Overview of cardiovascular system

DR. Arwa Rawashdeh

objectives

Overview of structure and function of the heart

Overview of Intrinsic cardiac conduction system

Overview of Conduction or electrophysiology pathway

The heart

Positioned between two bony structures – sternum and vertebrae

The heart is in the middle of the thorax, with the apex facing toward the left and inferiorly, at the level of the 5th intercostal space. The base of the heart is the posterior part of the heart.

Function of the heart

Primary (main) function:

1.Acts as a muscular pump:

in order to maintain adequate level of blood flow throughout CVS by pumping blood under pressure into vascular system.

2.Responsible for the mass movement of fluid in body.

Secondary functions:

1. Transportation:

Delivers O_2 to tissues, & brings back CO_2 to lungs

Carries absorbed digestion products to liver & tissues

Carries metabolic wastes to kidneys to be excreted

Distribution of body fluids

2. Regulation:

Hormonal: carries hormones to target tissues to produce their effects.

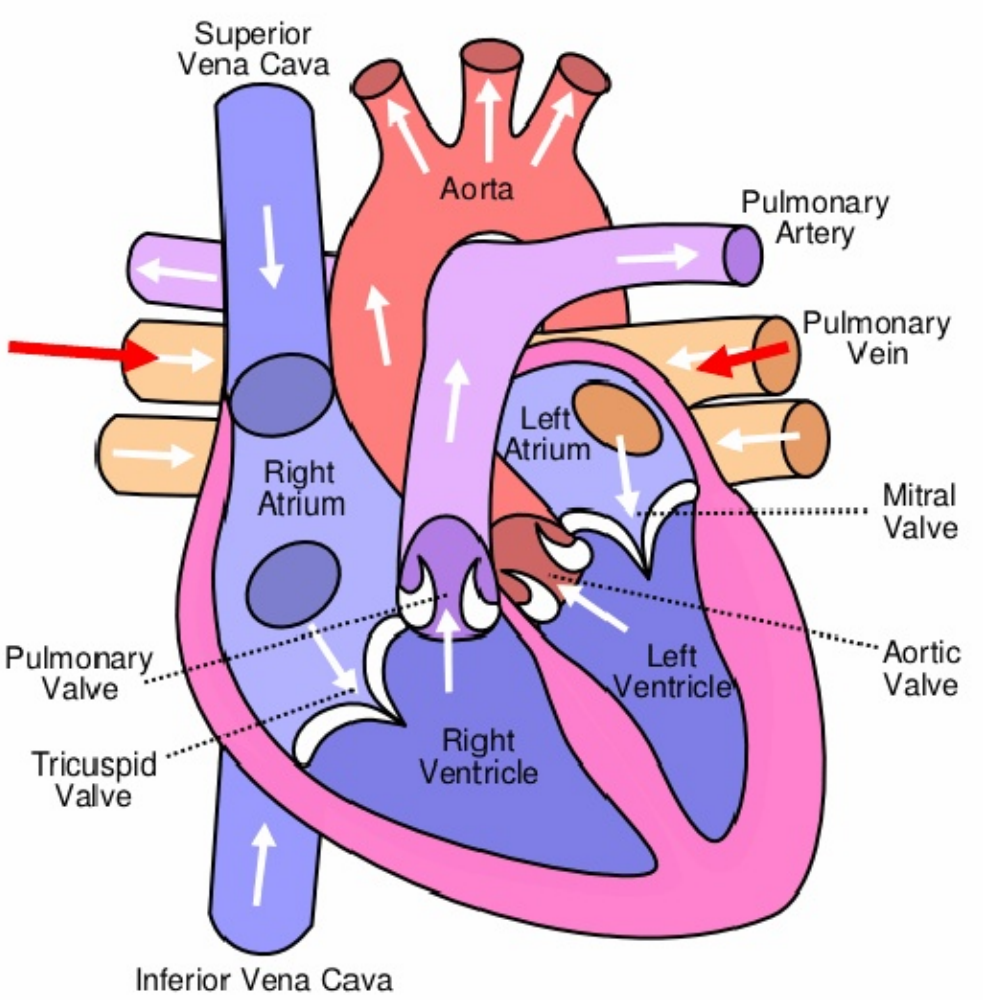
Immune: carries antibodies, leukocytes (WBCs), cytokines, & complement to aid body defense mechanism against pathogens.

Protection: carries platelets, & clotting factors to aid protection of the body in blood clotting mechanism.

Temperature: helps in regulation of body temperature, by diverting blood to warm the body.

Oxygenated blood from the right lung returns to the heart through the right pulmonary vein.
Oxygenated blood from the left lung returns to the heart through the left pulmonary vein.

THE PULMONARY VEINS ARE THE ONLY VEINS THAT CARRY OXYGENATED BLOOD.



Valves

Two semilunar valves :

- One way valves.
- At origin of pulmonary artery & aorta.
- Pulmonary (Rt) & Aortic (Lt).
- Open during ventricular contraction.

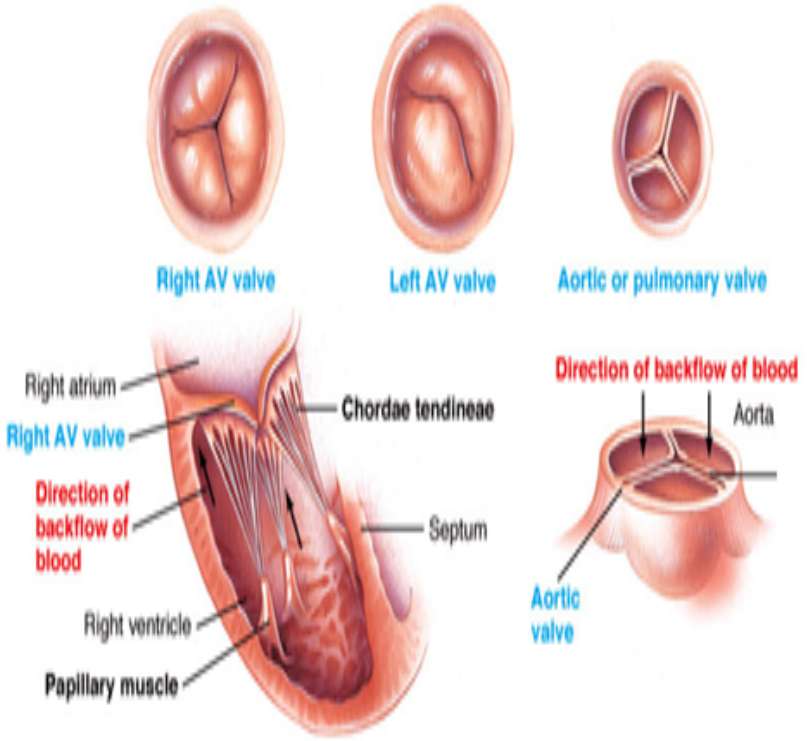
Two atrioventricular (AV) valves:

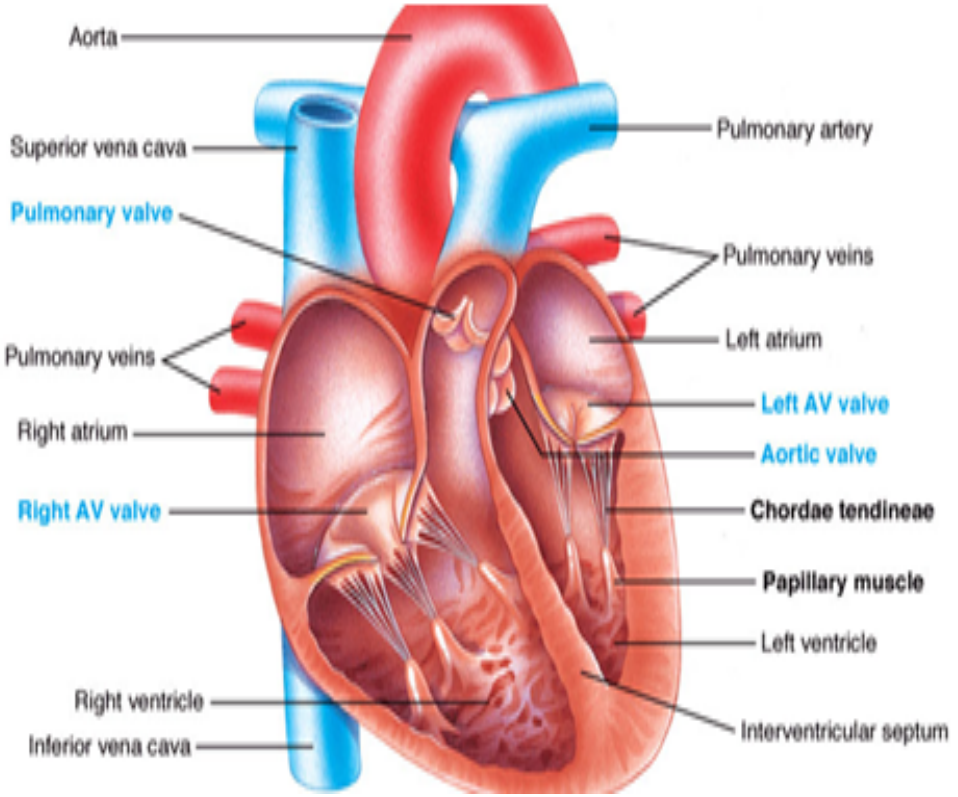
- One way valves.
- allow blood to flow from atria into ventricles.
- Tricuspid (Rt) & Mitral (Lt).

No valves between atria and veins

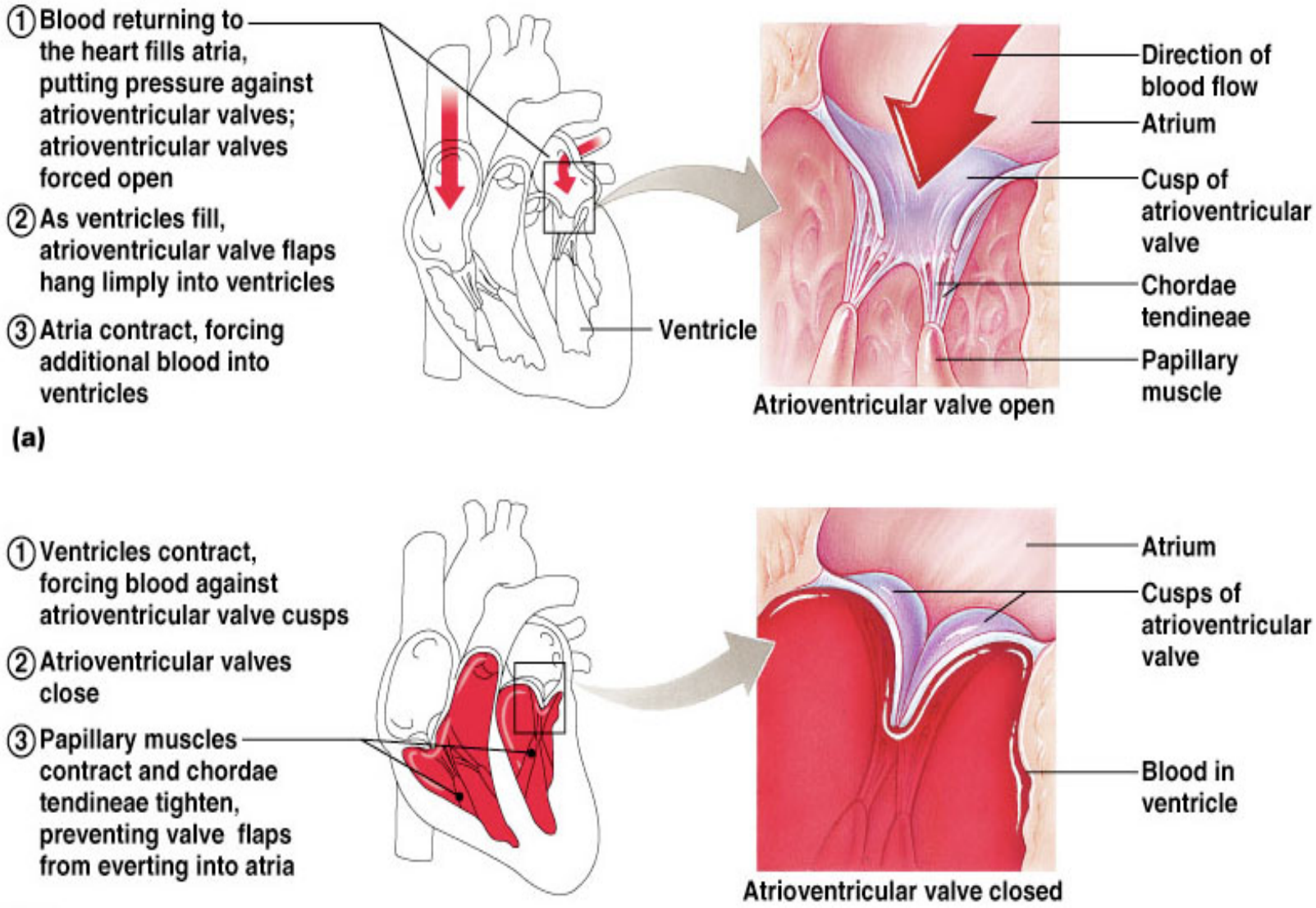
- Atrial pressures usually are not much higher than venous pressures sites

- where venae cava enter atria are partially compressed during atrial contraction

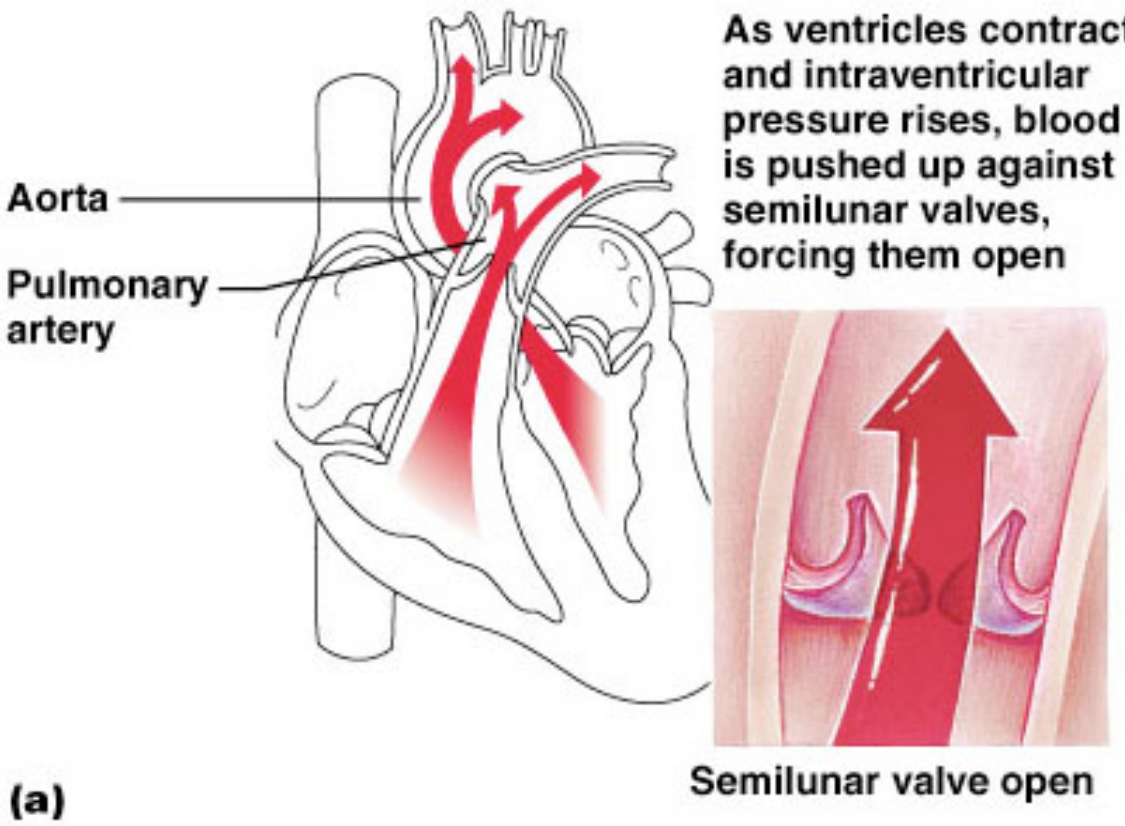

Right AV valve
Left AV valve
Aortic or pulmonary valve
Right atrium
Right AV valve
Direction of backflow of blood
Right ventricle
Papillary muscle
Chordae tendineae
Septum
Direction of backflow of blood
Aorta
Aortic valve

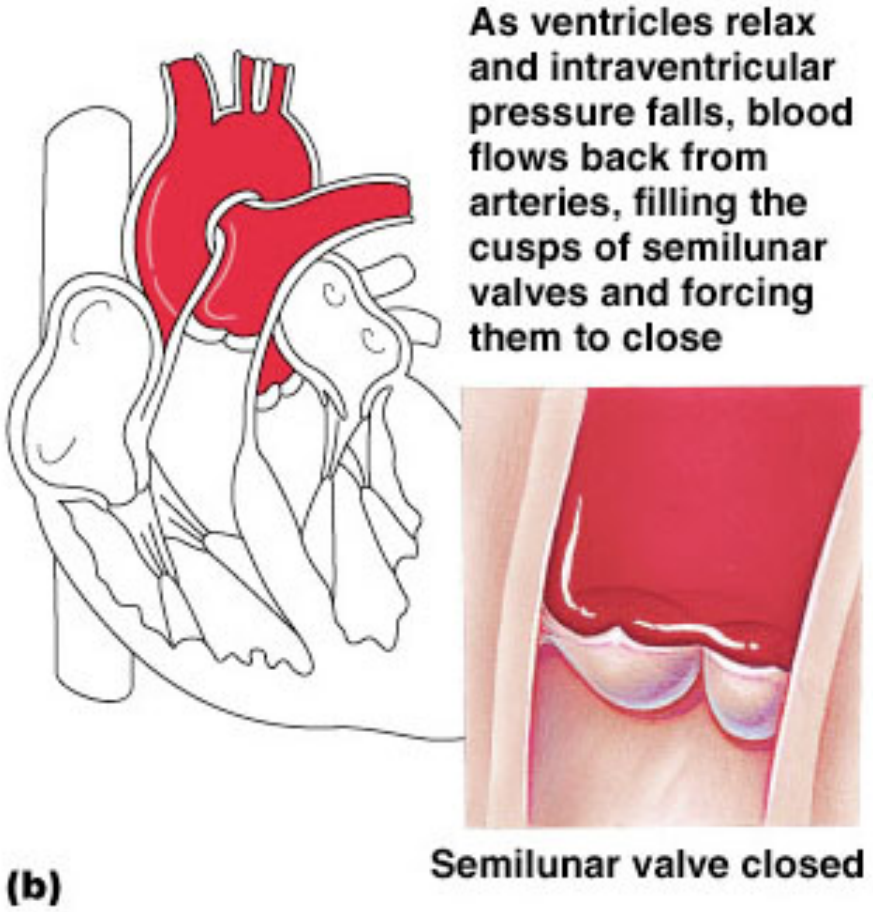

Aorta
Superior vena cava
Pulmonary valve
Pulmonary veins
Right atrium
Right AV valve
Right ventricle
Inferior vena cava
Pulmonary artery
Pulmonary veins
Left atrium
Left AV valve
Aortic valve
Chordae tendineae
Papillary muscle
Left ventricle
Interventricular septum

Atrioventricular valve function



Semilunar valve function





Intrinsic cardiac conduction system

- Electrophysiology of the heart is so special it had the ability to intrinsically depolarize itself it doesn’t really depend upon the nervous system

- The heart exhibits was called automaticity (the heart has its intrinsic ability on its own to spontaneously depolarize itself and then trigger action potentials to send it out to all other parts of the heart)

Types of heart cells

Two different types of myocardium ; nodal cells

- Nodal cells are non contractile cells these are the ones that generates automaticity set a rhythm or the base (SA, AV, AV Bundle(His), Bundle branches (left and right), Purkinje fibers)
- Contractile cells(actin and myosin, troponin and tropomyosin, sarcoplasmic reticulum) those ones that force and pushing the blood out of the heart