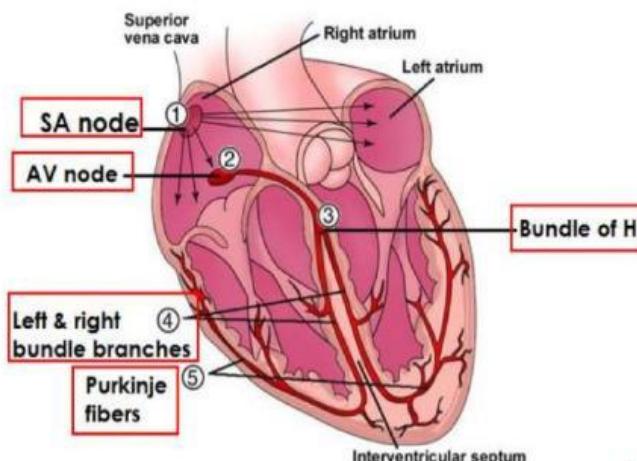


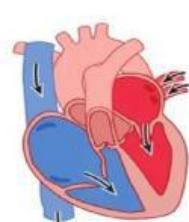
LO:

- a) Explain the mechanism of heartbeat.
- b) Explain the sequence of cardiac cycle (including changes in pressure and volume).
- c) Explain ECG waves and complexes in relation with cardiac cycle.

Chapter 8.1 - Mammalian heart and its regulation

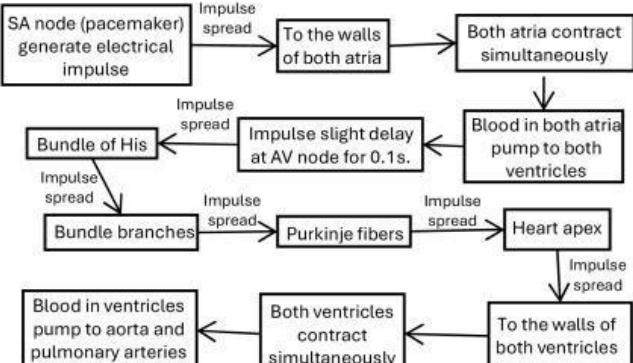


Atrial and ventricular diastole

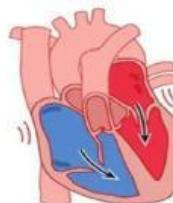


- Both atria and ventricles relax.
- Ventricular pressure is lower than blood pressure in aorta and pulmonary artery. This causes the semilunar valve to close to prevent the backflow of blood from aorta and pulmonary artery to the ventricles.
- The vibrations from the closing of semilunar valves produces the second heart sound 'dup'.
- Due to the low pressure in atria, the blood flow from atria to ventricles passively.
- Deoxygenated blood from right atria enter the right ventricle.
- Oxygenated blood from left atria enter the left ventricle.
- Blood volume in ventricles increases.

Initiation of heartbeat

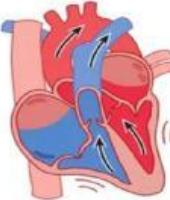


Atrial systole and ventricular diastole



- Impulse from SA node spread to the wall of both atria. Both atria contract simultaneously while both ventricles relax.
- Pressure in atria is higher than the pressure in ventricles.
- All remaining blood in atria is pumped to ventricles through AV valves.
- Blood volume in ventricles increases.

Cardiac cycle



Ventricular systole and atrial diastole

- Impulse from AV node spread to Bundle of His, bundle branches, Purkinje fiber to the heart apex and to the wall of both ventricles.
- Both ventricles contract simultaneously, causing ventricle pressure higher than atrial pressure.
- AV valves closed to prevent backflow of blood. The recoil of blood on closed AV valves produces the first heart sound 'lub'.
- High pressure in ventricles causes semilunar valves to open.
- Deoxygenated blood from right ventricle is pumped to pulmonary arteries.
- Oxygenated blood from left ventricle is pumped to the aorta.
- Blood volume in ventricles decrease.

- Impulse from SA node spread to both atria.
- Both atria depolarize causing both atria systole.

Electrocardiogram (ECG)

- Impulse spread to both ventricles via the high-velocity conduction system.
- Both ventricles depolarize causing both ventricular systole.
- At the same time, repolarization of atria occurs.

Atrial systole (0.1s) Ventricular systole (0.3s) Atrial & Ventricular diastole (0.4s)

- No transmission of impulse in both atria and ventricles.
- Repolarization of ventricles occur.
- Both ventricular diastole.

