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Heart Chambers

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Heart Chambers

The Heart composed of 4 chambers :-

Two Receiving chambers (Atria)

Right Atrium

Left Atrium

Two Discharging chambers (Ventricles)

Right Ventricles

Left Ventricles

VALVES OF THE HEART

Atrioventricular valves

Semilunar valves

Tricuspid valve:

Between right atrium and right ventricle

Mitral or Bicuspid valve:

Between left atrium and left ventricle

Pulmonary valve

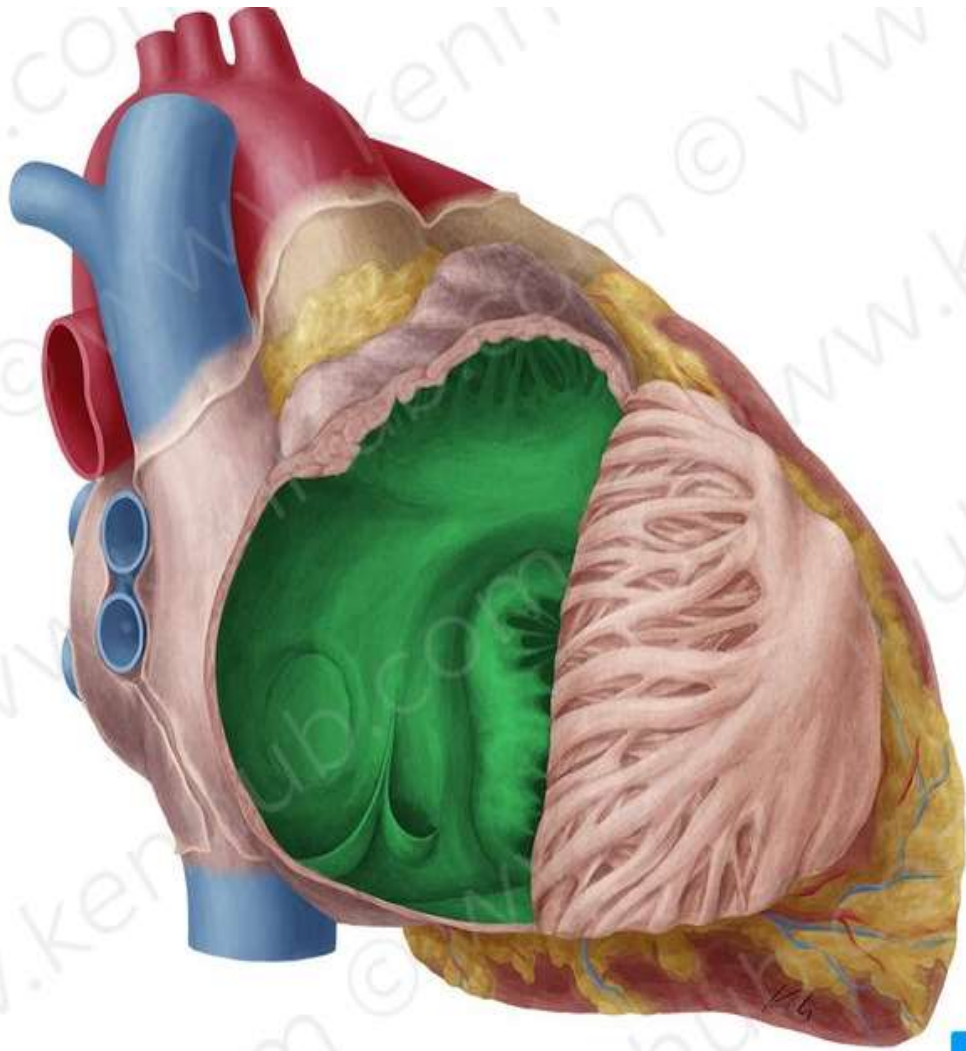
Between right ventricle and pulmonary artery

Aortic valve

Between left ventricle and Aortic artery

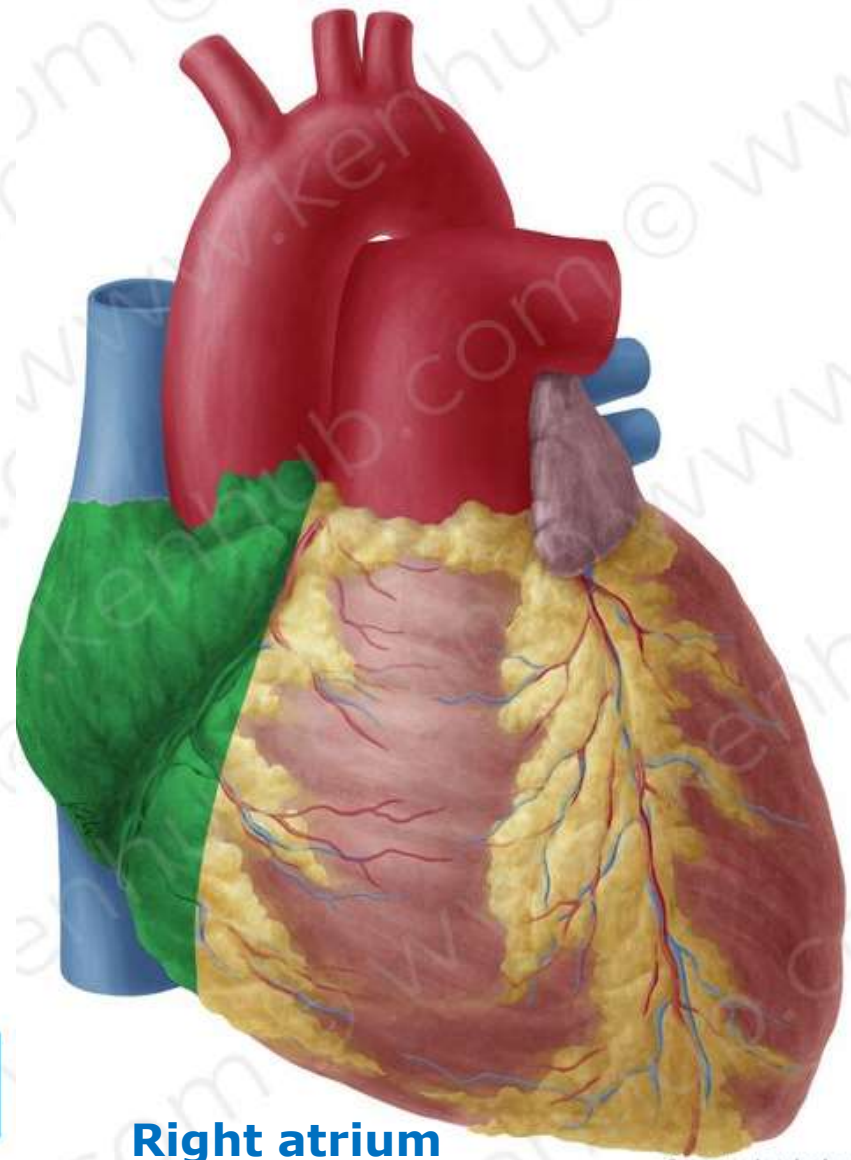
Right atrium

- ❑ The right atrium has a small muscular pouch called right auricle to increasing the capacity of the atrium
- ❑ The right atrium has
 - A.** Smooth posterior part and rough anterior part
 - B.** Septal wall ,which separates the right atrium from the left atrium



Smooth posterior part

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Right atrium

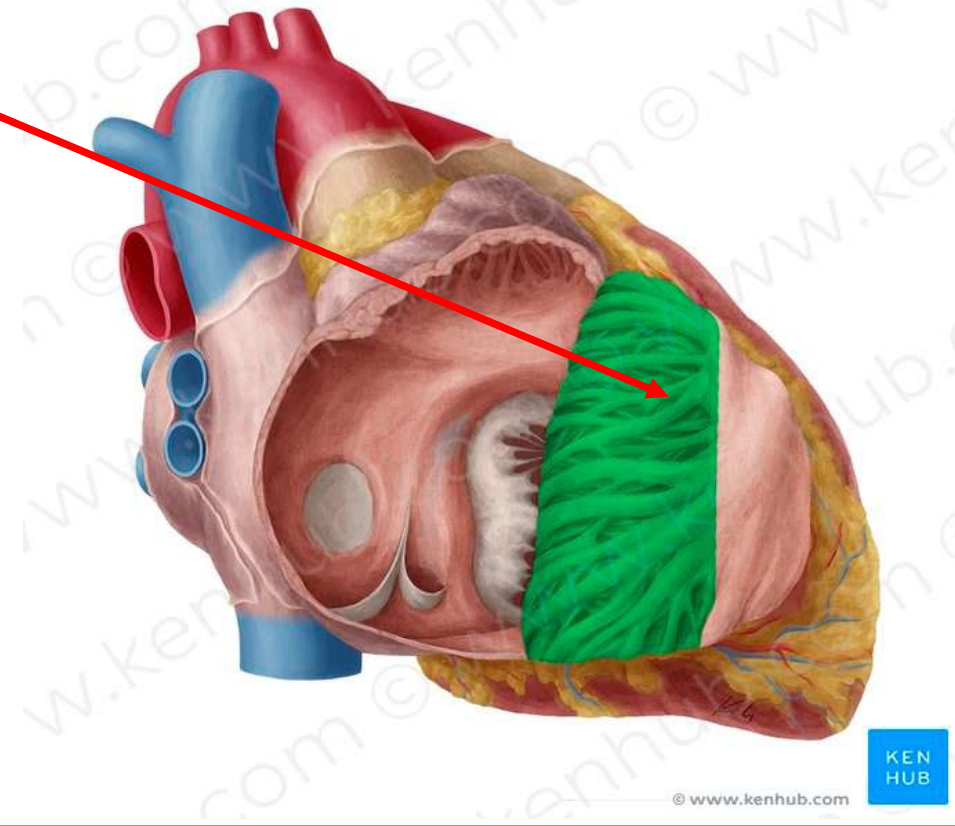
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➤ **Smooth posterior part (The sinus venarum)**

It receives superior and inferior venae cavae and coronary sinus openings

➤ **Rough Anterior part** muscular anterior wall composed of pectinate muscles (L. muscoli pectinati).



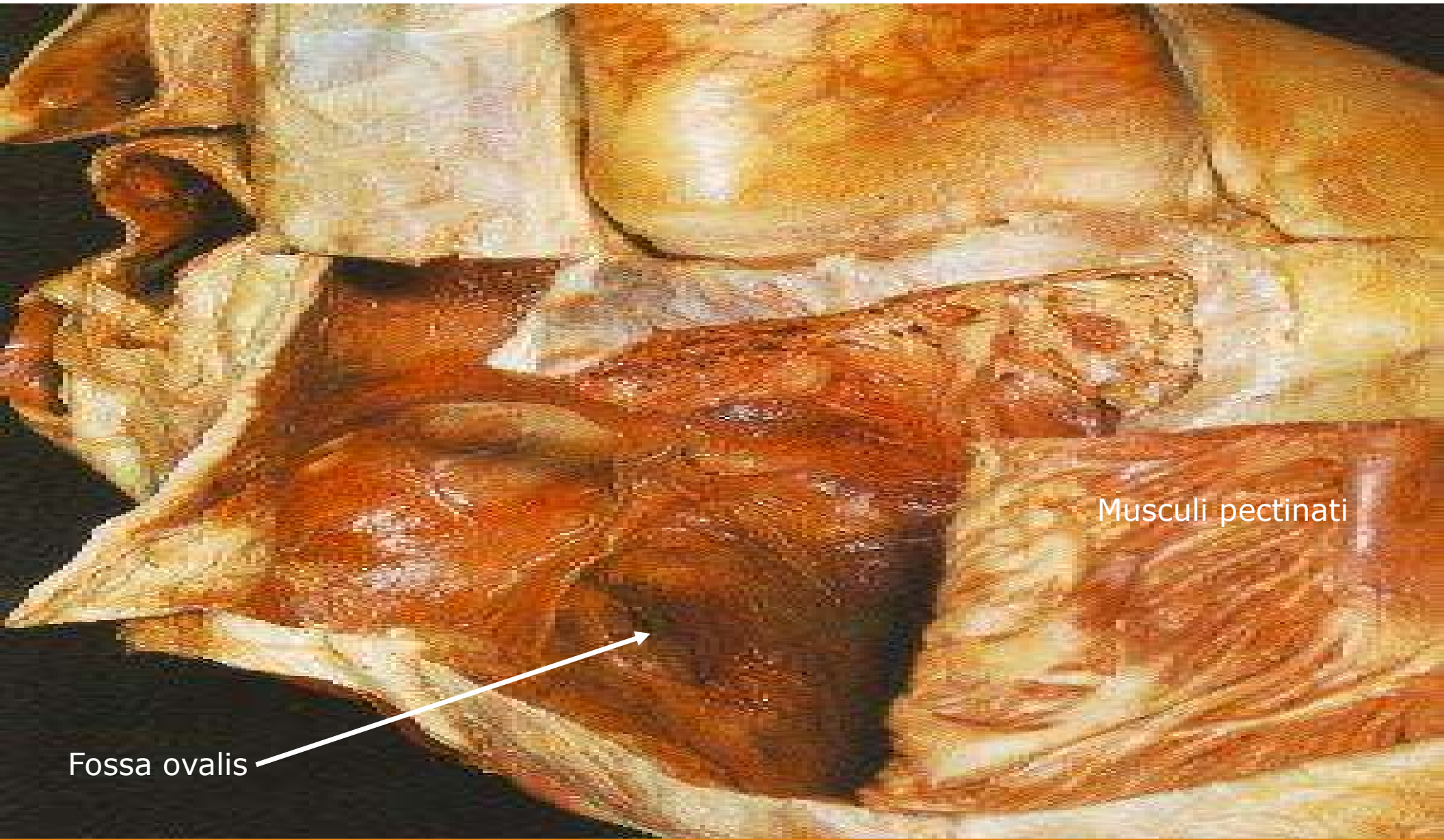
The smooth and rough parts are separated by

Externally by a shallow vertical groove, the **sulcus terminalis** or terminal groove

Internally by a vertical ridge, the **crista terminalis** or terminal crest

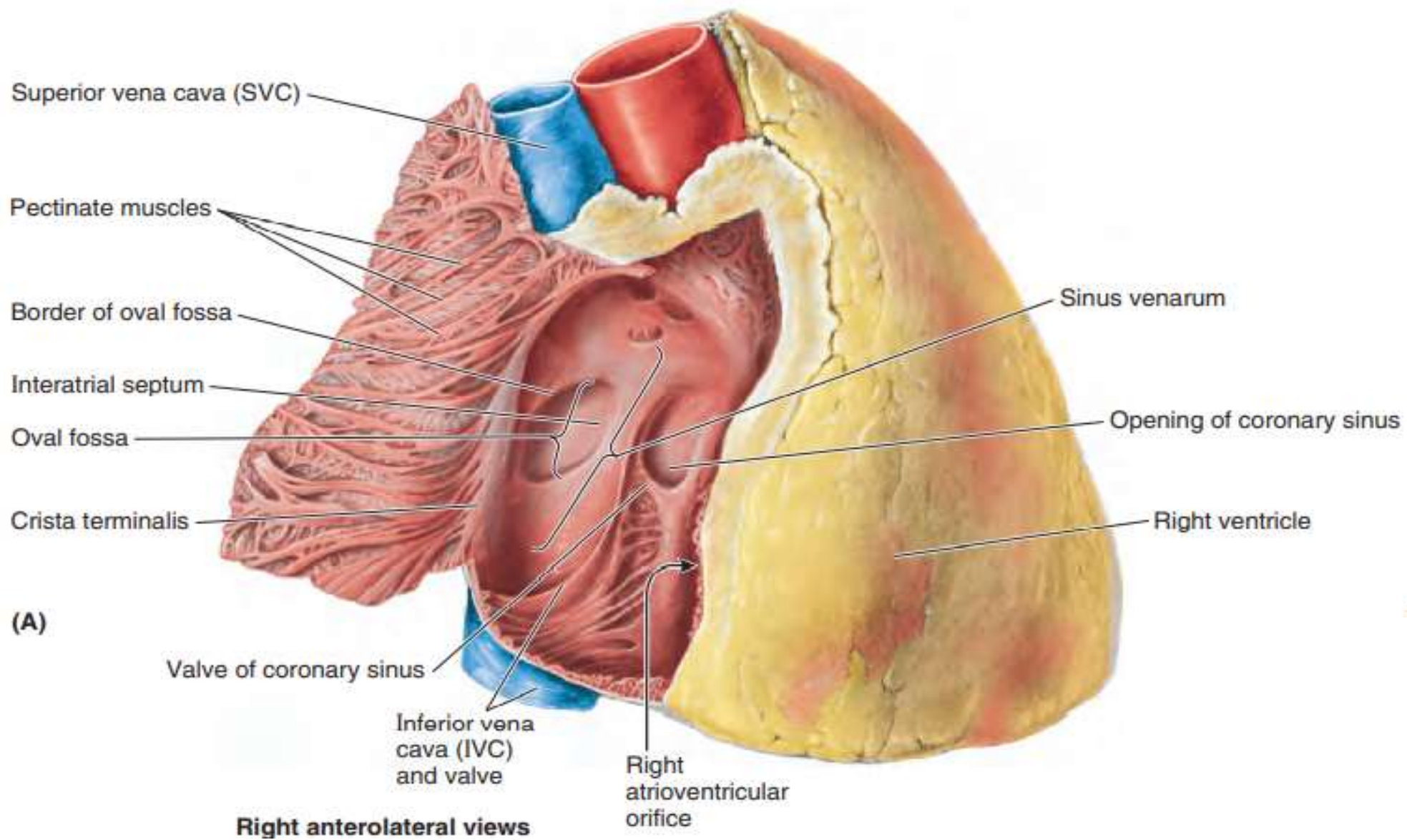
The interatrial septum

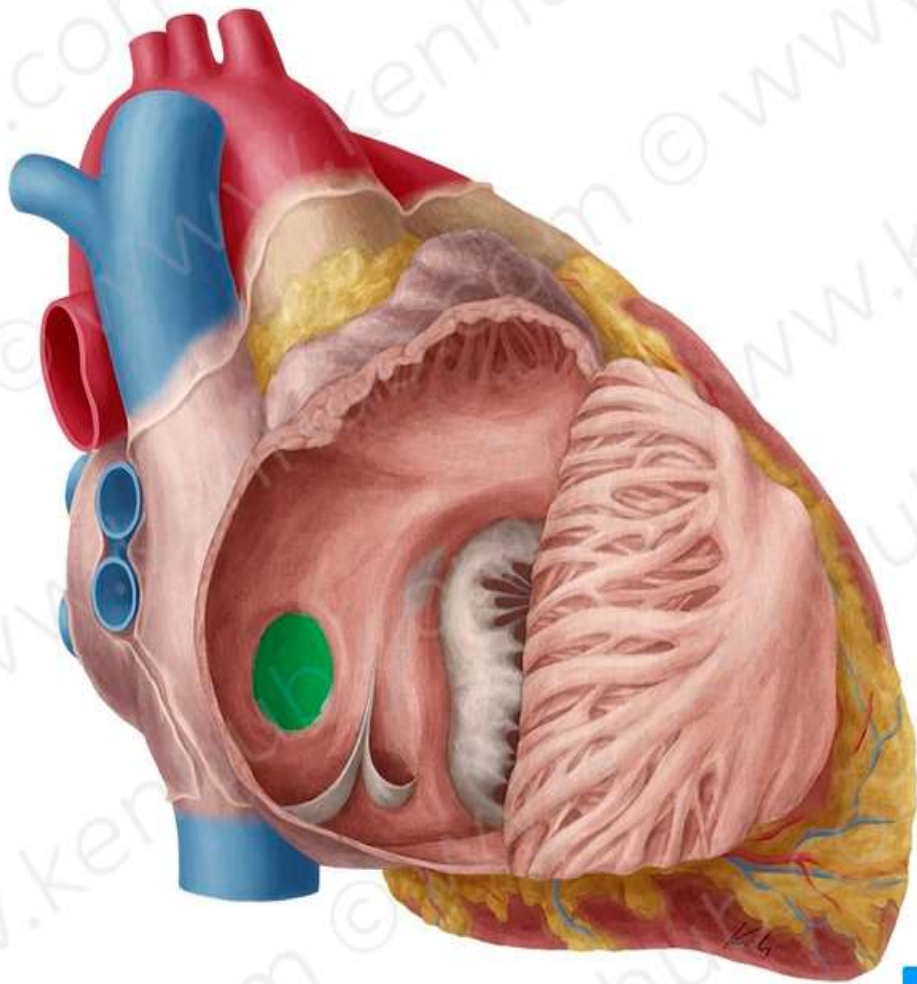
- ❖ It has an oval depression called fossa ovalis, which is a remnant of the oval foramen (L. foramen ovale) in the fetus.
- ❖ The fossa ovalis is surrounded by annulus ovalis (limbus fossa ovalis).



Fossa ovalis

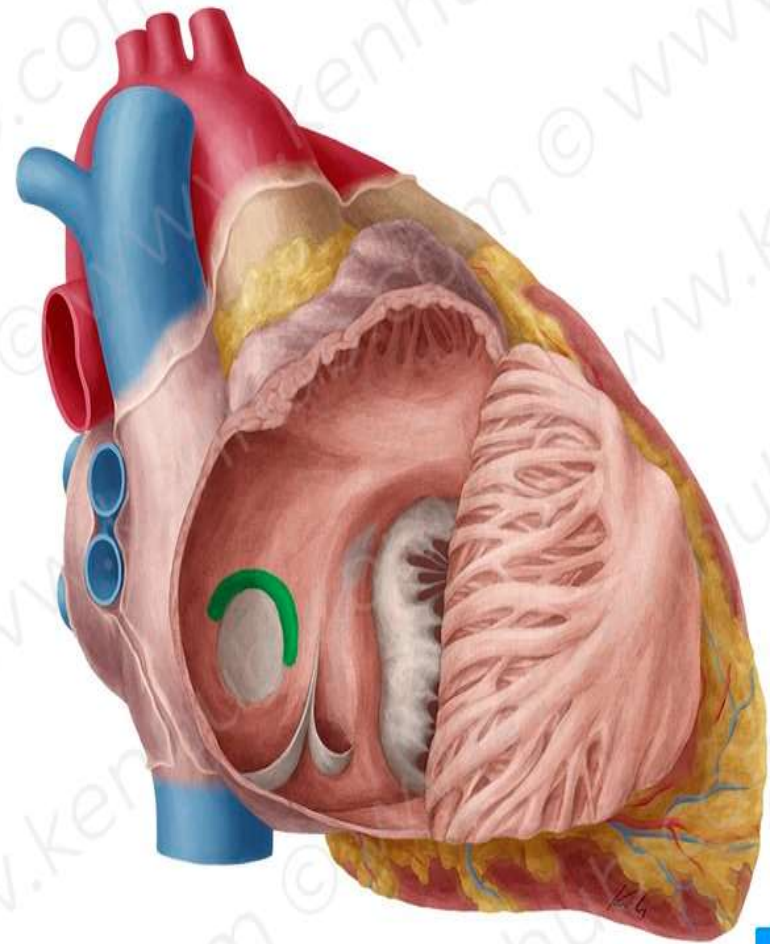
Musculi pectinati





Fossa ovalis

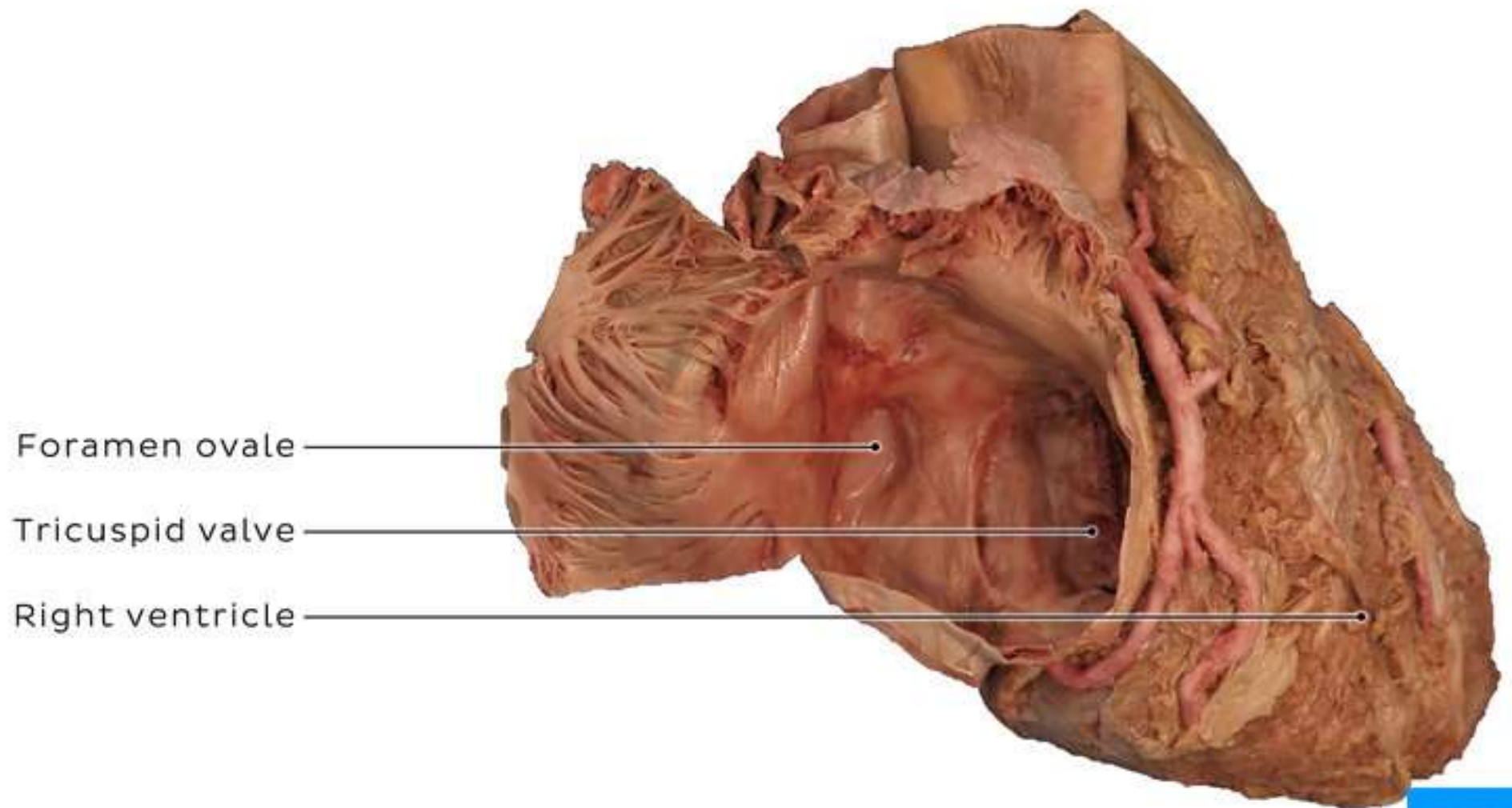
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Annulus ovalis

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Foramen ovale

Tricuspid valve

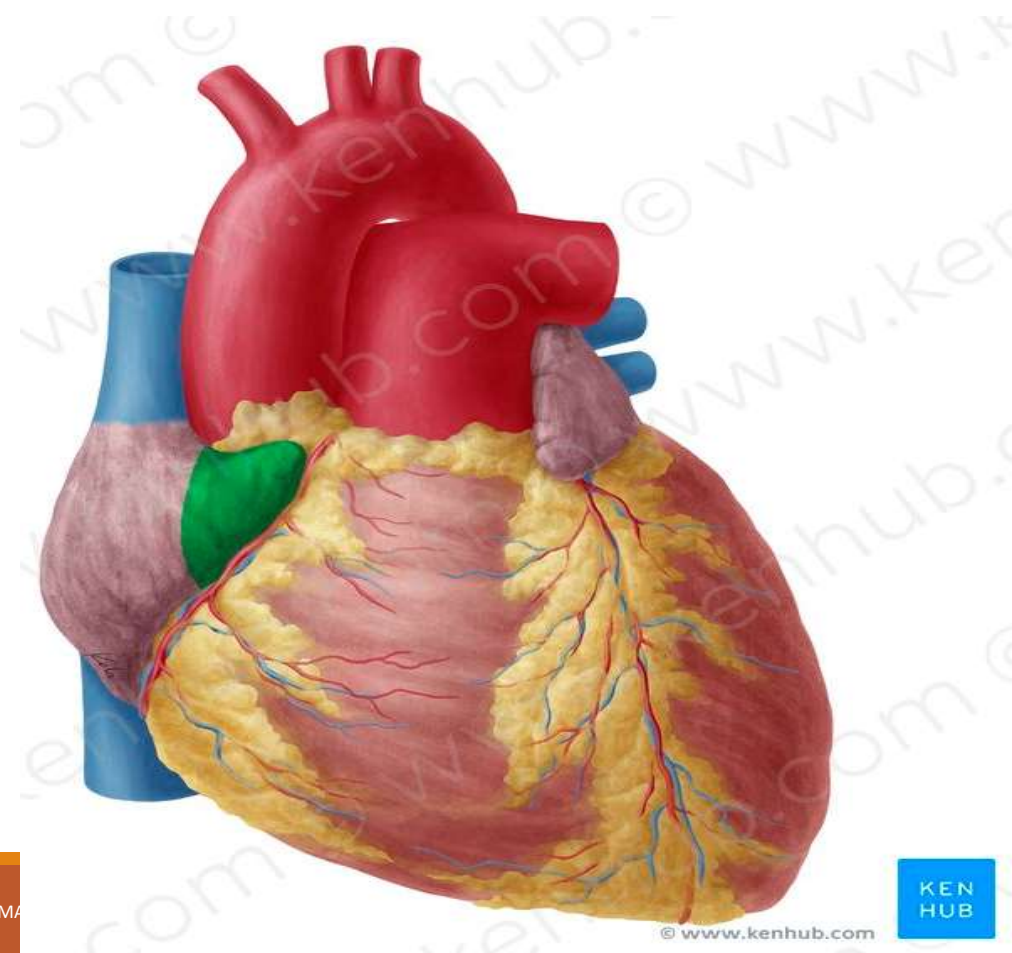
Right ventricle

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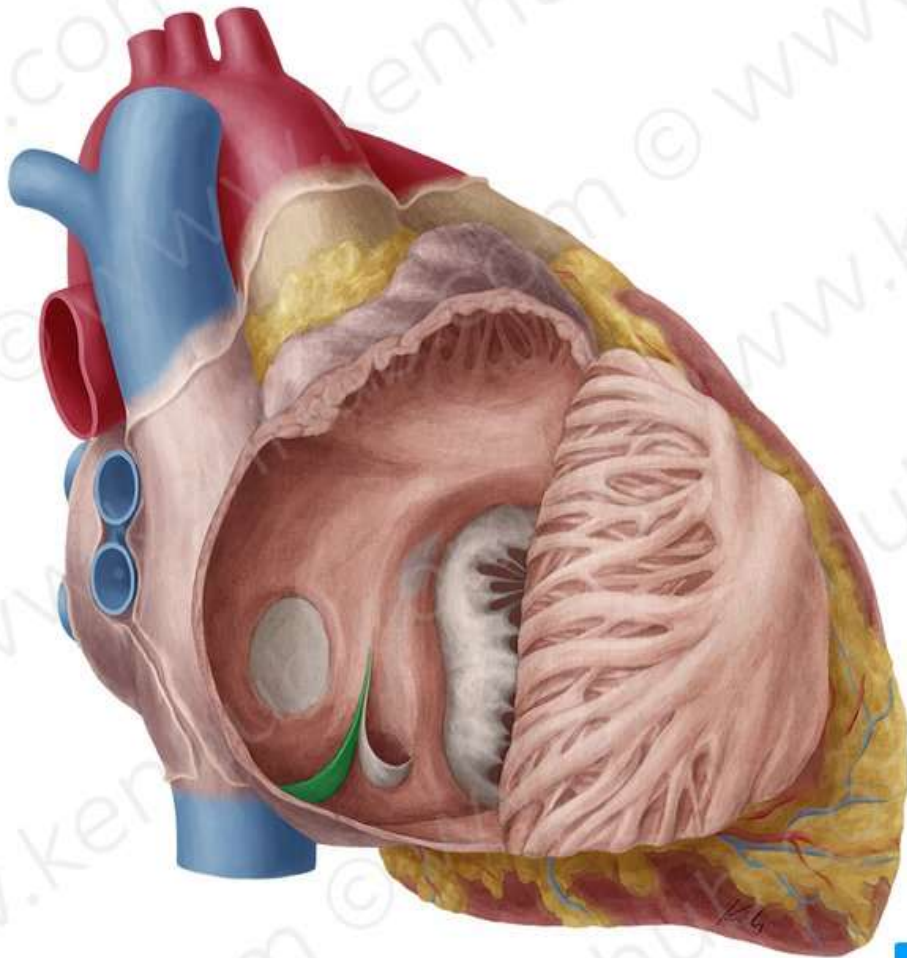
The right auricle

- ✓ It is a conical muscular pouch that projects from Rt. atrium
- ✓ It increase the capacity of the atrium
- ✓ It overlaps the ascending aorta
- ✓ Cardiac surgeon used it as point of entry



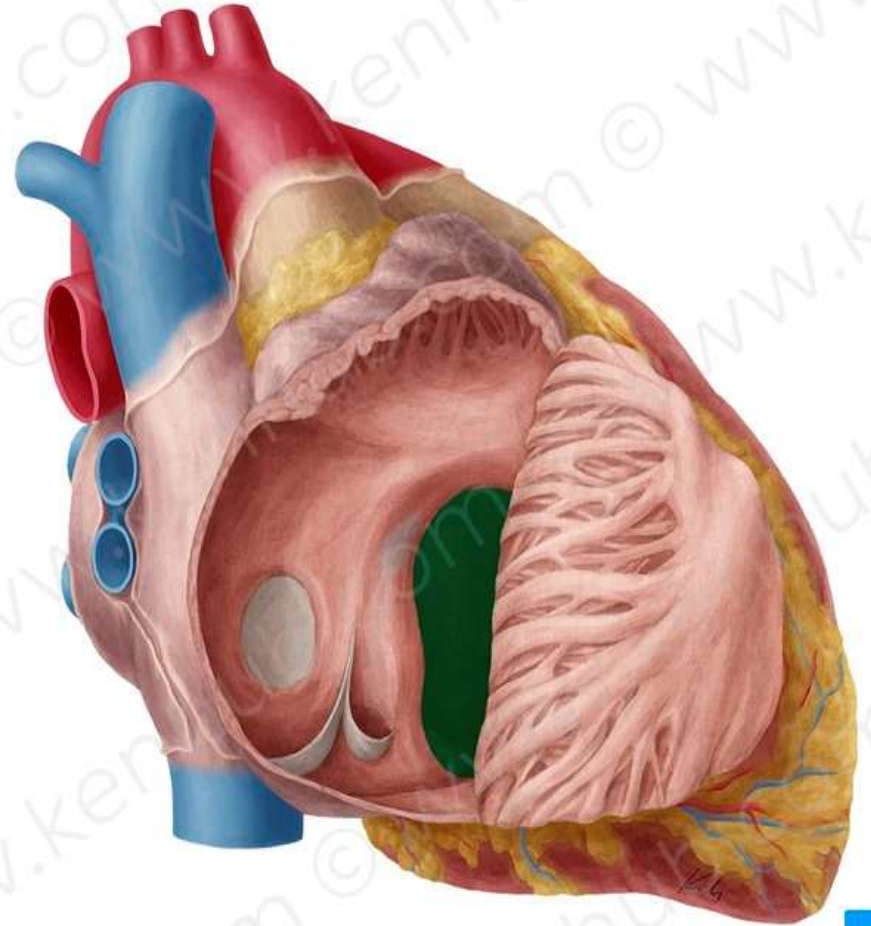
Openings of the right atrium:

1. SVC Opens at the level of right **3rd costal cartilage**
2. IVC Opens at the level of right **5th costal cartilage**
 - ✓ It has a valve called Eustachian valve or valve of the inferior vena cava, which is located anterior to the orifice
3. Coronary sinus
 - ✓ It opens between the orifice of the inferior vena cava, the fossa ovale and the vestibule of the atrioventricular opening .
 - ✓ It has a valve called Thebesian valve
4. Anterior cardiac veins.
5. Venae cordis minimi.
6. Right Atrioventricular orifice which is guarded by Tricuspid valve



Eustachian valve

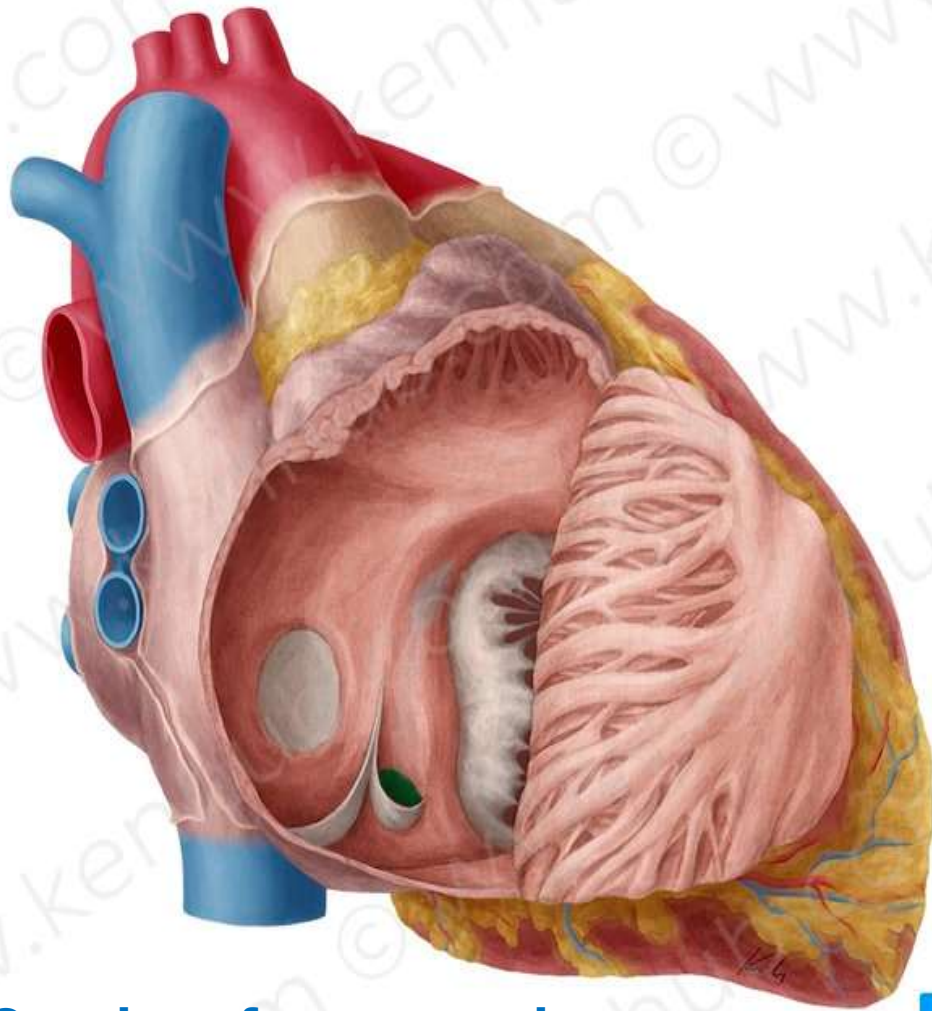
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Right atrioventricular orifice

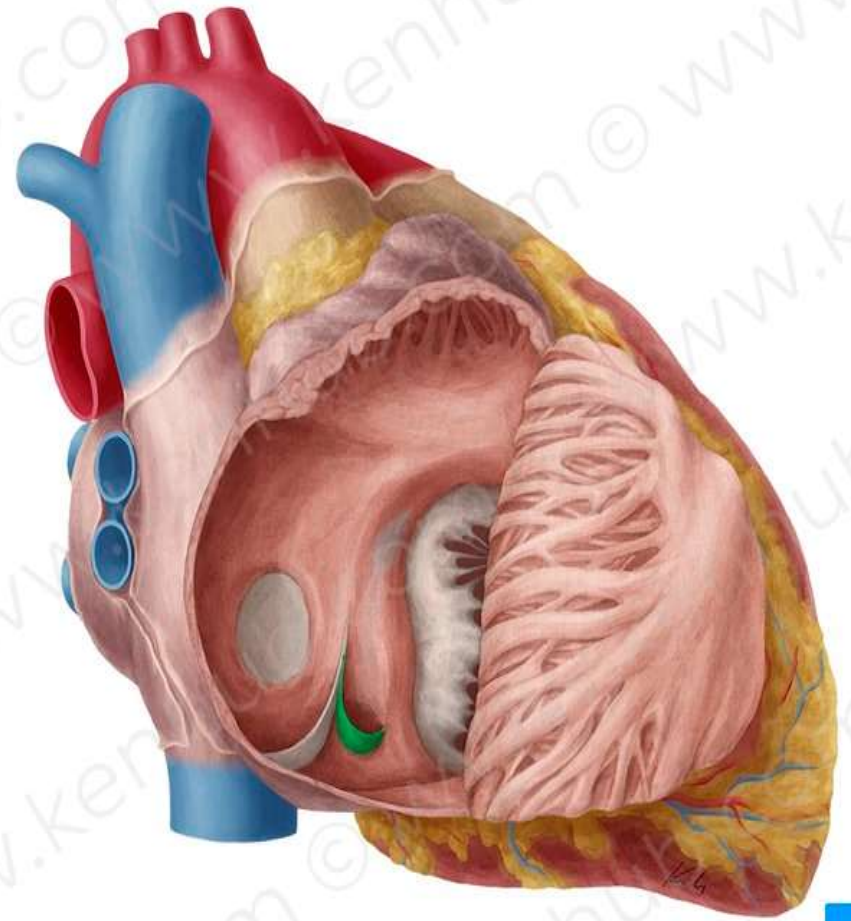
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Opening of coronary sinus

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Thebesian valve

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Right ventricle

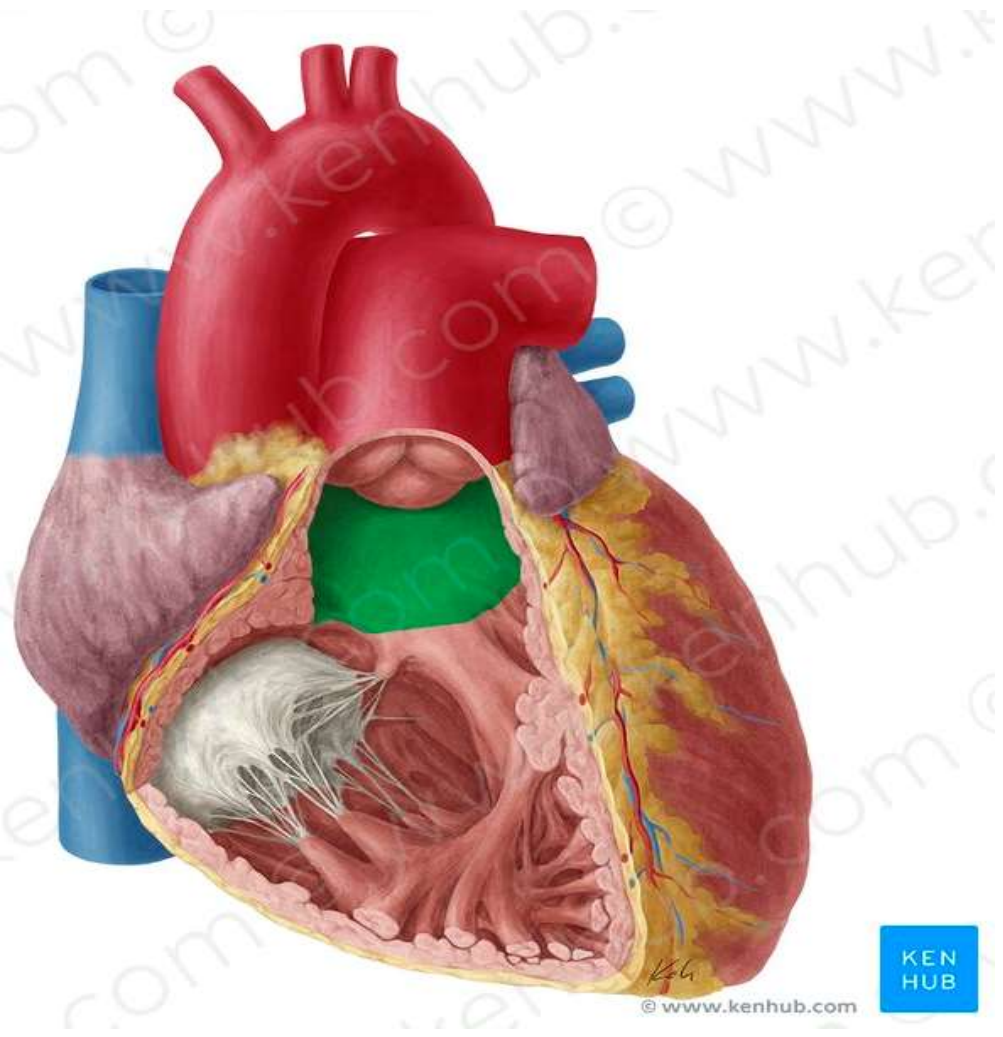
It has

1- Smooth outflow part which is called the **conus arteriosus** (infundibulum), which leads into the pulmonary trunk

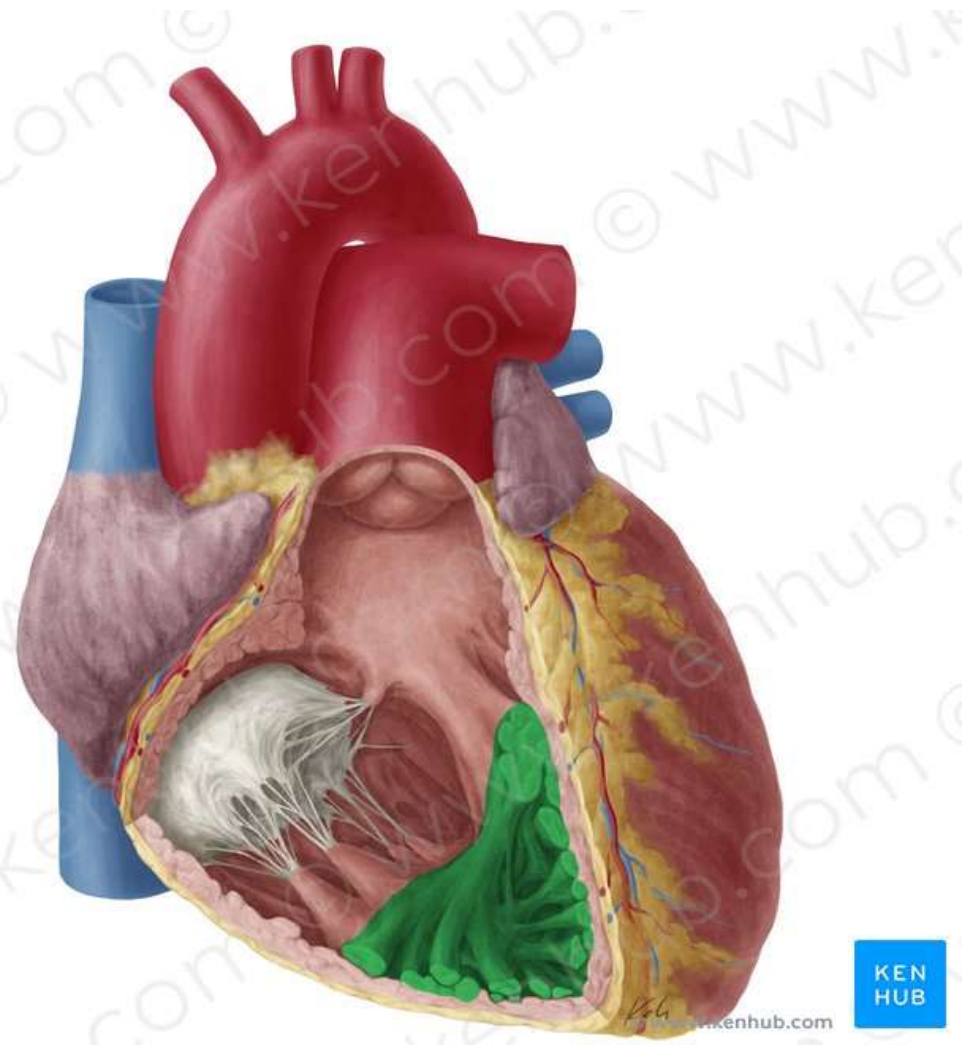
2- Rough inflow part which receives blood from the right atrium through the right atrioventricular orifice which is guarded by Tricuspid valve,

It has numerous muscular irregular structures called trabeculae carneae.

BOTH parts are separated by A thick muscular ridge called the **supraventricular crest**

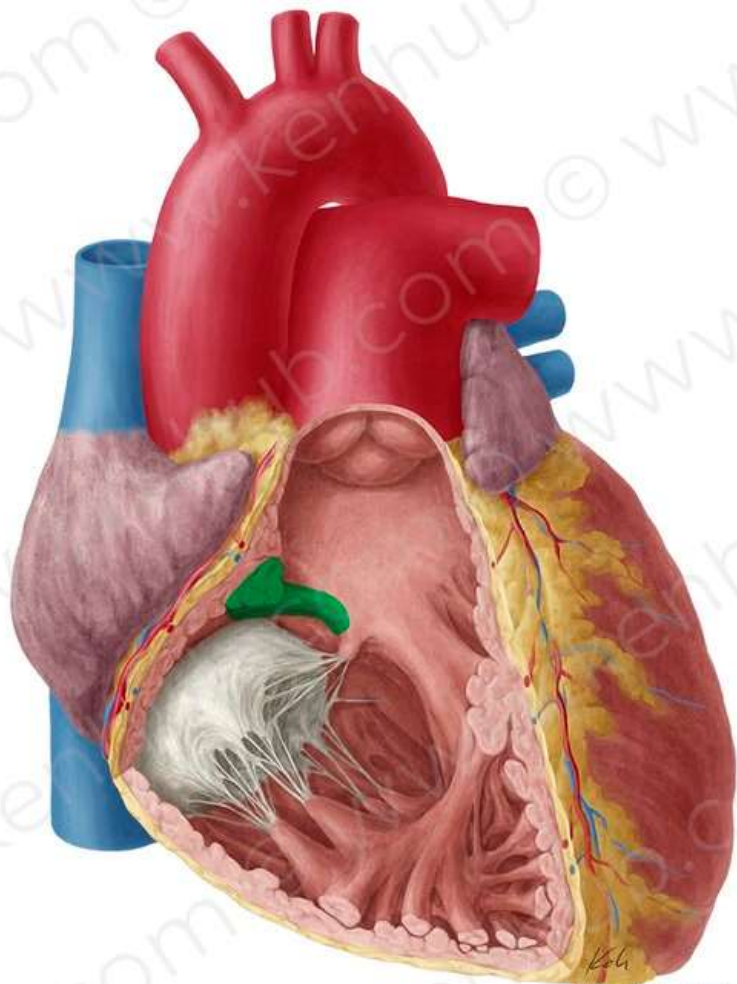


Conus arteriosus



Trabeculae carneae.





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supraventricular crest

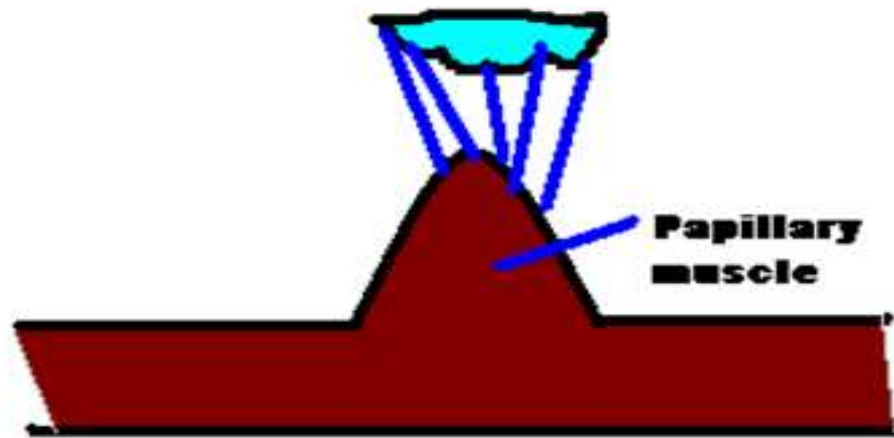
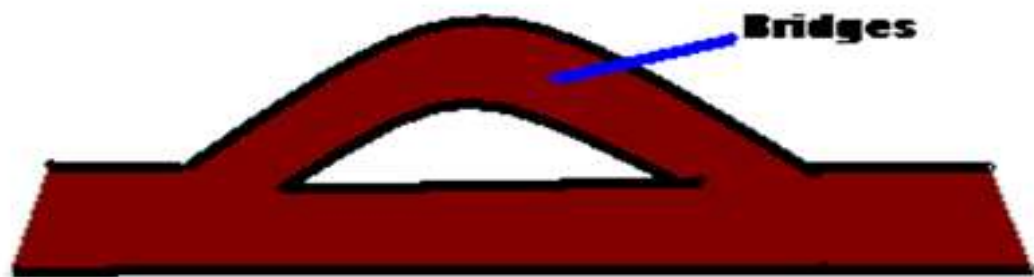
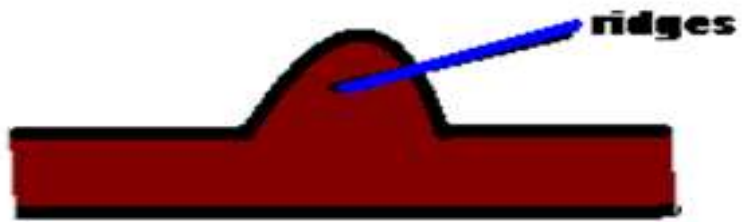
Trabeculae carneae has three patterns according to their attachments to the ventricular walls

1- Attached throughout their length forming **RIDGES**

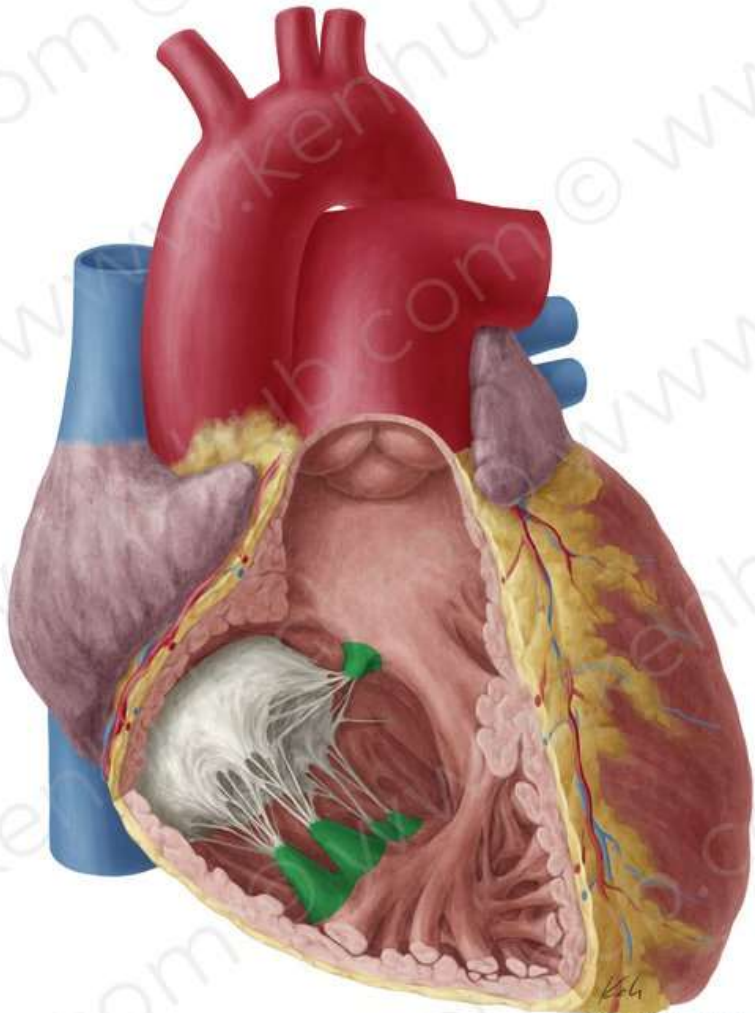
2- Attached by both ends forming **BRIDGES**

3- Attached by one end and the other end is free forming **PAPILLARY MUSCLES**

The papillary muscles are attached to tendinous cords called chordae tendineae which are attached to the free edges and ventricular surfaces of the tricuspid valve cusps.



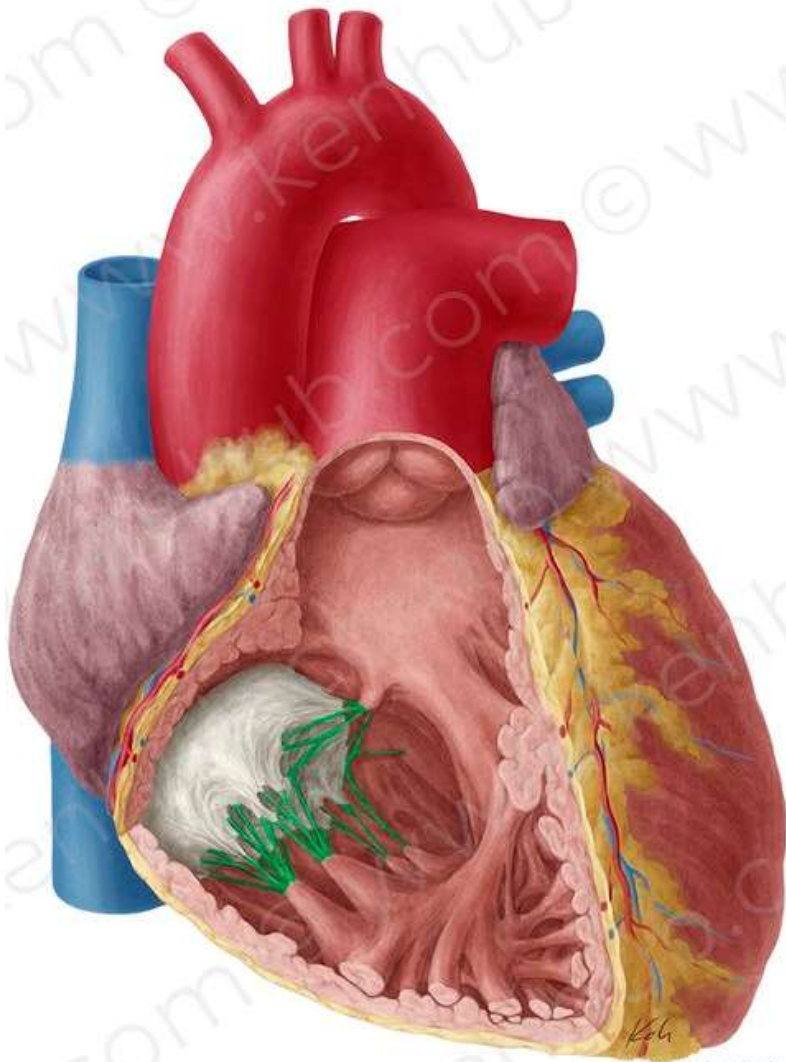
Trabeculae carneae



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Papillary muscles



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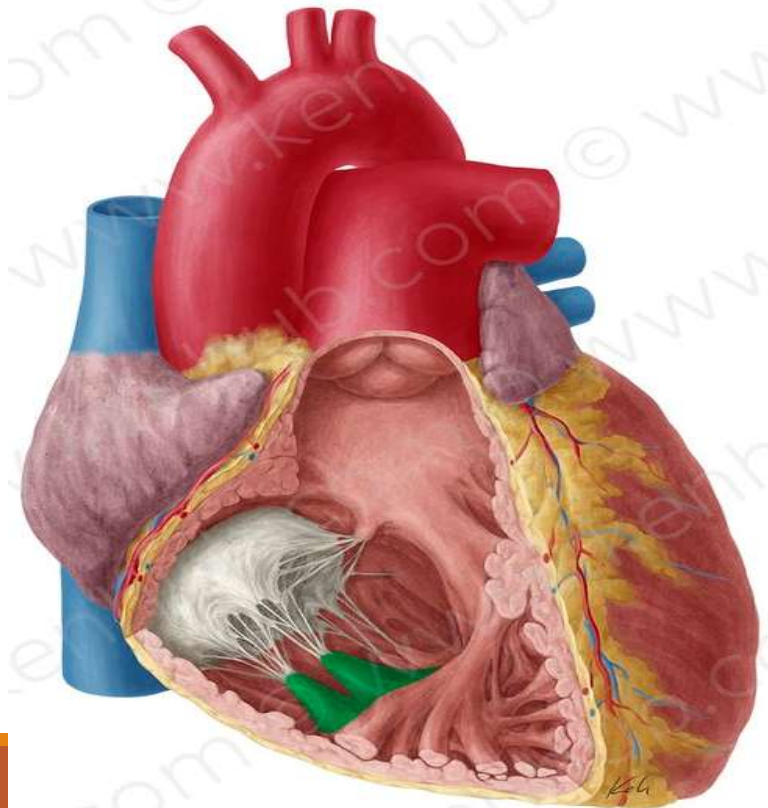
Tendinous cords

There are three papillary muscles in the right ventricle.

They named relative to their point of origin on the ventricular surface

A. The anterior papillary muscle

- The largest and most prominent one
- It arises from the anterior wall of the right ventricle
- Its tendinous cords attach to the anterior and posterior cusps of the tricuspid valve.

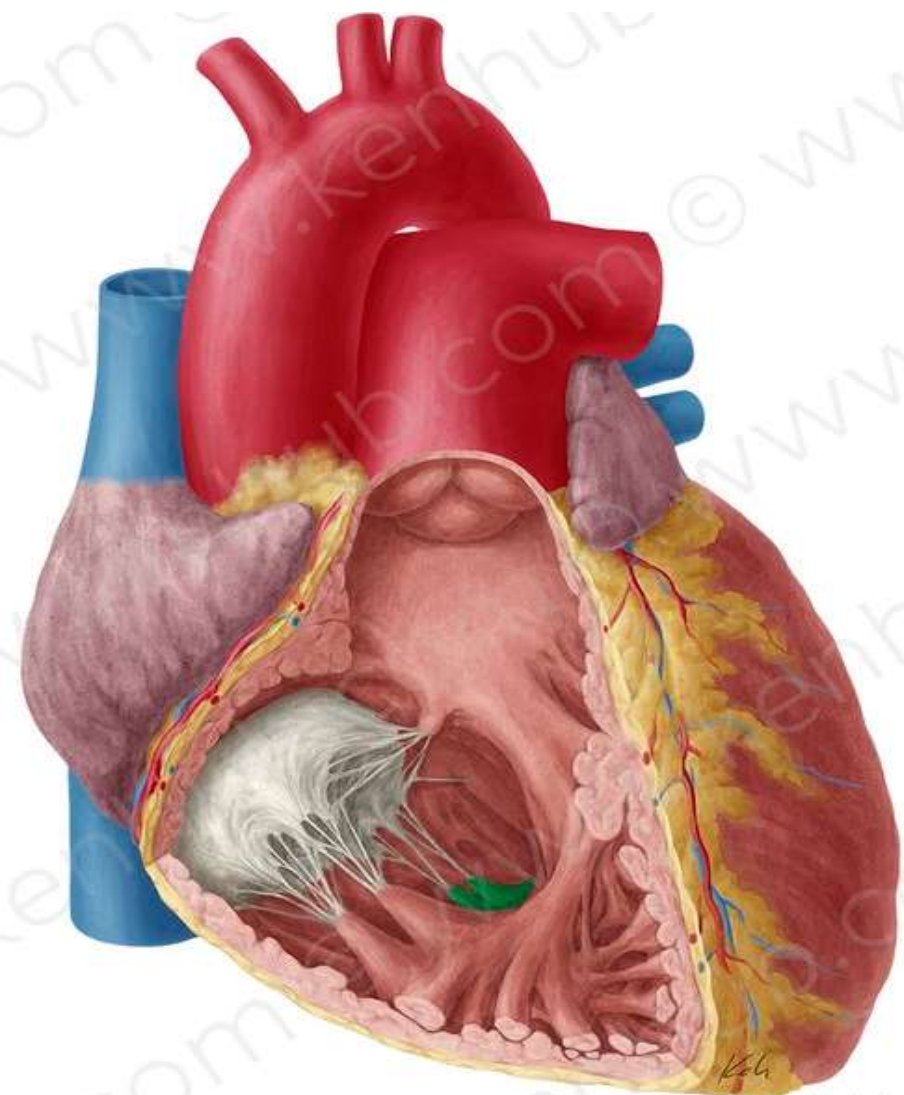


B. The posterior papillary muscle

- Smaller than the anterior muscle
- It arises from the inferior wall of the right ventricle
- Its tendinous cords attach to the posterior and septal cusps of the tricuspid valve.

C. The septal papillary muscle

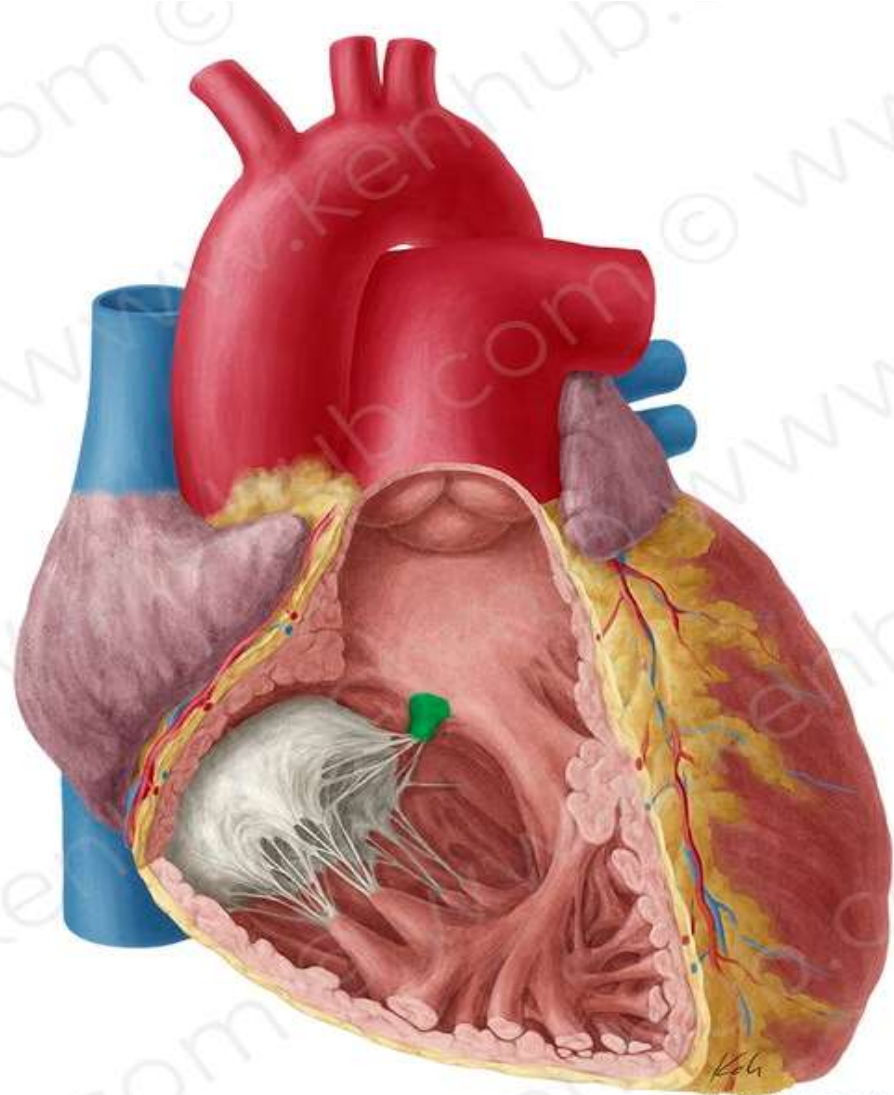
- Arises from the interventricular septum
- Its tendinous cords attach to the septal and anterior cusps of the tricuspid valve.



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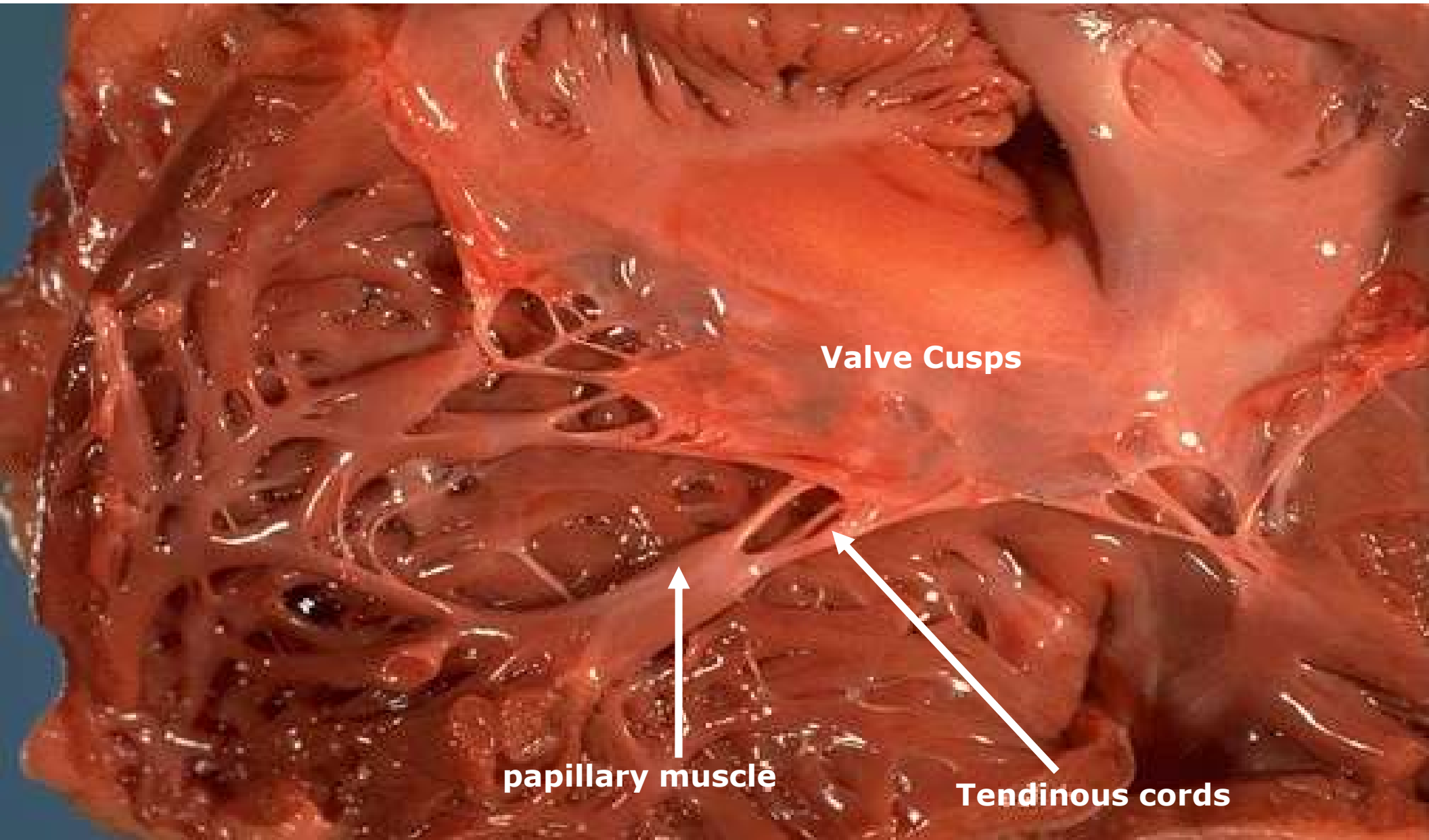
Posterior papillary muscle



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Septal papillary muscle



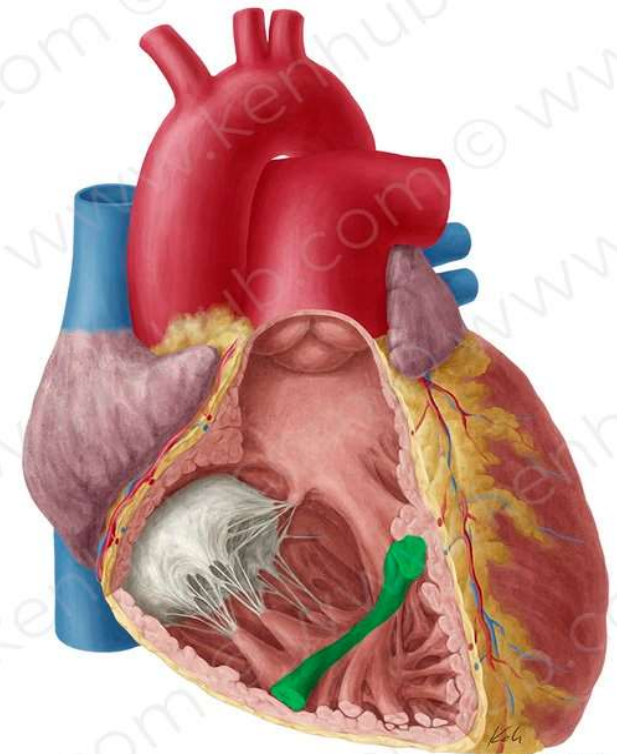
Valve Cusps

papillary muscle

Tendinous cords

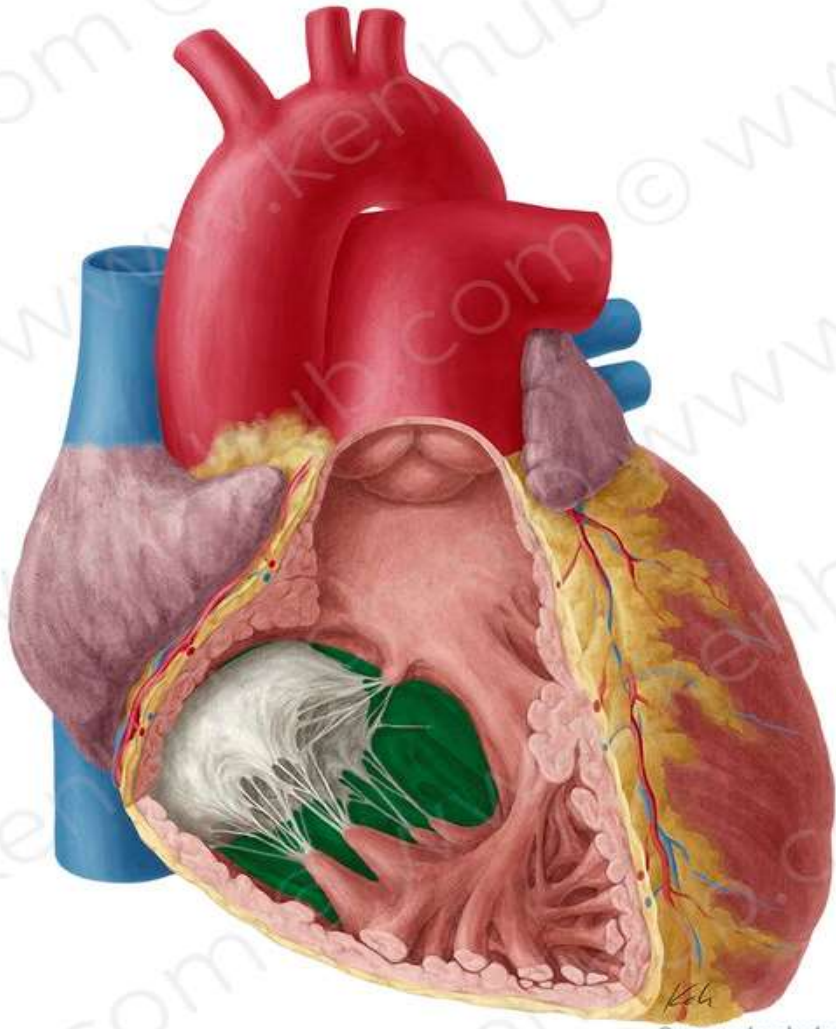
The septo marginal trabecula (moderator band)

- ❖ It is a curved muscular bundle that traverses the right ventricular from the inferior part of the interventricular septum (IVS) to the base of the anterior papillary muscle.
- ❖ It carries part of the right branch of the atrioventricular (AV) bundle (a part of the conducting system of the heart) to the anterior papillary muscle
- ❖ This shortcut across the chamber seems to facilitate conduction time, allowing coordinated contraction of the anterior papillary

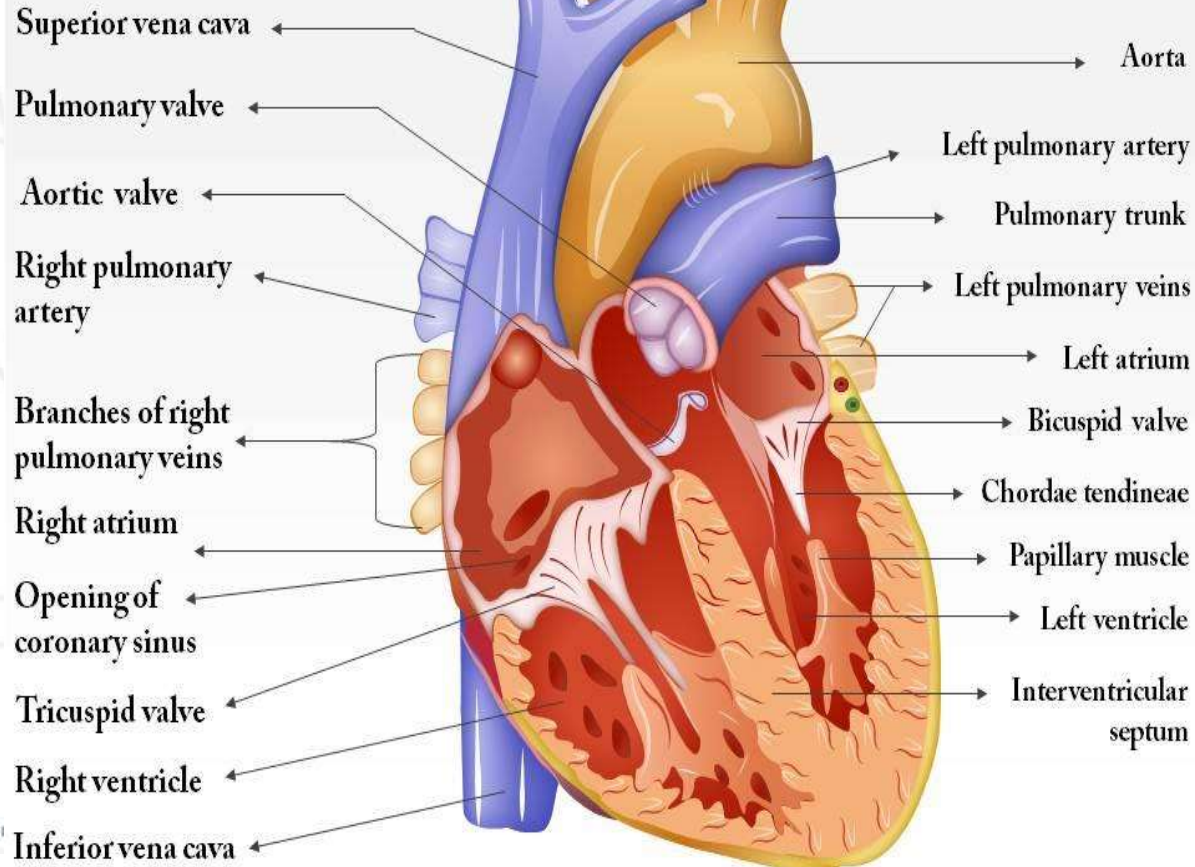


The interventricular septum (IVS)

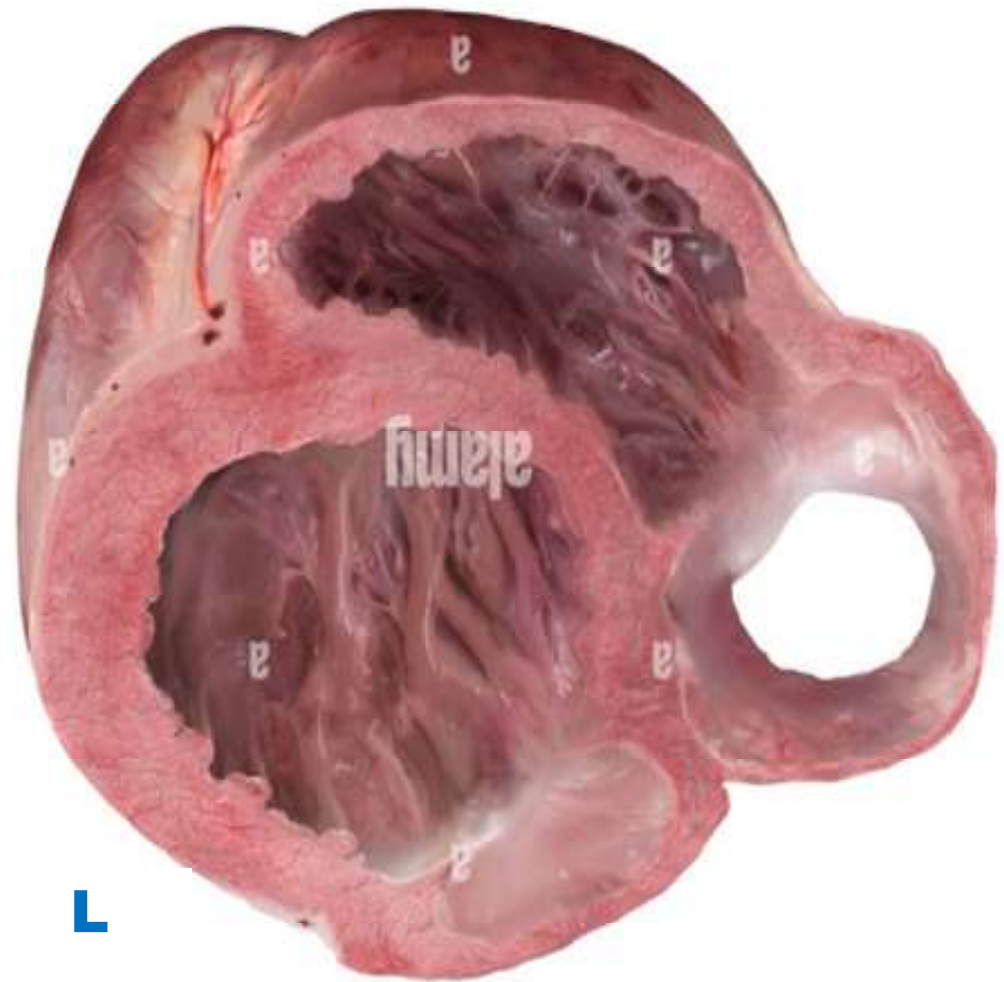
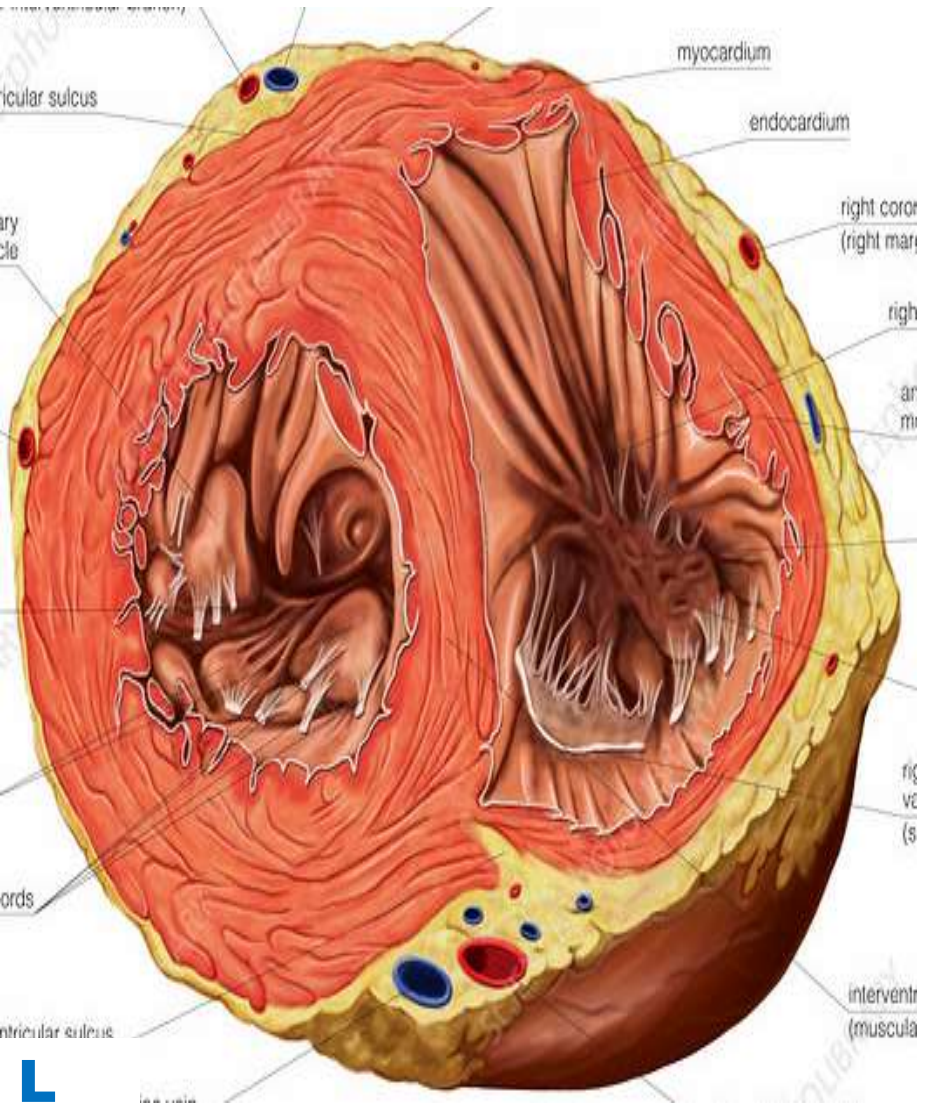
- It composed of muscular and membranous parts
- It is obliquely placed partition between the right and left ventricles forming part of the walls of each.
- Because of the much higher blood pressure in the left ventricle, the muscular part of the IVS, bulges into the cavity of the right ventricle.
- Superiorly and posteriorly, The membranous part of the IVS is formed from membranous part of fibrous skeleton of the heart
- On the right side, the septal cusp of the tricuspid valve is attached to the middle of this membranous part of the fibrous skeleton.
- This means that inferior to the cusp, the membrane is an interventricular septum, but superior to the cusp it is an atrioventricular septum, separating the right atrium from the left ventricle.



Heart Coronal Section



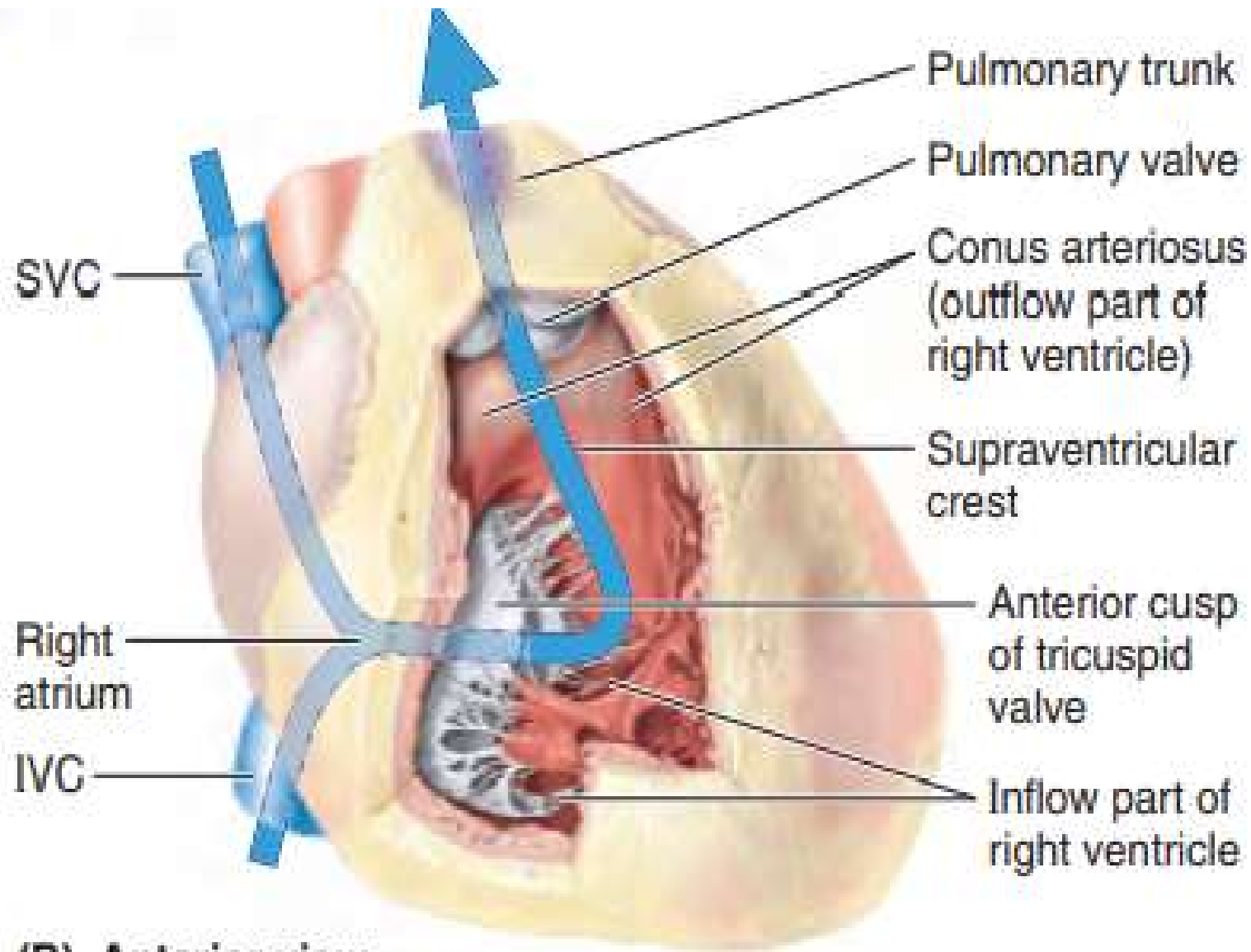
The interventricular septum



The interventricular septum

Blood flow through the right ventricle

- ❖ The right atrium contracts when the right ventricle is relaxed
- ❖ Thus blood is forced into the right ventricle, pushing the cusps of the tricuspid valve aside like curtains
- ❖ The inflow of blood into the right ventricle (inflow tract) enters posteriorly
- ❖ When the ventricle contracts, the outflow of blood into the pulmonary trunk (outflow tract) superiorly and to the left
- ❖ Consequently, the blood takes a U -shaped path through the right ventricle, changing direction about 140 °.
- ❖ This change in direction is accommodated by **the supraventricular crest**, which deflects the incoming flow into the main cavity of the ventricle, and the outgoing flow into the conus arteriosus toward the pulmonary orifice.



(B) Anterior view

Left atrium

The left atrium forms most of the base of the heart

Behind it lies the fibrous pericardium separates it from the esophagus

It is smaller in size but has thicker wall than right atrium

The left atrium extends behind the right atrium, thus the right atrium is anterolateral to the right part of the left atrium.

It has

1- Rough part

The left auricle, its wall lined with pectinate muscles

It represents the remains of the left part of the primordial atrium

2- Smooth part

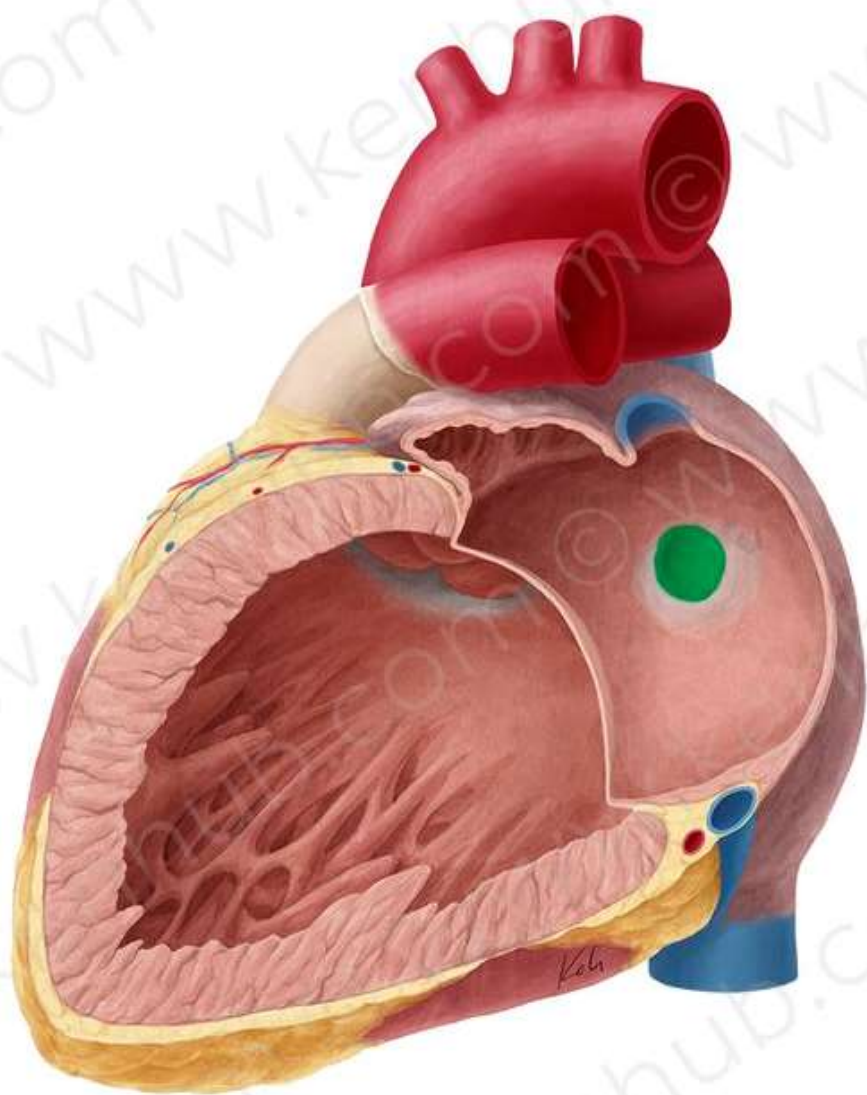
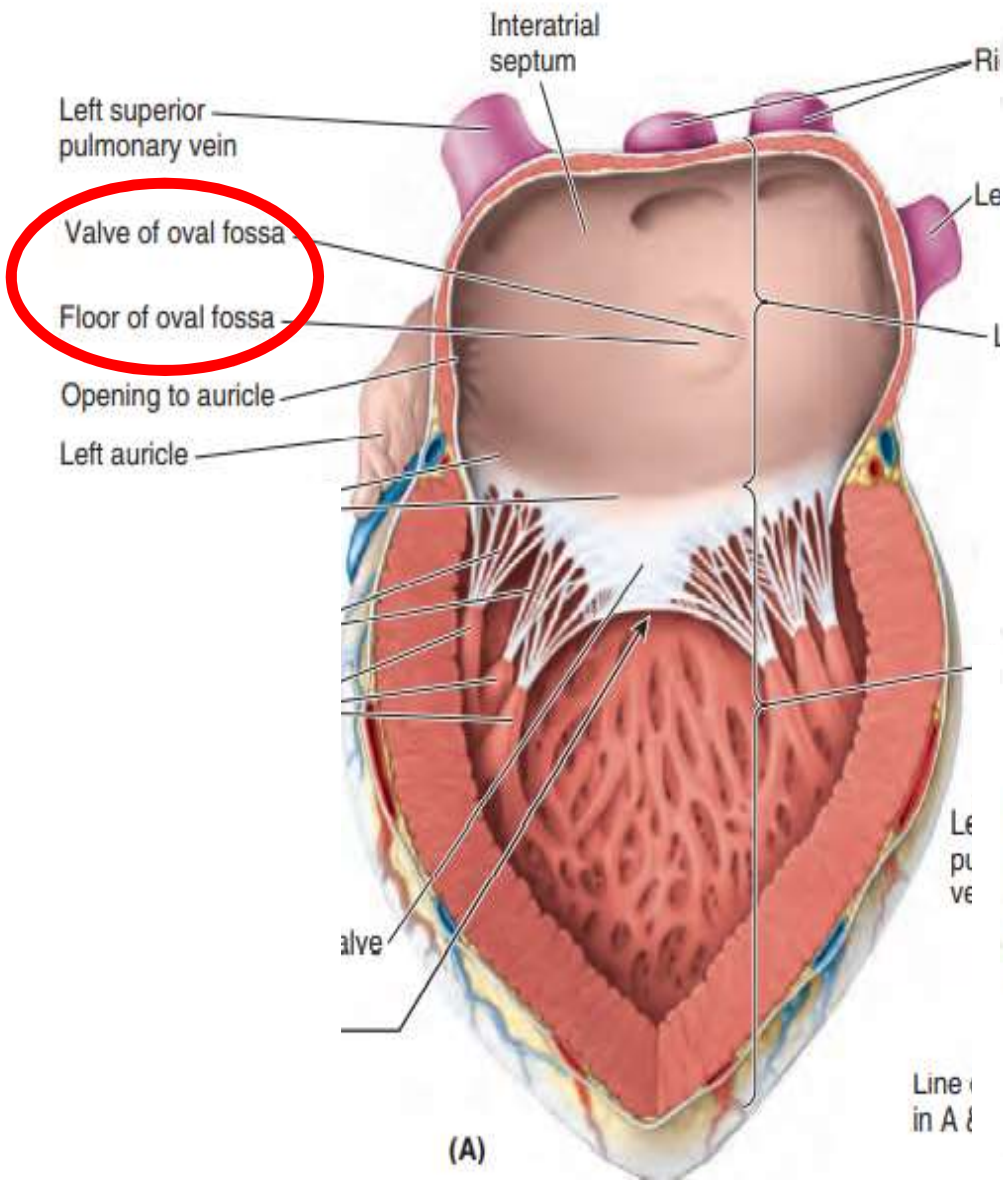
It represent the absorption of the future 4 pulmonary veins.

- ❑ The interatrial septum shows a semilunar edge indicates the oval fossa
- ❑ The surrounding ridge is the valve of the oval fossa

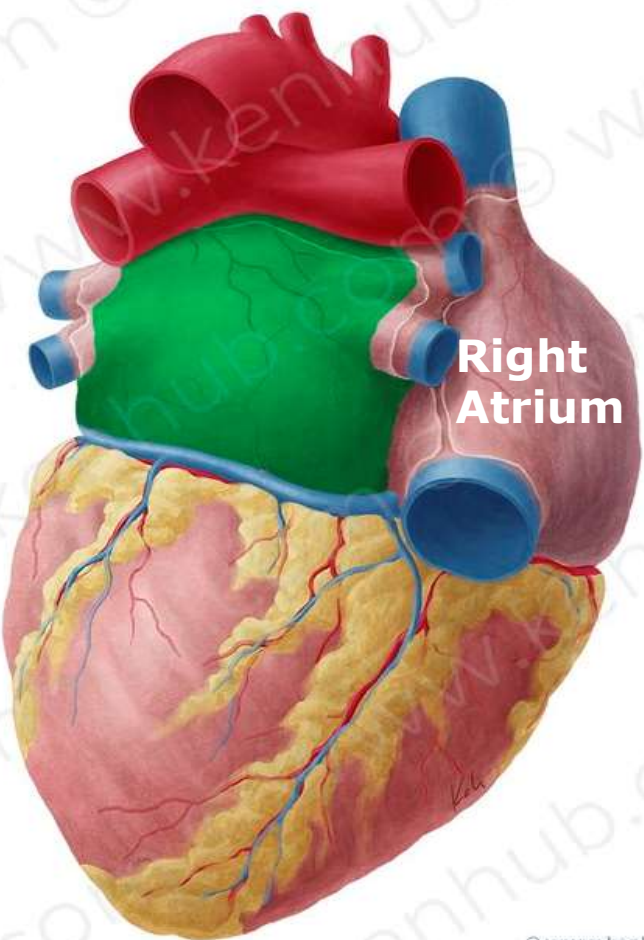
Openings of the left atrium

1-The four pulmonary veins

2-The left atrioventricular orifice which is guarded by mitral valve

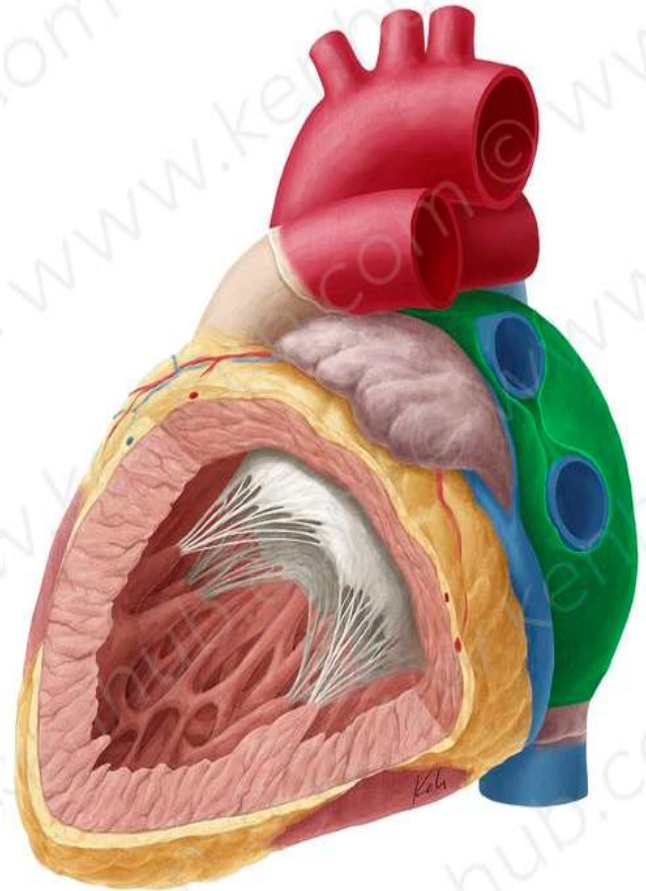


Line
in A

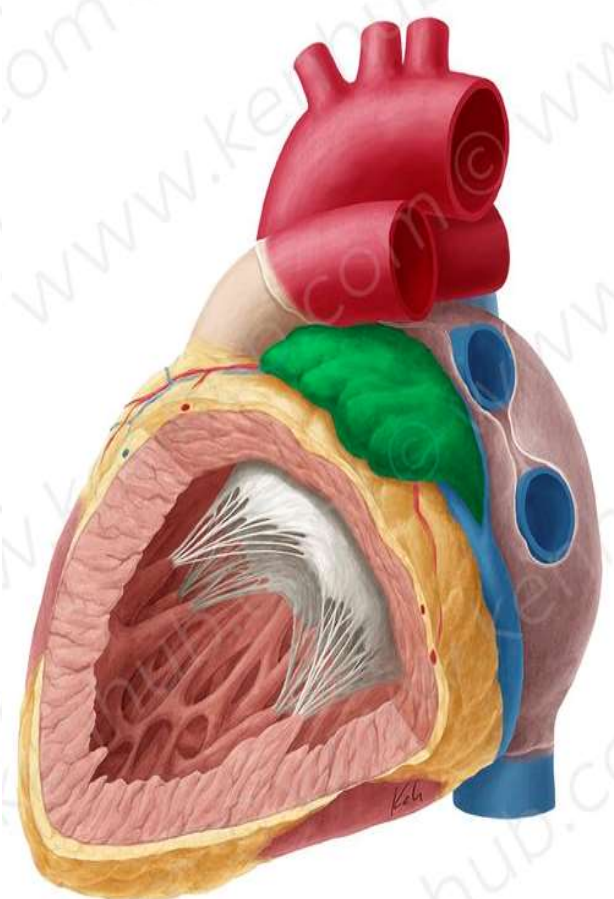


Right Atrium

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Left Atrium

Left Atrium

Left Auricle

Left ventricle

- The thickness of its wall is three times than that of the right ventricle
- The left ventricle is a conical cavity ,so it is longer than that of the right ventricle

It has :-

1-Inflow rough part:

- It contains trabeculae carneae which are more numerous than right ventricle
- It contains two papillary muscles:
 - 1- **Anterior papillary muscles** : arise from sternocostal surface
 - 2- **Posterior papillary muscles** : arises from diaphragmatic surface
- The papillary muscles are attached to chordae tendineae which are attach to the free edges and ventricular surfaces of the mitral valve cusps.

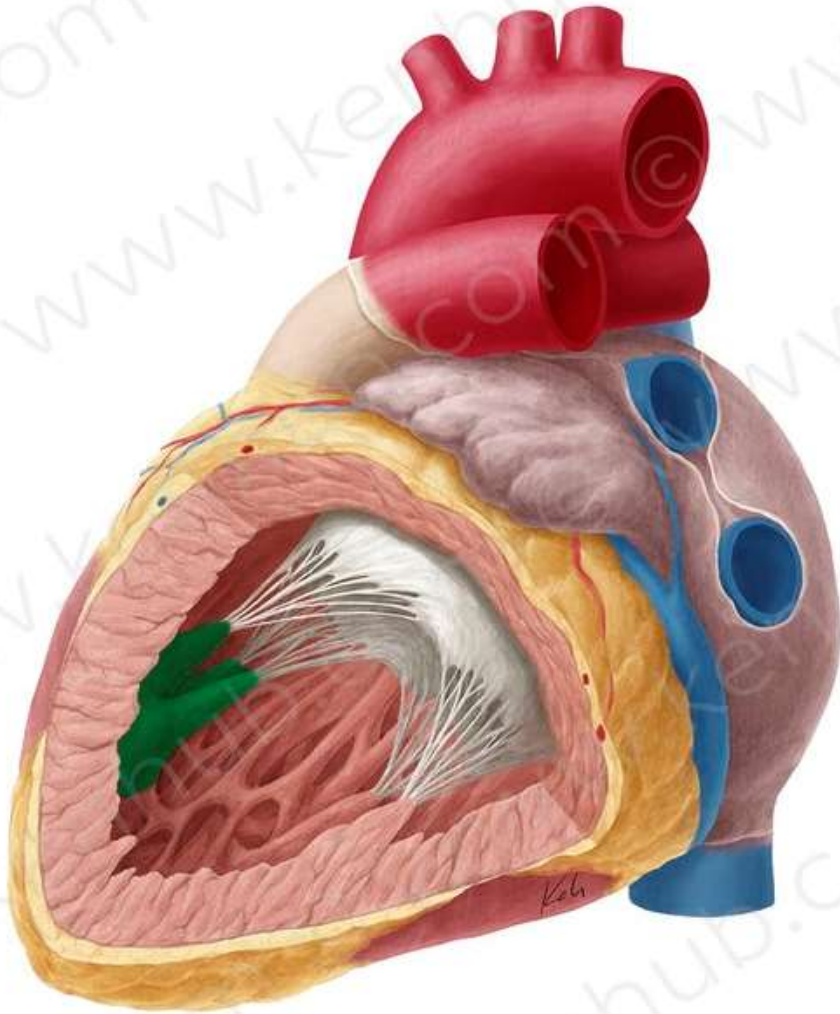
2- Smooth outflow part:

- ❖ It called the aortic vestibule
 - ❖ It is a smooth-walled, non muscular
 - ❖ It is located supero-anterior
 - ❖ It leads to the aortic orifice and aortic valve
- Both parts are separated by **subortic curtain** and anterior leaflet of the mitral valve

Openings of left ventricle

1. Right atrioventricular orifice which is guarded by the mitral valve (ostium venosum)
2. An outlet region, guarded by the aortic valve (ostium arteriosum)

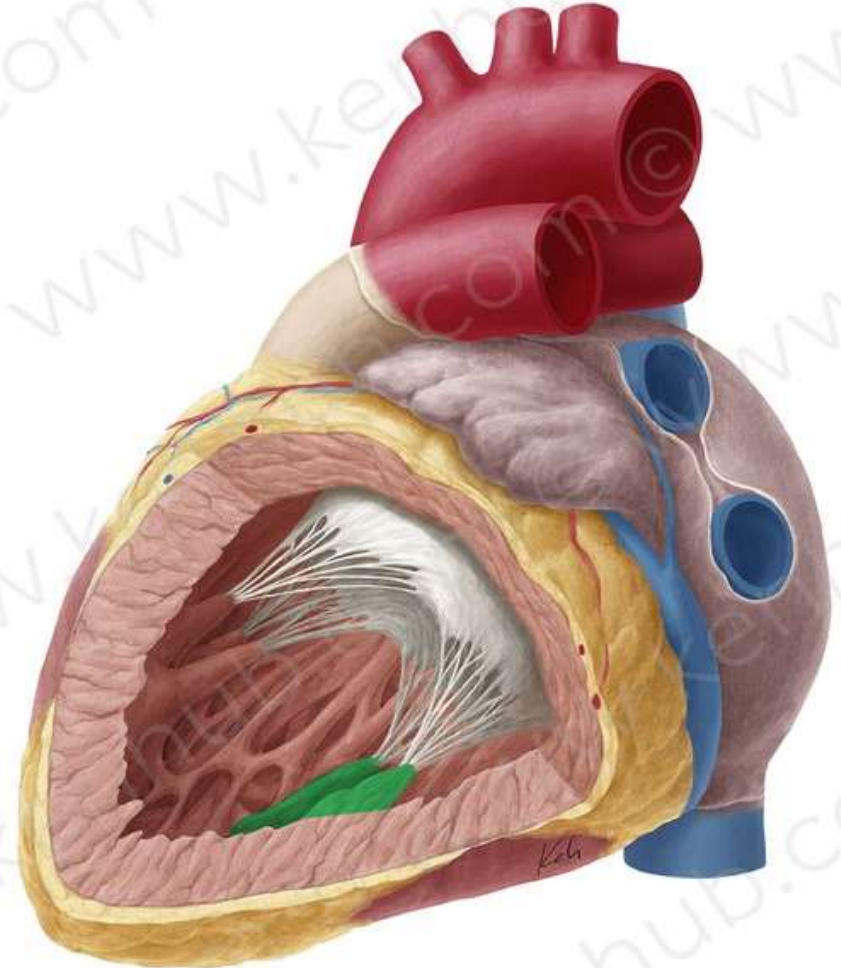
- ❑ The left atrioventricular orifice admits atrial blood during diastole, flow being towards the cardiac apex.
- ❑ After closure of the mitral cusps, and throughout the ejection phase of systole, blood is expelled from the apex through the aortic orifice
- ❑ The bloodstream undergoes two right angle turns, which together result in a 180° change in direction.
- ❑ This reversal of flow takes place around the anterior cusp of the mitral valve



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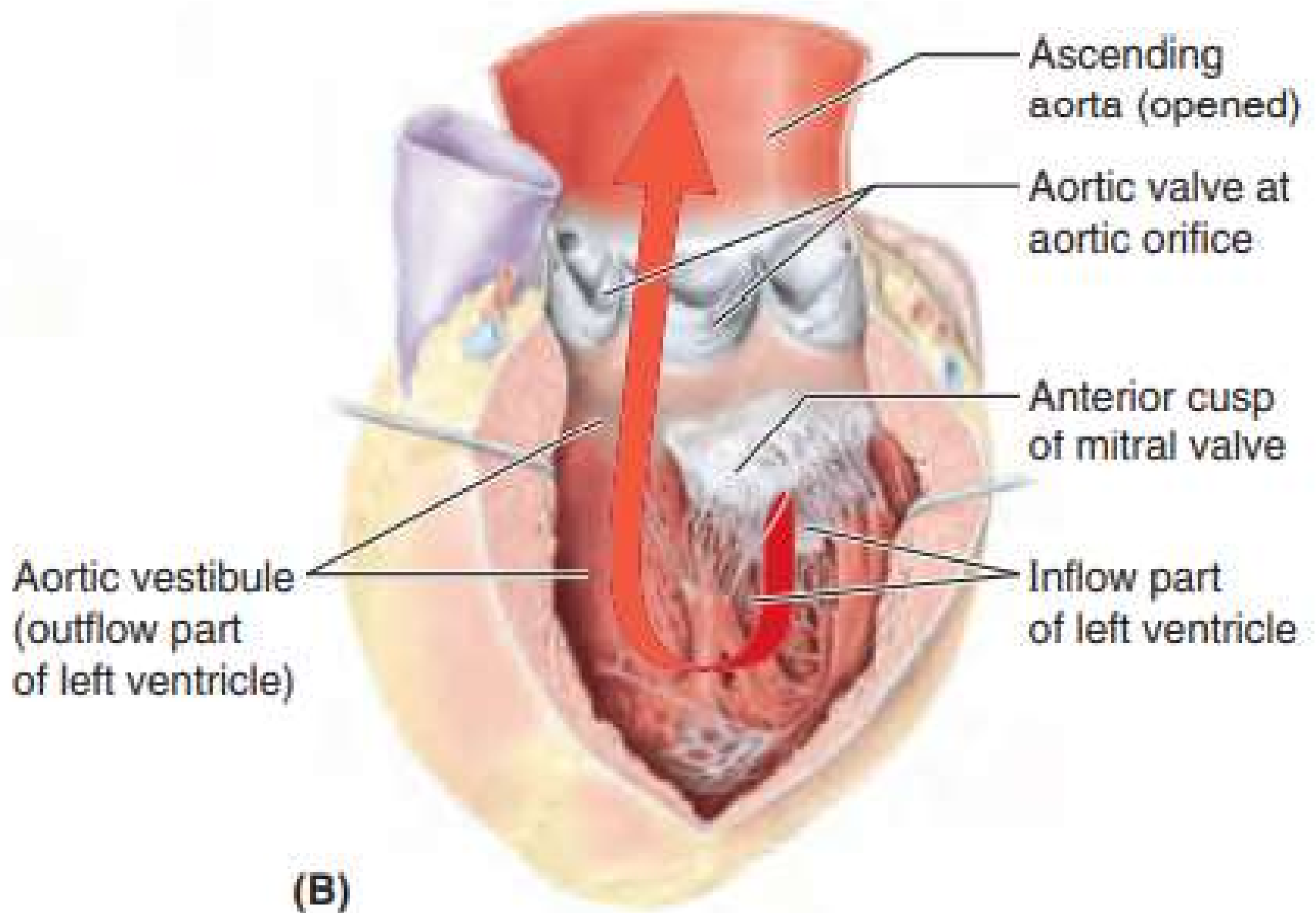
Anterior papillary muscles

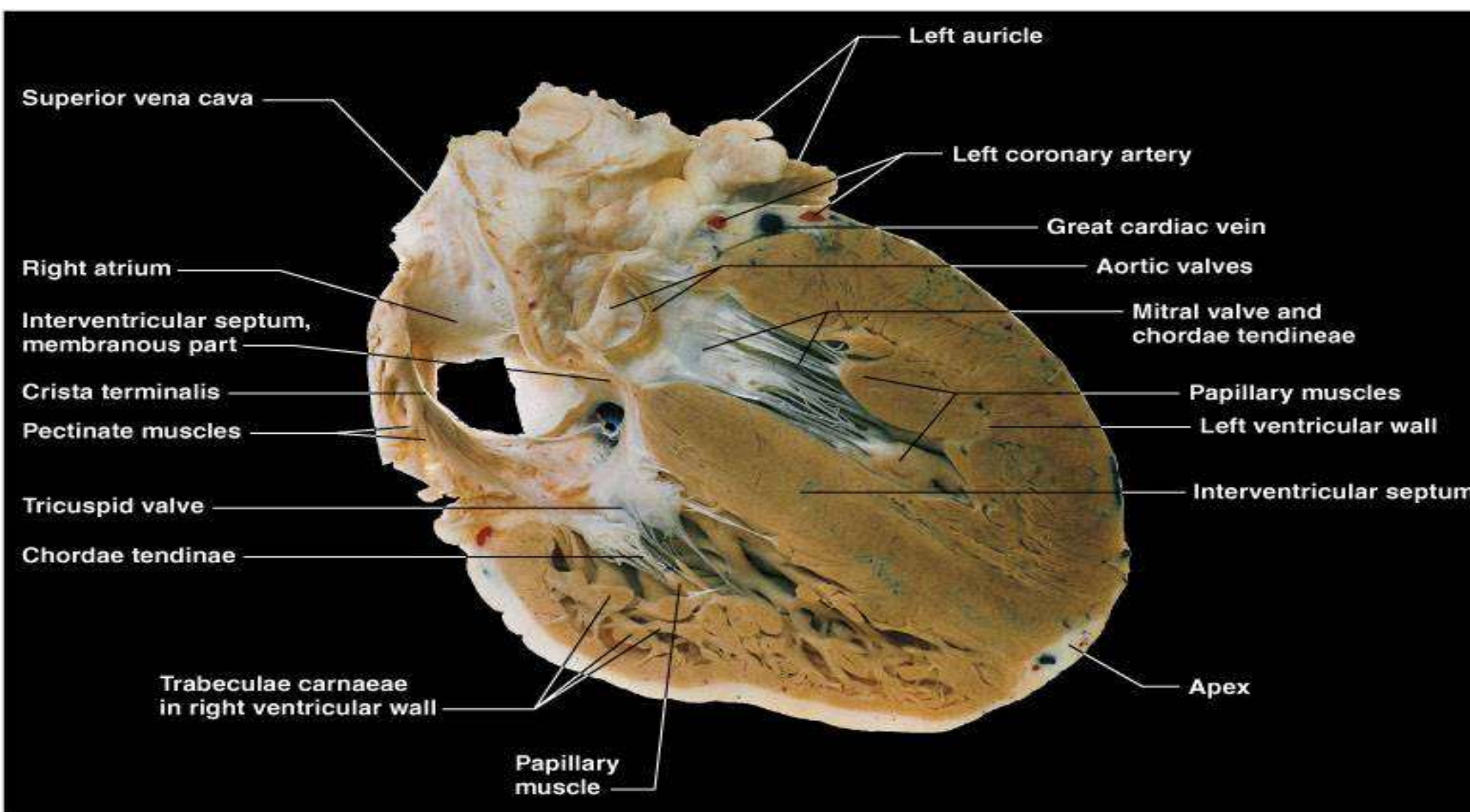


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Posterior papillary muscles





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