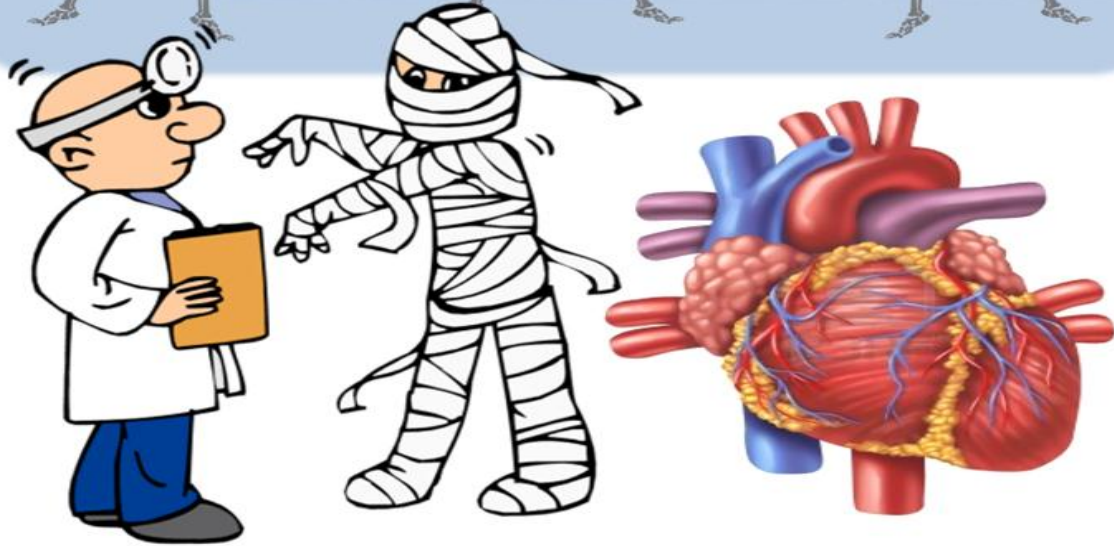




# Anatomy Team 432

## Cardiovascular Block



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تنويه : هذا العمل لا يعتبر مصدر رئيسي للمذاكرة وانما هو للمراجعة فقط ، وتم التأكيد بأنه لا يوجد أي اختلاف بين سلايد الأولاد والبنات باستثناء سلايد واحد زايد عند كل طرف وتم ارفاقه ..



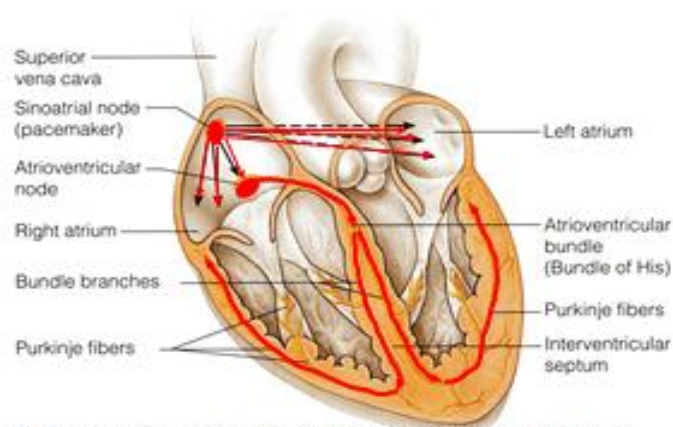
## **OBJECTIVE:**

- **Describe the shape of heart regarding** : apex, base, stern costal and diaphragmatic surfaces .
- **Describe the interior of heart chambers** : right atrium, right ventricle, left atrium and left ventricle.
- **List the orifices of the heart** :
  - Right atrioventricular (Tricuspid) orifice.
  - Pulmonary orifice.
  - Left atrioventricular (Mitral) orifice.
  - Aortic orifice.
- **Describe the innervation of the heart.**
- **Briefly describe the conduction system of the heart.**



عند الاولاد فقط :

## Conduction system of the heart



- The heart contraction begins with an electrical impulse in the SA node
- The impulse spreads to the two atria and triggers their contraction
- Then it reaches the AV node
- After that, the impulse travels along the AV bundle
- At the end, it reaches the Purkinje fibers in the walls of the ventricles and triggers their contraction
- Thus, the conduction system of the heart ensures simultaneous contraction of the atria and the ventricles

عند البنات فقط

1. In the interior of right ventricle :

- a. It has crista terminalis.
- b. Its wall is thicker than the left one.
- c. It has rough infundibulum toward the pulmonary trunk.
- e. It has 3 papillary muscles. \_\_\_\_\_

2. Which one of the following vessels open into the base of the Heart?

- a. The left pulmonary artery.
- b. The right pulmonary artery.
- c. The ascending aorta.
- d. The four pulmonary veins. \_\_\_\_\_

3. The left atrium of the heart :

- a. Has fossa ovalis in its interior.
- b. Forms the base of the heart. \_\_\_\_\_
- c. Recieves the superior vena cava.
- d. Has rough wall containing muscoli pectinati.

4. His bundle of the heart lies in :

- a. Right atrium.
- b. Interatrial septum.
- c. Walls of ventricles.
- d. Interventricular septum. \_\_\_\_\_



**The Heart is somewhat pyramidal in shape, having:**

|  |  |
|--|--|
| <b><u>Apex</u></b>                             | <ul style="list-style-type: none"> <li>❖ Directed downwards, forwards and to the left. It is formed by the <b>left ventricle</b>.</li> <li>❖ Lies at the level of <b>left 5<sup>th</sup> intercostal space</b> 3.5 inch from midline.</li> </ul>   |
| <b><u>Sterno-costal (anterior) surface</u></b> | <ul style="list-style-type: none"> <li>❖ Divided by <b>coronary (atrio-ventricular) groove</b> into :             <ol style="list-style-type: none"> <li>1- Atrial part.</li> <li>2- Ventricular part.</li> </ol> <ul style="list-style-type: none"> <li>❖ The 2 ventricles are separated by <b>anterior interventricular groove</b>, which lodges :                 <ol style="list-style-type: none"> <li>1- Anterior interventricular artery (branch of left coronary).</li> <li>2- Great cardiac vein.</li> </ol> </li> <li>❖ The coronary groove lodges the <b>right coronary artery</b>.</li> <li>❖ The marginal branch of right coronary artery runs along the <b>inferior border</b>.</li> <li>❖ The funnel-shaped part of <b>right ventricle</b> just below pulmonary trunk is called <b>infundibulum</b>.</li> </ul> </li> </ul> |
| <b><u>Diaphragmatic (Inferior) surface</u></b> | <ul style="list-style-type: none"> <li>❖ Formed by the 2-ventricles, <b>mainly left ventricle</b> (left 2/3).</li> <li>❖ Separated from base of heart by <b>posterior part of coronary sulcus</b>.</li> <li>❖ The 2-ventricles are separated by <b>posterior interventricular groove</b> <u>which lodges:</u> <ol style="list-style-type: none"> <li>1- <b>Posterior interventricular artery</b>.</li> <li>2- <b>Middle cardiac vein</b>.</li> </ol> </li> </ul>   |
| <b><u>Base</u></b>                             | <ul style="list-style-type: none"> <li>❖ It is formed by the 2 atria, <b>mainly left atrium</b>, into which open the 4 pulmonary veins.</li> <li>❖ Lies opposite middle <b>thoracic vertebrae(5-7)</b>.</li> <li>❖ Is separated from the vertebral column by descending aorta, esophagus and <b>oblique sinus of pericardium</b> .</li> <li>❖ Bounded inferiorly by <b>post part of coronary sulcus</b> , which lodges the <b>coronary sinus</b>.</li> </ul>   |



# Chambers of the Heart

| Chambers        | Features   | Openings   |
|-----------------|--|--|
| Right Atrium    | <p><u>Auricle</u>= small out pouching</p> <p><u>sulcus terminalis</u></p> <p><u>crista terminalis</u> which divide it vertically to <u>musculi pectinati</u> and <u>sinus venarum</u></p> <p><u>Fossa ovalis</u> which has a sharp margin "Annulus ovalis"</p> | SVC, IVC, Coronary sinus, Right Atrioventricular orifice and Small orifice                     |
| Right Ventricle | <p><u>trabeculae cornea</u> in the wall</p> <p><u>3 papillary muscles</u> attached to the cusps of tricuspid valve by tendinous threads called <u>chordae tendinae</u></p> <p><u>moderator band</u></p>  | pulmonary orifice to the Pulmonary trunk and right atrioventricular orifice to the R.A         |
| Left Atrium     | <p><u>musculi pectinati</u></p> <p><u>left atrioventricular orifice</u> which is guarded by <u>mitral valve</u></p>  | Receives 4 pulmonary veins which <u>have no valves</u><br><u>left atrioventricular orifice</u> |
| Left Ventricle  | <p><u>trabeculae cornea</u> in the wall</p> <p><u>2 papillary muscles</u></p> <p><u>chordae tendinae</u></p> <p><u>aortic vestibule</u> wall is fibrous and smooth</p>   | <u>aortic orifice</u>  |



| <b>Right atrio-ventricular (tricuspid) orifice</b>   | <b>Left atrio-ventricular (mitral) orifice</b>  |
|--|---|
| <ul style="list-style-type: none"><li>Guarded by a <b>tricuspid valve</b>.</li><li>It has <b>3-cusps</b> (<b>anterior-posterior-septal or medial</b>).</li></ul> | <ul style="list-style-type: none"><li>Guarded by a <b>mitral valve</b>.</li><li>Mitral valve is composed of <b>2 cusps</b>:<ul style="list-style-type: none"><li><b>1- Anterior cusp</b>: lies anteriorly and to right.</li><li><b>2- Posterior cusp</b>: lies posteriorly and to left.</li></ul></li></ul> |
| <b>Pulmonary orifice</b>   | <b>Aortic orifice</b>   |
| <b>Pulmonary valve is formed of: 3 semilunar cusps : 2 anterior and one posterior</b>  | <b>Aortic valve is formed of: 3 semilunar cusps: one anterior and 2 posterior.</b>  |

## ➤ NOTES:

- 1- The Heart lies in the **middle mediastinum**.
- 2- The Heart is surrounded by a fibroserous sac called pericardium which is differentiated into an **outer fibrous layer (Fibrous pericardium) & inner serous sac (Serous pericardium)**.
- 3- Apex of the heart formed by the **left ventricle**.
- 4- Sterno-costal (anterior) surface Divided by **coronary (atrio-ventricular) groove**.
- 5- The 2 ventricles in anterior surface are separated by **anterior interventricular groove**:
  - a- Anterior interventricular artery.
  - b- Great cardiac vein.
- 6- The funnel-shaped part of right ventricle just below pulmonary trunk is called **infundibulum**.



- 7- Diaphragmatic (Inferior) surface Separated from base of heart by **posterior part of coronary sulcus**.
- 8- The 2-ventricles in Inferior surface are separated by **posterior interventricular groove** which lodges:  
a- Posterior interventricular artery.  
b- Middle cardiac vein.
- 9- Anterior part of Right Atrium is **rough** while the Posterior part is **smooth**.
- 10- Right ventricle wall contains projections called **trabeculae carnae**.
- 11- Each papillary muscle is attached to the cusps of tricuspid valve by tendinous threads called **chordae tendinae**.
- 12- **Interventricular septum** is connected to **anterior papillary muscle** by a muscular band called **moderator band**.
- 13- Nerve supply of the heart by **sympathetic & parasympathetic fibers**.
- 14- The beating of the heart is regulated by the **intrinsic conduction (nodal) system**.
- 15- The main center is the **sinoatrial (SA) node**.
- 16- the SA node is called the **pacemaker** of the heart



❖ Apex of the heart is formed mainly of "**left ventricle**" at the level of the 5th intercostal space

- ❖ The heart does not rest on its base; it rests on its **diaphragmatic (inferior)** surface
  - ❖ Coronary groove= Atrioventricular groove because it separate the **atrium from the ventricle**
  - ❖ Diaphragmatic Separated from base of heart by posterior part of coronary sulcus
  - ❖ coronary **sulcus** has the posterior coronary **sinus**
  - ❖ Base of the Heart is separated from downward by "**post. part of coronary sulcus**" , which lodges the coronary sinus
  - ❖ Superior Vena Cava has **NO valves** according to Gravity
  - ❖ Wall of the right is **thinner** than that of left ventricle because of pumping
  - ❖ **3** papillary muscles "Anterior, Posterior and Septal in the medial side" in the right ventricle while the Left Ventricle has **2** only
  - ❖ The wall of aortic **vestibule** in the left ventricle is fibrous and smooth as well as **infundibulum** in the right ventricle
  - ❖ **cardiac plexus** situated below arch of aorta
  - ❖ atrioventricular (AV) bundle (bundle of His)
  - ❖ left atrioventricular orifice= Mitral orifice "Bicuspid"
  - ❖ Right atrioventricular orifice "Tricuspid"
- ❖ **Pulmonary cusp** has **2** Anterior and **1** posterior while the **Aortic cusp** has **1** Anterior and **2** posterior

*((posterior longitudinal sulcus (posterior interventricular sulcus, inferior interventricular groove))  
((coronary sulcus (also called coronary groove, auriculoventricular groove, atrioventricular groove, AV groove))*





## Review

**1- What is the name of sac surrounding the heart?**

Pericardium.

**2- At any level Lies Apex of the heart?**

left 5<sup>th</sup> intercostal space.

**3- Which part formed mainly the Sterno-costal?**

right atrium and the right ventricle.

**4- Where is the site of infundibulum?**

below pulmonary trunk and it is part of right ventricle.

**5- What part separate Diaphragmatic surface from base of heart?**

posterior part of coronary sulcus.

**6- At which level lies Base of the Heart?**

thoracic vertebrae(5-7).

**7- What structures Separate Base of the Heart from vertebral column?**

descending aorta, esophagus and oblique sinus of pericardium.

**8- What is the lower border of the heart?**

right ventricle and apical part of left ventricle.

**9- What is the name of junction between the right atrium and the right auricle?**

sulcus terminalis.

**10- What is the function of tricuspid valve?**

Leaves the blood from right atrium to the right ventricle.



**11- What is the opening in right atrium don't have valves?**

SVC.

**12- w projections in the wall of right ventricle?**

trabeculae carnae.

**13- What is name of muscle arise from the walls of ventricles?**

papillary muscles.

**14- What connect between papillary muscles and the cusps of tricuspid valve?**

chordae tendinae.

**15- What connects between anterior papillary muscle and Interventricular septum?**

moderator band.

**16- what is the thickest chambers of the heart?**

Left ventricle.

**17- How many cusps in Aortic orifice?**

three semilunar cusps.

**18- Where is from the parasympathetic fibres arise?**

vagus nerves.

**19- What the main center of the intrinsic conduction system?**

sinoatrial (SA) node.

**20- where is the site of Purkinje fibers ?** inside the walls of the ventricles.



**Here are some useful links to help you :**

Anatomy - Heart model:

<http://www.youtube.com/watch?v=fx5OR6eOfz8>

3D anatomy - Right atrium and ventricle:

<http://www.youtube.com/watch?v=M5agXgyN1ng>

<http://www.youtube.com/watch?v=GH5trHYjozI>

Gross heart anatomy:

<http://www.youtube.com/watch?v=KYZm5rEBfB4>

And here's a link that contains some nice and very clear gross pictures:

[http://www.pharmacology2000.com/Cardio/Cardio\\_risk/adult\\_cardiac\\_procedures/anatomy1.htm](http://www.pharmacology2000.com/Cardio/Cardio_risk/adult_cardiac_procedures/anatomy1.htm)

**Thank you *May Al-Orainy* for sharing the links :)**



## Quiz:

**1- The apex of heart formed mainly by, at the level of :**

- A- Right ventricle, left fifth intercostal
- B- Left ventricle, left fifth intercostal
- C- Left ventricle , right fifth intercostal
- D- Left atrium, left fifth intercostal

**2- The heart rest on:**

- A- Anterior surface
- B- Posterior surface
- C- Superior surface
- D- Inferior surface

**3- The two ventricle in the sterno-costal surface separated by:**

- A- Coronary (atrio-ventricle) groove
- B- Anterior interventricular groove
- C- Posterior interventricular groove
- D- posterior part of coronary sulcus

**4- Which one of the following separates the inferior surface from the posterior surface of the heart:**

- A- posterior part of coronary sulcus
- B- Coronary (atrio-ventricle) groove
- C- Anterior interventricular groove
- D- Posterior interventricular groove



**5- Base of heart separated from vertebral column by:**

- A- coronary sinus of pericardium
- B- ascending aorta
- C- oblique sinus of pericardium
- D- Thoracic vertebrae

**6- Right border formed by:**

- A- Right atrium
- B- Left atrium
- C- Right ventricle
- D- ( A and C are correct )

**7- The small out pouching of atrium called:**

- A- Sulcus
- B- cavity
- C- Auricle
- D- Fossa

**8- The interatrial septum carries an oval depression called:**

- A- Anulus ovalis
- B- Fossa ovalis
- C- Crista terminalis
- D- tricuspid valve.

**9- the infundibulum Is a funnel shaped of :**

- A- Right ventricle, below pulmonary trunk
- B- Right ventricle , above pulmonary trunk
- C- left ventricle, above pulmonary trunk
- D- left ventricle ventricle, above aorta

**10- Posterior part of coronary sulcus lodge:**

- A**-right coronary artery
- B**-Great cardiac vein
- C**-coronary groove
- D**- coronary sinus



**11- papillary muscles in :**

- A- Right ventricle
- B- Left Ventricle
- C- Left atrium
- D- ( A and B )

**12- Each papillary muscle is attached to the cusps by:**

- A- moderator band
- B- chordae tendinae.
- C- Tricuspid
- D- infundibulum

**13- Moderator band connect:**

- A- Interventricular septum to anterior papillary
- B- Interventricular septum to posterior papillary
- C- papillary muscle to the cusps
- D- Interventricular septum to septal papillary

**14- Left atrioventricular orifice guarded by:**

- A- left auricle
- B- chordae tendineae
- C- mitral valve
- D- Tricuspid

**15- Out flow part of left ventricle is called:**

- A- Aortic valve
- B- aortic orifice
- C- mitral valve
- D- aortic vestibule

**16- Which one of the following located inside the walls of the ventricles:**

- A- sinoatrial (SA) node
- B- atrioventricular (AV) node
- C- atrioventricular (AV) bundle
- D- Purkinje fibers



| <b>N.Q</b> | <b>ANS</b> |
|------------|------------|
| <b>1</b>   | <b>B</b>   |
| <b>2</b>   | <b>D</b>   |
| <b>3</b>   | <b>B</b>   |
| <b>4</b>   | <b>A</b>   |
| <b>5</b>   | <b>C</b>   |
| <b>6</b>   | <b>A</b>   |
| <b>7</b>   | <b>C</b>   |
| <b>8</b>   | <b>B</b>   |
| <b>9</b>   | <b>A</b>   |
| <b>10</b>  | <b>D</b>   |
| <b>11</b>  | <b>D</b>   |
| <b>12</b>  | <b>B</b>   |
| <b>13</b>  | <b>A</b>   |
| <b>14</b>  | <b>C</b>   |
| <b>15</b>  | <b>D</b>   |
| <b>16</b>  | <b>D</b>   |

**GOOD LUCK**

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