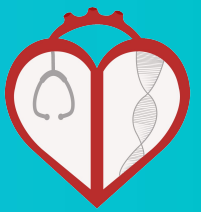




Anatomy Team
MED 439



MED439
KING SAUD UNIVERSITY

Arterial supply and venous drainage of the heart

Cardiovascular Block - Lecture 5

Color index:

Important

In male's slides only

In female's slides only

Doctors notes

Extra information, explanation

Don't forget to check the [Editing File](#)

Objectives:

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

Arterial Supply of the heart



[Helpful video](#)



[Helpful video](#)

◇ The arterial supply of the heart is provided by :

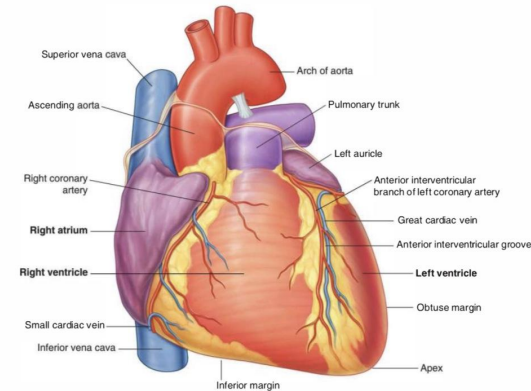
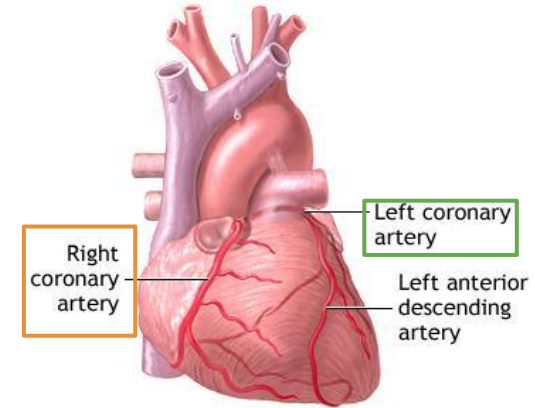
1. Right coronary artery
2. Left coronary artery

◇ They are distributed over the cardiac surface, within the **subepicardium connective tissue**

◇ **Origin of coronary arteries :**

They arise from the initial part of the **Ascending Aorta** (**Aortic Sinus**) immediately above the aortic valve.

◇ **aortic sinuses:** three dilatations at the base of ascending aorta



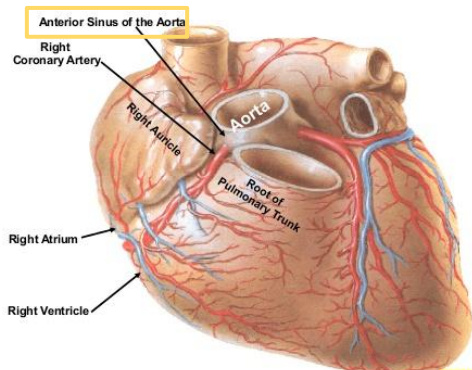
Right coronary artery



1

Origin

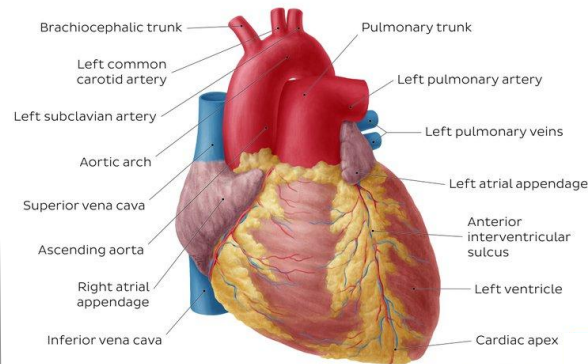
◇ Arises from the **anterior aortic sinus** of the ascending aorta.



2

Course

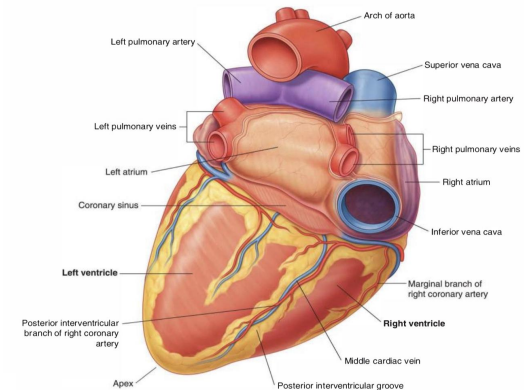
- ◇ Descends in the right atrioventricular groove between the Right Auricle and the Pulmonary trunk.
- ◇ At the inferior border of the heart it is **continuous posteriorly** along the atrioventricular groove to anastomose with the left coronary artery



3

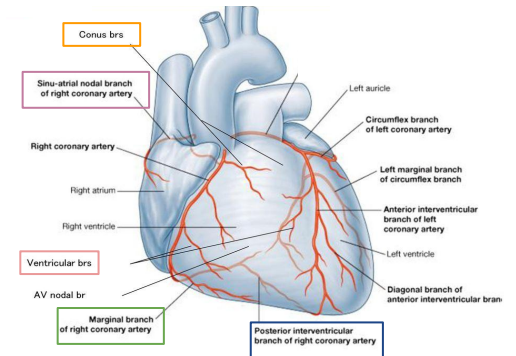
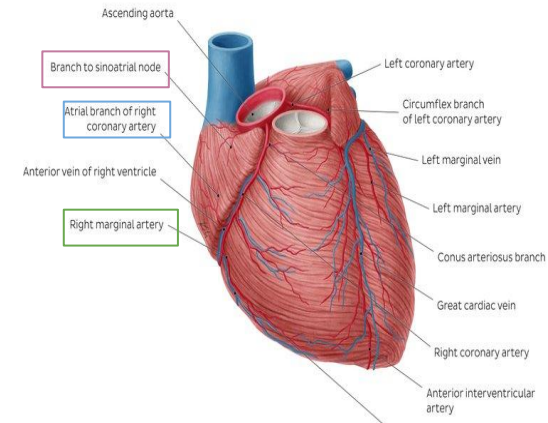
Supplies

- 1 - Right atrium
- 2 - Right ventricle
- 3 - part of Left Atrium
- 4 - Left ventricle
- 5 - Atrioventricular septum
- 6 - **Most of conducting system**



Branches of Right coronary artery

Right Conus	Course: To the infundibulum and upper part of anterior wall of the right ventricle.
Marginal artery	It's The largest branch. Course : runs along the lower (inferior) margin of the sternocostal surface toward the apex. It is accompanied by the Small Cardiac vein.
Anterior ventricular (2-3 branches)	Supplies: anterior surface of the right ventricle
Posterior ventricular (2 branches)	Supplies: the diaphragmatic surface of the right ventricle
Atrial branches	Supplies: -Anterior and lateral surfaces of the right atrium, -Posterior surface of both atria.
Artery of the Sinoatrial Node (SAN)	Supplies: the SAN and both atria In 35% it arises from the left coronary.
Posterior Interventricular artery (PIA)	Runs toward the apex, to supplies: - Diaphragmatic surface (including their inferior wall) of the R & L Ventricles. - Septal branch to the AVN - Posterior part of interventricular septum, (except Apex) Course: -(accompanied by Middle Cardiac vein) -Lies in the posterior interventricular groove



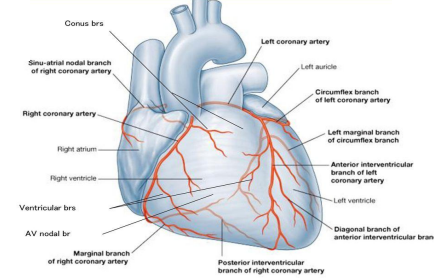
◇ Variations of the Coronary Arteries

-**Right dominance:** In (90 %) of population, the **PIA** is a branch of the **Right** Coronary.

-**Left dominance:** In (10%), the **PIA** arises from the Circumflex branch of the **Left** Coronary Artery.

Left coronary artery

- ◇ The **Larger** of the two coronaries.
- ◇ **Origin**: Arises from the **left posterior** aortic sinus of the ascending aorta.
- ◇ **Course**: Descends between the pulmonary trunk and the left auricle. Then enters the atrioventricular groove
- ◇ **Supplies** **1.** Greater part of Left Atrium, **2.** Left Ventricle **3.** Ventricular Septum
- ◇ It **anastomoses** with the right coronary in the posterior IV groove (in 2/3 of people)



Branches

Ventricular branches to both ventricles and the IV septum.

Then divides into 2 main branches In the IV groove to the apex of the heart:

Anterior interventricular artery give:

- ◇ Descends in the **anterior interventricular groove** toward the apex of the heart (accompanied by great cardiac vein)
- ◇ in most individuals it passes around the apex and anastomoses with the terminal branches of the right coronary in the posterior IV groove, in one third ends at the apex.

◇ Branches:

- 1. Left lateral diagonal artery** ; one of the Ventricular branches, or may arise from trunk of the left coronary
- 2. Anterior ventricular and Posterior ventricular branches** : supply the left ventricle
- 3. Atrial branches** : to the left atrium. Can also branch from the circumflex artery
- 4. Left conus artery for pulmonary conus**

Circumflex artery give:

- ◇ Winds around the **left margin** of the heart in the atrioventricular groove.

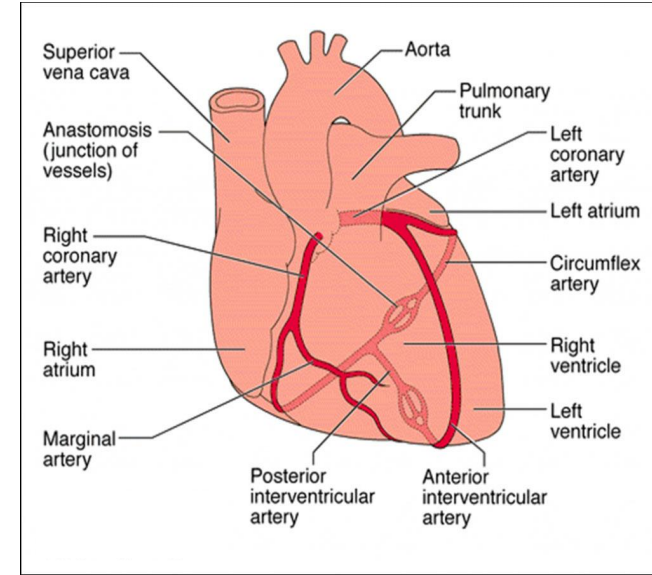
Left Marginal artery give:

- ◇ **Left Marginal artery** to the left margin of the left ventricle till the apex.

Coronary Anastomosis

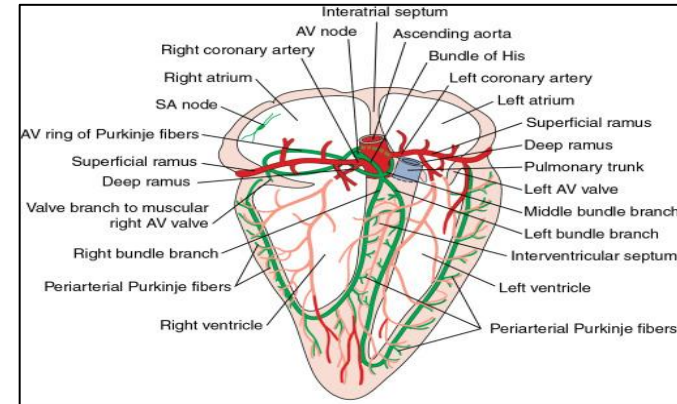
◇ **Anastomoses** between terminal branches of the right and left coronaries exist but not large **enough** to provide adequate blood supply

◇ 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, (Functional End Arteries)



Arterial Supply of Conducting System

Right coronary Supply :	1. SA node (SAN) 2. AV node (AVN) 3. AV bundle (AVB)
Both Supply :	Left bundle Branch (LBB) of (AVB)
Left coronary Supply :	Right Bundle Branch (RBB) of (AVB)



Venous drainage of the heart

Blood of the heart is drained into **the right atrium** through:

- **Coronary sinus**
- **Directly into the right atrium**

Coronary sinus:

Drains most of the venous blood of the heart.
Lies in the posterior part of the AV groove.

◇ **Origin** : It is the direct **continuation of the Great Cardiac Vein**.

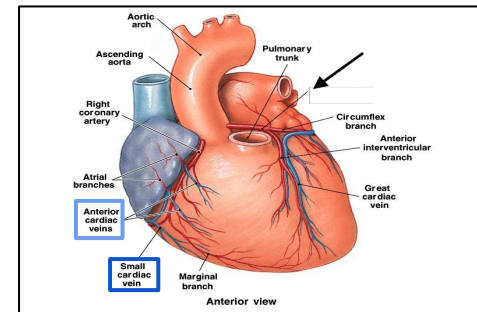
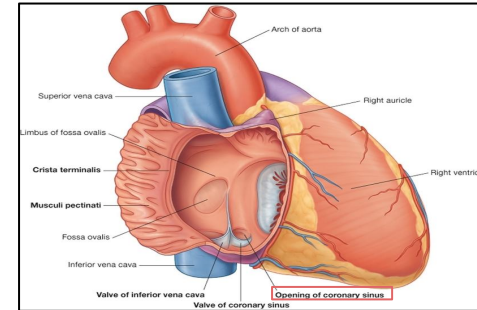
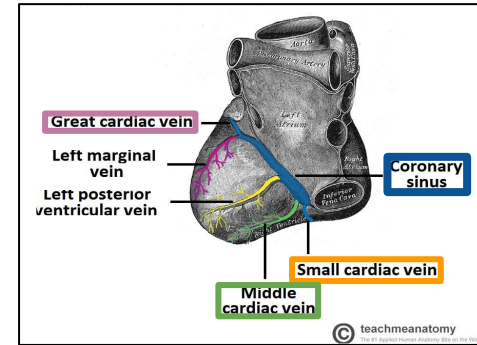
◇ **Tributaries**: **Great**, **Middle**, **Small** Cardiac Veins and Oblique vein of left atrium (vein of Marshall)



It empties into Right Atrium: Its opening is inferior & to the left of the IVC opening and its **guarded by a valve**.

◇ Veins Draining Open Directly into the right atrium

1. **Anterior cardiac veins**: Open directly into the Right Atrium.
2. **Venae Cordis minimae** (small cardiac veins): Open into the heart chambers



MCQ

Q1: The arterial supply of the heart is provided by

- A.** Two coronary arteries
- B.** Two coronary veins
- C.** Three coronary arteries
- D.** Three coronary veins

Q4: The marginal artery runs along

- A.** Lower margin of the sternocostal surface
- B.** Upper margin of the sternocostal surface
- C.** Lower margin of the posterior surface
- D.** Upper margin of the posterior surface

Q2: The Origin of the coronary arteries arise from the initial part of

- A.** Descending aorta
- B.** Ascending aorta
- C.** Both A & B
- D.** None of the above

Q5: The right coronary artery supplies

- A.** SA node
- B.** AV node
- C.** AV bundle
- D.** All of the above

Q3: The right coronary artery arises from

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

Q6: Which one 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

MCQ

Q7: The left marginal artery supplies which of the following

- A.** Left margin of the left ventricle
- B.** Left ventricle
- C.** Right ventricle
- D.** Left atrium

Q10: Which of the following branches supplies the diaphragmatic surface of the right ventricle?

- A.** Marginal artery
- B.** Posterior ventricular branches
- C.** Anterior ventricular branches
- D.** Posterior interventricular artery

Q8: Which one of the following is the artery of the pulmonary conus

- A.** Anterior interventricular
- B.** Left conus
- C.** Right conus
- D.** Circumflex artery

Q11: Which of the following branches supplies the anterior and lateral surfaces of the right atrium?

- A.** Right conus
- B.** Atrial branches
- C.** Marginal artery
- D.** Artery of the sinoatrial node

Q9: Anterior cardiac veins drain into

- A.** Coronary sinus
- B.** Right atrium
- C.** Right ventricle
- D.** Left atrium

Q12: In most people the terminal branches of the left and right coronaries anastomose in

- A.** Apex of the heart
- B.** Base of the heart
- C.** Posterior interventricular groove
- D.** Anterior interventricular groove

SAQ :

1 : What does the right coronary artery supply?

2 : List 4 branches of the coronary artery.

3 : The anterior interventricular artery branches into four structures what are they?

4: Where do the veins drain outside the coronary sinus?

SAQ Answers :

- 1:** 1 - Right atrium
2 - Right ventricle
3 - part of Left Atrium
4 - Left ventricle
5 - Atrioventricular septum
6 - Most of conducting system
- 2:** Slide 5
- 3:** 1- Left lateral diagonal artery ; one of the Ventricular branches, or may arise from trunk of the left coronary
2- Anterior ventricular and posterior ventricular branches: to the left ventricle
3- Arterial branches: to the left atrium
4- Left conus artery for pulmonary conus
- 4:** 1. Anterior cardiac veins: Open directly into the Right Atrium.
2. Venae Cordis minimae (small cardiac veins): Open into the heart chambers

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