

## ***BLOOD SUPPLY OF THE HEART***



### **Objectives:**

**At the end of the lecture the student should be able to know about;**

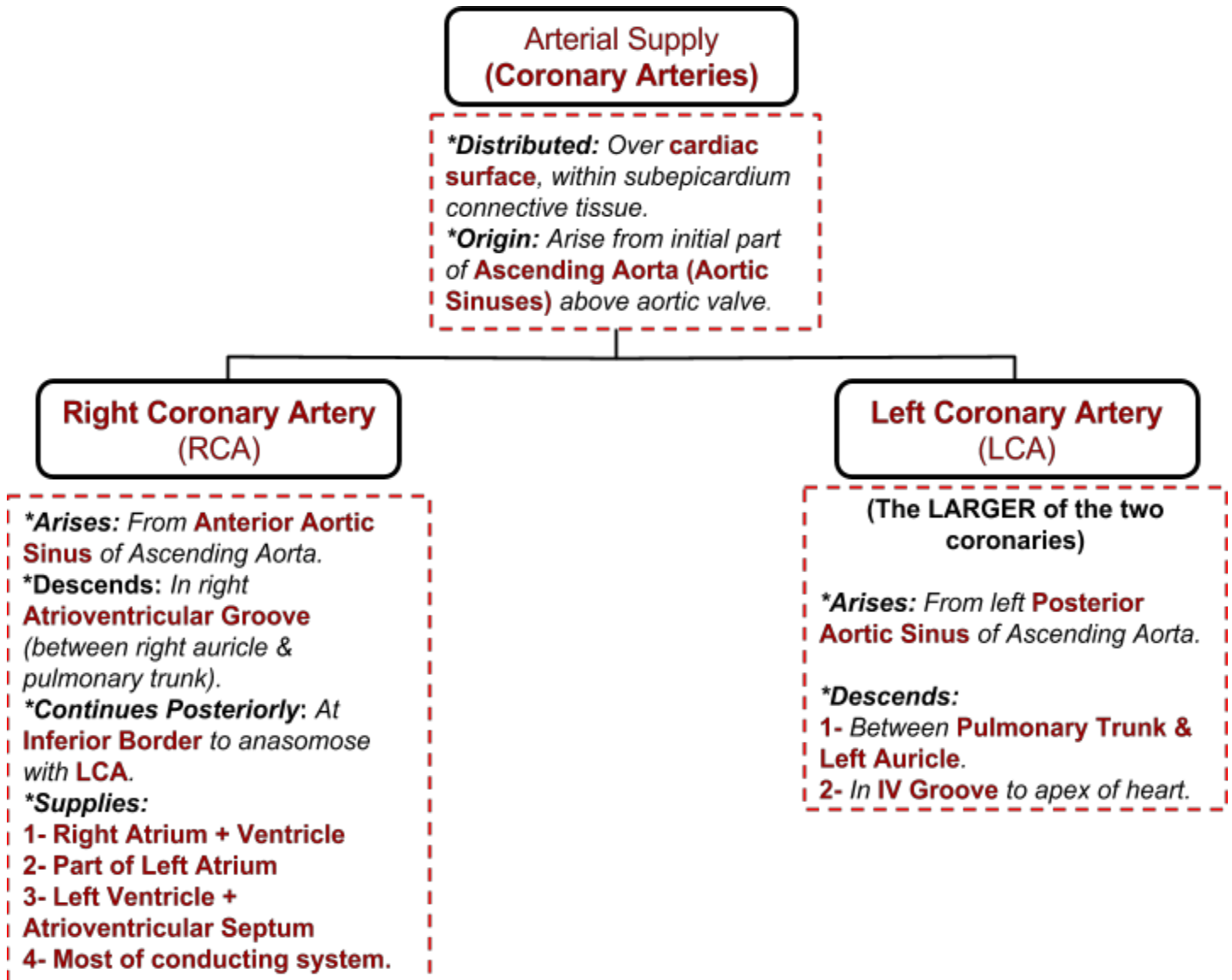
- The arterial supply of the cardiac muscle regarding (origin, course, distribution and branches).
- The coronary anastomosis.
- The arterial supply to the conducting system of the heart.
- The venous drainage of the heart regarding (origin, tributaries and termination)

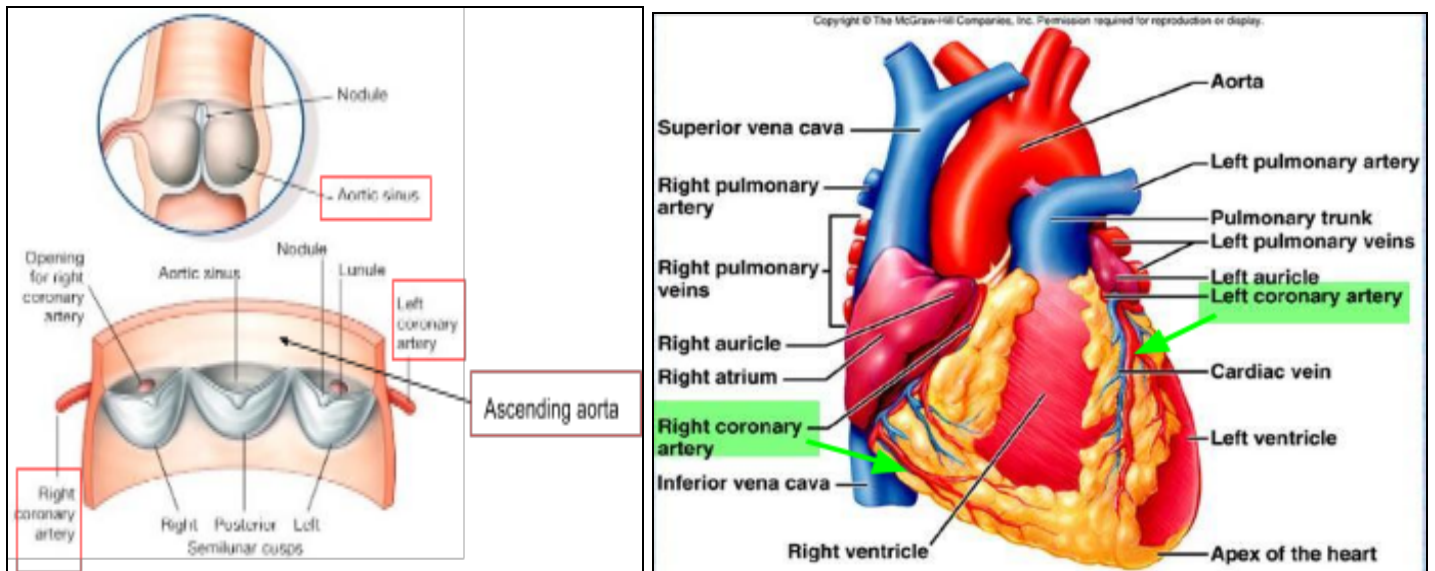


## Arterial Supply of the Heart:

The **arterial supply of the heart** is provided by **Two Coronary Arteries**

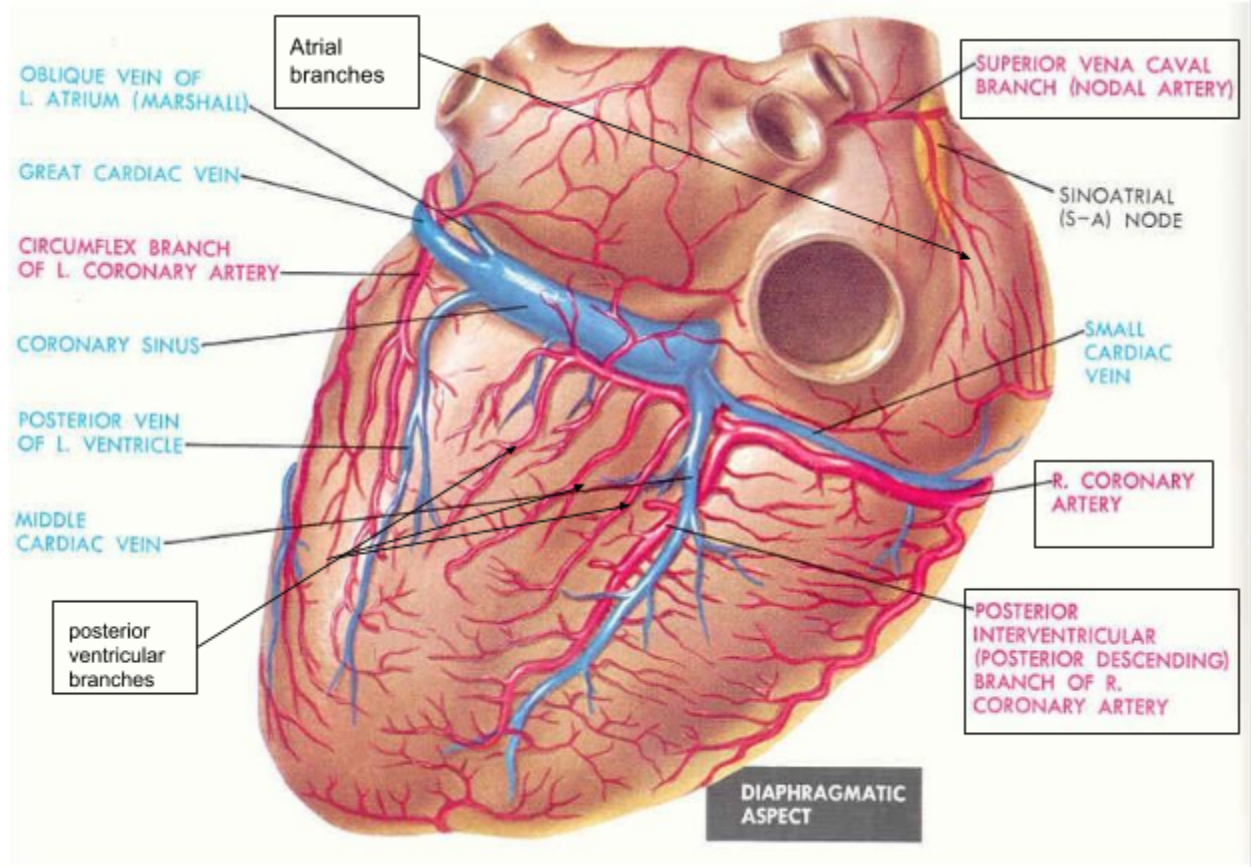
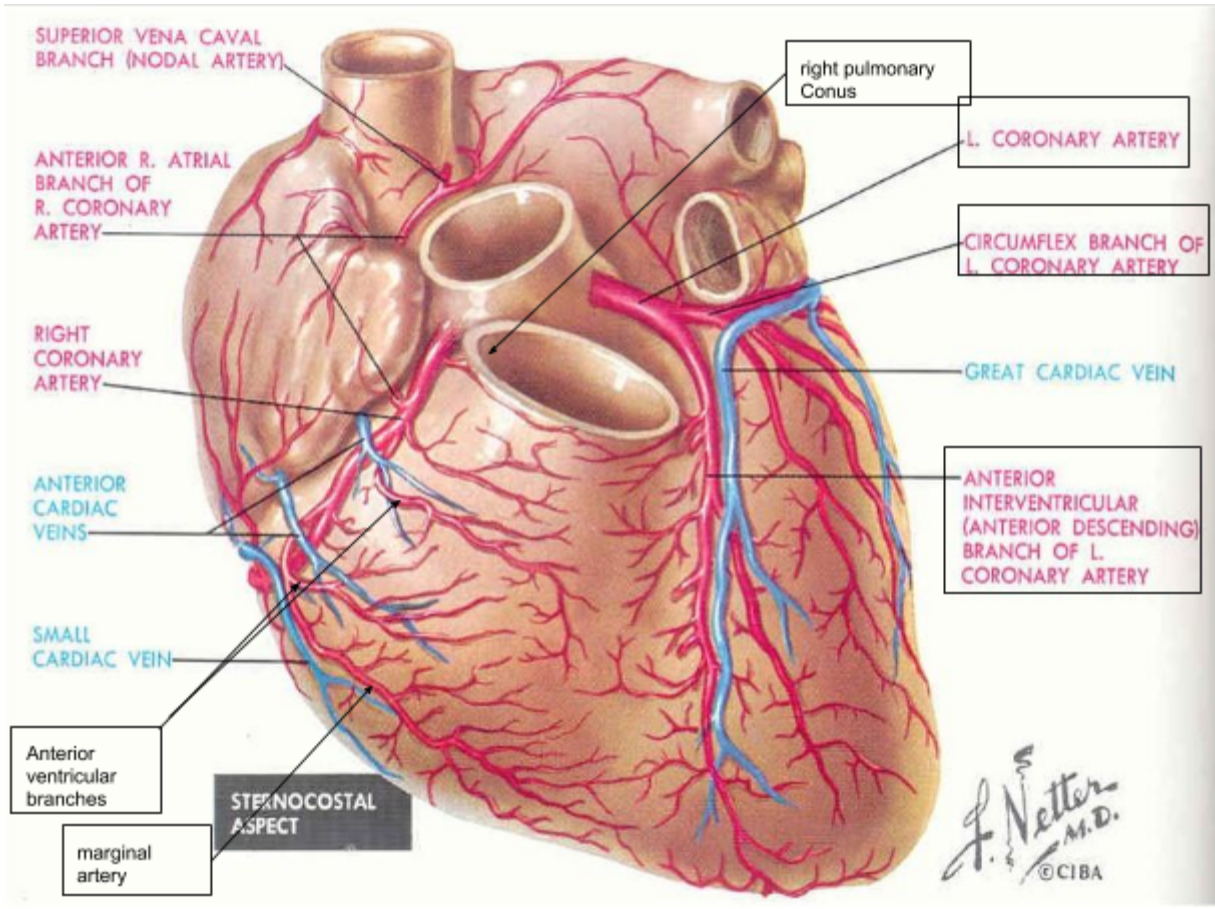
**Right Coronary artery & Left Coronary artery**





### Branches of Right Coronary Artery :

Artery	Description
Right Conus	For infundibulum and upper part of anterior wall of Right Ventricle.
Anterior ventricular branches	2-3 branches supply anterior surface of Right Ventricle.
Posterior Interventricular Artery	Lies in Posterior Interventricular Groove, supplies Right & Left Ventricles (including their inferior wall, posterior part of ventricular septum, NOT Apical Part), (accompanied by the Middle Cardiac Vein)
Atrial branches	Supply anterior & lateral surfaces of Right Atrium. *One branch supplies posterior surface of both Atria.
Artery of Sinoatrial Node	Supply SAN & both Atria. In 35% it arises from Left Coronary.
Posterior Ventricular branches	About 2 supply Diaphragmatic surface of Right Ventricle.
*Marginal Artery	Largest branch, runs along lower margin of Sternocostal Surface (accompanied by the Small Cardiac Vein)





## Left coronary Artery:

**The Larger** of the two coronaries.

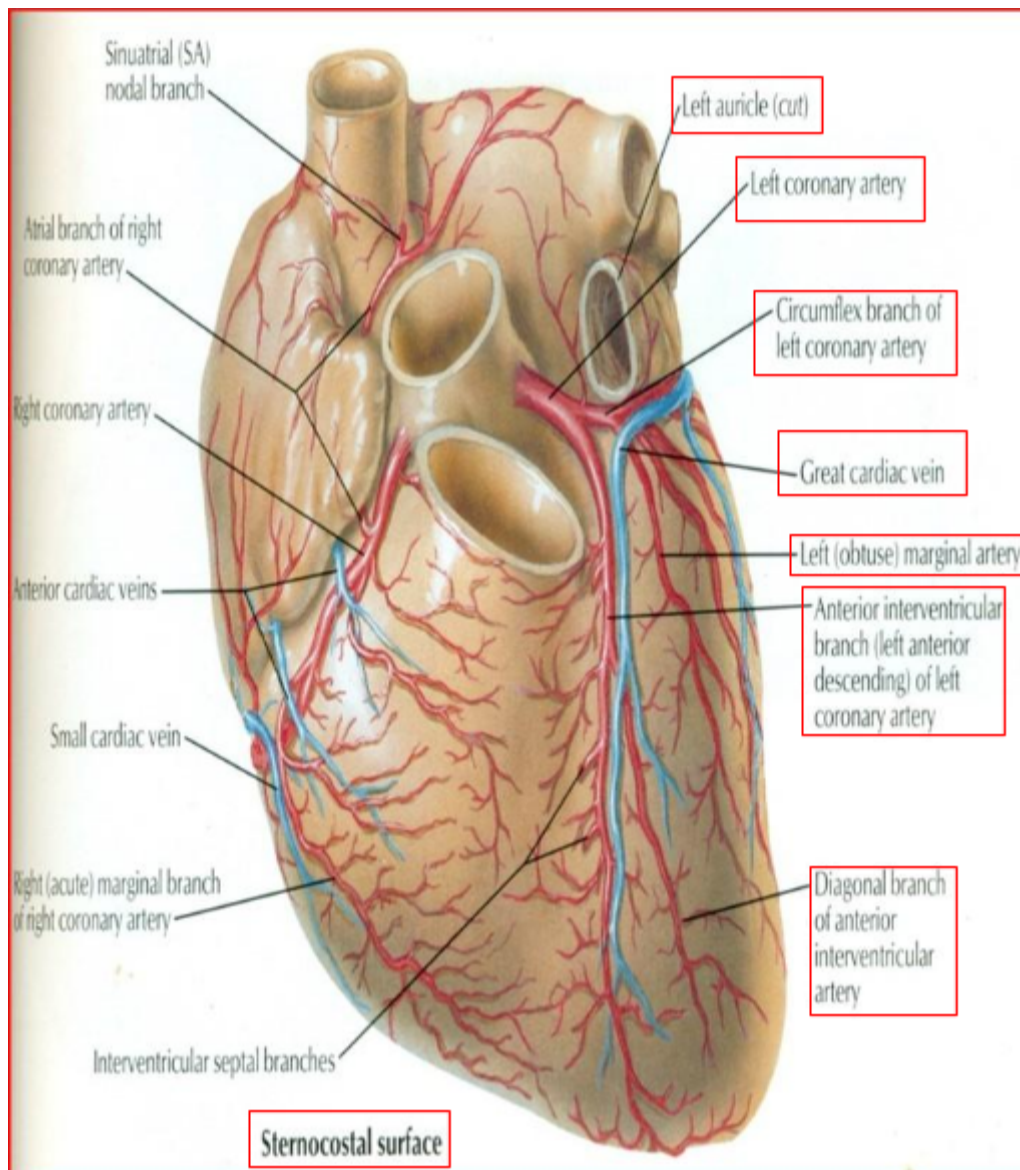
Arises from the **left posterior aortic sinus** of the ascending aorta.

Descends:

1. **Between the pulmonary trunk and the left auricle.**
2. In the **IV(inteintricardiac) groove** to the **apex of the heart.**

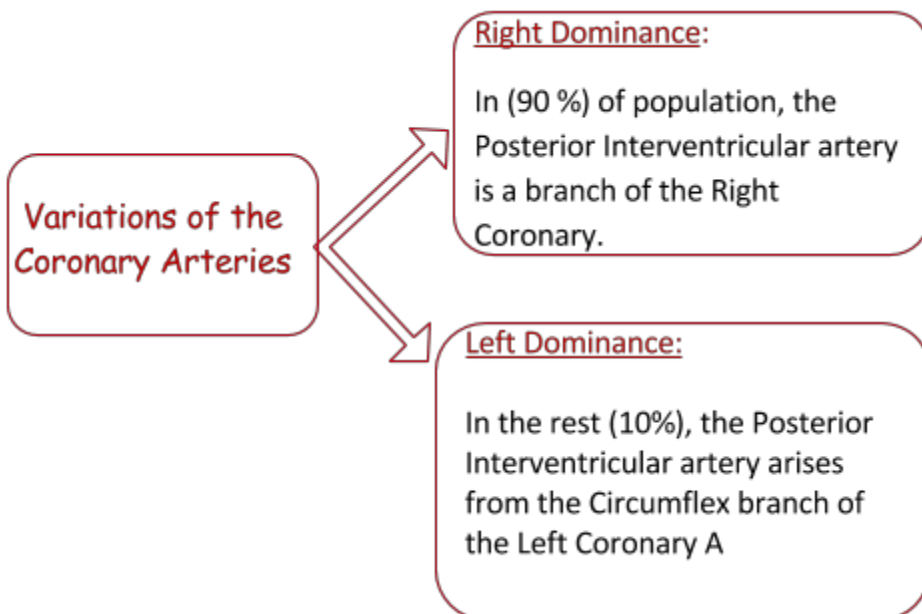
**Divides** into two terminal branches:

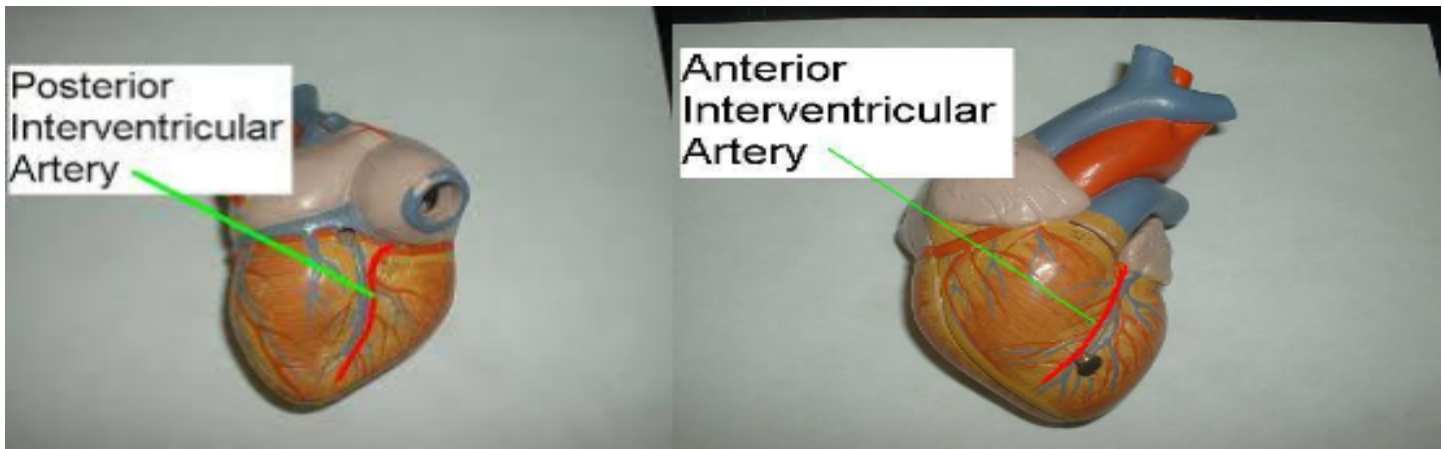
1. **Anterior Interventricular artery.**
2. **Circumflex artery.**



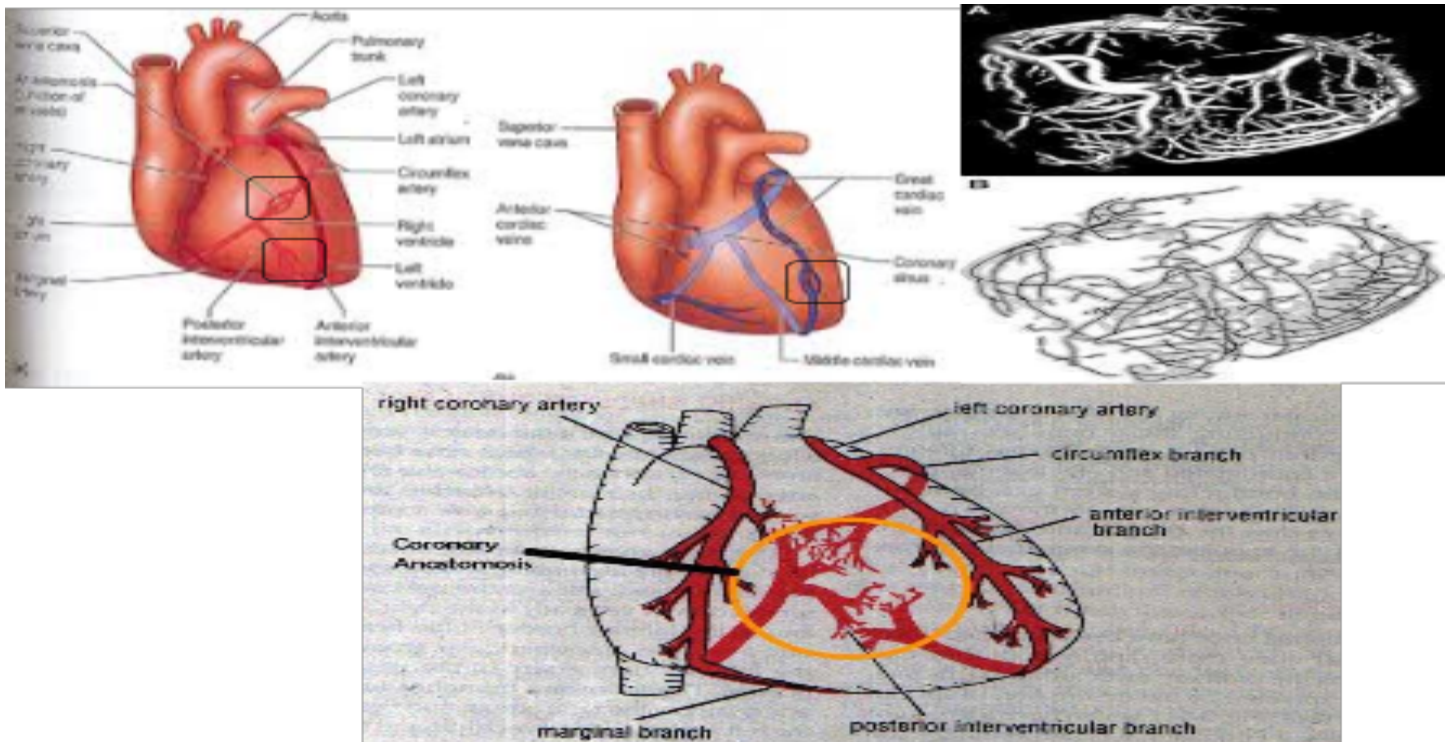
## Branches of Left Coronary Artery :

Artery	Description
Circumflex artery	Winds around the <b>left</b> margin of the heart in the <b>atrioventricular groove</b>
Left marginal artery	Supplies the <b>left</b> margin of the <b>left ventricle</b> down to the apex
Anterior Interventricular <u>*it gives:</u>	Descends in the <b>anterior interventricular groove</b> to the apex of the heart ( <b>accompanied by the Great cardiac vein</b> ) in most individuals it passes around the apex to anastomose with terminal branches of the right coronary , in 1\3 it ends at the apex ) It supplies the right and left ventricles and anterior part of ventricular septum
*Left conus	artery for <b>pulmonary conus</b> .
*Atrial branches	Supply greater part of <b>left atrium</b>
*Anterior & Posterior ventricular	Supply <b>left ventricle</b>
*Left diagonal artery	one of the ventricular branches or may arises from left coronary





**Anastomosis of the coronary arteries:**



**FACT:** The arteries whose terminal branches **do not anastomose** with branches of adjacent arteries are called “**end arteries or terminal arteries**”. End arteries are of two types:

**Anatomic (True) End Artery:** When **no anastomosis exists**, e.g. artery of the retina

**Functional End Artery:** When an **anastomosis exists but is incapable of providing a sufficient supply of blood**, e.g. splenic artery, renal artery.

**In MOST of people**, the terminal branches of the right and left coronaries **anastomose in the posterior part of the IV groove**

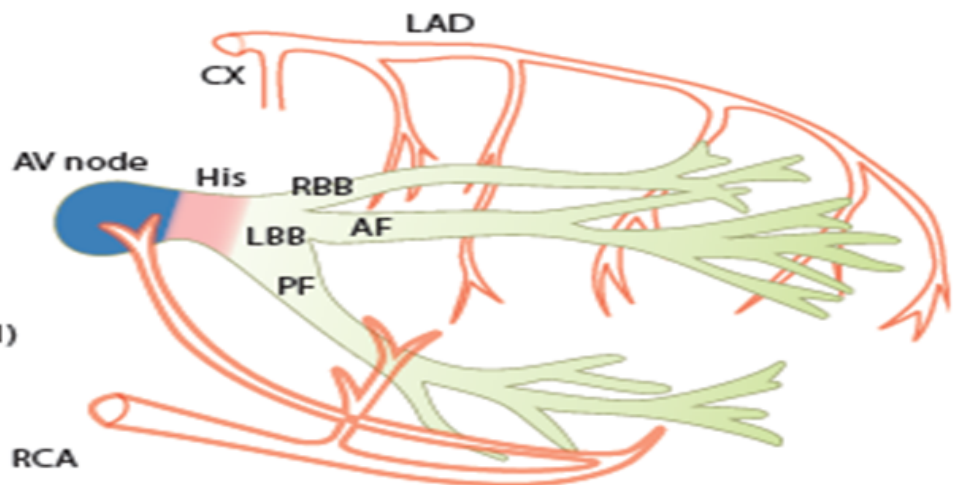
However **this anastomosis is not large enough to provide adequate blood supply in case of coronary occlusion**, so it's a **(Functional End arteries)**

## Arterial Supply of Conducting System

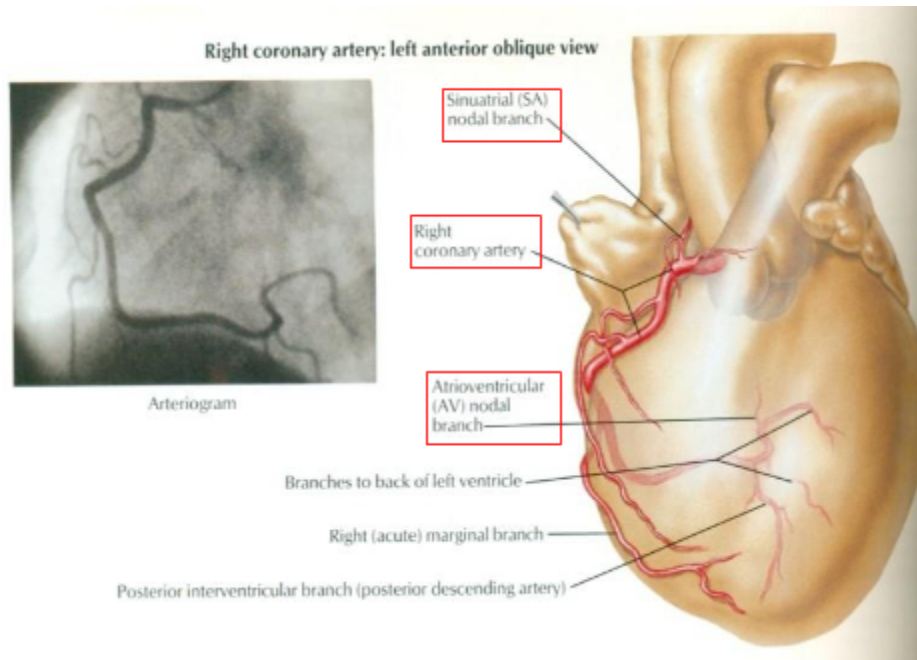
SAN	AVN	AVB	RBB ( <small>right bundle branch (bundle of His)</small> )	LBB ( <small>left bundle branch (bundle of His)</small> )
Right Coronary			Left Coronary	Right Coronary and left coronary

### BLOOD SUPPLY CARDIAC CONDUCTION SYSTEM

- SA node: RCA in 55-60 %
- AV node: RCA in 90 %
- His bundle : RCA / LAD
- Right bundle (RBB): LAD (S1)
- Left bundle (LBB):
  - Anticus (AF): LAD
  - Posticus (PF): LAD/ RCA







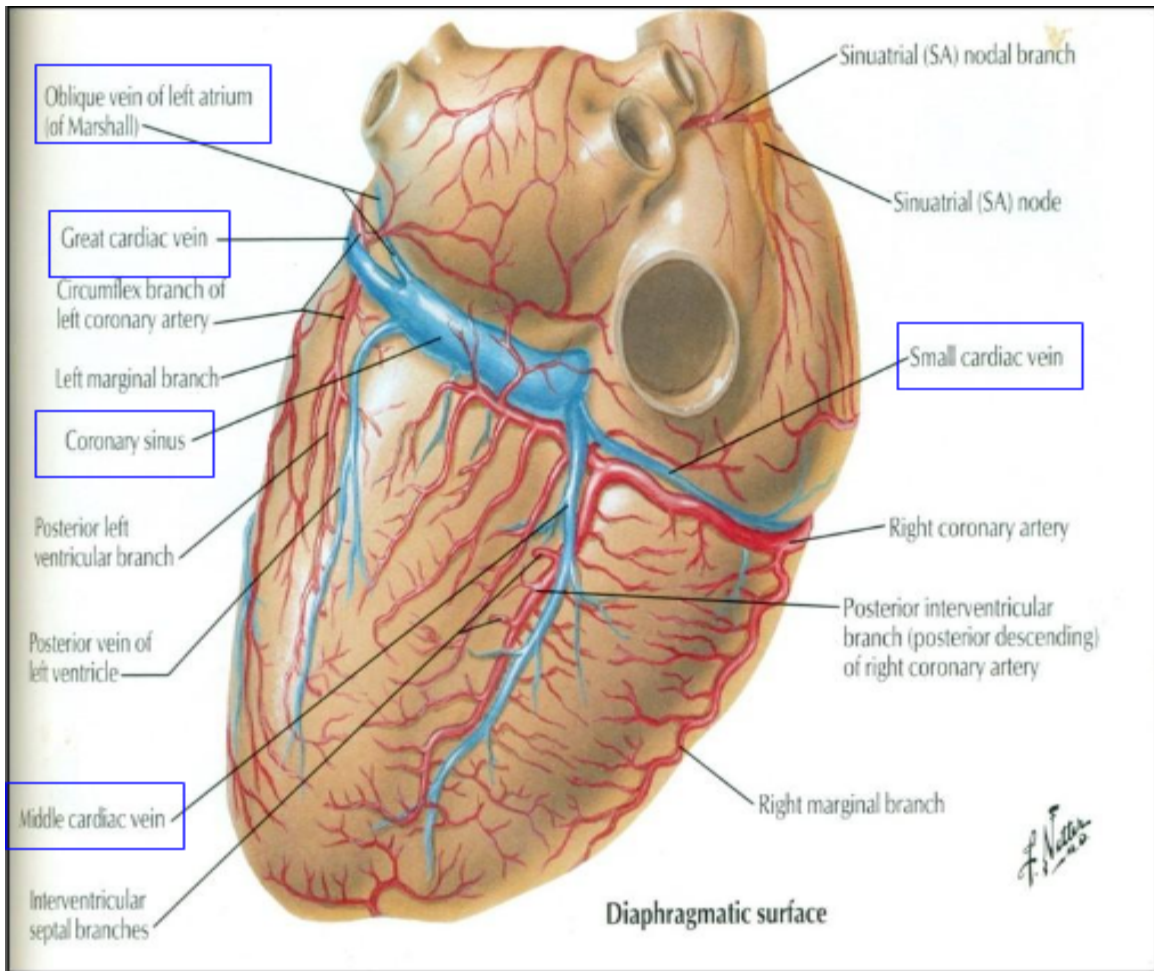
## Coronary Sinus

<b>Function</b>	<b>Drains most of the Venous Blood of the heart</b>
<b>Location</b>	<b>It lies in the Posterior part of the AV groove</b>
<b>Origin</b>	<b>It is the direct continuation of the Great Cardiac Vein.</b>
<b>Tributaries:</b>	<b>1- (3) Cardiac Veins:</b> <b>A. Great.</b> <b>B. Middle.</b> <b>C. Small.</b> <b>2-Oblique vein of left atrium (vein of Marshall)</b>
<b>Termination:</b>	<b>It empties into Right Atrium.</b> <b>Its opening is inferior &amp; to the left of the IVC opening.</b> <b>It is guarded by a valve.</b>

### **CONNECTING TO EMBRYOLOGY OF THE HEART:**

*fates of the horns of sinus venosus are:*

- The right horn forms the smooth posterior wall of the right atrium.
- The left horn and body atrophy and form the coronary sinus.
- The left common cardinal vein forms the oblique vein of the left atrium.



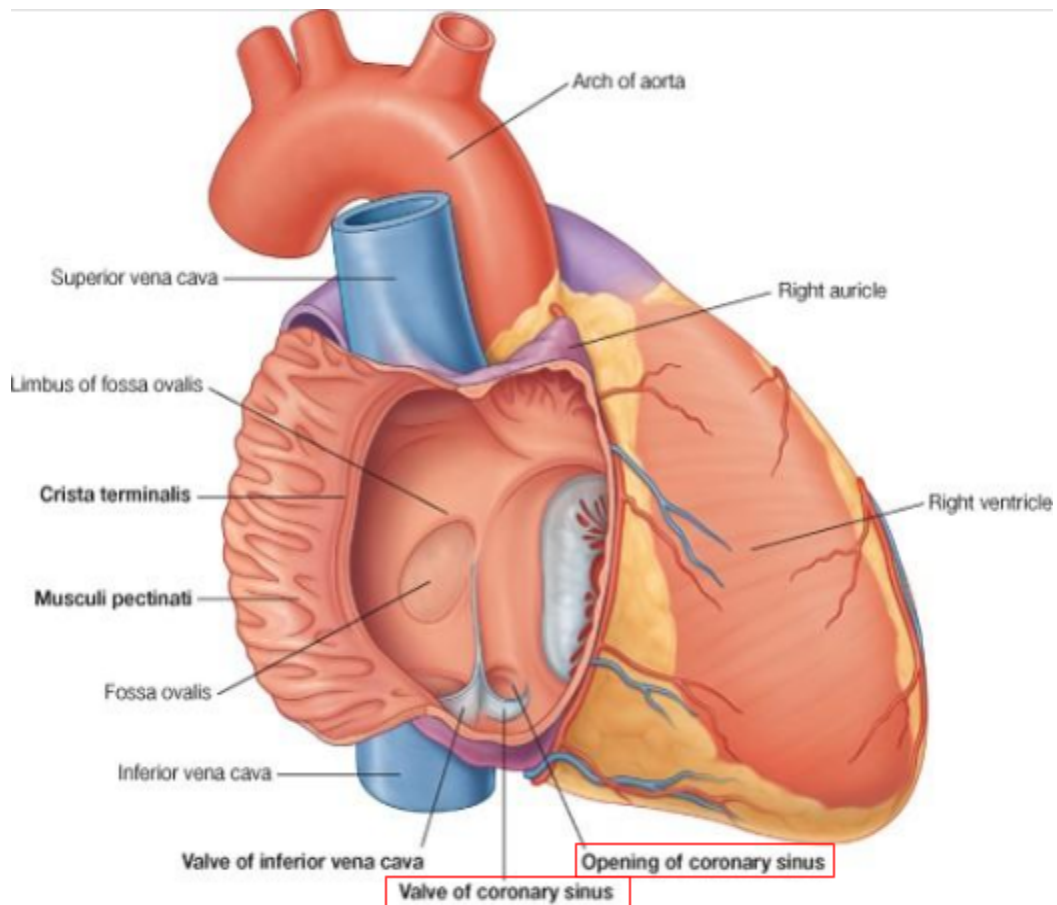
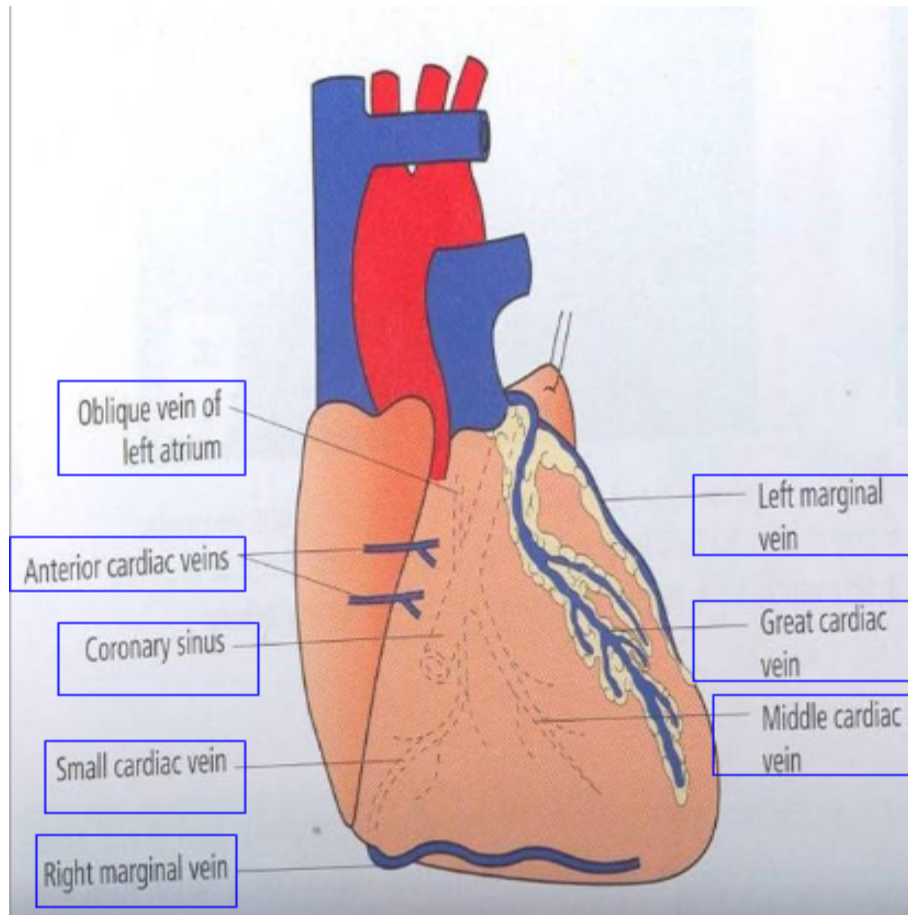
## Veins Draining outside Coronary Sinus

**1. Anterior  
cardiac veins**

*Open directly into  
the Right Atrium*

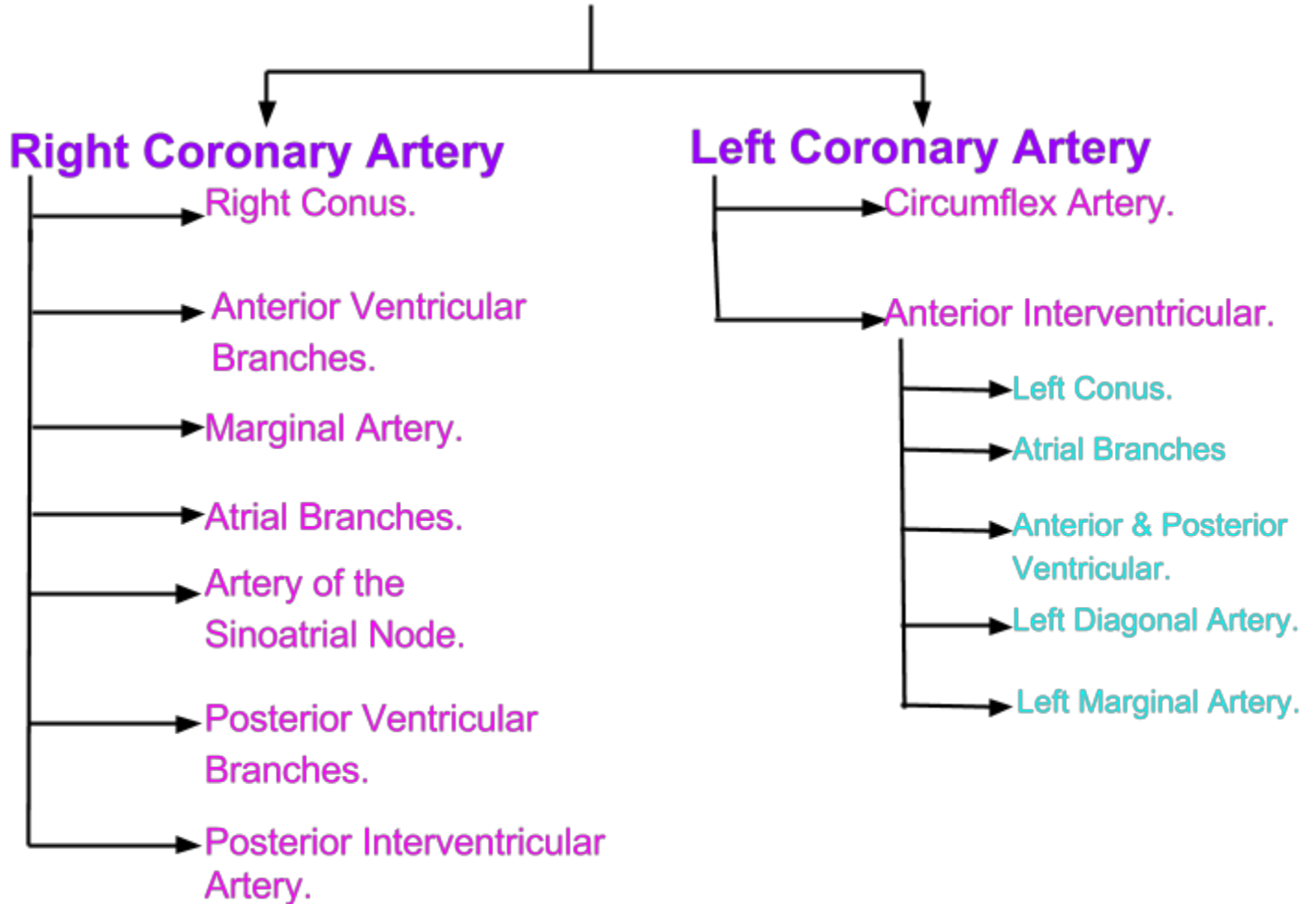
**2. Venae Cordis minime  
(small cardiac veins)**

*Open into the heart  
chambers*



# Summary:

## Arterial Supply





**1. Coronary sinus empties into:**

- A) Right ventricle
- B) Left atrium
- C) Right atrium

**2. Tributaries of Coronary Sinus are:**

- A) All of the three cardiac veins only
- B) vein of Marshall only
- C) the three cardiac veins + vein of Marshall

**3. All of the cardiac veins drain into coronary sinus except:**

- A) Venae Cordis minime
- B) middle coronary
- C) great coronary

**4. Right Coronary artery arises from the...of the ascending Aorta:**

- A) Posterior aortic sinus.
- B) Anterior aortic sinus.
- C) Lateral aortic sinus.
- D) Medial aortic sinus.

**5. The arterial supply of the heart is provided by:**

- A) Right pulmonary artery.
- B) left pulmonary artery.
- C) Nodal artery.
- D) Two coronary arteries.

**6. Is the largest branch of Right coronary that runs along the lower margin of sternocostal surface of the heart:**

- A) Marginal artery.
- B) Pulmonary artery.
- C) Coronary artery.
- D) Superior vena cava.

**7.the left coronary artery arises from :**

- a) left posterior aortic sinus of the descending aorta
- b) right posterior aortic sinus of the ascending aorta
- c) left posterior aortic sinus of the ascending aorta

**8.which of the following is not a branch of the left coronary artery :**

- a) right conus
- b) left marginal artery
- c)diagonal artery
- d)anterior interventricular artery

**9.left marginal artery supplies which of the following :**

- a) left margin of the left ventricle
- b) left ventricle
- c) right ventricle
- d) left atrium

**10.which one is correct about the left coronary artery:**

- a) divides into two terminal branches
- b) the larger of the two coronaries
- c) posterior to the IV groove to the apex of the heart

**11.which one of the following is the artery for pulmonary conus**

- a) anterior interventricular
- b) left conus

- c) right conus
- d) circumflex artery

**12. which one is correct about right dominance:**

- a) in 90% of population the posterior interventricular artery arises from the circumflex branch
- b) in 90% of population the posterior interventricular artery is a branch of the right coronary
- c) in 10% of population the posterior interventricular artery arises from the circumflex branch
- d) in 90% of population the anterior interventricular artery is a branch of the circumflex branch of left coronary

**13. Blood supply of the left bundle branch of bundle of his is:**

- a) right coronary
- b) left coronary
- c) both right and left coronaries
- d) Anterior Interventricular

- 1.C
- 2.C
- 3.A
- 4.B
- 5.D
- 6.A
- 7.C
- 8.A
- 9.A
- 10.B
- 11.B
- 12.B
- 13.C



[Cardiac Cath with Angioplasty:](#) (amazing video,visit it only if you are interested)



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