

Anatomy teamwork

Lecture 4

The cardiovascular system

Color coding

- Very important
- Notes

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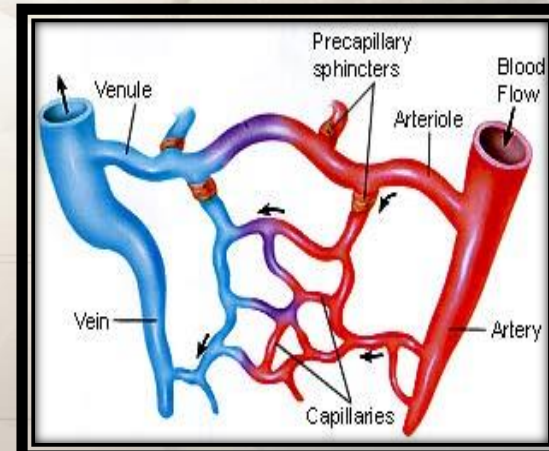
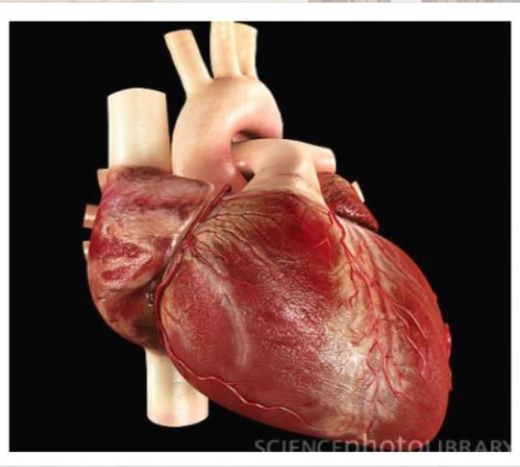
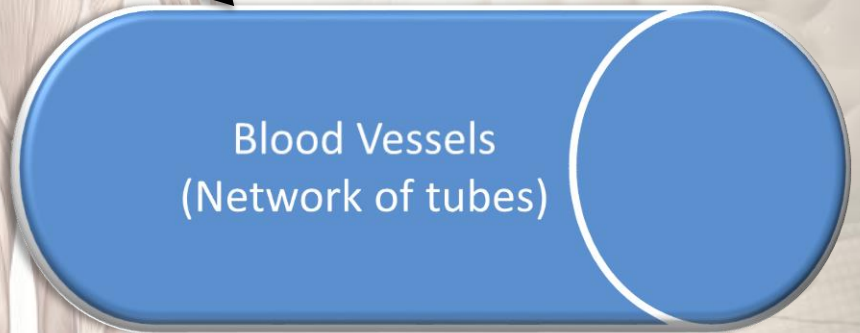
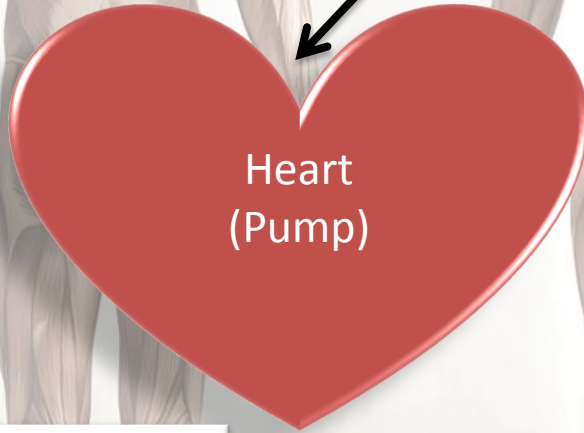


Objectives

- Identify the components of the cardiovascular system.
- Describe the Heart in regard to (position, chambers and valves).
- Describe the Blood vessels (Arteries, Veins and Capillaries).
- Describe the Portal System.
- Describe the Functional and Anatomical end arteries.
- Describe the Arteriovenous Anastomosis.

CVS COMPONENTS:

Cardiovascular



Functions of CVS

Function

Via

CVS

transportation

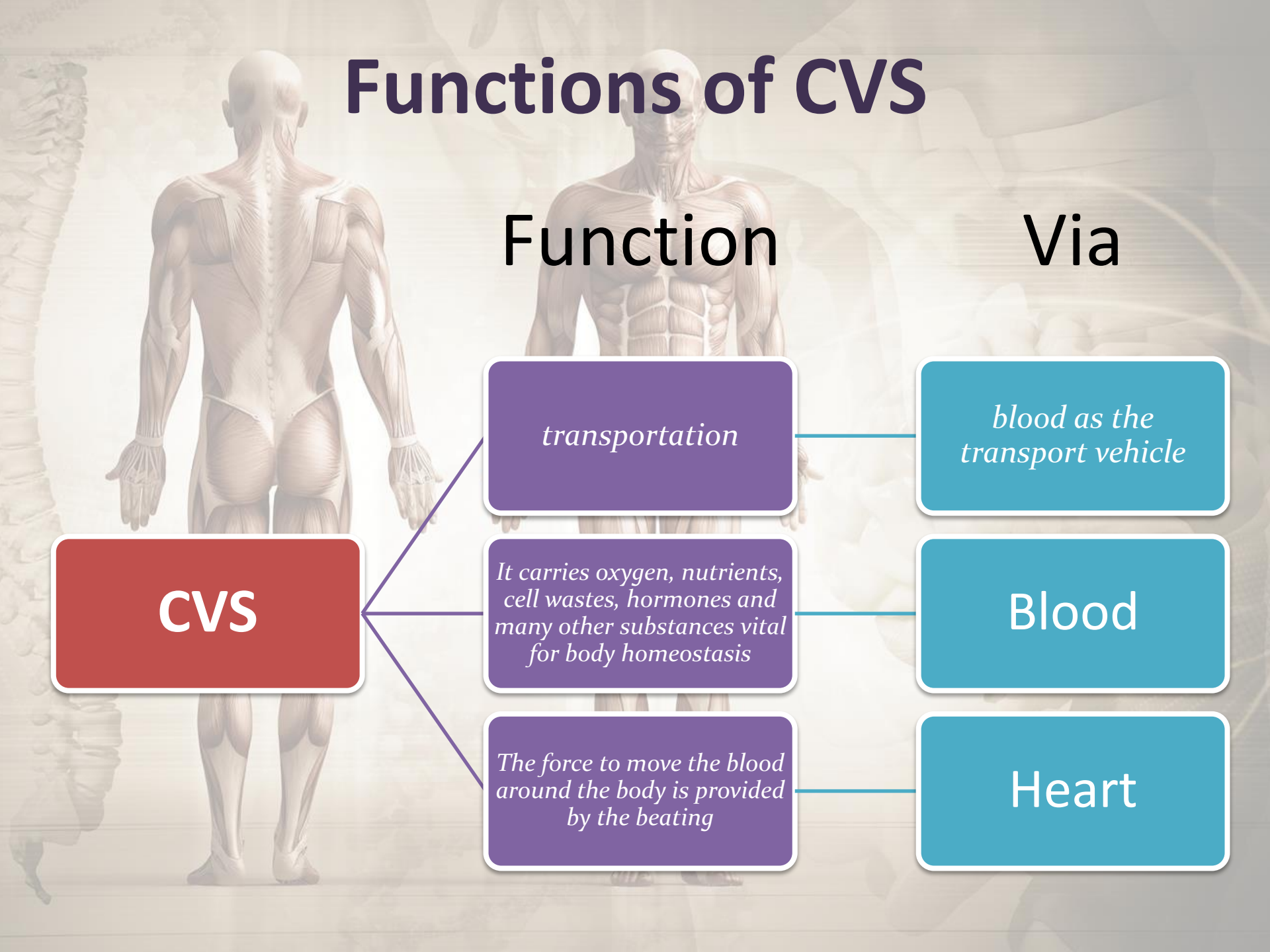
It carries oxygen, nutrients, cell wastes, hormones and many other substances vital for body homeostasis

The force to move the blood around the body is provided by the beating

blood as the transport vehicle

Blood

Heart



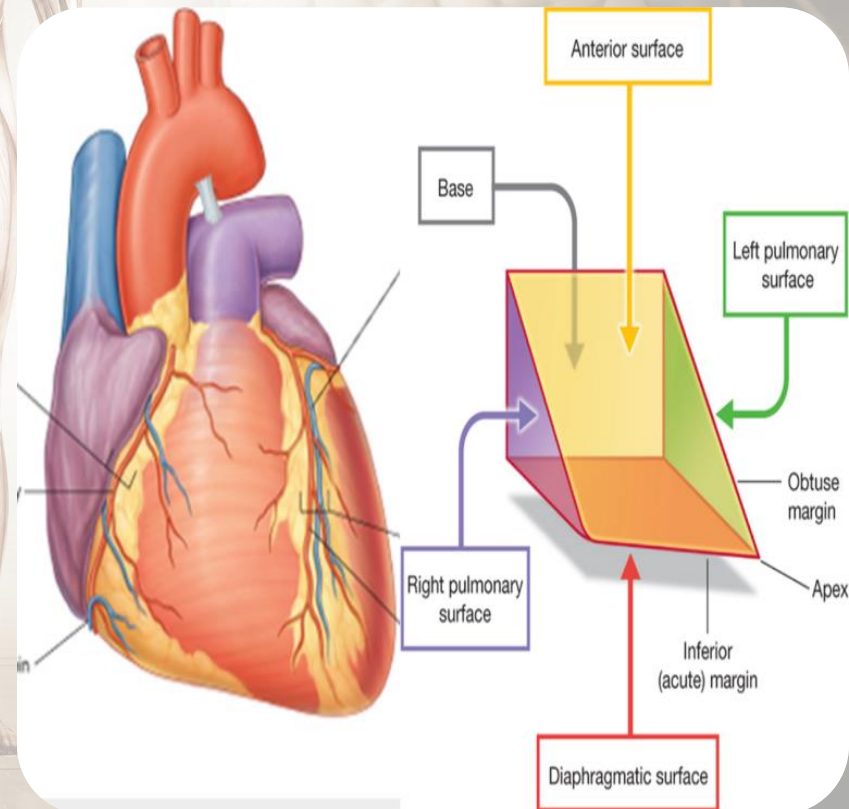
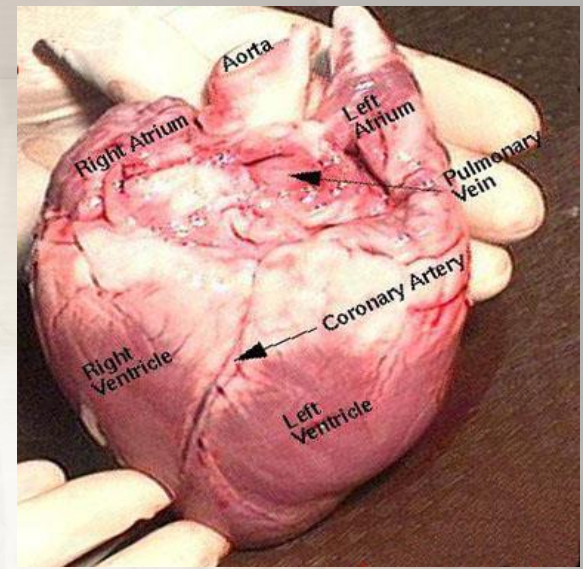
The heart

SHAPE

- ❖ hollow, cone shaped muscular pump that keeps circulation going on

It has

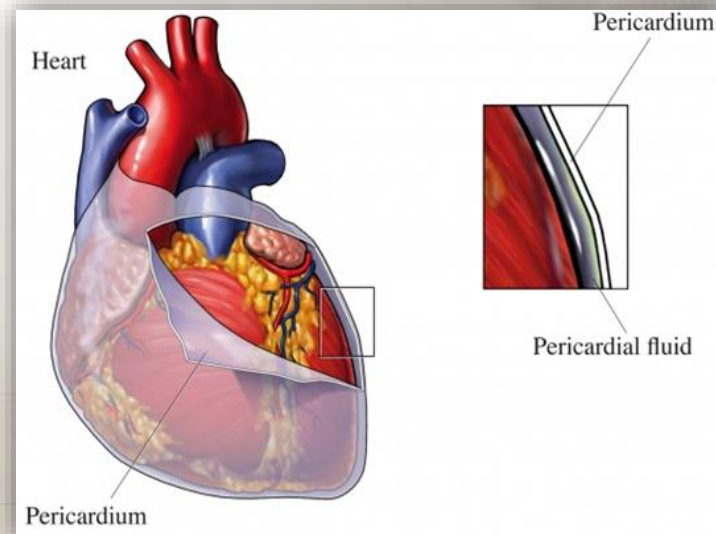
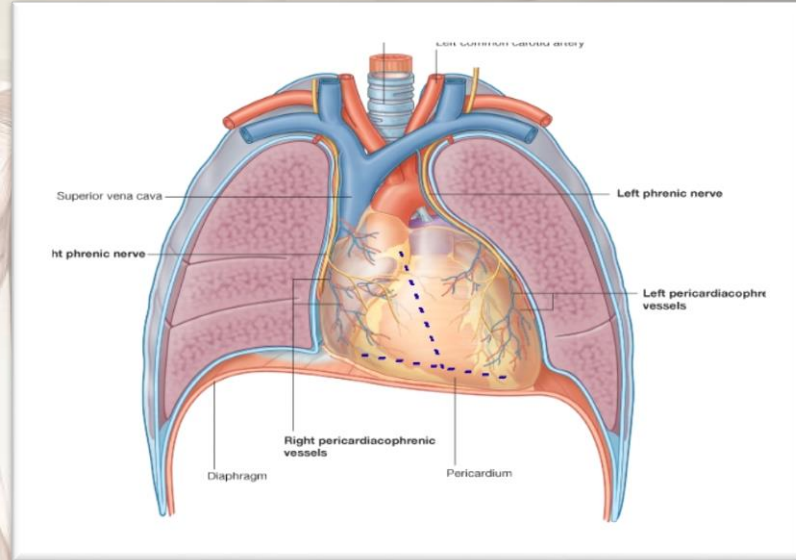
- Apex
- Base
- Surfaces:
 - ✓ Diaphragmatic & Sternocostal
- Borders:
 - ✓ Right, Left, Inferior.



N.B The heart does not rest on its base; it rests on its diaphragmatic (inferior) surface. **Check the picture.**

Location of the heart

- It is located in the thoracic cavity in a place known as the **Middle Mediastinum** between the two pleural sacs.
- Enclosed by a double sac of **serous** membrane (**Pericardium**).
- 2/3 of the heart lies to the left of median plane.
- The outer wall of the heart is made up of **three layers**:
 - **Epicardium**.
 - **Myocardium** (muscle of the heart).
 - **Endocardium**.



Heart Chambers

Ventricle (Ventricles)

- They are two (right & left).
- The inferior chambers.
- They have thick walls.
- They are the discharging chambers (actual pumps).
- Their contraction propels blood out of the heart into the circulation.

Atrium (Atria)

- They are two (Right & Left).
- Superior in position.
- They have thin walls.
- They are the receiving chambers.
- The upper part of each atrium is the Auricle.
- The Right Atrium receives the venous blood coming to the heart.
- Left Atrium receives arterial blood coming from the lungs.

valves

Atrioventricular Valves:

Valves between atria & ventricles. They allow the blood to flow in one direction from the atria to the ventricles.

And they are two types :

Right AVV (Tricuspid).

Left AVV (Bicuspid or **Mitral**).

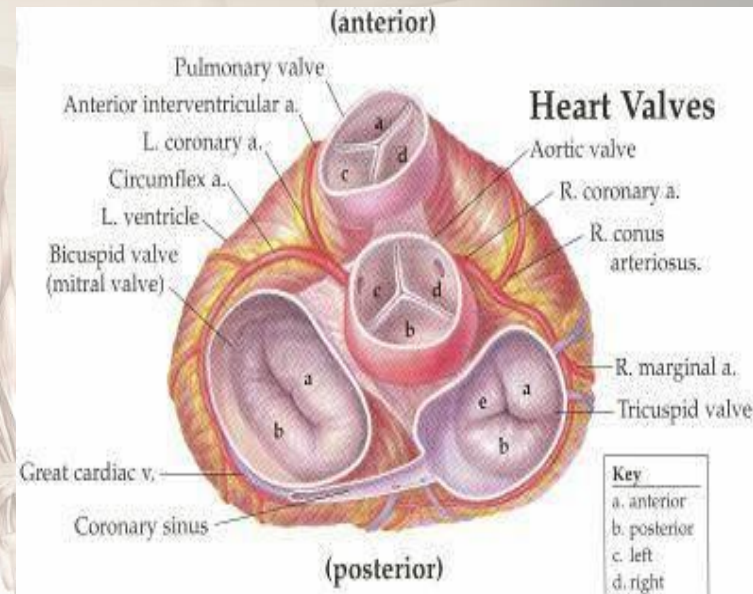
Semilunar Valves (Aortic & Pulmonary):

Between the right and left ventricles and the great arteries leaving the heart. They allow the flow of blood from the ventricles to these arteries.

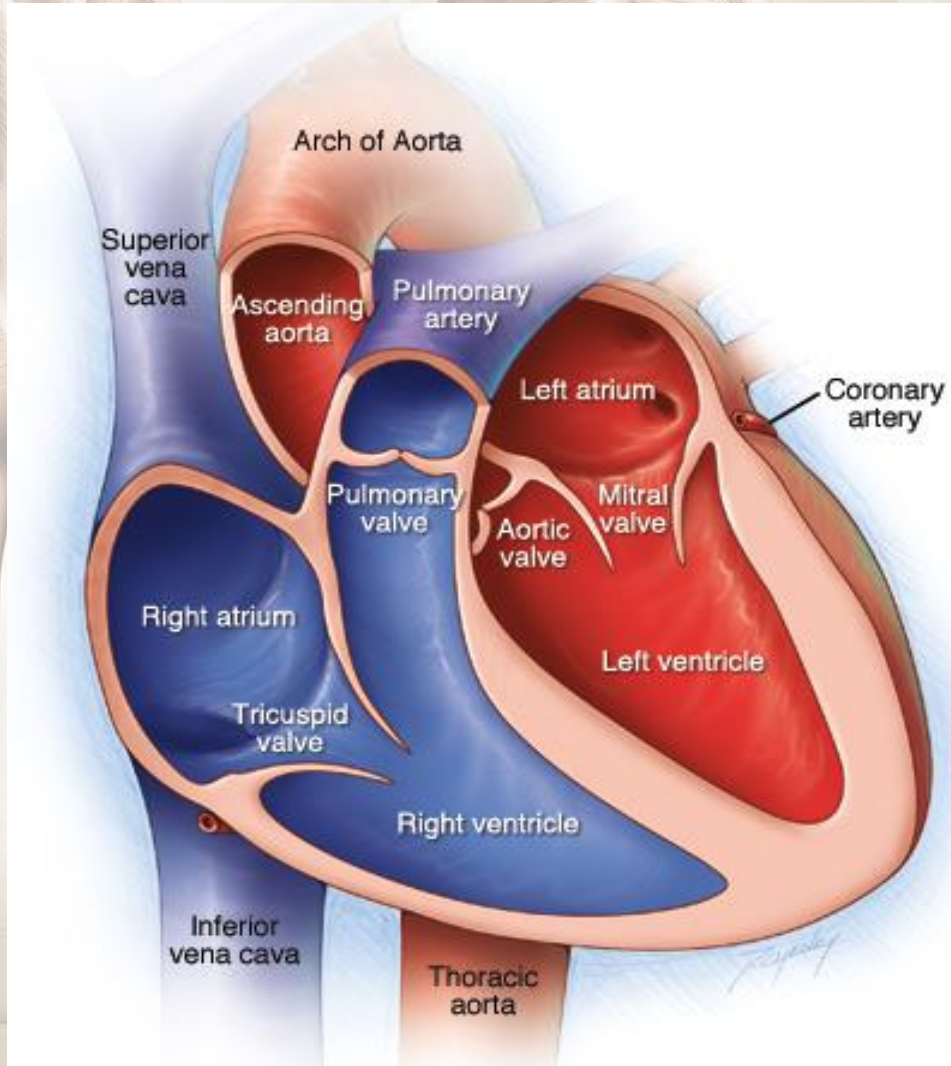
And they are two types :

Aortic Semilunar Valve

Pulmonary Semilunar Valve



Heart chambers & valves





Blood Vessels

Arteries

The smallest arteries are **arterioles**.

Thick walled, do not have valves.

Veins

The smallest veins are **venules**.

Thin walled.

Many of them possess **valves**.

Capillaries

Microscopic vessels in the form of a network.

They connect the **Arterioles** to the **Venules**.

Arteries vs Vein

Arteries vs vein

Vein

They transport blood back to the heart

The smaller veins (**Tributaries**) unite to form larger veins which commonly join with one another to form **Venous Plexuses**.

Carry deoxygenated blood toward the heart.

Artery

They transport blood from the heart and distribute it to the various tissues of the body through their branches

Carry oxygenated blood away from the heart.

Exceptions

Exception in (vein and arteries)

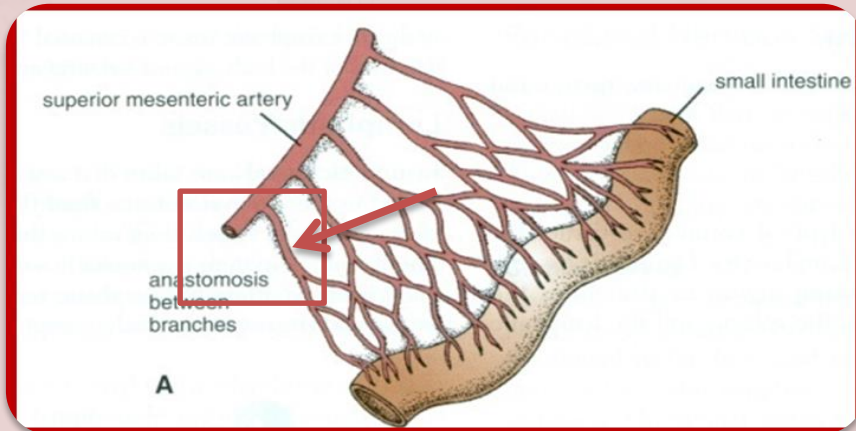
Vein

- ✓ the pulmonary veins.
 - receive **oxygenated** blood from the lungs and drain into the left atrium of the heart.

Artery

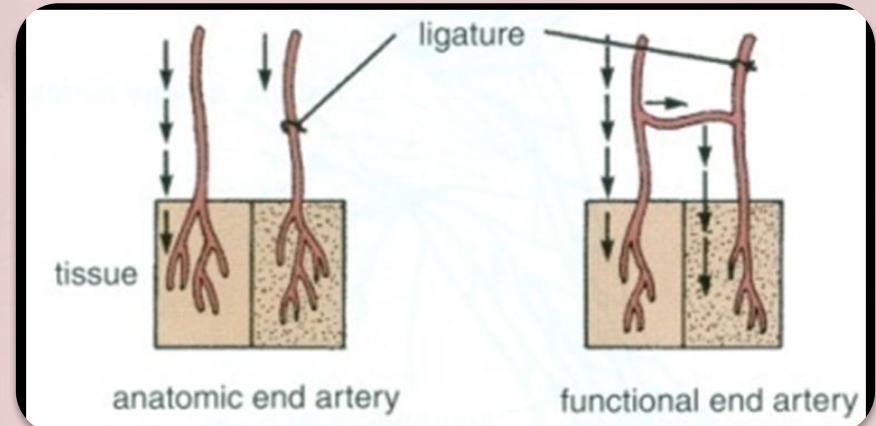
- ✓ the pulmonary arteries.
 - carries **deoxygenated** blood from the heart to the lungs.

Anastomosis : It is the connection of two structures.



Arterial anastomosis

It is the joining of terminal branches of the arteries.



End Arteries

It is the artery that is the only supply of oxygenated blood to a portion of tissue and don't anastomose with their neighbors are called end arteries.

Examples :

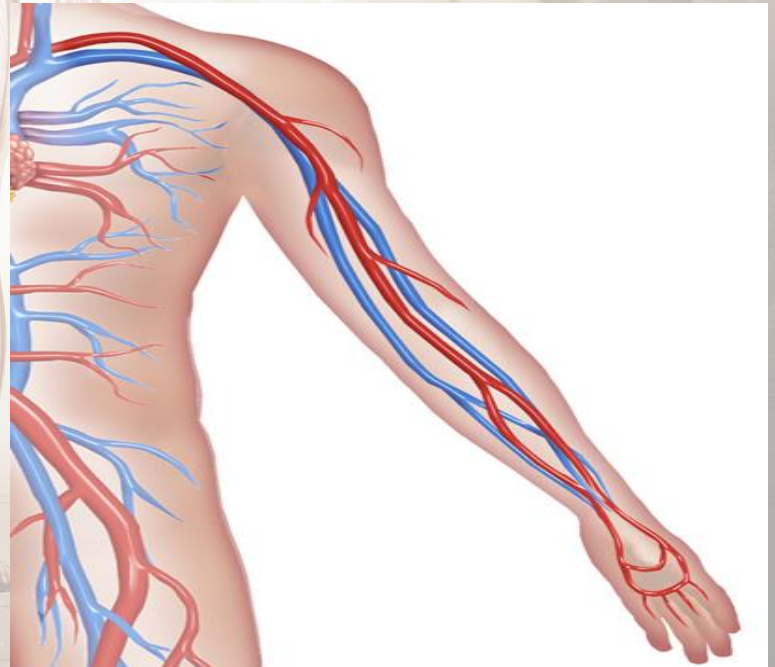
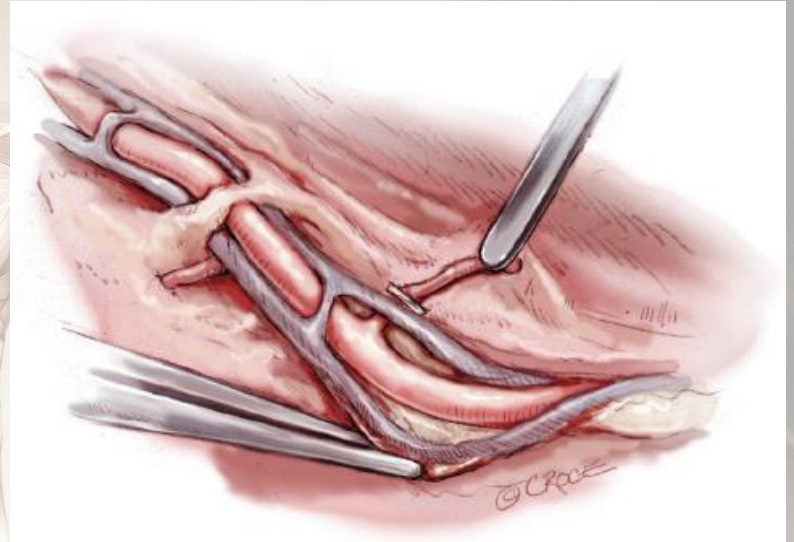
- Splenic artery
- Renal artery

N.B: If the artery got cut, the other Arteries will help in function.

* Arterial anastomosis is mostly found in patella scapula and small intestines

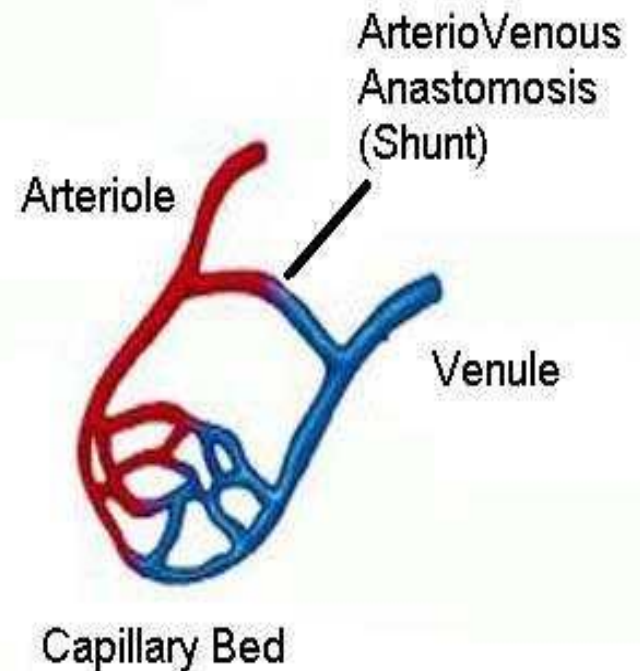
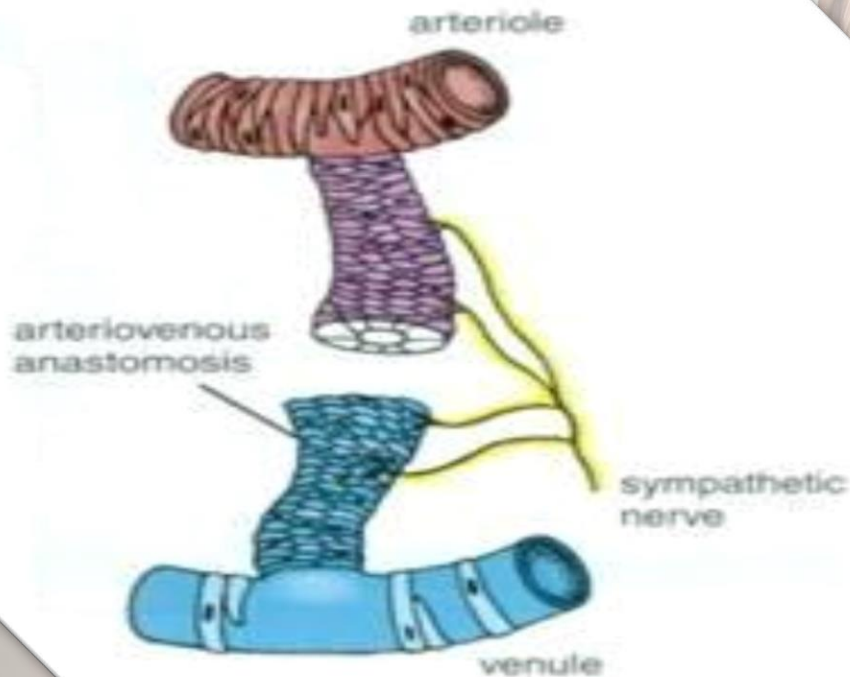
Deep vein(venae comitantes)

- ❖ Two veins that accompany medium sized deep arteries
- ❖ Vena comitans is Latin for accompanying vein.
- ❖ They are found in close to arteries so that the pulsations of the artery aid venous return.
- ❖ Venae comitantes are usually found with smaller arteries, especially those in the limbs.
 - Larger arteries do not have venae comitantes. They usually have a single, similarly sized vein.



Arteriovenous Anastomosis

- ❖ Direct connections between the arteries and veins without the intervention of capillaries.
- ❖ Found in tips of the fingers and toes.

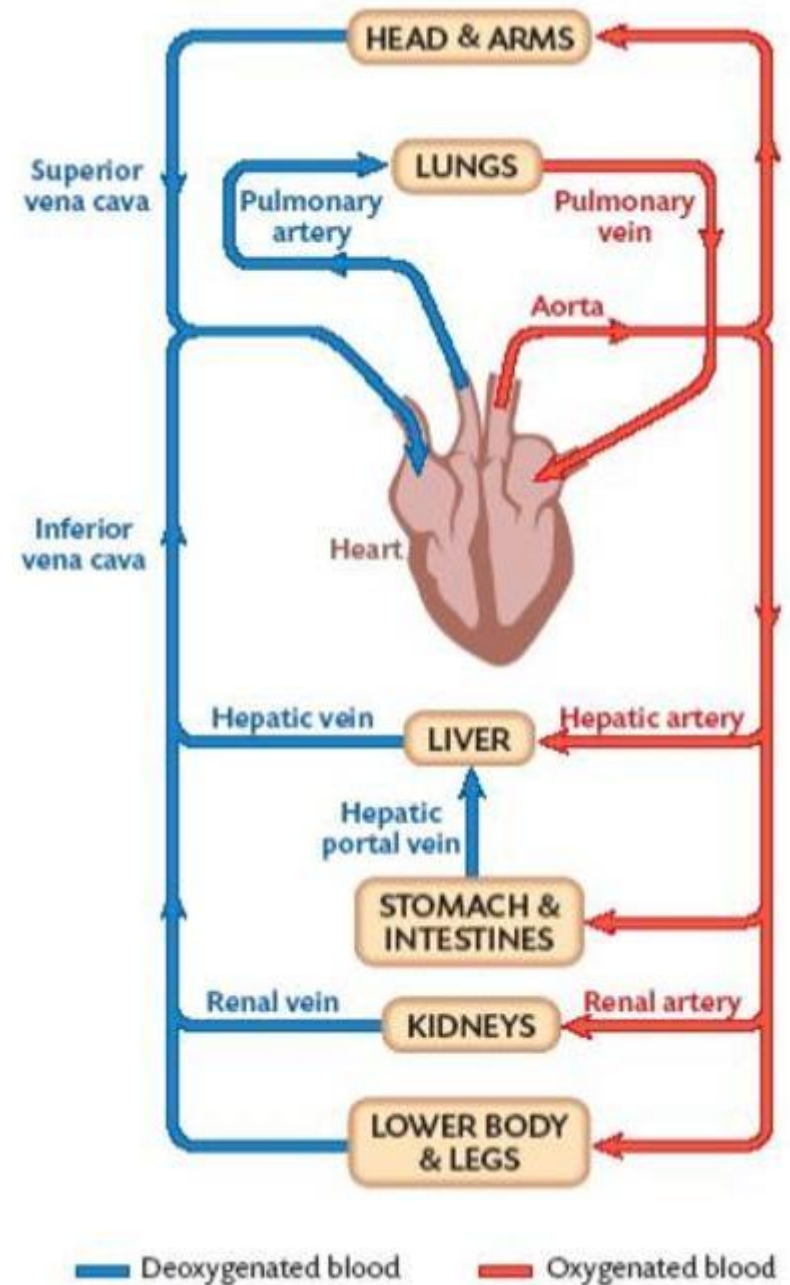


Portal Circulation System



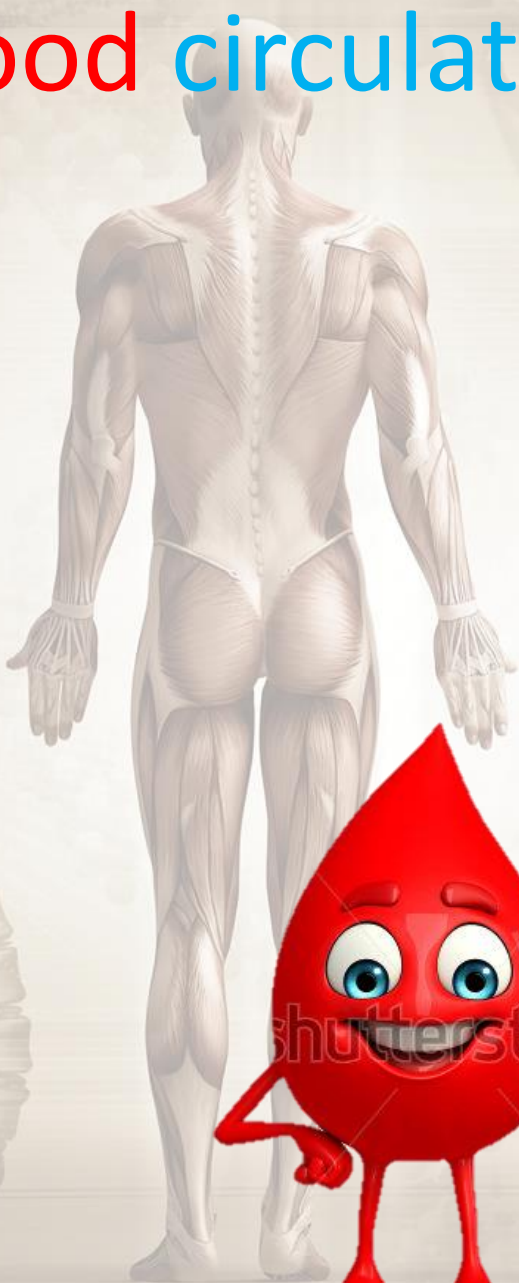
- ❖ Portal Venous System occurs when a capillary bed pools into another capillary bed through veins, without first going through the heart.
- ❖ Veins leaving the gastrointestinal tract do not go direct to the heart.
- ❖ They pass to the Portal Vein.
- ❖ This vein enters the liver and breaks up again into veins of diminishing size which ultimately join capillary like vessels (Sinusoids).

Sinusoids

- Thin walled blood vessels like capillaries.
- They are wider with irregular cross diameter.



Blood circulation (Narrated by the blood itself)



Hey Everyone!
It's me, Blood, and
I'm here to tell you
about my journey..
ENJOY!

Blood Drop Journey

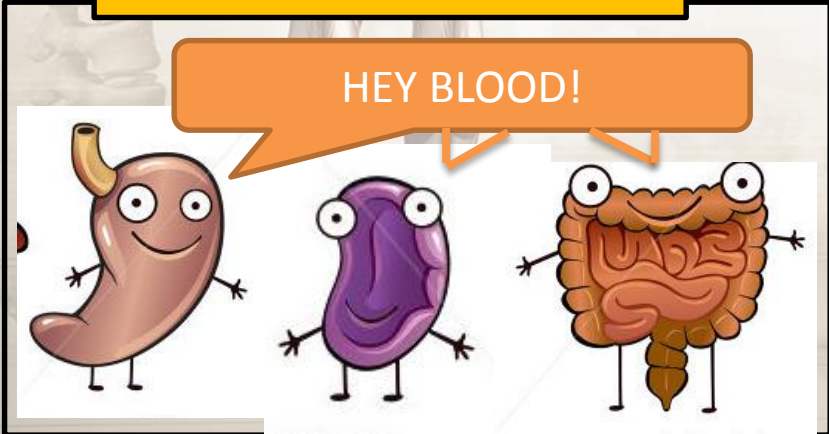
By: Lina Aljurf



Wonderin' why I'm blue?
Thanks to the organs -_-
Lemme tell you what happened

I was on my way back from the organs to the heart after delivering oxygen and nutrients.. When one organ called me:

And then everyone joined..



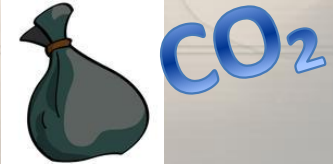
Yeah?

Hey Blood!

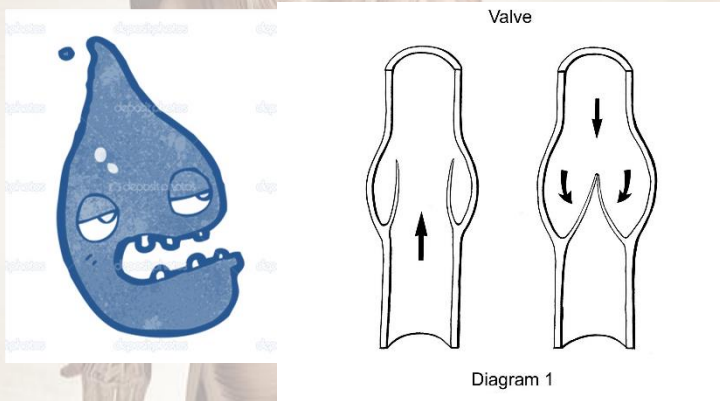
Are you going back to the heart?

Yup

Can you take these wastes with you?



On my way back through the *thin Venule Street* which enlarges to become *thin Veins Road*, I found valves.. (they prevent us from moving in the opposite direction)

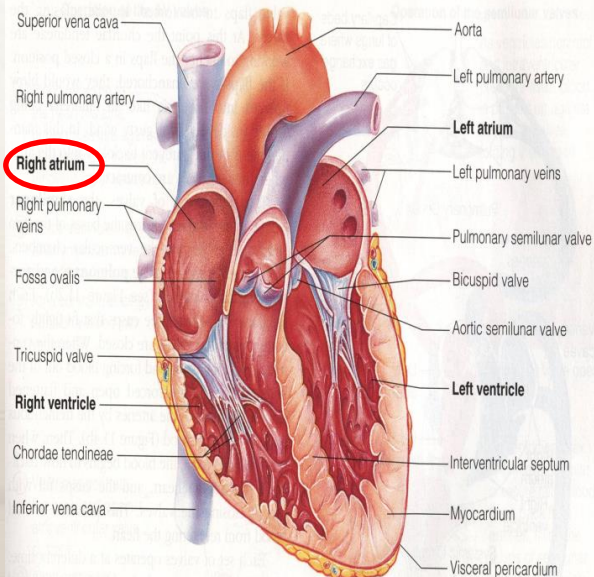


At last!
I reached the
heart!

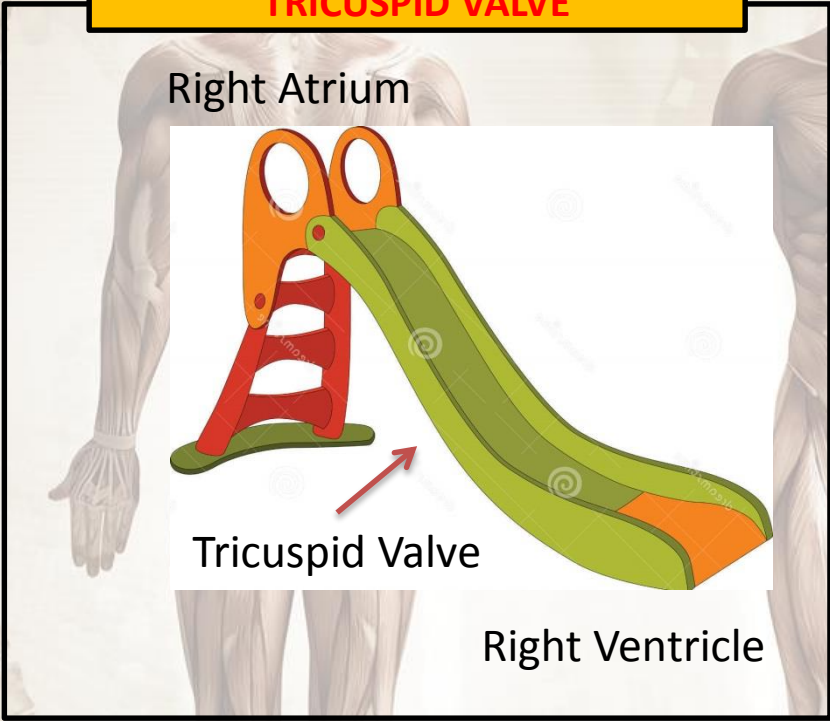


Heart
Right
Atrium

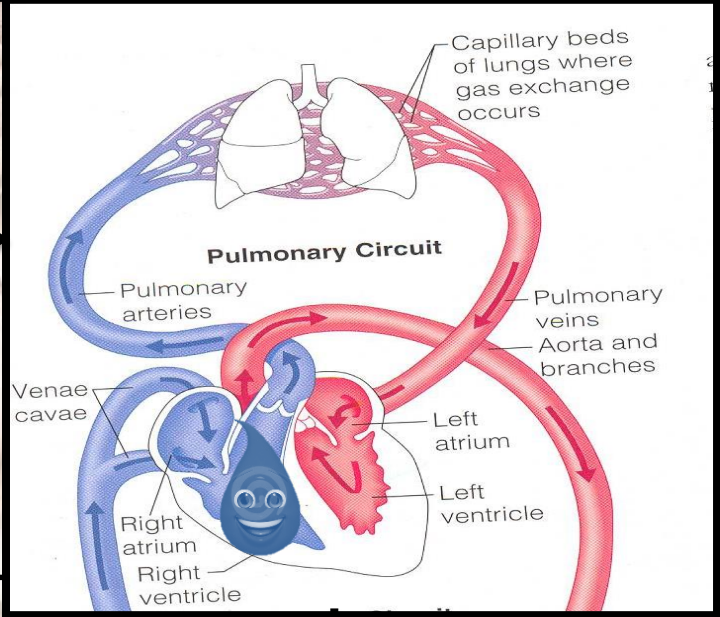
You Are Here



I slid from the right atrium to the right ventricle through the **TRICUSPID VALVE**



You think the journey was over?
No.
The heart pumped me through the **pulmonary trunk** to the lungs..
And that's when my **Cardiopulmonary journey** started



Hey Blood, give us the wastes, we can throw them away..

No.. No.. I'm fine

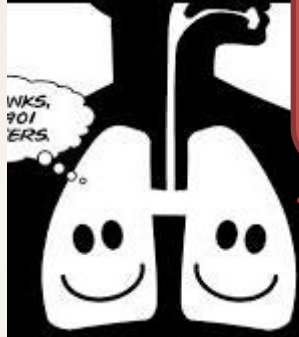
No really, we can take them and throw them away

WKS, 901 ERS

This cartoon depicts two white, smiling lungs on the left and a blue, smiling blood drop on the right. The lungs are speaking to the blood drop. A thought bubble above the lungs contains the text 'WKS, 901 ERS'. The background is black.

Unlike the other organs, the lungs were courteous and lovely

Not only they took away the CO₂, but they also insisted on giving me an O₂ bouquet

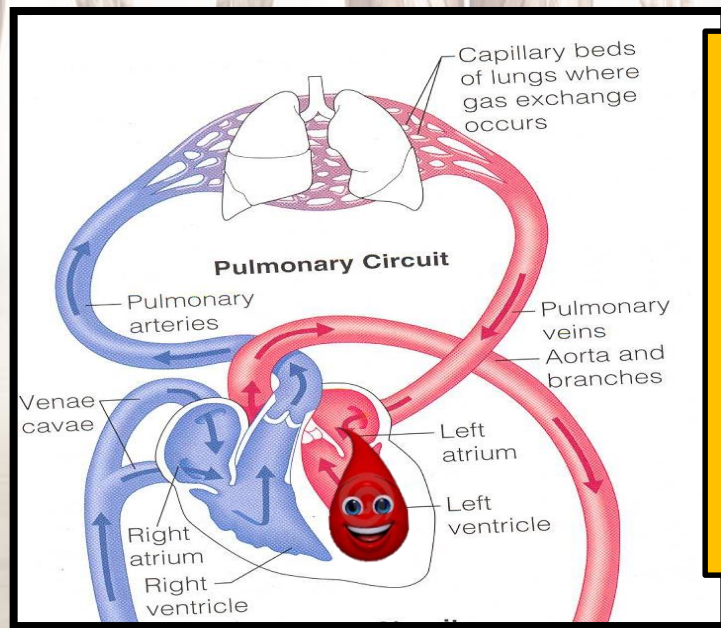


Take some oxygen as a gift..

Thx dudes ur awesome!



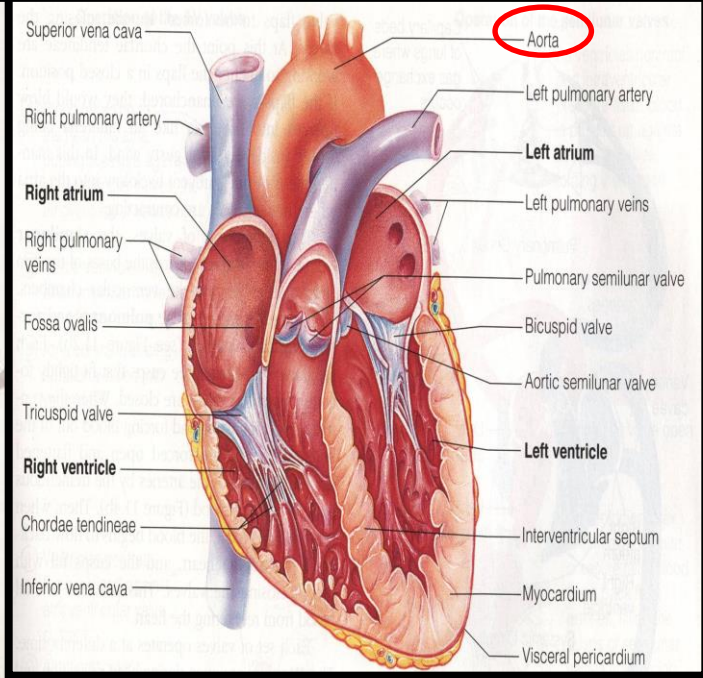
Yep. I know, I look awesome again B)



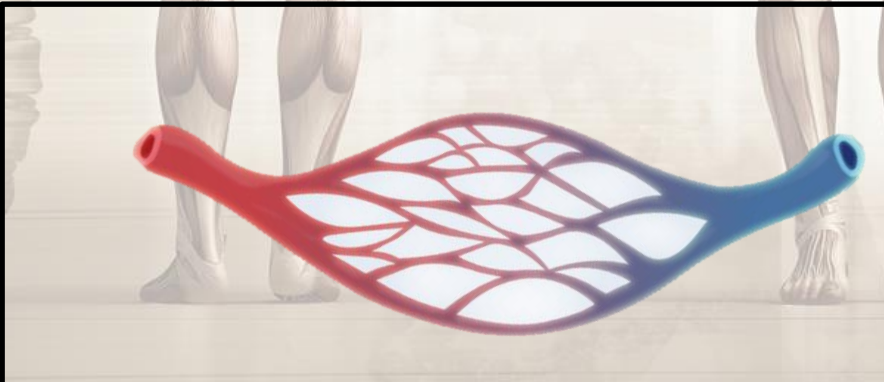
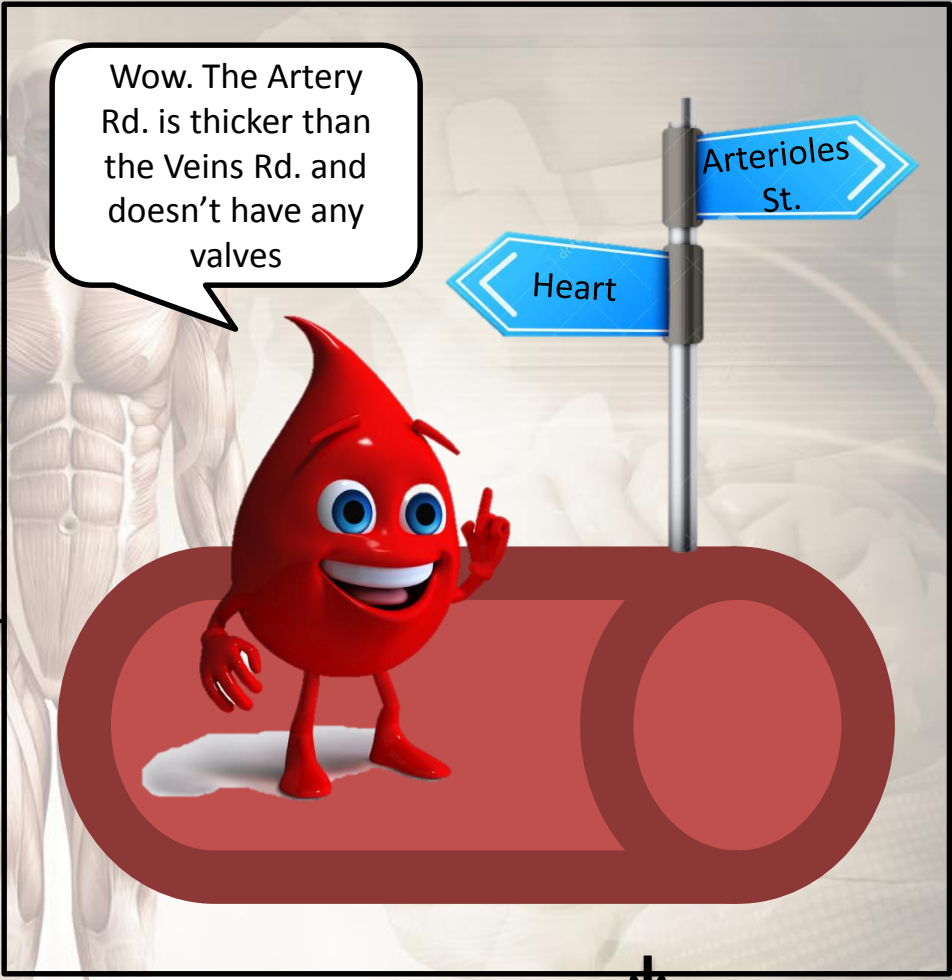
Unfortunately, I had to leave the lungs and go back to the heart through the pulmonary veins to the left atrium.. Then I had to slide to the left ventricle through the left Atrioventricle valve:

Mitral

I packed my oxygen and got ready for the **Systemic Circulation** as the heart pumped me through the **Aorta**



Wow. The Artery Rd. is thicker than the Veins Rd. and doesn't have any valves



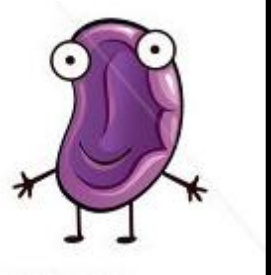
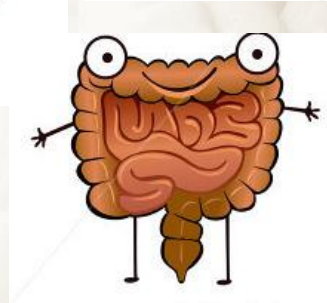
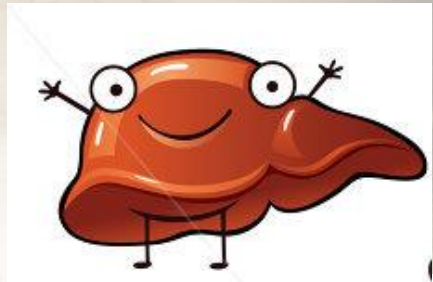
Capillaries Connecting Arterioles to Venules

I forgot to mention that on the Artery Rd. I found two veins hugging the artery and a sign says: "Venae Comitantes" (Deep Veins)

I delivered the oxygen and nutrients to the organs..
What do you think happened?
...

HEY BLOOD! -

Oh no.. Not again...



So once again.. The Body Homeostasis is saved.. Thanks to the Power Puff Blood!

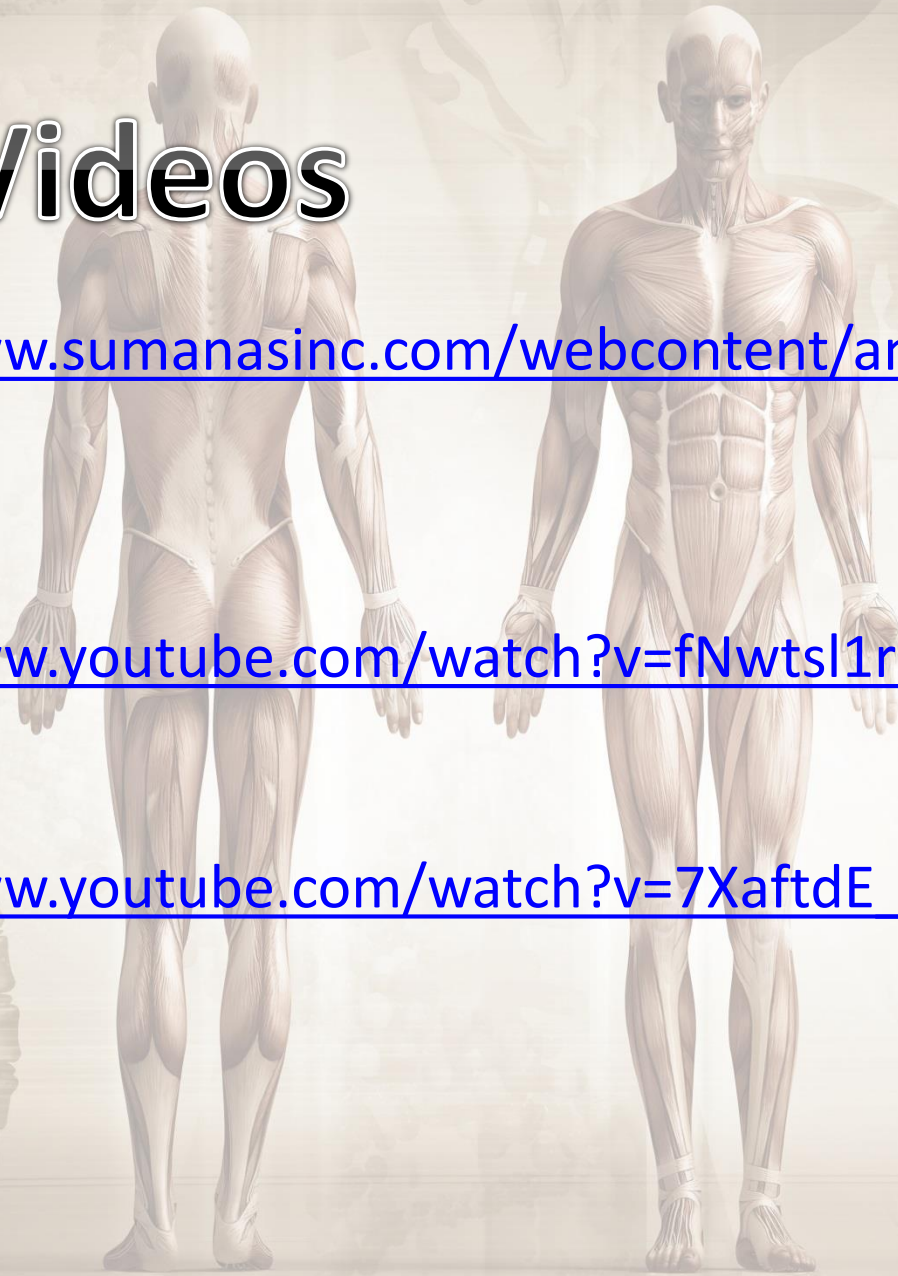


Videos

<http://www.sumanasinc.com/webcontent/animations/content/humanheart.html>

<http://www.youtube.com/watch?v=fNwtsl1rP48>

http://www.youtube.com/watch?v=7XaftdE_h60&feature=youtu.be



MCQs

- The pulmonary valve leaves which compartment of the heart :
a)Right atrium b)left atrium c)right ventricle d)left ventricle
- Which of these vascular organs has valves:
a)Artery b)vein c)capillary d)arteriole
- Arteries always carry oxygenated blood except:
a)The common iliac artery b)The renal artery c)The pulmonary artery
d)The ulnar artery
- The arteriovenous anastomosis is found in:
a)Everywhere in the body b) Tips of fingers and toes c)On the organ
d)Kidneys

عمل الفريق

لمياء الذوادي

محمد الرويتع

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عبدالعزيز النويبت

عبدالرحمن الكاف

حنان خشيم

معاذ البطاح

عبدالله العمير

نهى الحميضي

مشاعل الحسين

لينة الجرف

رهام العبيدان

أمل أفراح

إلهام الغامدي

أصالة نحاس

ابتهال ال مشاوي