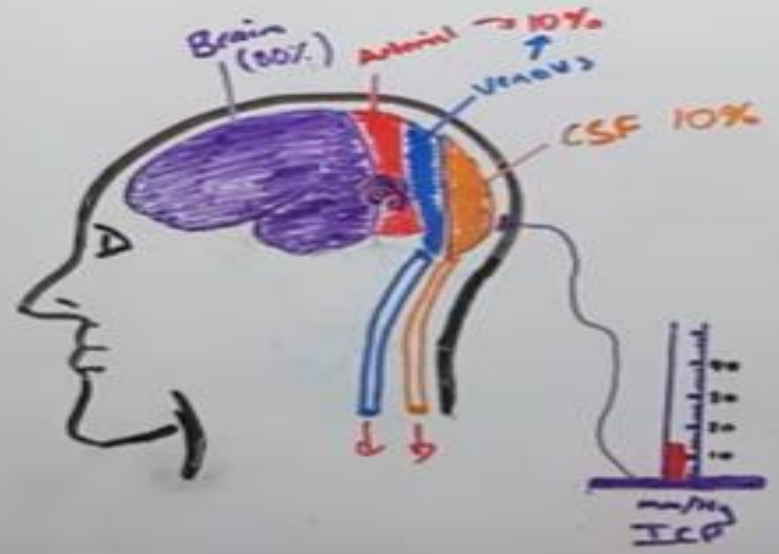
Lung: PO_2 decrease blood shunt

GIT and skin : Vasoconstriction



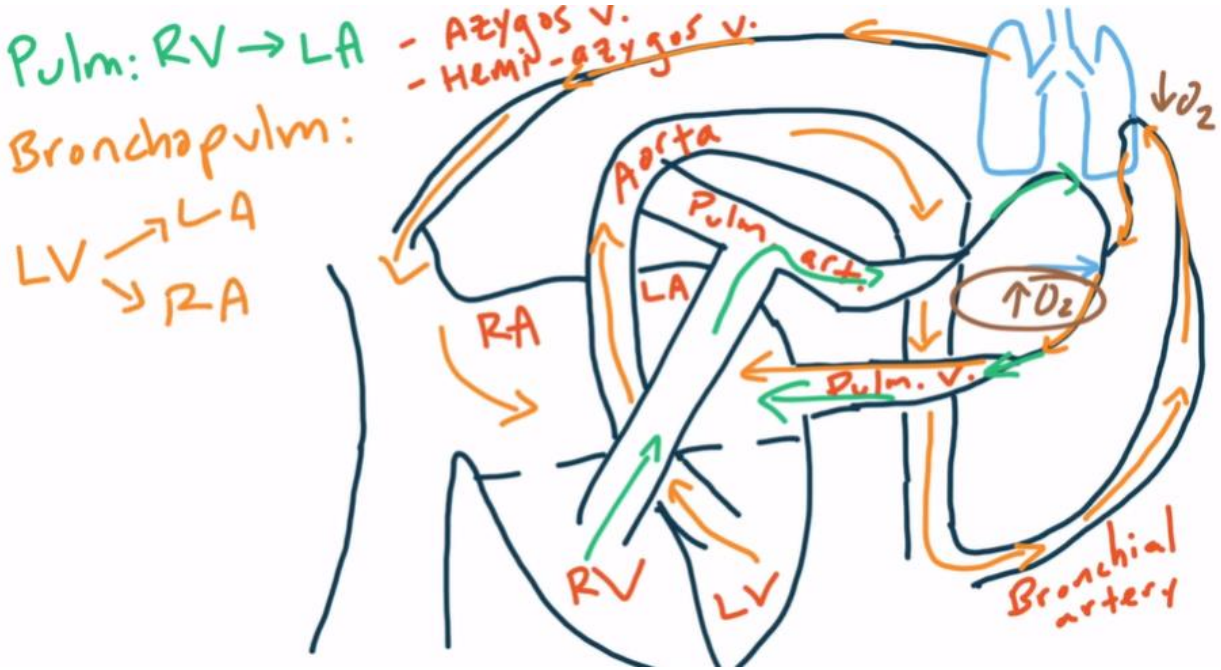
Arteries forming the circulus arteriosus (circle of Willis) and its main branches to the brain. Viewed from below.

Increased Intracranial Pressure



CPP = MAP - ICP

Cushing triad



- Bronchopulmonary circulation
  -Supplied by blood from the left ventricle and mostly empties into the left atrium
- Pulmonary circulation
  -Supplied by blood from the right ventricle and empties into the left atrium

Ventricular Compliance

- As the ventricle fills with blood, the pressure and volume that result from filling are determined by the compliance of the ventricle. Normally, compliance curves are plotted as the change in volume (ΔV) over the change in pressure (ΔP). Therefore, the slope of the relationship is the reciprocal of the compliance, which is sometimes referred to as ventricular "stiffness.“

- As the ventricle fills with blood and its volume increases, the pressure within the ventricular chamber passively increases (see the Normal filling curve in the figure). The relationship is not linear, particularly at higher volumes, because the compliance of the ventricular wall decreases ("stiffness" increases) the more the ventricular wall is stretched. This occurs in most biological tissues.

- in ventricular hypertrophy the ventricular compliance is decreased (i.e., the ventricle is "stiffer") because the thickness of the ventricular wall increases; therefore, ventricular end-diastolic pressure (EDP) is higher at any given end-diastolic volume (EDV)

- In a disease state such as dilated cardiomyopathy, the ventricle becomes very dilated without appreciable thickening of the wall. This dilated ventricle will have increased compliance as shown in the figure; therefore, although the EDV may be very high, the EDP may not be greatly elevated.