



MED437  
KING SAUD UNIVERSITY



# Anatomy of the arterial supply and venous drainage of the heart

Lecture 4



Please check our [Editing File](#)

هذا العمل لا يغني عن المصدر الأساسي للمذاكرة

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

# Objectives

- 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**).

- Text in **BLUE** was found only in the boys' slides
- Text in **PINK** was found only in the girls' slides
- **Text in RED is considered important**
- Text in **GREY** is considered extra notes

# Arterial Supply

The arterial supply of the heart is provided by

Right coronary artery

Left coronary artery

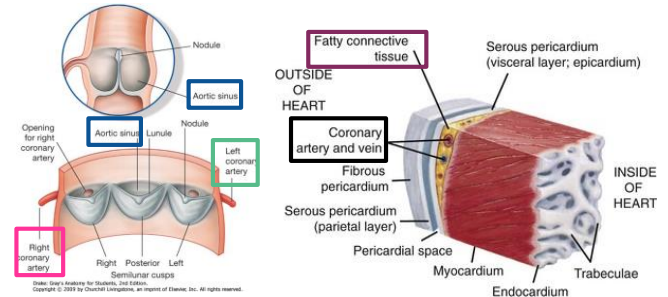
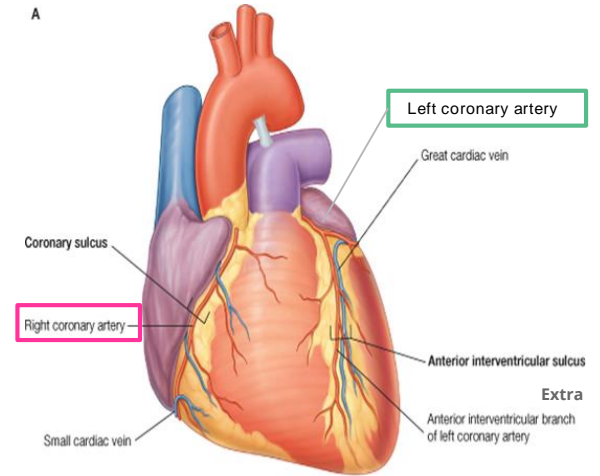
they are distributed over the cardiac surface, within the **subepicardium** (below epicardial) **connective tissue**

## Origin of coronary arteries

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

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

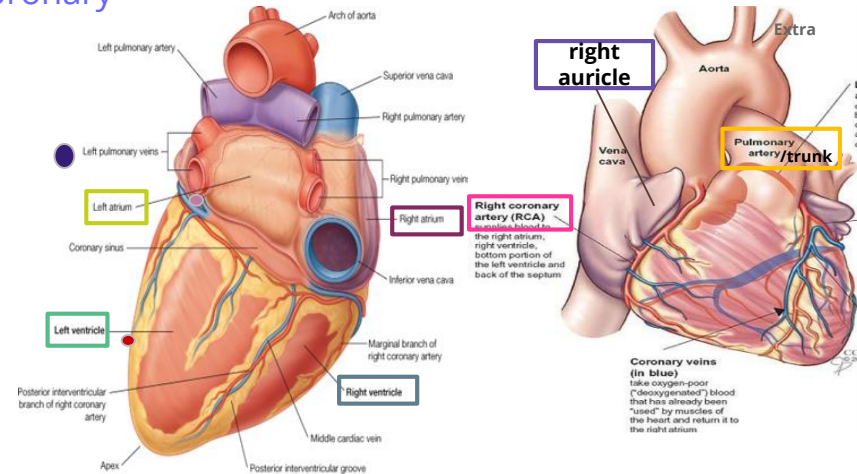
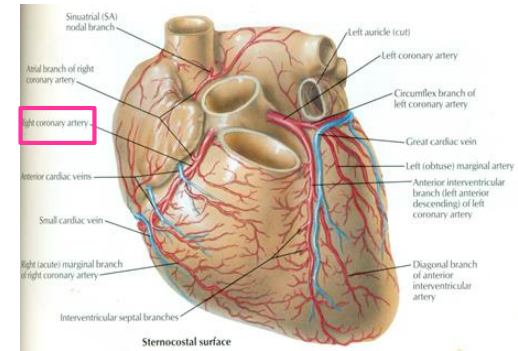
A



Drake, Gray's Anatomy for Students, 2nd Edition, Copyright © 2012 by Elsevier Saunders, an imprint of Elsevier Inc. All rights reserved.

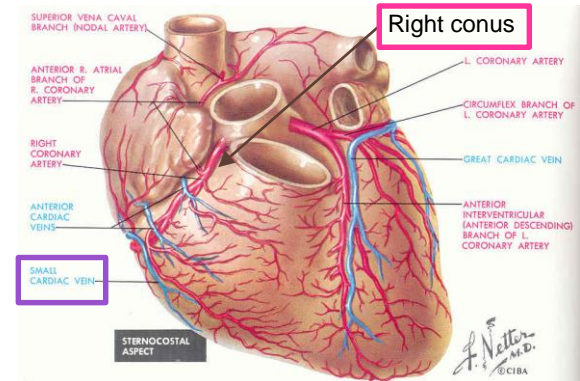
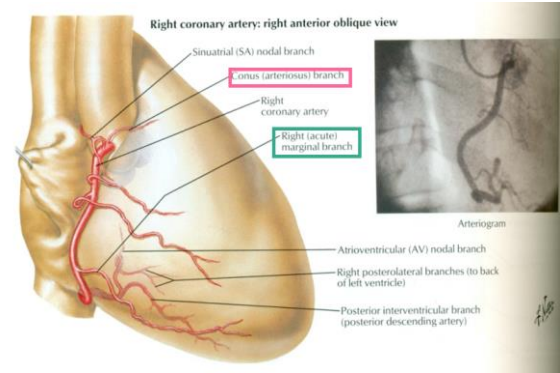
# Right Coronary Artery “smaller branch”

- Arises from the **anterior aortic sinus** of the ascending aorta.
- Descends in the right atrioventricular groove between the Right Auricle and the Pulmonary trunk.
- At the inferior border of the heart it continues posteriorly to anastomose with the left coronary
- Runs forward between the Pulmonary trunk and Right Auricle.
- At the inferior border of the heart it is continuous posteriorly a long the atrioventricular groove to anastomose with the left coronary artery (in the posterior interventricular groove)
- **Right coronary artery (RCA) supplies:**
  - Right atrium:
  - Right ventricle
  - part of Left Atrium ,
  - Left ventricle
  - Atrioventricular septum
  - Most of conducting system



# Branches (Right Coronary Artery)

- **Right Conus:**  
to the infundibulum and upper part of anterior wall of the right ventricle.
- **Anterior ventricular branches (2-3 branches):**  
Supply anterior surface of the right ventricle.
- **Marginal artery:**  
The **largest branch**, runs along the lower (inferior) margin of the sternocostal surface toward the apex. It is accompanied by the Small Cardiac vein.
- **Posterior ventricular branches (2 branches):**  
Supply the diaphragmatic surface of the right ventricle



# Branches (Right Coronary Artery)

- **Atrial branches:**

Supply **anterior and lateral surfaces** of the right atrium, one branch supplies **posterior surface** of both atria.

- **Artery of the Sinoatrial Node (SAN):**

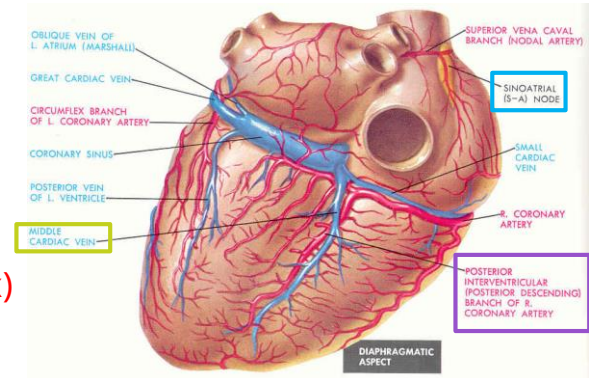
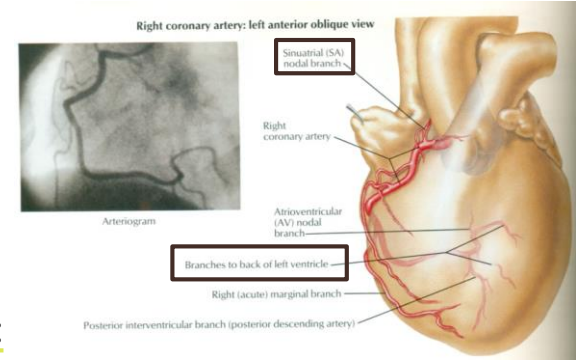
Supplies the SAN and both atria **In 35% it arises from the left coronary.**

- **Posterior Interventricular artery** (accompanied by Middle Cardiac vein):

Runs toward the apex

Lies in the posterior interventricular groove, it supplies:

- Diaphragmatic surface of the **Right and Left Ventricles.**
- **Septal branch** to the **AVN**
- **Posterior part** of the **IVC** (except its Apex)
- The **Right and Left Ventricles**, including their inferior wall.
- Posterior part of ventricular septum, not the Apical part (except Apex)

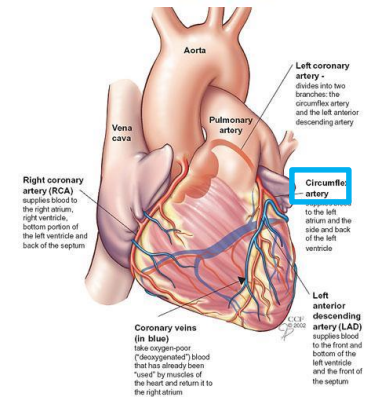
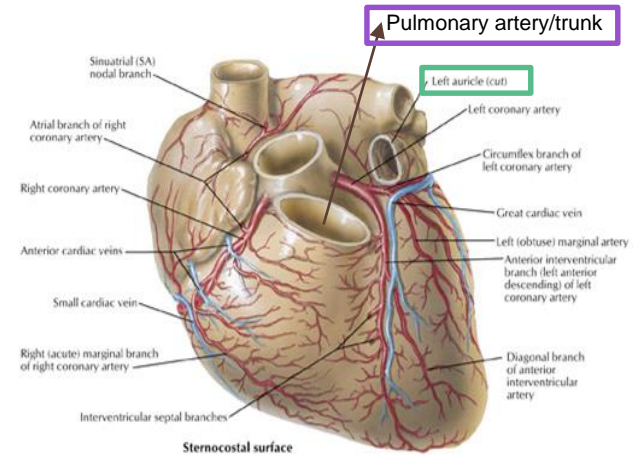


# Left Coronary Artery

- The **Larger** of the two coronaries.
- Arises from the **left posterior aortic sinus** of the ascending aorta.
- Descends:
  1. (passing forward) Between the pulmonary (artery) trunk and the left auricle.
  2. (Enter) the IV (interventricular) groove to the apex of the heart.
- Divides into two terminal branches:  
Anterior Interventricular artery & Circumflex arteries.

\*Q from Dr.Sanaa Which of the aortic sinuses doesn't give rise to any of coronary arteries ?

Right posterior aortic sinus "because the RCA arises from the anterior aortic since & LCA arises from the left posterior aortic sinus"





# Branches (Left Coronary Artery)

- **Anterior Interventricular**

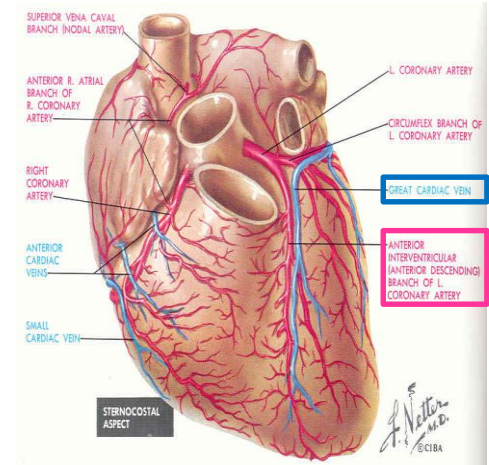
Descends in the **anterior interventricular groove** to the apex of the heart (accompanied by the **Great cardiac vein** in most individuals it passes around the apex to anastomose with terminal branches of the right coronary , in 1\3 it ends at the apex.

It supplies the

1. right and left ventricles
2. anterior part of ventricular septum .

It gives:

- Left conus artery for pulmonary conus.
- Anterior ventricular and Posterior ventricular ; Supply left ventricle
- Atrial branches ; Supply greater part of left atrium
- Left diagonal artery one of the ventricular branches or may arises from **trunk of the** left coronary.





# Branches (Left Coronary Artery)

- **Circumflex Artery**

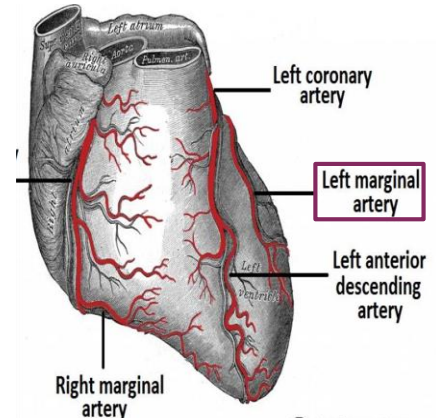
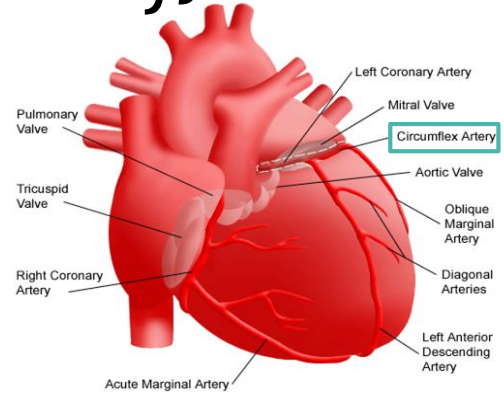
Winds around the left margin of the heart in the atrioventricular groove.

It give:

1. Left Marginal artery
2. Anterior & posterior ventricular branches to the left ventricle
3. Atrial branches to the left atrium

- **Left Marginal artery**

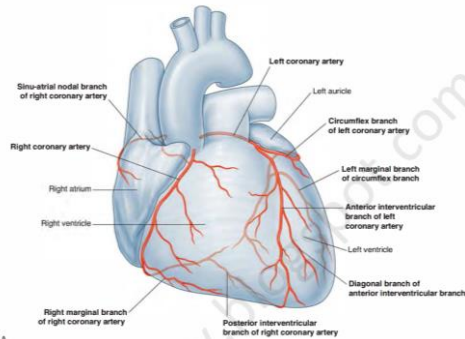
Supplies the left margin of the left ventricle down to the apex



# Variations of the Coronary Arteries

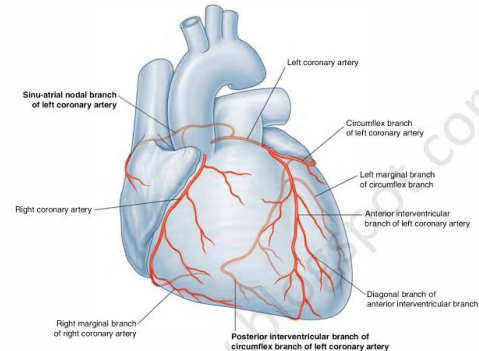
## Right Dominance:

In (90 %) of population, the Posterior Interventricular artery is a branch of the Right Coronary.



## Left Dominance:

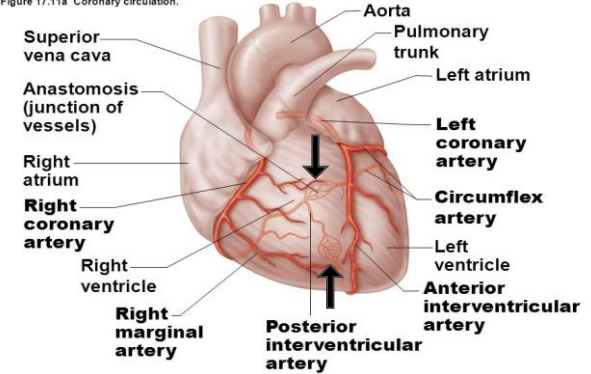
In the rest (10%), the Posterior Interventricular artery arises from the **Circumflex branch** of the Left Coronary Artery.



# Coronary Anastomoses

- In MOST of people, the terminal branches of the right and left coronaries **exist anastomose in the posterior part of the IV (interventricular)**.
- However this anastomoses is not large enough to provide adequate blood supply **in case of coronary occlusion (Functional End arteries)**.

Figure 17.11a Coronary circulation.

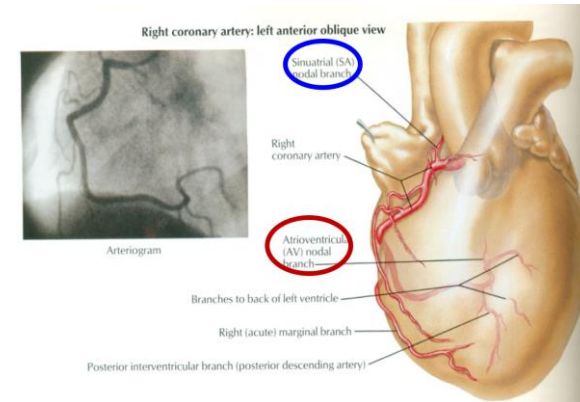


(a) The major coronary arteries

© 2014 Pearson Education, Inc.

# Arterial Supply of Conducting System

- SAN, AVN & AVB are usually supplied by Right coronary.
- Right Bundle Branch (RBB) of (AVB) is supplied by Left coronary.
- LBB of (AVB) is supplied by both Right and Left coronaries.

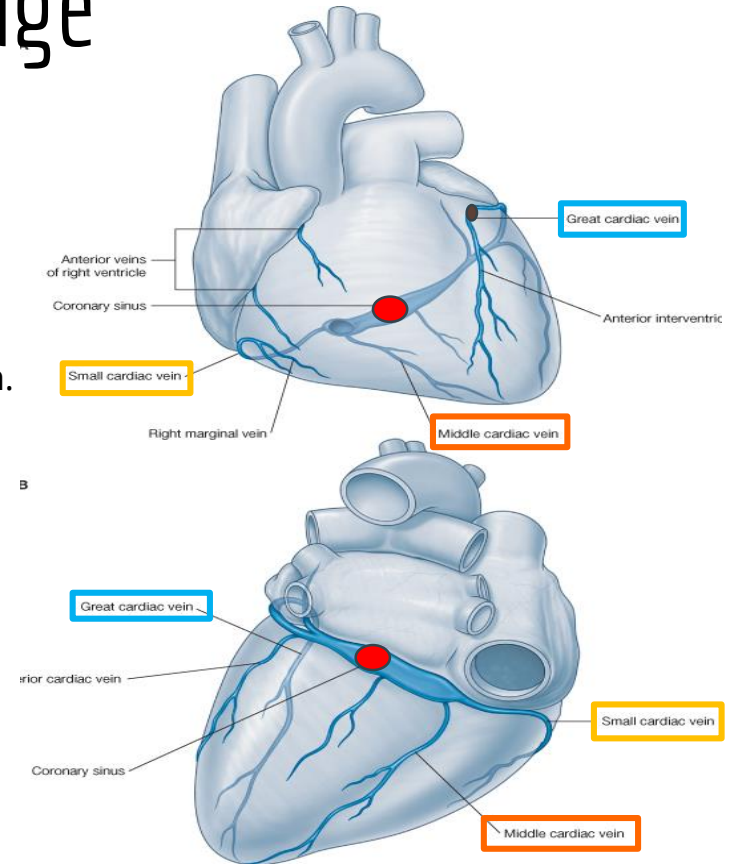


# Venous Drainage

- Blood of the heart is drained into the right atrium either **directly** or through the coronary sinus.

## “Coronary sinus”

- **Drains most** of the Venous Blood of the heart.
- It lies in the **Posterior part** of the AV groove.
- Origin : It is the **direct** continuation of the **Great Cardiac Vein**.
- Tributaries:
  - (3) Cardiac Veins:
    - i. Great
    - ii. Middle
    - iii. Small
  - Oblique vein of left atrium (vein of Marshall).
- **Termination:** It empties into **Right Atrium**.
- Its opening is inferior & to the left of the IVC opening.
- It is guarded by a valve.



# Venous Drainage

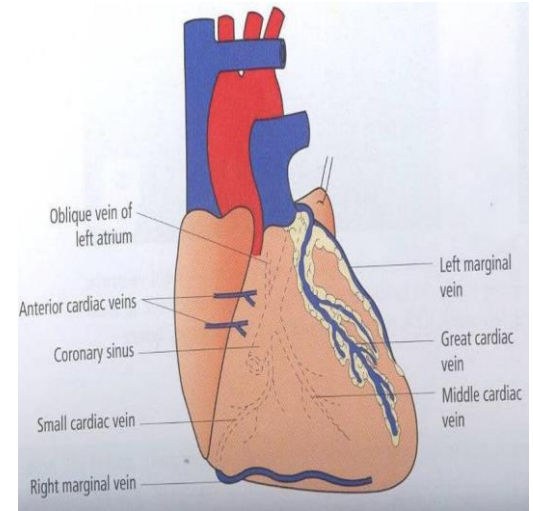
Outside coronary sinus “directly into right atrium”

## **Anterior cardiac veins:**

Open directly into the Right Atrium.

## **Venae Cordis minime (small cardiac veins):**

Open into the heart chambers.



# MCQs

(1) Which of the following arises from the anterior aortic sinus?

- A) Right coronary artery
- B) Circumflex artery
- C) Anterior Interventricular
- D) Left coronary artery

(2) Posterior ventricular branches of Right coronary artery supply:

- A) Anterior surface of the right ventricle
- B) Diaphragmatic surface of the right ventricle
- C) The whole right ventricle

(3) LBB of (AVB) is supplied by:

- A) Right coronary artery
- B) Left coronary artery
- C) Both
- D) none

(4) Which of the following lies in the Posterior part of the AV groove?

- A) Right coronary artery
- B) Coronary sinus
- C) Left coronary artery
- D) Marginal artery

(5) Which of the following veins is draining out of coronary sinus?

- A) Small cardiac veins
- B) Posterior cardiac veins
- C) Large cardiac veins
- D) Inferior cardiac veins

# MCQs

(6)\_\_\_\_\_ lies between the pulmonary trunk and the left auricle?

- A)Right coronary artery
- B)Circumflex artery
- C)Anterior Interventricular
- D)Left coronary artery

(7)Which of the following is not a branch of left coronary artery?

- A)Circumflex artery
- B)Posterior ventricular
- C)Anterior Interventricular

(8)Left Marginal artery supplies?

- A)Left margin of the left ventricle
- B)The whole left ventricle
- C)Inferior margin of the left ventricle

(9)SAN, AVN & AVB are usually supplied by ?

- A)Right coronary artery
- B)Circumflex artery
- C)Left coronary artery
- D)A+C

(10)\_\_\_\_\_accompanied by Middle Cardiac vein?

- A)Posterior Interventricular artery
- B)Circumflex artery
- C)Anterior Interventricular artery
- D)Marginal artery



# Answers

- |      |       |
|------|-------|
| (1)A | (6)D  |
| (2)B | (7)B  |
| (3)C | (8)A  |
| (4)B | (9)A  |
| (5)A | (10)A |

# Team Members

## **Team leader: Faisal Fahad Alsaif**

Abdulaziz Al dukhayel  
Abdulelah Aldossari  
Abdulrahman Alduhayyim  
Hamdan Aldossari  
Fahad Alfaiz  
Zeyad Al-khenaizan  
Abdullah Almeaither  
Abduljabbar Al-yamane  
Abdulmajeed Alwardi  
Abdulaziz Al-drgam  
Ali Alammari  
Saleh Almoaiqel  
Majed Aljohani

## **Team leader: Rawan Mohammad Alharbi**

Abeer Alabduljabbar  
Afnan Almustafa  
Ahad Algrain  
Albandari Alshaye  
AlFhadah alsaleem  
Ghaida Alsanad  
Lojain Azizalrahman  
Majd AlBarrak  
Maha barakah  
Nouf Alotaibi  
Rinad Alghoraiby  
Wejdan Albadrani