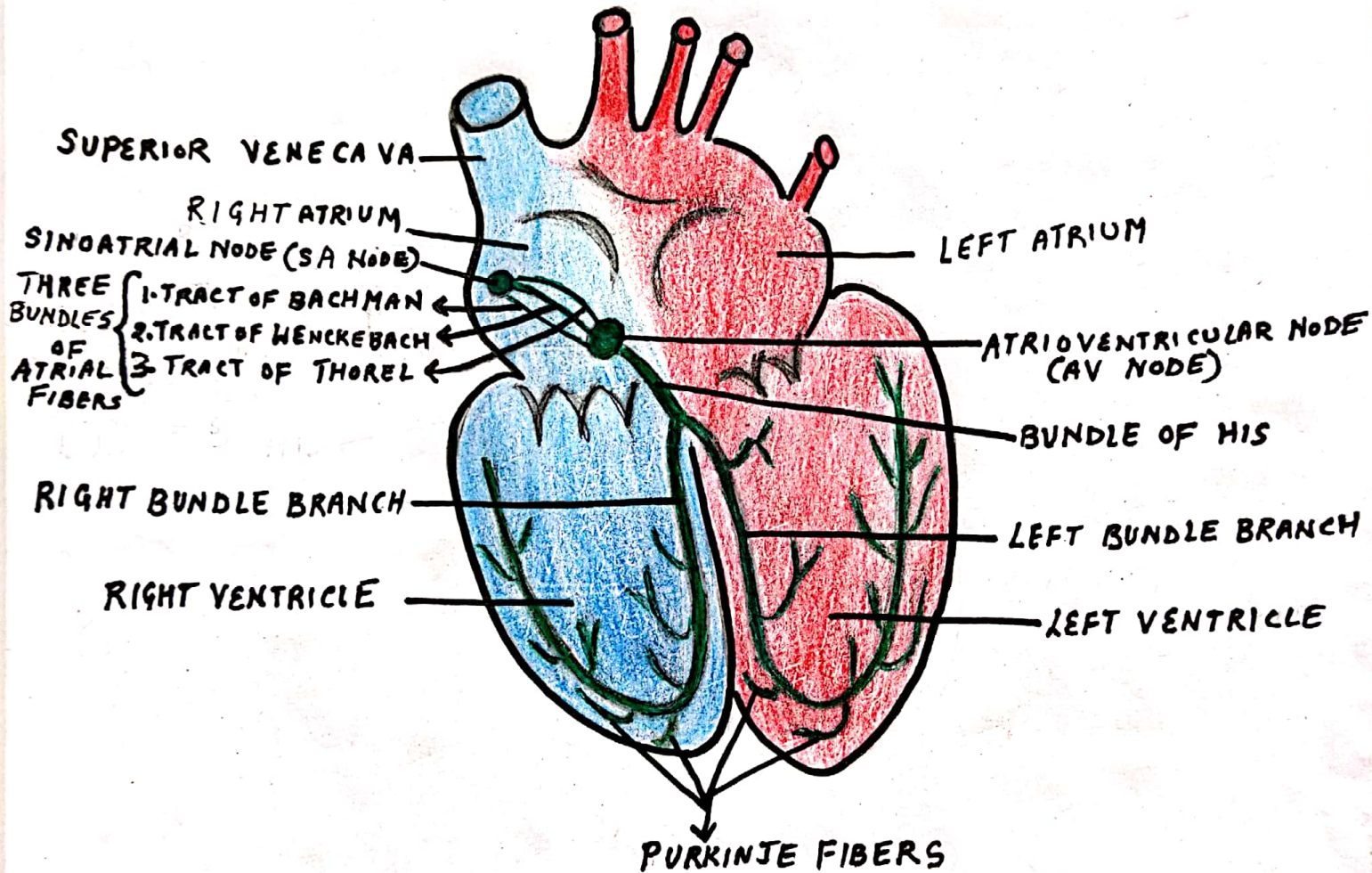


Origin and Conduction of Cardiac Impulse

- ① The human heart beats normally in a coordinated orderly sequence. Heartbeat originates in the cardiac conduction system which is a specialized system that spreads to the entire heart.
- ② Cardiac action potentials are generated that propagate through the conduction system.
- ③ The cardiac excitation starts in the SA Node (Sinoatrial node). It is located at the junction of Superior Vena cava with the right atrium.
- ④ The SA node cells repeatedly depolarize to threshold spontaneously and rapidly. The spontaneous depolarization is called a pacemaker potential (thus SA node is the normal cardiac pacemaker). The pacemaker potential occurs due to inherent permeability of SA node cells to Na^+ . Na^+ ion enters inside the SA node and causes depolarization.
- ⑤ When the pacemaker potential reaches the threshold it results in the generation of action potential (Ca^{2+} is the main ion responsible for action potential in the SA node).

- ⑥ Action potential from SA node spreads radially through the atria. Via the atrial pathways to the AV (atrioventricular) node.
- ⑦ The AV node is located in the right posterior portion of the interatrial septum. There are three bundles of atrial fibres connecting SA node to AV node.
- (i) Tract of Bachman
 - (ii) Tract of Wenckebach
 - (iii) Tract of Thorel
- ⑧ From the AV node the action potential travels to the Bundle of His (AV Bundle). Here the action potential is conducted from the atria to the ventricles.
- ⑨ From the Bundle of His the action potential enters both the right and left bundle branches. The bundle branches extend through interventricular septum towards the apex.
- ⑩ Finally the Purkinje fibres conduct the action potential beginning at apex of the heart to the remaining ventricular muscle.

- ⑪ Thus, the cardiac impulse originates at the SA node, then travels to the AV node through the three bundles of Atrial fibers. From AV node to the Bundle of His which divides into the right and left bundle branch and then via the Purkinje system to the entire ventricular muscle.



CARDIAC CONDUCTING SYSTEM (ORIGIN AND SPREAD OF CARDIAC IMPULSE)

References

1. Tortora, G.J and Grabowski, S. (2006) Principles of Anatomy & Physiology. XI edition. John Wiley & Sons.
2. Ganong W.F (2019). Review of Medical Physiology 26th Edition, Mc. Graw-Hill.